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RESEARCH ARTICLE

Gait Imbalances of Middle-Aged Sedentary Populations

Hasan Hüseyin YILMAZ[1*] and Murat KALDIRIMCI[2]

[1]Atatürk University, Sport Sciences Application and Research Center, Erzurum / Türkiye.
[2] Atatürk University, Faculty of Sport Sciences, Erzurum / Türkiye.
*Corresponding author: hasanh.yilmaz@atauni.edu.tr

Abstract
Walking is the first locomotor movement developed by humans after reflexive movements and balancing processes. This study aimed to evaluate walking patterns of middle-aged individuals who lead a sedentary life and to compare gait parameters in terms of gender and body mass index. This study contained eighty-four voluntarily participants (30.00±6.94 years; 74.02±15.44 kg; 170.23±8.94 cm). All participants were sedentary individuals who had not undergone any lower extremity surgery, did not use any movement system medication. Height was assessed by using a wall-mounted stadiometer. Weight was assesed by using Tanita TBF-300. Gait Analysis were performed by Microgate Optogait. All tests were carried out in the same air-conditioned lab which was set to 20°C and 1890 m altitude. Gait parameters were directly provided from Microgate Optogait. The differences between women and men, fat and normal weight were determined using an analysis of variance with Independent T test. All the data were shown as mean and standard deviation. In statistical analysis, the level of significance was chosen as $p<0.05$. There was no significantly difference, when gait parameters values was compared according to gender and BMI ($p>0.05$) in all parameters. There was just significantly difference contact phase and propulsive phase according to gender and double support phase according to BMI. There was also bilaterally difference contact phase, the overweights had more imbalance and interestingly in favor of the non-dominant limb. The mean values of the gait values obtained were similarly the norm values of healthy middle-aged individuals.

Keywords
Walking, Adults, Imbalance

INTRODUCTION

Walking is the first locomotor movement developed by humans after reflexive movements and balancing processes (Viswakumar et al., 2019). Generally, walking forms the basis of many other movements (Baker et al., 2016). All voluntary movements, including walking, are the result of a complex process involving the brain, spinal cord, peripheral nerves, muscles, bones, and joints (Chambers and Sutherland, 2002).

Walking is a movement in which many joints work in a complex way, especially the hip, knee and ankle joints. Therefore, it is very important to establish and use the correct walking form (Chambers and Sutherland, 2002). In gait analysis, the gait cycle and its stages are used (Silva and Stergiou, 2020; Stergiou, 2020). The walking cycle starts with the first touch of one foot to the ground and ends with the second touch of the same foot to the ground (Viswakumar et al., 2019). In other words, two steps are considered as a walking cycle (Baker et al., 2009). The walking cycle consists of eight phases. Five of these eight phases are stance/support and three are swing phases (Whittle,

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[1]**ORC**ID: 0000-0003-1994-7731 , [2]**ORC**ID: 0000-0002-4285-7307

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2014). The stance includes the initial contact, loading response, mid-stance, terminal stance and pre-swing phases. The stance phases generates 62% of the gait cycle. The swing phase includes initial swing, mid-swing, and terminal-swing phases. The swing phases generates 38% of the walking cycle. When this eight-phase cycle is completed, the walking cycle is completed (Chambers and Sutherland, 2002; Silva and Stergiou, 2020; Whittle, 2014).

Gait analysis has been researched by scientists since the late 20th century. Much more information and analysis methods have been developed in the last years, especially depending on technological developments (Bahureksa et al., 2016; Buckley et al., 2019; Chen et al., 2016). With these analyzes, gait kinematics and kinetics became much more evident (Rozumalski and Schwartz, 2011). Screening for excessive atypical movement patterns during walking can help facilitate effective clinical interventions and prevent injury. On the other hand, energy efficiency can be achieved with gait analysis. At the same time, since walking is the basis of all motor movements, it can directly affect the performance of other movements. The study of gait analysis aims to quantify the factors that the functionality of the lower limbs (Khera and Kumar, 2020). This is crucial for detecting gait abnormalities, recognizing postural imbalances, and evaluating clinical interventions and rehabilitation programs. When the literature is examined, analyzes related to walking have been carried out in many different disease groups and athletes (Buckley et al., 2019; Carter et al., 2017; Chang et al., 2010; Kirmizi et al., 2019). However, studies on sedentary groups are limited. It is known that the sedentary lifestyle weakens the movement systems of people and is among the causes of many chronic fatal diseases (Booth and Chakravarthy, 2002; Carter et al., 2017; Mainous III et al., 2019). When considered from this point of view, it is possible that walking, which is the most basic motor movement, may be a factor that prevents sedentary individuals from moving. It is known that limited walking and/or abnormalities that occur during walking cause different joint and muscle diseases (Brunner & Romkes, 2008). It is also likely that the degrees of physical dysfunction will increase and tend to further restrict walking. For this reason, it is important to perform gait analyzes of sedentary individuals and to reveal abnormalities.

In this context, the aim of the study is to compare gait parameters of middle-aged individuals who lead a sedentary life and to present imbalances. We also purposed to compare gait parameters in terms of gender and body mass index.

MATERIALS AND METHODS

Subjects

This study contained eighty-four voluntarily participants (30.00±6.94 years; 74.02±15.44 kg; 170.23±8.94 cm; 25.47±4.81 kg/m2). All participants were sedentary individuals who had not undergone any lower extremity surgery, did not use any movement system medication. After the participants were determined, we informed the participants about the study. All tests were conducted according to the principles expressed in the Declaration of Helsinki.

Experimental Approach to the Problem

All participants were tested under the same conditions on a flat ground. Participants visited just once laboratuvary for measurement. When participants visited laboratuvary, we informed them about the tests. The height and weight measurements were firstly conducted. Each participant completed a gait analysis protocol. All tests were carried out in the same air-conditioned lab which was set to 20°C and 1890 m altitude in Erzurum. Participants were asked to refrain from physical activity, caffeine and alcohol in the twenty-four hours prior to trials. All participants applied a familiarisation session prior to trials.

Instruments

1. Gait Analysis were performed by Microgate Optogait (Optogait, Microgate, Bolzano, Italy).
2. Height was assessed by using a wall-mounted stadiometer (Seca Stadiometer 282, Seca GmBH & Co Kg, Hamburg, Germany).
3. Weight was assesed by using Tanita TBF-300 (TANITA, Middlesex, UK).

Procedure

All tests were conducted at Ataturk University Sport Sciences Application and Researh Center. Height measurements were performed bare feet on a flat platform in an anatomical position. In body weight measurements, the participants only wore running shorts. Before starting to walk,

participants were asked to walk at a normal walking pace. The gait analysis with optogait was performed with walking shoes on the flat ground. The ten-meter optogait was used for walking. Participants performed gait analysis measurement, starting with the right foot.

Statistical Analyses

Optogait data were sampled at 1000 Hz and processed into 1D footfall patterns using dedicated software (Optogait Next, Version 1.3.20.0, Microgate, Bolzano, Italy). The Statistical Package for the Social Sciences version 25.0 (IBM Corp, Chicago, IL, USA) was used to analyze the obtained datas. Normality and sphericity tests were done using Kolmogorov-Smirnov and Mauchly's test, respectively. Descriptive statistics include mean ($\bar{X}$) and SDs. Independent t-test was used for pairwise comparisons. In all analyzes of the data, the significance level was accepted as $p<0.05$.

RESULTS

In this section, the results obtained from the research are shown in tables. Comparisons were made according to the participants' gender and body mass index.

Table 1. Gait parameters averages and bilateral differences of all participants

	Min.	Max.	$\bar{X}$	SDs.
TCont_Avg	0.53	0.96	0.72	0.07
TCont_L_R	-16.90	10.90	-2.21	3.06
Speed_Avg	0.72	1.97	1.25	0.18
Speed_L_R	-2.10	2.90	0.81	0.86
Step_Avg	53.10	83.20	69.16	6.05
Step_L_R	-4.60	6.60	0.53	2.58
Stride_Avg	106.50	167.20	138.81	12.12
Stride_L_R	-2.10	0.80	-0.45	0.62
DoubleSup_Avg	0.17	0.46	0.30	0.06
DoubleSup_L_R	-2.00	17.40	1.60	2.19
StepTime_Avg	0.31	0.75	0.56	0.05
StepTime_L_R	-4.50	26.10	2.49	3.67
ContactPhase_Avg	0.04	0.94	0.09	0.09
ContactPhase_L_R	-107.90	58.00	-3.78	30.90
Footflat_Avg	0.25	0.63	0.42	0.07
Footflat_L_R	-24.10	20.10	-3.27	9.84
PropulsivePhase_Avg	0.15	0.35	0.21	0.03
PropulsivePhase_L_R	-58.60	24.00	-3.07	15.14

Table 2. and Table 3. show comparisons of gait parameters in terms of gender and body mass index. When gait parameters were evaluated in terms of gender, it was determined that there was a significant difference in two parameters. When evaluated in terms of body mass index, it was determined that there was a significant difference between the groups in one parameter.

Table 4. and Table 5. show comparisons of bilateral differences of gait parameters in terms of gender and body mass index. When bilateral differences were evaluated in terms of gender, it was determined that there was no a significant difference in parameters. When evaluated in terms of body mass index, it was determined that there was a significant difference between the groups in one parameter.

Table 2. Gait parameter differences according to gender

Gender (W:40 M:44)		X̄± SDs.	t	p
TCont_Avg (sn)	*W*	0.71±0.07	-1.548	0.12
	M	0.73±0.07		
Speed_Avg (sn)	*W*	1.26±0.18	0.127	0.89
	M	1.25±0.18		
Step Avg (cm)	*W*	68.47±5.75	-0.991	0.32
	M	69.78±6.31		
Stride_Avg (cm)	*W*	137.40±11.51	-1.015	0.31
	M	140.09±12.64		
DoubleSup_Avg (sn)	*W*	0.29±0.05	-2.328	**0.02***
	M	0.32±0.06		
StepTime_Avg (sn)	*W*	0.55±0.06	-1.636	0.10
	M	0.57±0.04		
ContactPhase_Avg (sn)	*W*	0.10±0.13	1.045	0.22
	M	0.08±0.02		
Footflat_Avg (sn)	*W*	0.42±0.07	-0.368	0.71
	M	0.42±0.07		
PropulsivePhase_Avg (sn)	*W*	0.20±0.03	-2.402	**0.01***
	M	0.22±0.04		

*there was difference between the men and women p<0.05 W: Women; M: Men

Table 3. Gait parameter differences according to BMI

BMI (OW: 42 NW: 42)		X̄±SDs.	t	p
TCont_Avg (sn)	*OW*	0.73±0.06	1.414	0.16
	NW	0.71±0.07		
Speed_Avg (sn)	*OW*	1.23±0.15	-.983	0.32
	NW	1.27±0.20		
Step_Avg (cm)	*OW*	68.70±5.34	-0.693	0.49
	NW	69.62±6.72		
Stride_Avg (cm)	*OW*	137.86±10.64	-0.719	0.47
	NW	139.76±13.50		
DoubleSup_Avg (sn)	*OW*	0.32±0.05	2.520	**0.01***
	NW	0.29±0.06		
StepTime_Avg (sn)	*OW*	0.57±0.04	1.036	0.30
	NW	0.55±0.06		
ContactPhase_Avg (sn)	*OW*	0.08±0.02	-1.936	0.57
	NW	0.09±0.13		
Footflat_Avg (sn)	*OW*	0.43±0.07	1.191	0.23
	NW	0.41±0.07		
PropulsivePhase_Avg (sn)	*OW*	0.21±0.03	-0.630	0.53
	NW	0.22±0.04		

*there was difference between the overweight and normal p<0.05. OW: Overweight; NW: Normal Weight.

Table 4. Bilateral differences of gait parameters according to gender

Gender (W:40 M:44)		X̄± SDs.	t	p
TContact	*W*	-2.83±3.13	-1.781	0.79
	M	-1.65±2.92		
Speed	*W*	0.66±0.76	-1.468	0.14
	M	0.94±0.93		
Step	*W*	0.42±2.37	-0.369	0.71
	M	0.63±2.77		
Stride	*W*	-0.38±0.59	0.961	0.33
	M	-0.51±0.64		
Double Sup.	*W*	1.66±1.34	0.258	0.79
	M	1.54±2.76		
StepTime	*W*	2.01±2.67	-1.149	0.25
	M	2.93±4.38		
Contact Phase	*W*	4.26±23.13	1.334	0.22
	M	-11.0±35.26		
Foot flat	*W*	-4.90±10.08	-1.456	0.14
	M	-1.79±9.49		
Propulsive Phase	*W*	-5.25±18.56	-1.261	0.21
	M	-1.09±11.04		

-Negative values mean in favour of left limb

Table 5. Bilateral differences of gait parameters according to BMI

BMI (OW: 42 NW: 42)		X̄±SDs.	t	p
TContact	*OW*	-2.37±2.20	-0.478	0.63
	NW	-2.05±3.75		
Speed	*OW*	0.68±0.88	-1.394	0.16
	NW	0.94±0.83		
Step	*OW*	0.75±2.77	0.772	0.44
	NW	0.31±2.38		
Stride	*OW*	-0.45±0.66	-0.017	0.98
	NW	-0.45±0.58		
Double Sup.	*OW*	1.27±1.36	-1.389	0.16
	NW	1.93±2.77		
StepTime	*OW*	1.79±2.61	-1.766	0.08
	NW	3.19±4.42		
Contact Phase	*OW*	-10.20±33.28	-1.936	**0.04***
	NW	2.64±27.23		
Foot flat	*OW*	-4.39±10.01	-1.043	0.30
	NW	-2.15±9.67		
Propulsive Phase	*OW*	-0.73±14.93	1.426	0.15
	NW	-5.42±15.17		

*there was difference between the overweight and normal p<0.05. -Negative values mean in favour of left limb.

DISCUSSION

The present study conducted to evaluate gait imbalances and to compare gait parameters according to gender and BMI. The nine variables of gait were evaluated in sedentary individuals. We also evaluated gait analysis parameters, bilaterally. There was also no bilateral differences of gait parameters according to gender. But Doublesup. Avg and Propulsive Phase Avg. values had a significantly difference between men and

women. The women had shorter time from men both doublesup. avg. and Propulsive Phase avg. values.

Measurement of gait is essential for identifying underlying deficits contributing to gait dysfunction, guiding clinical decisions and measuring rehabilitation outcomes (Patterson et al., 2012). The mean values in the results of the study conducted on healthy Korean individuals by Kim and Yoon (2009) with the mean values of the current study were similar. In another study, it was determined that the length of the step and the stride length of middle-aged individuals were higher than the results of our study (Lencioni et al., 2020). In a study comparing two different analysis systems, walking parameters of middle-aged individuals were compared. Our study showed similarity with the mean values of walking parameters obtained in this study (Healy et al., 2019). In a study by Jayakaran et al. (2014) in which different walking aid interventions were compared, it was stated that the dual support phase showed significant differences bilaterally. Rowe et al. (2021) compared gait patterns in different age groups and reported that when evaluated in terms of gender, women's stance times were shorter than men, and stride length was longer in men than in women. The main reason for this may be that women use their lower extremity joints at more limited angles than men. In the same study, the walking speed results were similar to the results of our study and did not show any difference in terms of gender (Rowe et al., 2021). In another study, researcher found that the men's stride length, vertical displacement, stride duration and length, and walking speed were higher than women, but lower in cadence. In the same study, it was stated that gait imbalances have similar characteristics in men and women (Senden et al., 2009). Similar results have been proven many times in different previous studies. The observation that men walk faster and take bigger steps, while having a lower cadence than women, is commonly reported in many studies using laboratory-based gait analysis systems (Cho et al., 2004; Öberg et al., 1993). Auvinet et al. (2002) reported that there was also a high level of correspondence in gait with the normative data for healthy subjects. Only a slightly higher speed, cadence and a slightly shorter step length for young and older subjects was observed. In addiction, comparing the men gait and the women gait, there were small differences. In a study investigating the gait analysis and asymmetries of individuals with neck pain by Kirmizi et al. (2019), the walking speed, stride length and frequency of the control group were similar to our study.

Andrews et al. (2022) reported that there was no significant difference between the gait speeds of men and women in the 30-39 age range in their systematic view studies on the effect of gender and age on walking speed. Similarly, Hollman et al. (2011) also stated that there was no significant difference in mean walking speed during normal walking in terms of gender. In a study in which walking parameters at different speeds were evaluated in terms of gender and age, it was reported that the men took longer strides, less cadence, and faster strides than women (Yoneyama et al., 2016). Conducted on 25 healthy individuals with volunteers by Jacobs et al., (2021), another study showed the gait stance time and stride length were not similar with results of present study. The main reason for this may be attracted to the lower average age of the sample group of this study. In a the study by Cho et al. (2004), similar results were obtained in our study. It has been reported that men have higher stride lengths and speeds than women. The main reason for this may be that the leg lengths of men are longer and their pelvises are more forward inclined in women. Contrary to this result, Chung and Wang (2010) reported that many of the walking parameters gave similar results in terms of gender and age variables.

When the gait parameters evaluated bilaterally, there was no significantly difference between overweight and normal body weight in all gait parameters except for contact phase. In overweight individuals, the contact phase time of the left side was longer than that of the right side. However, in individuals with normal weight, the contact phase time was in favor of the dominant side at a rate of 2%. Also, DoubleSup. Avg value had differences according to BMI. The doublesup avg. value of overweight was longer than normal weight. Senden et al., (2009) stated that gait imbalances have similar characteristics in men and women. In a study comparing walking parameters on different surfaces, it was stated that the knee and hip joint coordination of individuals walking on different surfaces changed, and this might have an effect on the double support phase, especially on flat surfaces. The reason for the difference in

BMI in current study may be due to the fact that overweight people put more strain on the knee and hip joints on hard floors (Ippersiel et al., 2022). It may also be that they spend more time in the double support phase because they have more fat and they spend more effort. In the study conducted by Lencioni et al., (2020), gait parameters were compared bilaterally and it was determined that the dominant limbs had higher values than the other in the stride length. Fukuchi et al. (2019) stated that walking at low speeds decreases the gait parameters. Gait speed is particularly affected by body composition. This may explain the difference in walking parameters of overweight individuals compared to normal individuals. In another study, Koo and Lee (2016) evaluated the gait parameters in different arm swinging styles and it was stated that there were significant differences in many walking phases according to the arm swinging styles. The absence of a limitation on arm swinging in the current study could be shown as the reason for the differences gender, BMI, bilateral.

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Conflict of Interest

No potential conflict of interest was reported by the authors.

Ethics Committee

(Date: 24.06.2023; Decision number: 2023/06-130). The study was approved by the sub-ethics committee of Atatürk University, Faculty of Sports Sciences. Participants were informed with a written informed consent form.

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Author Contributions

Study Design, HHY, MK; Data Collection, HHY; Statistical Analysis, HHY, MK; Data Interpretation, HHY; Manuscript Preparation, HHY, MK; Literature Search, HHY. Authors have read and agreed to the published version of the manuscript

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RESEARCH ARTICLE

The Correlational Study of the Vertical Jump Test and Wingate Cycle Test as a Method to Assess Anaerobic Power in Road Cyclists

Yusuf ULUSOY[1*] and Fatih KOÇAK[2]

[1]Fenerbahçe University, Faculty of Sport Science, Physical Education and Sports Teaching, Istanbul, Turkey
[2]Fenerbahçe University, Faculty of Sport Science, Exercises and Sport Sciences, Istanbul, Turkey
*Correspondingauthor: Yusufulusoy@gmail.com

Abstract
Road Cycling is an important sport that uses anaerobic and aerobic metabolism and especially sprinter cyclists have higher anaerobic capacity. The assessment of anaerobic power in cyclists often involves the use of the vertical jump and Wingate cycle tests. The lack of research in the field of cycling-specific tests to assess anaerobic performance has led to the improvement of existing research. The objective of this research was to investigate the correlation between the vertical jump test and the Wingate anaerobic cycling tests, both of which are often used to assess anaerobic power in road cyclists. A correlation study was conducted on 15 athletes of the Turkish national road cycling team in the 14-16 age group (15.107 ± 0.717 (SD)). The sample of the study was determined by using the convenient sampling method. On the first day, anthropometric measurements and the vertical jump test were conducted. The Wingate cycle ergometer test, lasting for a duration of 30 seconds, was administered to the participants on the second day. The computer application was used to determine the 30-second peak and average anaerobic power during the test. The results acquired from the study revealed a statistically significant positive relationship between the vertical jump performance and the peak power production measured during the Wingate cycle test ($r=0.321$, $p<0.05$). The findings indicate that vertical jump tests may serve as suitable field measurements of anaerobic power for road cyclists, as an alternative to the laboratory-based Wingate anaerobic test.

Keywords
Cycling, Vertical Jump, Wingate Anaerobic Test

INTRODUCTION

Anaerobic power, also known as anaerobic fitness, is a localized attribute of a muscle that is not reliant on the provision of blood and oxygen to that specific muscle" (Fleck and Kreamer, 1997). The capacity of an individual's muscular system to produce substantial levels of power is often regarded as a reliable indicator of athletic achievement (Bompa, 1993). Brooks et al. (2000) opt to utilize the term "high-intensity exercise" as an alternative descriptor for anaerobic power, deviating from the prevailing terminology. Anaerobic power tests are now used to evaluate an athlete's capacity to generate both power and speed in a brief amount of time or over a relatively short distance in both clinical and field settings (Stauffer, 2005).

In several sports, including particular athletics and cycling disciplines, gymnastics, combat sports, as well as various games and winter sports, the execution of explosive movements, such as jumping, accelerating, changing direction, or propelling an item or opponent, plays a substantial role in determining performance outcomes." The execution of such actions is predominantly contingent upon the capacity to produce muscular

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[1]**ORC**ID: 0000-0001-6442-8717 , [2]**ORC**ID: 0000-0002-9435-7320

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contractions and exert external force at considerable speeds, spanning a temporal range of milliseconds to seconds (Gross &Lüthy, 2020). The term used to describe this capacity is referred to as explosive power (Stone et al., 2007). "The capacity described can alternatively be denoted as muscular strength" (Markovic & Jaric, 2007) or anaerobic power, as the combination of force and velocity indicated in this context aligns with mechanical strength, and the energy needed for muscle exertion is not generated aerobically during these brief periods of activity (Heck et al., 2003).

Professional road cyclists often cover a distance ranging from 25,000 to 35,000 kilometers annually, including races and training at high altitudes. The most important characteristics of road cyclists are expressed in the literature with their high aerobic capacity, maximal power output (w) and maximal oxygen uptake (VO_2max) (Mujika&Padilla, 2001).

Athletes' anaerobic power is often assessed using the Wingate anaerobic test (WAnT) and vertical jump tests, which provide invaluable insights into the anaerobic performance of athletes in a variety of sports" (Changela& Bhatt, 2012). In numerous strength-oriented sports including football, basketball, tennis, and track and field, the Wingate Anaerobic Test has been used as a measure for evaluating anaerobic fitness levels and the efficacy of anaerobic training plans" (Choppin et al., 2012).

In many athletic disciplines, the vertical jump test is a standard method of assessing the lower extremities' explosive strength. In the context of football and volleyball players, the validity and reliability of such techniques are often investigated (Hespanhol et al., 2013). "The basic purpose of the vertical jump test is for the athlete to accomplish the greatest vertical displacement of the body's center of gravity, known as vertical height, during each subsequent leap within a certain time window." The mechanical power created during the propulsion phase dominates the vertical displacement seen during a leap. The average power output, measured in Watts, is typically used to estimate the vertical jump test performance. The estimate may be easily determined using Harman's approach (Theodorou et al., 1998). When used to calculate peak power and average power during the vertical jump evaluation, the Harman et al. (1991) method has been found to be both reliable and valid.

There is a lack of comprehensive academic investigation that has been undertaken to examine the relationship between the vertical jump test and the Wingate anaerobic test as measures of anaerobic power in road cyclists. The main objective of this research study was to investigate a possible correlation between the vertical jump test and the Wingate anaerobic test, with the purpose of evaluating the extent of anaerobic power in cyclists.

MATERIALS AND METHODS

Participants

The present study uses a cross-sectional design, using the relational screening model to investigate the research question. The investigation involves the selection of a suitable sample participant group, which is then assessed under two distinct conditions. The study's sample was determined by the use of the easy sampling approach. According to Buyukozturk et al. (2018), the convenient sampling approach is characterized by the preference for readily and rapidly accessible units, mostly owing to practical constraints such as limited labor force and time availability. Consequently, the study intends to include a sample of 15 male road cyclists, aged 14-16, who are members of the national team of Turkey, on a voluntary basis. The present research has obtained approval from the Non-Invasive Clinical Research Ethics Committee of Fenerbahçe University, with the reference number 12.04.2023/76.2023fbu. All participants provided written informed consent.

Study Design and Data Collection

Anthropometric measurements and vertical jump test were done on the first day for the athletes whose sample was selected according to the convenient sampling method. On the second day, 30-second Wingate anaerobic cycling test was applied to the athletes and during the test, 30-second peak and average anaerobic power calculations were made with a computer program.

Research variables

Independent Variable: Explosive power (Wingate anaerobic cycling test)

Dependent Variable: Vertical Jump Test

Inclusion Criteria

1. Participate in competitions.
2. To be a 14-16 men's national team athlete.

Exclusion Criteria

Athletes who have had any joint injury and/or ligament injury in the last three years. In the study to be conducted, there are 2 tests besides taking the anthropometric measurements of the participants. The Vertical Jump Test will be applied as the 1st test and the Wingate Anaerobic Bicycle Test will be applied as the 2nd test. Personal (age, body weight, etc.) data obtained from laboratory tests were recorded in a single data collection form created by the researcher.

Working Process

After obtaining permission from Fenerbahçe University Non-Invasive Clinical Research Ethics Committee; The working process has started by obtaining the necessary permissions from the Turkish Cycling Federation and Fenerbahçe

University Sports Research Application and Research Center.

After the measurement methods to be applied were explained to the participants, the measurement devices were optimized and the measurement environment and the athletes were made ready. First of all, the participants; Anthropometric measurements (height and body weight) were taken. After a routine warm-up on the bike, the participants were given a vertical jump test. Participants were asked not to do high-intensity exercise, not to consume alcohol or heavy caffeine-containing foods and foods within 48 hours before coming to the test. It was paid attention that the athletes participating in the study had their last meal between 09:00 and 17:00 on weekdays and 3 hours before the measurements, and they were included in the study at the normal satiety level.

Height and Body Weight Measurement

The height and length measurements of the volunteer cyclists were measured with a stadiometer (Holtain Ltd, UK) fixed to the wall with an accuracy of ±0.1mm. Body weights were measured with an electronic laboratory scale (Seca, Vogel &Halke, Hamburg) with an accuracy of ±0.1 kg.

Cyclists did not wear thick clothes and socks so that the appropriate body position could be given during the measurements. Measurements were taken with the heads of the subjects in the "Frankfort Horizontal Plan" position, the arms on the side of the body and the palms facing the legs, of the subjects whose body weight was evenly distributed on both legs. When the heels touch each other, the angle on the inside of the feet is approximately 60°. All height measurements were taken with the heels, hips and scapula touching the platform in a vertical position and subjects in an upright position. Body weights were calculated by Lohman et al. (1988) suggested.

Vertical Jump Test

The participants of the research started the exercise session by adhering to a warm-up routine, which involved engaging in cycling for a period of 5-7 minutes on the 894 Ea, Peak Bike produced by Monark AB, a company based in Sweden. Furthermore, the participants performed a stretching protocol lasting 5-7 minutes, during which they maintained a cycling cadence of 55-60 revolutions per minute, without the inclusion of any external resistance. After the initial warm-up session, the participants proceeded to partake in a period of rest lasting for a length of 5 minutes. The studies involving vertical jumps were carried out using a customized power platform called the Sport Expert TM (MPS-501, Tümer Electronic LDT, Turkey). In all test circumstances, specifically the Squat Jump and Counter Movement Jump, each participant performed a total of three leaps. The maximum recorded value from the three trials was chosen for later analysis (Atabek, 2014).

Wingate Anaerobic Cycling Test

The Wingate Anaerobic Test (WAnT) was performed on a bicycle ergometer model 894 Ea, also known as the Peak Bike, manufactured by MonarkAB and equipped with mechanical brakes. Participants will be placed on the ergometer, and appropriate modifications will be made to ensure the best riding posture. Individual seat heights were changed to suit each participant's preferences, and striped nose clips were used to limit the probability of feet sliding off the pedals. The study was carried out in accordance with the standardized procedures given by Inbar et al. (1996). “The Wingate Anaerobic Test (WAnT) procedure consisted of administering a load for 30 seconds, with the resistance set at 7.5% of the individual's body mass. Before the resistance was added, the participants were instructed to cycle with their greatest effort.” The WAnT software, developed by Inhabar et al. (1996), was used to automate the calculation and recording of various power measures. Absolute peak power output (APP), relative peak power output (RPP), absolute average power output (AMP), relative average

power output (RMP), and lowest power output were among the criteria considered. The calculations were carried out using a computer equipped with the Swedish Monark Exercise AB system.

Laboratory tests carried out within the scope of the study were carried out in Fenerbahçe University, Sports Research Application and Research Center in May 2023.

Statistical analysis

The information was evaluated statistically with the help of the SPSS 24.0 program. Using Descriptive statistics, we were able to provide a comprehensive evaluation of the sample as a whole. The average and standard deviation of the test results were calculated. The normality of the data was assessed using the Kolmogorov-Smirnov test, while the homogeneity of variance was assessed using the Levene test. The present research used Pearson correlation analysis to examine the relationship between the Wingate Anaerobic Cycling Test and vertical jump performance. The utilization of one-way regression analysis was used to ascertain the influence of the independent variable on the dependent variable in the presence of a correlation between the two variables. The threshold for statistical significance was established at a significance level of $p < 0.05$.

RESULTS

Table 1 shows the demographic characteristics of the participants. The ages, weights, heights, BMIs, and body fat percentages of the cyclists were computed.

Table 1. Demographic characteristics of the participants

Variable	Mean	Std.	Min.	Max.
Age (years)	15.107	0.717	14.000	16.000
Body Weight (kg)	63.500	7.361	49.200	80.500
Body Height (cm)	173.467	7.090	157.000	183.000
BMI (kg/m²)	20.960	2.611	17.000	26.900
Body Fat (%)	11.640	5.629	4.300	24.600

n=15; BMİ: Body MassİndexCm: centimetre; Kg: kilogram; Min: minimum; Max: maximum; Std: standart deviation

Table 2. Jump and wingate test data of the participants

Variable	Mean	Std.	Minimum	Maximum
CMJ	33.922	2.974	28.610	38.320
SJ	32.325	2.504	26.860	36.690
PeakWatt	1.047.613	150.780	816.880	1.316.070
PeakWatt/Kg	16.622	1.952	13.680	21.110
Avg. Watt	637.512	62.010	501.580	747.540
Avg. Watt /Kg	10.113	0.510	9.340	11.200

n=15; CMJ: CountermovementJump; SJ: SquatJump; Std: standart deviation

The results of the participants jump and wingate tests are shown in Table 2. Table 3 analysis revealed that CMJ and SJ had a statistically significant relationship (p0.001),between Peak Watt/Kg andboth CMJ and SJ (p0.05), and between Avg. Watt/Kg and both PeakWatt/Kg and SJ. Examining Table 4, it was determined that the Peak Watt/Kg value accountedfor 32% of the variance in CMJ, which was statistically significant.

Table 3. Pearson'scorrelationanalysisdata of theparticipants

Variable		CMJ	SJ	PeakWatt/Kg	Avg. Watt /Kg	BMİ
CMJ	Pearson's r	—				
SJ	Pearson's r	0.814***	—			
PeakWatt/Kg	Pearson's r	0.559*	0.550*	—		
Avg. Watt /Kg	Pearson's r	0.475	0.316	0.653**	—	
BMİ	Pearson's r	0.074	0.031	−0.122	−0.321	—

* p < 0,05, ** p < 0,01, *** p < 0,001; BMİ: Body MassİndeX; CMJ: CountermovementJump; SJ: SquatJump; Kg: kilogram

Table 4. Regression analysis data of the participants

	Std. Error	Coefficients Beta	t	p	R Square
PeakW/Kg	0,004	0,57	2,501*	,027*	0,321

DependentVariable: CMJ; *P<0,05 **p<0,01 ***p<0,001

DISCUSSION

The findings of this study indicated a statistically significant positive correlation (p<0.001) between the countermovement jump (CMJ) and the squat jump (SJ). Moreover, the production of peak power per kilogram (Peak Watt/Kg) was shown to be significantly correlated with both the countermovement jump (CMJ) and the squat jump (SJ) (p<0.05). Ultimately, a significant statistical correlation was identified between the mean power output per kilogram (Avg. Watt/Kg) and the maximum power output per kilogram (Peak Watt/Kg).

The Vertical Jump and Wingate anaerobic power tests demonstrate a strong dependence on the ATP/PC energy system, which is responsible for generating and maintaining peak anaerobic power. Moreover, it is worth noting that the performance of the participants in each of the aforementioned tasks was significantly influenced by the independent variable of weight. The research revealed that participants with greater muscle mass had higher levels of anaerobic power outputs in both the Vertical Jump and Wingate tests. “Prior research has used the vertical jump and Wingate power tests to evaluate the anaerobic contributions of persons engaged in sporting activities and leisure physical activity. The tests being discussed have been shown to possess a good level of validity and reliability, as supported by existing academic research” (Stauffer, 2005).

The significance of anaerobic performance has considerable relevance across several athletic disciplines. The recognition of the need for expeditious and substantial power production in many sports scenarios, including defensive maneuvers in team-based competitions, sprinting, throwing and leaping disciplines, and a multitude of other athletic endeavors, is widely accepted. “The concept of anaerobic performance encompasses two essential components, namely anaerobic power and anaerobic capacity. The term "anaerobic power" pertains to the ability to use the phosphagenic system, while "anaerobic capacity" is linked to the capability to extract energy from a combination of anaerobic glycolysis and the phosphagen system.” The performance of anaerobic exercises may be influenced by a range of parameters, “including body composition, sex, age, muscle fiber composition, muscle cross-sectional area, strength, and training “(Kin-Isler et al., 2008). The relationship between the dynamic and static contraction power of the lower extremities and anaerobic power performance is significant, especially in sports disciplines that require quick and powerful movements. The factors listed above have considerable importance in evaluating sports performance (Fox et al., 1993). The Wingate anaerobic power test is a popular and reliable method for measuring the most power that can be generated by the lower leg muscles in an anaerobic state (Inbar et al., 1996).

The measurement of mechanical power has great significance in the assessment of performance across several disciplines, including both sports and routine activities. As a result, a significant amount of research has been devoted to this field over a substantial period of time. The

examination of athletes' vertical leaping ability often involves the use of the Squat Jump (SJ) and Countermovement Jump (CMJ) tests. Newton et al. (2006) "state that the evaluation of lower-body concentric strength/power is often referred to as SJ, whereas CMJ is used as a measure for assessing lower-body reactive strength/power." The aforementioned trials provide empirical support for the efficacy and pertinence of the SJ and CMJ tests as valid measures for assessing the force and power capabilities of athletes' lower extremities (Riggs & Sheppard, 2009). During the execution of various kinds of leaps, the central nervous system employs distinct motor programs to facilitate the synchronization of neuromuscular activity required for the completion of each individual jump. The squat jump (SJ) is generally acknowledged as a fundamental approach for evaluating explosive muscular power due to its exclusive reliance on concentric activation. The countermovement leap (CMJ) necessitates a modest level of eccentric activation, followed by a subsequent substantial level of concentric activation. Consequently, it necessitates a more intricate coordination and recruitment of motor units. Therefore, the squat jump (SJ) may be used as a standard for evaluating explosive muscular strength, whereas the countermovement leap (CMJ) can provide significant insights into the enhancement of this capability (Bencke et al., 2002).

The results of the present study indicate a statistically significant association between Peak Watt/Kg and many indicators of jump performance, such as height, total effort, and anaerobic power. In a study conducted by Stauffer et al. (2010), "a robust and statistically significant correlation (r=0.85) was identified between peak power, as measured through vertical jump assessments, and the Wingate Anaerobic Test (WAnT) in a cohort of 13 female basketball players (mean age: 19.7±1.1 years)."Farlinger et al. (2007) performed a study with the objective of investigating the association between vertical jump height and modified Wingate performance measures. These measures included average power output (APP), average mean power (AMP), relative power output (RPP), and relative mean power (RMP). The research investigation centered on a cohort of adolescent and young adult male athletes engaged in competitive ice hockey, ranging in age from 15 to 22 years. The mean age of the participants was calculated to be 16.3±1.7 years. The analysis yielded results indicating a range of correlation coefficients (r values) spanning from 0.63 to 0.69. Furthermore, previous research has shown a significant correlation of 0.88 and 0.89 between the peak power measured by vertical jump and the absolute Wingate performance (APP, AMP) respectively. On the other hand, the research carried out by Farlinger et al. (2007) "demonstrated a correlation value of 0.46 between the peak power assessed by vertical jump and the relative performance in the Wingate test." Additionally, a correlation coefficient of 0.33 was seen in connection to relative mean power. Arslan (2005) performed a research that demonstrated a significant positive relationship between APP, RPP, AMP, RMP, and vertical jump ability (r=0.60, r=0.49, r=0.63, r=0.59, respectively) among participants in a regular exercise group, including both males and females. Furthermore, Arslan (2005) "performed a research that revealed a noteworthy correlation between APP, AMP, and vertical jump performance (r=0.68, r=0.65, respectively) within the sedentary group." Furthermore, previous research has shown a noteworthy correlation (r=0.56) between the Wingate Anaerobic Test-All-out Peak Power (WAnT-APP) and "vertical jump height in a sample of soccer players with a mean age of 19.6±0.8 years" (Miller et al., 2011).

In a research done by Bencke et al. (2002), it was noted that there existed a moderate link between the advancement of peak power (PP) and the performance of squat jump (SJ) and countermovement jump (CMJ) exercises, with correlation values of 0.41 and 0.46, respectively. The current study focused on a cohort of youngsters, including individuals of both genders, aged between 10 and 13 years. The youngsters exhibited enthusiastic participation in a variety of physical activities, including swimming, tennis, gymnastics, and handball. Based on the aforementioned findings, it has been shown that a modest correlation exists (r=0.36) between vertical jump performance and power production among a cohort of male athletes participating in national and international volleyball, basketball, and wrestling competitions. According to Saç and Taşmektepligil (2011), previous research has shown a moderate association between AMP, RMP, and vertical jump. This is supported by correlation coefficients of 0.35 and 0.43

respectively, as reported by Almuzaini and Fleck (2008).

By contrast, Almuzaini and Fleck (2008) looked at a group of 21.66±1.66 -year-olds who participated in a physical education program and found no significant relationship between APP, RPP, and vertical jump performance. Moreover, the research done by Emeterio and González-Badillo (2010) "demonstrated that there was no statistically significant correlation seen between the vertical displacement of countermovement jumps (CMJh) and the production of anaerobic power (APP) among a cohort of teenage skiers." The research included of male participants with a mean age of 14.6 ± 1.1 years, alongside female participants with a mean age of 14.9 ± 1.0 years. Furthermore, the study conducted by Eyuboğlu et al. (2009) "demonstrated that there was no statistically significant correlation observed between resting pulmonary pressure (RPP), resting metabolic rate (RMP), and countermovement jump height (CMJh) in a cohort of American football athletes with an average age of 23.07±3.45 years."Similarly, no significant association was seen between RPP and SJh. A significant positive connection was identified between SJh and RMP, yielding a correlation coefficient of 0.536. In addition, Alemdaroğlu (2012) has provided empirical evidence that establishes a significant correlation between the height of countermovement jumps (CMJh), the height of squat jumps (SJh), and the maximum power output (PP). Nevertheless, the statistical analysis revealed no statistically significant correlation between countermovement jump height (CMJh) and muscular power (MP).

Conclusion

The vertical jump, specifically the SJ and CMJ, is commonly employed as a measure of lower body power across various sports disciplines. Research findings have demonstrated that the vertical jump has the potential to serve as a reliable predictor of maximal anaerobic power. Consequently, coaches may find it advantageous to utilize the vertical jump as a convenient and straightforward field screening test (Kasabalis et al., 2005). The findings of the current investigation suggest that both squat jump (SJ) and countermovement jump (CMJ) have the potential to serve as reliable measures for assessing lower body power in road cyclists.

Conflic of interest

No conflict of interest is declared by the authors. In addition, no financial support was received.

Ethics Committee

This study is approved by Fenerbahçe University (FBU) Non-Invasive Clinical Research Ethics Committee (Approval Number: 12.04.2023/76.2023fbu)

Author Contributions

Planned by the author: Study Design, Data Collection, Statistical Analysis, Data Interpretation, Manuscript Preparation, Literature Search. Author have read and agreed to the published version of the manuscript.

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RESEARCH ARTICLE

Examination of the Relationship Between The Children's Version of the Perception of Success Questionnaire and Coaching Behavior Scale for Sports on 14-18 Years Old Swimmers: Aegean Region Example

Esra KÜRKCÜ AKGÖNÜL[1*], Tolga ŞAHİN[2], Beste Can KOÇ[3] and Recep Nur UZUN[4]

[1]Dokuz Eylul University, Necat Hepkon Sports Faculty, Physical Education and Sport, Izmir / Turkiye
[2,4]Dokuz Eylul University, Necat Hepkon Sports Faculty, Sports Management, Izmir / Turkiye
[3]Dokuz Eylul University, Health Science Instıtute, Physical Education and Sports, Izmir / Turkiye
*Corresponding author: bestfemalecyclist@gmail.com

Abstract
The aim of this study to examine the relationship between the perception of success and coaching behavior of 14-18 age swimming athletes living in Aegean region. A total of 114 swimmers participated voluntarily. The "Children's Version of the Perception of Success Questionare" (POSQ-CH) and "Coach Behavior Scale for Sport" (CBS-S) was used. The analysis of the data was evaluated with the SPSS. POSQ-CH score was 49.03 (very high); sub-dimensions, "Ego Orientation" (EO) score is 22.17 (high) and the "Task Orientation" (TO) score is 26.85 (very high). CBS-S score is 262.35 (quite high); sub-dimensions scores are between 23.43 (very low)-50.95 (very high). According to gender, a significant difference in POSQ-CH and GO sub-dimension and TS, PR and NR sub-dimension scores of CBS-S ($p<0.05$). Similarly, a significant difference in the EO sub-dimension according to coach gender, in the POSQ-CH and GO according to swimming style and in the EO and TS according to sport age ($p<0.05$). No correlation between POSQ-CH and CBS-S and its sub-dimensions; however, a positive and moderate relationship between the closeness to team captain score and CBS-S. It was determined that the swimmers in the relevant age range had high perception of achievement and perception of coach behavior, and the athletes were more goal-oriented. It can be said that the coach's physical-mental preparation, positive behavior, providing technical skill learning, directing the athlete correctly in terms of goal expectation, helping to provide appropriate and optimum competition strategy and negative behavior are not related to the swimmers' perception of success.

Keywords
Coaching behavior, Perception of success, Young swimmer

INTRODUCTION

The concept of success is explained as the achievement of an object, position or social status that individuals want to reach a point that is considered important in their lives, in line with the targeted time and planning (Secer, 2013). Duda and White (1992), who were influenced by the ability theory, reported that there are two main orientations, ego and task, in achieving goals and motivation for success in sport. According to these two approaches, an athlete with a task orientation aims to demonstrate his/her talent and mastery, to improve himself/herself, to master the skill, and to be competent; he/she sees competitions as an opportunity to demonstrate and improve his/her talent (Ekinci and Koc, 2020). On the other hand, an athlete with ego orientation, wants to be the best (Karabulut, 2010) and cares about being

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[1]**ORCID:** 0000-0003-3771-937X , [2]**ORCID:** 0000-0001-9594-4466 , [3]**ORCID:** 0000-0002-8439-2368 , [4]**ORCID:** 0000-0002-0825-8722

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superior to others in the process based on social comparison (Ekinci and Koc, 2020).

Sport represents an important area of success for children and adolescents (Treasure, 2001). Especially young athletes' perceptions and approaches to success may change according to their social environment or the attitudes or guidance of individuals they look up to (Ozgun et al., 2017). Since coach behaviors play a critical role in the development of the skills necessary for the motivation and performance of the athlete, it can be said that the perception of success in athletes is also related to coach behavior style and leadership styles (Cengiz et al., 2019).

Athletes, expect people other than themselves to give them feedback on their performance, pat them on the back or congratulate them on their sporting achievements, and they want to strengthen their motivation levels with this feedback (Ramalu, 2007; Ramalu et al., 2020). In a related study conducted by William and Straub (1998) with university students, it was shown that 80% of athletes' performance is influenced by mental skills. However, Sheard and Golby (2006), who studied national level swimmers for seven weeks, reported that psychological skills practices caused large and significant psychological improvements in athletes. Therefore, coaches need to be attentive and careful in giving feedback in order to contribute to both the physiological and psychological development of the athlete. Related to the topic, according to the results of the study conducted by Trigueros and Aguilar-Paraa (2019) on the impact of psychological and motivational practice needs in sport on the athlete, there is a need to improve performance in training based on the athlete's success. Realizing this, coaches started to pay attention to the motivational (psychological) aspects of goal orientation in order to improve athletic performance (Karim, 2016).

The coach is recognized as the architect of the motivational climate (Treasure, 2001). It has been reported that if the coach creates a climate that emphasizes the learning process, skill development and personal growth, then athletes are more likely to be goal-oriented individuals; on the other hand, if the coach creates a climate that emphasizes interpersonal competition or ego, then athletes are more likely to be ego-oriented individuals (Solstad and Lemyre, 2014; Jowett, 2017a). It is stated that for a good relationship between coach and athlete, skills, experience and interests should be used interactively together; for such an interaction, the coach and athlete should not only have regular, high-quality communication (Davis et al., 2019), but also trust, goodwill and mutual sharing (Jowett, 2017a, 2017b; Jowett and Poczwardowski, 2007; Lorimer and Jowett, 2013).

As in all sports branches, the concept of "success" in swimming, which is an individual sport branch, can be considered as a concept that motivates athletes the most. Achieving success depends on good communication between the coach and the athlete. In this context, the relationship between athletes' communication with their coaches and their perceptions of success is of interest. For this reason, the present study was conducted to reveal the perceptions of success of young individuals engaged in swimming and to examine the relationship between coach behaviors and perceptions of success. Considering that internal emotions such as psychological warfare, anxiety, stress, worry, anxiety, confidence, self-confidence affect sportive performance in swimming, which is an individual sport, it is thought that determining the factors affecting the perception of success will be guiding in terms of psychologically focusing on success in directing the inner drives of young swimmers to achieve success.

MATERIALS AND METHODS

Research Model

In this study, the relational survey model was used since it was conducted to determine whether there is a relationship between two or more variables (Karasar, 2012).

Research Group

A total of 114 licensed male and female athletes aged 14-18 years living in Izmir, Manisa, Mugla, Denizli in the Aegean region participated in the study voluntarily. Participants, who were between the ages of 14 and 18, engaged in swimming, had a license for at least one year and participated in competitions, lived in the Aegean region, had no health problems and were volunteers were included in the research. Participants who were not between the ages of 14 and 18, did not live in the Aegean region, were not involved in swimming sports, did not have a license for at least one year and did not participate in

sample size should be at least 76 people with a medium effect size, 0.05 significance level and 0.85 power in relationship analysis.

Data Collection

Scale items and personal information form questions were prepared online. Participants and their parents were informed about the study and the forms were administered in the athletes' free time.

Personal Information Form (PIF)

A "Personal Information Form" consisting of 18 questions prepared by the researchers was applied to learn the personal information of the athletes participating in the study, such as gender, age, sport age, coach gender, coach style, etc.

The Children's Version of the Perception of Success Questionnaire (POSQ-CH)

The scale developed by Roberts, Treasure, and Balague (1998) consists of 12 items, six of which are task orientation and six of which are ego orientation, on a 5-point Likert scale. The Turkish validity and reliability study of the scale was conducted by Kazak Cetinkalp (2006). The scale has two sub-dimensions, namely "Goal Orientation-GO" and "Ego Orientation-EO". Since the scale has 12 items and a 5-point Likert scale, a minimum of 12 points and a maximum of 60 points can be obtained in total. Accordingly, the scoring for the scale is 0-12 (very low), 13-24 (low), 25-36 (medium), 37-48 (high), 49-60 (very high); since the sub-dimensions EO and GO consist of six items each, the scoring for each sub-dimension is 0-6 (very low), 7-12 (low), 13-18 (medium), 19-24 (high), 25-30 (very high).

Coach Behavior Scale for Sport (CBS-S)

The scale, originally developed by Côté et al. (1999), was adapted into Turkish by Yapar and Ince (2014).The original scale consists of 47 items and 7 sub-dimensions; physical training and planning (PTP), technical skills teaching (TS), mental preparation (MP), goal setting (GS), competition strategies (CS), positive rapport (PR) and negative rapport (NR). High scores in the first six sub-dimensions of the scale and low scores in the last sub-dimension indicate that the coach exhibits positive behavior (Yapar and Ince, 2014).

In the scale, 0-47 points (very low), 48-94 (quite low), 95-141 (low), 142-188 (medium), 189 235 (high), 236-282 (quite high), 283-329 (very high); sub-dimensions were evaluated according to 7-point Likert scale depending on the number of items.

Data Analysis

The data were analyzed using SPSS 25 package program. Whether the data were normally distributed was analyzed by Kolmogorov-Simirnov, Shapiro Wilk tests and skewness and kurtosis values and descriptive statistics were made. As a result, it was determined that the data were not normally distributed ($p<0.05$). Accordingly, non-parametric tests were used in the analyses. Differences in the scale and sub-dimensions according to independent variables were tested with "Mann Whitney-U" and "Kruskal Wallis" tests. “Tamhane T2” test was used to determine the direction between the groups with a difference. The difference between the groups was interpreted by taking $\alpha=0.05$ error level into consideration ($p<0,05$); the relationship between the perception of success and coach behavior was evaluated with "Spearman Correlation" test.

RESULTS

Descriptive statistics results of the demographic characteristics of the participants are presented in Table 1.

According to the results obtained in Table 1, 58.8% of the participants were male, 76.3% of them had high school or undergraduate education level, 82.4% of them had worked with their coach for 2 years or more, 71.1% of them had a male coach, 87.7% of them had 5 years or more of sports experience, 50% of them had freestyle swimming, 83.9% of them had a medium or good economic level, and 51.8% of them had a diligent coach.

The descriptive statistics of the total scores of the participants from the POSQ-CH, CBS-S and its sub-dimensions are presented in Table 2.

Table 1. Descriptive statistics of demographic characteristics of the participants

Variable	Categories	N	f (%)	Variable	Categories	N	f (%)
Gender	Female	47	41.2	**Coach gender**	Female	33	28.9
	Male	67	58.8		Male	81	71.1
Swimming year	2-4	14	12.3	**Education status**	College	27	23.7
	≥5	100	87.7		High school/ university	87	76.3
Swimming style	Free	57	50.0	**Economic status**	Low	2	1.8
	Breaststroke	22	19.3		Medium	49	43.0
	Butterfly	14	12.3		Good	58	50.9
	Backstroke	21	18.4		Very good	5	4.4
Working time with coach (year)	<1	8	7	**Coach style**	Overly disciplined	36	31.6
	1-2	12	10.5		Good-natured	14	12.3
	2-4	30	26.3		Tense and mobile	5	4.4
	≥4	64	56.1		Diligent	59	51.8
Educational status of mother	College	12	10.5	**Educational status of father**	College	9	7.9
	High school	44	38.6		High school	44	38.6
	University	44	38.6		University	51	44.7
	Master/Phd	14	12.3		Master/Phd	10	8.8

Table 2. Descriptive statistics of the participants' total scores of POSQ-CH, CBS-S and sub-dimensions

Variable	N	TS	Sd	Min	Max
POSQ-CH	114	49.03	7.04	28.00	60.00
GO	114	26.85	3.06	16.00	30.00
EO	114	22.17	5.09	9.00	30.00
CBS-S	114	262.35	35.39	98.00	329.00
PTP	114	40.89	6.67	20.00	49.00
TS	114	50.95	8.66	8.00	56.00
MP	114	28.48	8.58	5.00	35.00
GS	114	36.50	7.19	7.00	42.00
CS	114	44.26	7.61	14.00	49.00
PR	114	37.80	5.63	13.00	42.00
NR	114	23.43	11.17	8.00	56.00

TS: Total Score, Sd: Standart deviation, Min: Minimum, Max: Maximum, POSQ-CH: The Children's Version of the Perception of Success Questionnaire, EO: Ego Orientation, GO: Goal Orientation, CBS-S: Coach Behavior Scale for Sport, PTP: Physical Training And Planning,TS: Technical Skills, MP: Mental Preparation,GS: Goal Setting CS:Competition Strategies,PR: Positive Rapport, NR: Negative Rapport

According to the data obtained in Table 2, the scores belonging to the POSQ-CH scale, which evaluates the success perceptions of the swimmers participating in the study, were found to be 49.03 very high; the EO sub-dimension score was 22.17 and high, and the GO sub-dimension score was 26.85 very high. It was determined that the score of the CBS-S which evaluates the coach behaviors of the athletes, was 262.35 quite high; the PTP score of the sub-dimensions of the scale was 40.89 quite high, the TS score was 50.95 very high, the MP score was 28.48 quite high, the GS score was 36.50 very high, the CS score was 44.26 very high, the PR score was 37.80 very high, and the NR score was 23.43 low. As a result, it was determined that the achievement perceptions of male and female swimmers between the ages of 14-18 were very high, coach behavior perceptions were quite high and there was no negative coach behavior perception. Since the NR sub-dimension of the scale includes negative statements about the coach, the low total score of the sub-dimension reflects that the athletes have positive thoughts about their coach. The comparison of the total scores of the scale and sub-dimensions of POSQ-CH and CBS-S according to gender is presented in Table 3.

Table 3. Comparison of the total scores of POSQ-CH and CBS-S scales and sub-dimensions according to gender

Variable	Categories	N	TS	Sd	U	p
POSQ-CH	Female	47	50.55	7.07	1210.00	**0.036***
	Male	67	47.95	6.86		
EO	Female	47	22.47	5.42	1499.50	0.665
	Male	67	21.95	4.86		
GO	Female	47	28.08	2.46	929.00	**0.000***
	Male	67	26.00	3.16		
CBS-S	Female	47	25.91	41.69	1327.50	0.155
	Male	67	266.86	29.72		
PTP	Female	47	39.12	6.93	1124.50	**0.009***
	Male	67	42.13	6.24		
TS	Female	47	49.59	11.19	1521.00	0.751
	Male	67	51.91	6.23		
MP	Female	47	28.70	9.17	1437.00	0.412
	Male	67	28.32	8.21		
GS	Female	47	36.21	7.46	1426.00	0.382
	Male	67	36.71	7.04		
CS	Female	47	43.80	8.75	1491.50	0.618
	Male	67	44.58	6.75		
PR	Female	47	38.40	6.47	1215.50	**0.033***
	Male	67	37.38	4.98		
NR	Female	47	20.06	10.60	995.00	**0.001***
	Male	67	25.80	11.03		

*p<0.05,TS: Total Score, Sd: Standart deviation, Min: Minimum, Max: Maximum, POSQ-CH: The Children's Version of the Perception of Success Questionnaire, EO: Ego Orientation, GO: Goal Orientation, CBS-S: Coach Behavior Scale for Sport, PTP: Physical Training And Planning, TS: Technical Skills, MP: Mental Preparation, GS: Goal Setting CS: Competition Strategies, PR: Positive Rapport, NR: Negative Rapport

In line with the results obtained in Table 3, it was determined that there was a significant difference between the groups according to gender in the POSQ-CH scale and GO sub-dimension score ($p<0.05$, $p=0.036$, $p=0.000$); however, there was no significant difference in the EO sub-dimension score according to gender ($p>0.05$, $p=0.665$). It was observed that the significance was in favor of female swimmers in both the POSQ-CH and GO sub-dimensions. When the CBS-S scale score was analyzed according to gender, it was found that there was no difference between the scale scores of male and female swimmers ($p>0.05$, $p=0.155$); while there was a significant difference in the PTP, PR and NR sub-dimension scores ($p<0.05$, $p=0.009$, $p=0.033$, $p=0.001$); while there was no significant difference in TS, MP, GS and CS sub-dimension scores according to gender ($p>0.05$, $p=0.751$, $p=0.412$, $p=0.382$, $p=0.618$). The significance in PTP, PR and NR sub-dimensions was found to be in favor of male swimmers in PTP sub-dimension and in favor of female swimmers in PR and NR sub-dimensions.

When the scores of the POSQ-CH scale were compared according to the gender of the coach, it was found that there was a significant difference only in the EO scores ($p<0.05$, $p=0.035$). It was concluded that this difference was in favor of the athletes working with male coaches ($X_{male}=22.72$, $X_{female}=20.78$). When the scores were compared according to the swimming style, it was found that the mean score of POSQ-CH and the mean score of GO sub-dimension were significantly different in favor of the athletes who swim butterfly style ($p<0.05$, $p=0.001$, $p=0.000$). When the scores were compared according to the type of coach, it was found that there was a significant difference between the CBS-S scale score and sub-dimensions of PTP, TS, GS and PR scores ($p<0.05$, $p=0.001$, $p=0.005$, $p=0.005$, $p=0.005$, $p=0.006$, $p=0.000$). In line with this result, it was concluded that the scores of CBS-S, PTP, TS and GS were the highest in the "Overly disciplined" coach type, while the PR score was the highest in the "Good-natured" coach type. When the scores were compared according to sport age, it was found that there was a significant difference ($p<0.05$) in the EO and TS sub-dimensions; EO scores were highest in those with a sport age of "2-4 years" and TS scores were highest in those with a sport age of "5 years and above". Despite these results, when the scores of the athletes were compared according to their economic level, education level and working time with the coach, it was found that there was no significant difference in POSQ-CH, CBS-S and sub-dimensions ($p>0.05$).

Table 4. The relationship between swimmers' perceived coaching behaviors, achievement perceptions and sub-dimensions

	POSQ-CH	GO	EO	CBS-S	PTP	TS	MP	GS	CS	PR
POSQ-CH	1									
GO	,762**	1								
EY	,912**	,459**	1							
CBS-S	-,030	,044	-,047	1						
PTP	,075	,156	,033	,778**	1					
TS	-,092	,036	-,127	,715**	,600**	1				
MP	,017	,093	-0,44	,743**	,529**	,646**	1			
GS	-,129	-,022	-,153	,770**	,569**	,583**	,697**	1		
CS	-,071	,036	-,128	,720**	,460**	,759**	,739**	,750**	1	
PR	,067	,217*	-,039	,691**	,409**	,650**	,655**	,592**	,681**	1
NR	-,161	-,273**	-,038	,019	-,030	-,325**	-,389**	-,227*	-,315**	-,421**

*p<0.05, **p<0.01,POSQ-CH: The Children's Version of the Perception of Success Questionnaire, EO: Ego Orientation, GO: Goal Orientation, CBS-S: Coach Behavior Scale for Sport, PTP: Physical Training And Planning, TS: Technical Skills, MP: Mental Preparation, GS: Goal Setting CS: Competition Strategies, PR: Positive Rapport, NR: Negative Rapport

In the light of the information obtained in Table 4, in which the relationship between the coach behaviors perceived by the swimmers, their perceptions of success and sub-dimensions was examined, it was found that there was no significant relationship between the swimmers' POSQ-CH and CBS-S scores and its sub-dimensions. It was found that there was a positive and low correlation between EO sub-dimension and PR, a negative and low correlation between NR sub-dimension (r=0.217, r=-0.273). Apart from the level of relationship between the scale and sub-dimensions, when the correlations with the independent variables that may have an effect on POSQ-CH and CBS-S were examined; it was found that there was no relationship between POSQ-CH and closeness with the captain, communication level with the coach and age variable (p>0.05). While there was a significant, positive and moderate correlation between the closeness of the team captain and the CBS-S scores of the athletes (p=0,001, r=0,417); it was concluded that there was no relationship between age and coach communication level (p>0,05).

DISCUSSION

In this study, the perception of success and the level of evaluation of coach behaviors in 14-18 years old swimmers were examined. In addition, the perceptions of success and coach behavior of the swimmers in the relevant age range were examined by comparing them according to gender, sport age, type of coach, duration of working with the coach, swimming style, education and economic status of the athlete. According to the results of the study, it was found that swimmer' perceptions of success and GO sub-dimension scores were very high, and EO sub-dimension scores were high. From this point of view, although it comes to mind that swimmers aged 14-18 are more goal-oriented, it is not correct to infer that athletes are ego or task-oriented in line with this result; because both of these two independent thoughts of success can be high or low; one of them can be low and the other high, and therefore they do not describe the athlete; they show that a certain orientation is dominant (Kazak Cetinkalp, 2006).

In the sub-dimensions of the scale of athletes' evaluation of coaches' behaviors, it was determined that TS, GS, CS, PR score was very high, PTP, MP sub-dimensions were quite high, and NR score was low. Accordingly, it can be inferred that the coaches of 14-18 years old swimmers living in the Aegean region are better at teaching technical skills, goal setting, creating a competition strategy, and exhibiting positive behavior than mental preparation and physical training and planning.

It was determined that the participants' POSQ-CH, EO-GO sub-dimension scores were higher in female athletes; CBS-S scale scores were higher in male athletes and did not differ according to gender. Tanrıkulu (2019), in his study examining the perceptions of success of elite athletes in the 10-15 age group engaged in taekwondo, judo, and karate sports, reported that the ego orientation of male athletes was higher than that of female athletes, that the perception of success of athletes could increase with an increase in the level of mother education level, and that the success orientation of athletes engaged in the karate branch among the related branches was higher. It can be said that these results are not in parallel with the finding that ego orientation scores were higher in female swimmers in the current study. In addition, the fact that there is a positive relationship between mother's level of education and athletes' perception of success reveals that mothers have an effect on their children's perceptions of success. In the present study, although there was no difference in the scores of POSQ-CH, EO-GO and CBS-S according to gender, it was determined that the scores of PTP, PR and NR sub-dimensions differed according to gender. It is seen that the detected significance is in favor of men in the PTP sub-dimension, while it is in favor of female swimmers in the PR and NR sub-dimensions. When the studies conducted in this context are examined; Gok and Okan (2020), in their study on adult active national athletes from different branches, reported that there was a significant difference between the groups according to the gender variable in the PTP sub-dimension scores and that this difference was in favor of male athletes. Ermis et al. (2017), in a study conducted on adolescent athletes engaged in ball and contact sports, reported that there was a significant difference in the scores of CBS-S, PTP, TS and NR sub-dimensions of the athletes according to gender in favor of males. In line with these results, it can be said that male athletes evaluate coach behavior according to physical

training and planning. In the literature studies, it can be said that different results were obtained with the comparison of achievement perception and coach behavior evaluation scale and sub-dimension scores according to gender. It is thought that the different results are related to the characteristics of the branch that the athlete is engaged in; individual, team sport, collective or non-collective, contact sport, age of the athlete; adolescent or adult, level of sport; amateur or national athlete. In addition, both in the present study and in the literature studies, it was observed that male athletes had higher PTP scores than female athletes. From this point of view, it can be inferred that male athletes think that their coaches offer an adequate training program and that this program contributes to their physical development compared to female athletes. In contrast to these results, Yapar and Serbest (2020), in their study on athletics, reported that in all sub-dimensions of perceived coach behavior, except for the NR sub-dimension, the scores of female athletes were higher than those of male athletes; female athletics had more positive opinions towards the coach than male athletes. Among these results, the findings related to PR and NR sub-dimension overlap with the findings of the current study, and from this point of view, it can be said that coaches approach female athletics and swimmers more moderately and understandingly than males. On the other hand, Koh et al. (2014), in their study with Singaporean athletes, reported that male basketball players had higher scores than females in both PR and NR sub-dimensions. In line with this result and the results of the current study, it can be inferred that individual sport coaches approach female athletes more moderately than male athletes; on the other hand, team sport coaches approach male athletes more moderately than females.

In the current study, when the scale mean scores were examined according to the coach gender variable, it was found that only the mean scores of the EO sub-dimension were significantly different in favor of the athletes who have male coaches. This result is thought to be due to the fact that male coaches give more immediate feedback and comparative feedback to their athletes.In addition to this, the age of the athlete also has an effect on the evaluation of the coach's behavior. In the study conducted by Gok and Okan (2020) on the subject, it was concluded that there was a positive, low-level significant relationship between the age of the athletes and the PTP score. From this point of view, it can be said that as the age of the athlete increases, the PTP score will also increase. In Torun's (2020) study on elite level judo athletes, the mean scores of athletes' perceptions of success were examined according to age distribution and it was reported that the mean scores of perceptions of success based on age were statistically significantly different; individuals between the ages of 15-17 had the lowest mean EO and individuals between the ages of 18-25 had the highest mean GO. Ego-oriented individuals tend to aim for goals from the outside because they compare themselves with their competitors in every situation. Since such athletes are in a constant state of comparison, they may give up in a very short time and take an easy-going approach. On the other hand, if the athlete has the desire to do better and improve according to his/her past performances without comparing himself/herself with others, this athlete has goal orientation (Torun, 2020). In this direction, according to the results of the related study, it can be inferred that athletes between the ages of 15-17 are task-oriented and athletes between the ages of 18-25 are ego-oriented. These results do not overlap with the 14-18 year old swimmers being goal-oriented in the current study. Therefore, it is thought that ego and goal orientation are related to sport experience and adolescence. In future studies, investigating the relationship of ego-goal orientation with the athlete's experience and the developmental period will support the findings of the literature. In the current study, the fact that the mean score of the GO sub-dimension of the swimmers was higher than the mean score of the EO sub-dimension may be due to the age range of the swimmers participating in the study and the known potential effects of the coaches on the goals of the athletes, setting long-term goals for the athletes instead of instant (short-term) goals. On the other hand, since swimming is an individual sport, the assumption that the goal of the age group athletes may be to prove that they are better than their previous performance, such as "breaking their own record" or "proving that they are better" may also be shown as a reason for the high GO sub-dimension score.

When the scores were compared according to the specialized swimming style, economic level and education level of the athletes, it was found

that there was no significant difference in POSQ-CH and its sub-dimensions. In Karabulut's (2010) study, which obtained parallel results with the current research, it was reported that the anxiety levels and achievement perceptions of fifth grade primary school students did not differ according to their game preferences, game type and economic level. Similarly, in a study conducted by Elmas (2018) on early adolescents participating in sportive recreation activities, it was reported that GO and EO scores did not differ significantly according to sufficient free time and family income level. In the same direction, Basoğlu (2017) reported in his study conducted with the national team players of the men's wrestling national team that there was no significant difference in the mean POSQ-CH of the athletes according to the family economic level. In contrast to these findings, Ozbey and Unal (2020) conducted a study with amateur football players aged 17-34 years and reported that there was a significant difference in the GS scores of participants with different income levels from the sub-dimensions of the CBS-S. According to both the results of the current study and the results of the literature, it can be said that the perception of success does not change according to economic level, and only economic status may affect goal setting. Despite the findings of the current study, there have also been studies reporting that athletes' level of education and sports participation have an effect on their perception of success. Accordingly, Dereceli (2019), in his study on primary school students, reported that the achievement perceptions, task and ego orientations of children who do sports are higher than non-athlete children, and that the sense of responsibility and behaviors of athlete children are more developed. Similar to the results in primary school students, Ekinci (2018) reported in a study that sportsmanship behaviors and achievement perceptions of secondary school students differed according to various variables and that achievement perception predicted sportsmanship behaviors.In this direction, it can be said that doing sports can change the perception of success by creating behavioral changes in the individual, so there may be a difference in the orientation and perception of success in individuals who do sports and those who do not.

When the scores of the athletes were compared according to the time they worked with their coaches, it was found that there was no significant difference in the CBS-S and sub-dimensions, but according to the type of coach, there was a significant difference between the CBS-S scale score and sub-dimensions of PTP, TS, GS and PR scores in favor of the "Overly disciplined" coach. Cik (2009), as a result of his research on young basketball players, reported that the perceived coach behavior scores were significantly different according to the duration of working with the coach. In the current study, the fact that there was no difference in the coach behavior scale score according to the duration of working with the coach may be due to the fact that swimming is an individual sport. Because in team sports such as basketball, athletes' perceptions about the coach may also depend on other athletes, so it can be said that the duration of working with the coach in team sports is effective on the perception of success and coach behavior. In individual sports, it is thought that success and coach perception may depend more on the type of coach. In this direction, according to the results of the current research, when the mean scores of the coach perception scale were examined, it was seen that the mean score of the swimmers who had an overly disciplined coach in four sub-dimensions was the highest. From this point of view, it can be inferred that individual athletes who have overly disciplined coaches have high coach perceptions, in other words, they have positive coach perceptions. Another factor affecting coach perception is thought to be the developmental period of the athlete. Regarding the subject, in a study conducted in young people who do sports in different branches, it was found that there was a significant difference in TS, GS, CS and NR sub-dimensions according to age and it was reported that there was a difference in adolescents' perception of their coaches' behaviors towards them (Ermis et al., 2017). In this respect, it is thought that coaches should pay attention to their approach styles to athletes, especially in the adolescent period and adolescence; psychological characteristics and approaches are effective in revealing the physical potential of the athlete. This thesis is supported by Baker et al. (2000), who reported that negative coach behavior is a significant predictor of athlete anxiety, impaired concentration and worry, and that the negative relationship between coach and athlete is effective on athlete anxiety; similarly, Mohd Noor et al.

(2019) reported that negative coach behavior has a negative and serious effect on athletes' motivation.

According to the results of the current study, it was determined that the athletes had the highest mean score in TS and the lowest mean score in NR sub-dimension. When the mean scores of the participants were analyzed according to their sport age, it was seen that the mean scores of young swimmers with a sport age of five years or more were higher than those of athletes who have been swimming for 2-4 years. In the study conducted by Cik (2009) on basketball players, it was reported that there was no significant difference in the sub-dimension scores of CBS-S of participants according to their sport age; however, in the TS sub-dimension, participants with a sport history of 10 years or more had higher mean scores than the others. Based on the findings of both the current study and the literature, it can be inferred that, regardless of the branch, as the athlete's sport age increases, the perception of the coach's technical skill acquisition increases. Considering that technical learning is important in swimming, it can be said that the athlete's perception of the coach's ability to teach technical skills is also important and effective in achieving success. When the relationship between achievement perception and coach behavior evaluation scores in swimmers was examined, it was found that there was no correlation between POSQ-CH scores and CBS-S scores. With this result, coaches' approach to athletes may not have an effect on athletes' perception of success. On the other hand, the fact that there is a relationship between the GO sub-dimension and the PR, NR sub-dimensions can be evaluated with the assumption that athletes' coaches may affect their perception of positive and negative coaching behavior. The correlation between closeness to the captain and CBS-S can be explained by the fact that young swimmers' team captains act as an important bridge between the team members and the coach in terms of communication.

As a result, it was determined that young swimmers had very high perceptions of success and positive perceptions of coach behavior; athletes' perceptions of success differed according to gender and swimming style, and perceptions of coach behavior differed according to coach type; however, perceptions of success and coach behavior did not differ according to the duration of working with the coach, economic level and education level. It can be said that the behaviors of the coaches as a leader can affect the motivation status of the athletes and accordingly their perception of success; therefore, the coaches should pay attention to their behaviors during training and competitions, especially towards young, adolescent athletes. It is thought that it is important to see the feedbacks given by the athletes against the coaches' behaviors as an opportunity for the athletes in adolescence to gain emotional skills in this period in terms of having a successful athlete identity as well as the development of high-level performance in their future sports life.

Declaration of Conflicting Interests

All authors declare no conflicts of interest.

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Ethics Statement

Ethical permission was obtained for this research from the “Non-Interventional Research Ethics Committee” of Dokuz Eylul University with the decision number 2022/28-12 dated 31.08.2022 andconducted in consideration of Helsinki’s Declaration principles.

Author Contributions

Study Design, EKA, TŞ; Data Collection, BCK, EKA; Statistical Analysis, EKA; Data Interpretation, EKA, TŞ; Manuscript Preparation, EKA, RNU; Literature Search, EKA, BCK, TŞ. All authors have read and agreed to the published version of the manuscript.

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RESEARCH ARTICLE

The Evaluation of Developments in Children with Autism within the Framework of Hemsball Training: From the Trainer's and Parents' Perspective

Meltem Işık AFACAN[1*]

[1]Aydin Adnan Menderes University, Faculty of Sports Science, Aydın / Turkiye
*Corresponding author: isik.meltem@adu.edu.tr

Abstract
This study was designed to answer questions about why hemsball, an activity that allows children with autism to be easily involved and allows for individualized adaptations, can be an alternative activity for children with autism. The aim of this study is to examine the observations of parents and trainers for the evaluation of developments in children with autism with in the frame work of hemsball training. This study adopted a qualitative research model and was designed as a case study.The study group in the research consists of 8 parents and one trainer, who were selected by easily accessible case sampling method and participated in the research voluntarily. Semi-structured interviews were conducted with the parents and the trainer to achieve the aims of the research. In the first part of the form given to the parents, there is personal in formation and general information about the participation of their child with autism in hemsball training, and in the second form, there are interview forms consisting of 3 semi-structured questions for the parent and the trainer. After the interviews, the data were coded with the maticanalysis method. Content analysis technique was used in the analysis of the data obtained in the research. The changes that parents and hemsball trainer saw in children with autism after the hemsball training started were collected under 6 themes: motor, behavioral, academic, language and communication, sociological and psychological. And as a result, it was revealed that children with autism showed positive development in these six themes.

Keywords
Hemsball, Autism, Training, Skill Development, Sportive Skill Development

INTRODUCTION

Autism is classified as a neurodevelopmental disorder in which genetic and environmental factors play a role. Neurodevelopmental disorders are a heterogeneous group of conditions characterized by disorders or abnormalities, such as delays in motor skills, in various areas of development [Diagnostic and Statistical Manual of Mental Disorders Fifth Edition (DSM-5)]. In autism, attitudes such as lack of social communication, repetitive behaviors, limited interests, and attachment to familiar events or situations are observed (APA, 2013). From another perspective, autism is also defined as a syndrome in which repetitive behaviors and behaviors characterized by excesses can be changed with the regulation of the physical and social environment and early, intensive and continuous education (Green, 2001; Öztürk et al., 2023).

The prevalence of motor disorders in autism is frequently reported in the literature (Esposito et al. 2009; Fournier et al. 2010). The fact that children with autism have delays in locomotor skills such as kicking and catching a ball, balancing and jumping, and object control skills is seen as a factor that may prevent participation in physical activities (Crucitti et al. 2019; Lee and Vargo, 2017). At the same time, it is stated that

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[1]**ORCID:** 0000-0002-1372-9322

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motor deficits as well as deficits in social and communicative skills seen in children with autism are also barriers to participation in after-school physical activities (Obrusnikova and Miccinello, 2012). Therefore, instead of asking or waiting for a child with autism to enter a crowded environment with active, noisy and unpredictable characteristics, it would be of greater benefit for children with autism to increase the frequency of individual training, provide direct instruction, and then gradually include them in group activities (Bremer and Lloyd, 2016; Ketcheson et al. 2017). From past to present, the effects of physical activities on children with autism have been evaluated in many studies in terms of physical, motor, intellectual, behavioral and emotional aspects and their role in reducing inappropriate behaviors has been revealed (Nazemzadegan et al. 2016; Healy et al. 2018; Ruggeri et al. 2020; Jachyra et al. 2021).

Since the development of motor function is related to a child's capacity in linguistic, cognitive and social development (Iverson, 2010; Karasik et al. 2011; Bedford et al. 2016), the type and duration of activities that support motor development may vary in children with autism compared to their typically developing peers. For these reasons, the continuity of exercise in children with autism is as important as the type of exercise. Studies have shown that acute physical exercise can at least temporarily improve cognitive functions in children with autism (Ludyga et al. 2019; Benzing et al. 2018; Chen et al. 2016; Tan et al. 2016), but long-term physical exercise interventions have shown positive effects on the brain-based skills needed to successfully execute goal-directed behaviors among school-aged children diagnosed with autism (Tan et al. 2016; Phung and Goldberg, 2019; Bahrami et al. 2015). Moreover, Bremer and Lloyd (2016) suggest that the intervention duration (>18 weeks) should be increased to better understand the effects of motor skills interventions on social skills.

Behavioral therapies are widely preferred in autism, but the economic burden of these therapies on families' budgets makes it necessary to investigate alternative therapeutic strategies that are effective and physical (Tan et al. 2016). However, parents' efforts to find activities and a suitable environment for their children with autism often require a lot of time, energy and resources (Obrusnikovaand Cavalier, 2011).

In this respect, hemsball, which has an adaptive game integrity, should be seen as an alternative activity that can be set up and played in any indoor or outdoor area, and has high accessibility.

Hemsball has been studied in the areas of psychomotor and physical development and physiological effects of both normally developing children and children with special needs. For example, it was examined whether there was a change in attention and coordination (Işık and Kılıç, 2021b), balance and coordination (Işık and Zorba, 2020), fine motor precision and integration (Işık and Kılıç, 2021a), physical measurements (height, weight, flexibility, chest width and heart rate, etc. (Todorova et al. 2014) in children with intellectual disabilities, and jumping and balance (Sever et al. 2016) skills/measurements in children with normal development compared to the control group. The findings of the study revealed that hemsball was effective by creating a change in the physical characteristics and motor skills of both normally developing and children with disabilities compared. However, no studies have been found that demonstrate the intellectual, social, emotional or cooperative contributions or language developments in children.

This article aims to analyze the observations of parents and trainers about the effects of hemsball on children with autism. The themes obtained from parent and trainer views will be discussed respectively. It is thought that the hemsball activity discussed in this article can benefit all physical trainers, sports experts and program providers serving children with autism.

Hemsball

Hemsball, which was introduced as an idea by Murat Altınay in 2011 and was accepted by the Ministry of Youth and Sports in 2013 after being finalized through research and development studies, is the official sports branch of the Republic of Turkey, (ihfed.org. 2023). The aim of the game is to bounce a ball into a hoop on a target board so as to make it land on the opponents field and to prevent the opponent from achieving the same goal. (Gönülateş 2017; Işık and Kılıç, 2021). The name of this sports branch, hemsball, is the result of the combination of the initials (hand, energy, move, stability and ball) of the performance put forward during the game. The materials required for the game are a ball, a hoop, a target board, a foot plate and strips to mark the

game area. As can be seen in Figure 1 below, the materials required for the game can be increased according to the needs of the individual or the group, and suitable conditions can be provided for skill acquisition. Figure 2 shows the of the hemsball pitchand equipment. Figure 3 shows the measurements of the hemsball ball.

Figure 1. Sample studies related to hemsball trainings

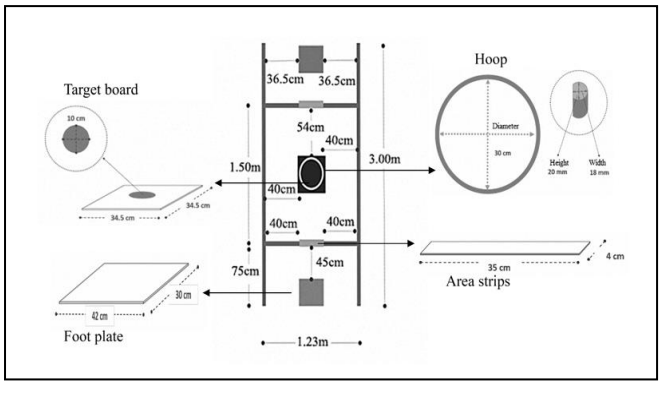

Figure2. Hemsball pitch and equipments

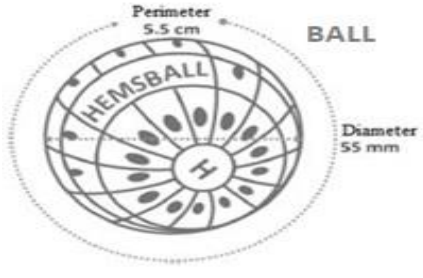

Figure3. The measurements of the hemsball ball

MATERIALS AND METHODS

Research Model

This study adopted a qualitative research model and was designed as a case study. Case studies focus on one or more individuals, events or situations and the variables that affect or are affected by this situation (Yıldırım and Şimşek, 2011). In this study, the case study design is thought to be suitable for the purpose of the research, as the evaluation of the development of children with autism who have been continuing their hemsball training for a while from the perspective of their parents and educators will be examined.

Population

The families of children with autism who participated in hemsball training for at least one and at most five years at Aydın Youth and Sports Training Center and the trainer who gave these trainings were invited to participate in the study. Participation in the study was voluntary. Eight parents who agreed to participate in the study from the families who received hemsball training and a trainer who provided the hemsball training were included.

It was determined that the parents were between the ages of 40 and 50, 5 of them were mothers and 3 of them were fathers. In terms of educational level, the number of parents who were university graduates was higher. Only one of the parents was retired and the others were working.

It was determined that the children with autism who participated in the study were between the ages of 10 and 18. 1 participant was female, 7 were male. 2 participants had second disabled. 6 children with autism participated in inclusive education and all participants received after-school support education.

This study was conducted in accordance with the principles stated in the Declaration of Helsinki, the necessary ethical permission was obtained, and Informed Consent was obtained from the parents and educator who were invited to the study and agreed to participate.

Data Collection Tools

A Semi-structured interview technique was used to obtain the views of parents and trainers. The first part of the form given to the parents included personal information and general information about the participation of their child with autism in hemsball training, while the second form included interview forms consisting of 3 semi-structured questions for the parent and the trainer. During the semi-structured interview process, the interview questions directed to the parents and the trainer were determined in line with the relevant researches (Hebert et al. 2022;

Thomas 2021) and the opinions of researchers working with parents of children with autism as practitioners. In the interview with the parents of children diagnosed with autism, open-ended questions were asked about their experiences after starting the hemsball training (How interested is your child in participating in hemsball training?

Have there been any noticeable changes in your child after starting hemsball training? If there have been changes, in which area have they been most noticeable? In the interview with the Hemsball trainer, open-ended questions were asked about his/her experiences after starting the training (How was the child's willingness to participate from the beginning of the Hemsball trainings until today? What kind of difficulties did you encounter with the child with autism during the Hemsball training?, If there have been noticeable changes in the child with autism after starting the Hemsball training, what are these? The interviews were conducted one-on-one and lasted 30 to 40 minutes. Participants were informed about the purpose of the study and the interview questions. Interviews were held with each participant on different days. The interviews took place over a two-week period.

Data Analysis

After the interviews, the data were coded by thematic analysis method. Content analysis technique was used to analyze the data obtained in the study. "Content Analysis is a systematic, repeatable technique in which some words of a text are summarized by smaller content categories with certain rules-based encodings asit is defined" (Büyüköztürk et al. 2016). In order to categorize the participants' views on the effects of the hemsball training on their children with autism, common concepts were identified from the topics mentioned by the participants and coding was done. Then, themes were created from the coded data and the concepts were organized according to these themes. The themes were grouped and the final version of the content analysis was obtained. To calculate the reliability of the study, the reliability formula suggested by Miles and Huberman (1994) (Reliability = Consensus/ (Agreement + Disagreement) × 100) was used. As a result of the anal-ysis, the reliability rate was found to be 90%. In addition, as a measure of reliability, the data obtained were quoted directly without comment.

RESULTS

In this part of the study, the demographic information of the parents and their children diagnosed with autism, the answer themes, frequencies and example answers generated in line with the answers they gave to the open-ended questions directed to the parents and the hemsball trainer, and the findings and interpretations related to these findings are presented. During the analysis process, parents were coded as P1, P2, P3, ……, P8. The children with autism evaluated by the trainer are coded as A1, A2, A3....., A8.

Educational information for children diagnosed with autism is presented in Table 1.

Table 1. Demographic information of children diagnosed with autism

Educational information for children with autism		*f*
Education type	Inclusive education	6
	Tutoring school	2
Doesout-of-school support receive education?	Yes	8
	No	0
Has he/she participated in a sports event before?	Yes	5
	No	3
How did you meet hemsball?	Autism association	2
	YSC Courses	2
	Friend recommendation	4
How long has he/she been studying hemsball?	1 year	2
	2 year	1
	3 year	4
	5 year	1
How many hours per week does he/she train hemsball?	2 hours	8
Have you met other parents through hemsball?	Yes	8
	No	0

Findings Related to Parents' Views on Hemsball

In the interview with the parents of children with autism, open-ended questions were asked about their experiences after starting the hemsball training (How interested is your child in participating in the hemsball training? Have there been any noticeable changes in your child after starting the hemsball training? If there have been changes, in which area have they been most noticeable?) The themes, frequencies and example answers extracted from the views obtained in line with the answers given by the parents to the question "How interested is the child with autism in participating in hemsball training?" are presented in Table 2.

Table 2. Participation interest of children with autism in hemsball trainings

Themes	Frequency	Example answers
Willing	4 Parents	Has been very enthusiastic since the day he/she met Hemsball, looks forward to the training days, he/she can't wait to go to the training.
Trainer attention	3 Parents	Is happy during the trainings because of the attention and love shown by our trainer. We love our trainer very much.
Incentive	1 Parent	Participates in trainings with rewards. Interest in Hemsball is changing day by day.

Based on the responses of the parents to the first question, three different themes were identified. Four parents stated that their children were eager to participate in hemsball, three parents stated that the trainer's relevant approach affected participation, and one parent stated that their child participated with the rewarding method.The answers given by the parents to the open-ended questions about the experiences gained after the start hemsball training were divided into 6 themes. These themes are presented in Table 3.

Table 3. Thematic distribution of the areas of development of their children after the start of hemsball training according to parents

1.Motor development	Parents
Reduction of balance problems	P1, P3, P4
Increased hand-eye coordination	P1, P2, P4, P5, P6
Fine motor skill development	P2, P4, P5, P6
Grasping the ball and throwing it to the target point	P2, P4, P6
Prolonged attention (focus) time	P3, P4, P5, P6
2. Behavioral development	
Learning the waiting behavior	P2, P3, P6
Obey the rules	P1, P2, P3, P4, P5, P6
Ability to stay calm	P8
3.Cognitive development	
Counting	P2,P4,P5
Learning the concepts of right-left	P1,P2,P4
4. Language and communication development	
Listening	P1,P2,P3,P4,P5,P6
Answering questions	P1,P2,P3,P4,P5,P6
Request to speak	P1,P2,P3,P4,P5,P6
5.Sociological development	
Making friends	P3,P4
Ability to play games in different environments	P3,P4,P6
6.Psychological development	
Being happy	P1,P2,P3,P4,P5,P6
Increased motivation	P1,P2,P3,P4,P5,P6
Self-confidence development	P7

In the interview with the hemsball trainer who has been working with children diagnosed with autism for 7 years, three open-ended questions were asked about the experiences the trainer had after starting the training. (How was the child's willingness to participate from the beginning of the hemsball trainings until today? What kind of difficulties did you encounter with the child with autism during the hemsball training?, If there have been significant changes in the child with autism after starting the hemsball training, what are these? The answers given by the trainer for each child regarding these experiences are presented below. The answers given by the trainer participating in the research to the question of the child's willingness to participate from the beginning of the hemsball training until today are given below.

For Participant 1: "He has been attending hemsball training for about 3 years, two days a week for one hour. In this process, he has not been absent except for when he was ill. At the moment, we can keep the duration of the exercises longer than when we first started. He always comes willingly."

For Participant 2: "He has been attending hemsball training for about 3 years, two days a week for one hour. He mostly participated in the trainings. When we first started, we had a lot of trouble responding to commands and paying attention, we could do the exercises for very short periods of time, but now we can do our exercises for longer."

For Participant 3: "The participant, whom I have been working with for one year, 2 days a week for one hour, initially had a focus time of no more than 15 minutes. At the end of one year, he could participate with the same enthusiasm from the beginning to the end of the training. He is very enthusiastic about participation and continuity."

For Participant 4: "In the first months of our training, which has been going on for 18 months, the participant was both hesitant and his attention span was quite short, but over time, he got used to both me and the training and his focus time increased. He participated except for public holidays and illness."

For Participant 5: "He has been attending my hemsball training 2 days a week for one hour for 3 years. While at first, he participated with a reward, I can say that he gradually became more routine and enthusiastic. When I say let's start, we start working in an order. He is one of my regular participants."

For Participant 6: "We have been working for about 1 year, 2 days a week for one hour. She has maintained continuity since the first day and participates very willingly. She makes a lot of effort to do the activities without any mistakes."

For Participant 7: "At first, he was obliged to participate. It has been a year since we started, and now he participates more willingly."

For Participant 8: "In the first days of hemsball training, he was easily distracted. He participated regularly every week. After the first six months, he participated more willingly and enjoyably from the beginning to the end of the one-hour training."

The themes, frequencies and example answers extracted from the opinions obtained in line with the answers given by the trainer participating in the study to the question "What difficulties did you encounter with the child with autism during the hemsball training?" are given in Table 4.

Table 4. Thematic distribution of the difficulties encountered with the child with autism during the training according to the hemsball trainer

Trainer's response themes for participants	Participants	Trainer Opinions
Communication	For A1, A2	Has difficulty making eye contact and is not taking commands
Motor	For A1, A2, A4	Has loss of balance, has difficulty using hand and fingers while grasping or trying to hold the ball
Behavioral	For A4, A5, A8	Has trouble focusing, gets bored quickly and leaves the training area
Psychological	For A3, A6, A8	When he/she can't do the shown movement, he gets angry, sad and unhappy
Sociological	For A5, A7	Has difficulty participating in group activities

Five different themes (communication, motor, behavioral, psychological, psychological and sociological) emerged from the responses of the trainer to the question of "what difficulties did you encounter with the child with autism during the hemsball training?". The trainer who participated in the study asked, "Would you say that there have been noticeable changes after you started hemsball training? If yes, what are these changes?", the themes, frequencies and example answers are given in Table 5.

Table 5. Thematic distribution of the significant changes in children with autism after the hemsball training started according to the trainer

The themes of the trainer's response for the participants	Participants	Trainer Opinions
Communi-cation	For A1, A2, A3, A4, A5, A6, A7, A8	Can hold short conversations, shows less echolalia, can give short answers to questions, can express needs and feelings, increased eye contact, can use greetings and goodbyes
Motor	For A1, A2, A3, A4, A5, A6, A7, A8	Can balance on the step-board, can hold the ball with one hand, can use both hands, hand-eye coordination has increased, can reach for and catch the ball that comes towards him/her or that goes in a different direction, and focus has increased.
Behavioural	For A2, A4, A5, A6, A8	Performs sequential exercises without receiving commands, imitates the movement shown, develops the ability to wait for a turn and act in accordance with commands, throws the ball to the desired target, puts the dislocated hoop in its correct place, helps in the preparation and removement of hemsball materials.
Psychological	For A5	Overcame his fear of touching the hemsball.
Sociological	For A1, A2, A3, A4, A6, A7, A8	Adapts to group work, is willing to participate in group work with her peers, and his/her communication with his/her peers has increased.
Cognitive	For A1, A5, A7	Has learned the concept of directions, can count the sequence of movements by tens, can answer questions about the basic rules of hemsball correctly.

DISCUSSION

This is the first study to systematically investigate the perceptions of parents and trainers regarding the factors affecting the development of children with autism who have participated in hemsball training for at least one and up to five years. Parents with different demographic characteristics generally had positive views about the benefits of hemsball for their children with autism. These views were grouped into 6 themes: motor, behavioral, cognitive, language and communication, sociological and psychological development.

The first of the themes, motor development, was reported by the trainer that the children experienced loss of balance, difficulty in grasping the ball and using their fingers in the beginning stages of the studies. Both trainer and parents stated that balance and hand-eye coordination increased, fine motor skills improved, and attention (focusing) durations were prolonged by grasping the ball and throwing it to the target point with hemsball training. There are various studies in the literature in which different physical education interventions have a positive effect on the motor skill acquisition of children with autism (Ruggeri et al. 2020; Ketcheson et al. 2017). In addition, the importance of intervening in motor skills is seen in order for children with autism to have the necessary skills for physical and recreational activities and not to lag behind their peers in motor competence (Guest et al. 2017; Thomas et al. 2021; Pan 2014). A meta-analysis of the effects of physical activity interventions on young people with autism found that physical activity interventions had a moderate or large effect on a variety of outcomes, including improving manipulative and locomotor skills, and skill-related fitness (Healy et al. 2018). Visual aids commonly used in activity programs designed for children with autism support the motor skill

learning of children with autism (Winnick 2011). This especially enriches the game skill learning of hemsball, which has equipments such as a hoop, a ball, a target board and foot plates.

The second theme is behavioral development; The trainer reported problems focusing of children with autism in the early stages of the training, getting bored easily, and leaving the training area. As a result of the interviews, parents stated that they observed improvement in their children's ability to learn waiting behavior, obey the rules, and stay calm through hemsball training. Similar behavioral improvements were noted by the coach, while improvement in imitation and cooperation was also reported. All cultural systems such as law, religion and morality are living techniques that teach how individuals should behave in society, and they are called rules of behavior. These systems bind people living in society together and force them to obey the rules (Topçuoğlu 1984). The effort to transform the environment into a positive learning environment to minimize inappropriate behaviors in children with autism is known as an important positive behavior support for physical activity (Winnick 2005). In many scientific studies, it has been determined that there is a decrease in behavioral problems in children with autism through physical exercise (Liu et al. 2016; Ferreira et al. 2019; Tse 2020). Emphasizing the importance of exercise in children with autism, researchers have stated that after the emergence of maladaptive behaviors in children, parents and educators can use physical activities to reduce stereotyped behaviors as an alternative before starting to use medication (Liu et al. 2016). Physical education and physical activities are widely accepted, especially to reduce stereotypic behaviors in children with autism.

The third of the themes is academic development; The trainer reported that the child with autism learned the concept of direction, could count the order of moves with decimal places, and could correctly answer questions about the basic rules of hemsball. Parents rated their children's academic progress in a similar way. The concept of academic development is a concept that covers all developmental behaviors other than psychomotor skills and affective development (Arslan 2019). Students need institutional communication due to factors such as ideas, practices and research topics which are outside their field of knowledge but are effective in academic development (Sezgin 2017). In this context, we can state that sports, an important social institution, can also have a positive impact on academic development. In the literature review, it can be seen that the issue of adaptation to the academic environment and academic development in children with autism is among the limited studies. A few of the limited studies were as following: for example, Oriel et al. (2011) on the effect of exercise on academic development found that aerobic exercise before class activities can improve the academic responses of young children with autism. In another study, it was emphasized that a physical activity as simple as light jogging can be effective in increasing academic achievement for students with autism (Nicholson et al. 2011).

The fourth theme was language and communication development; The trainer stated that children with autism have difficulty in making eye contact and taking commands. With the hemsball training, it was reported that there were positive changes in children with autism, such as decreasing echolalia, giving short answers to questions, expressing their needs and feelings, increasing eye contact, and using greeting and farewell words. Likewise, parents made statements that their children's desire to listen, answer questions and talk has increased. One of the main limitations of children with autism is language and communication (Eigsti et al. 2011; Campisi et al. 2018) and almost half of these children fail to develop appropriate verbal language skills (Vandereycken et al. 2016). On the other hand, there are studies that support the findings of this study and show that physical activities positively affect language and communication development. For example, Zhao and Chen (2018) concluded that a specially structured physical activity program positively affected the communication skills, social interaction, rapid response and frequency of expression of children with autism.

The fifth theme was sociological development; the trainer stated that the children with autism have difficulty in participating in group activities when they are just starting their hemsball training. The trainer clarified that the children in the course of time adapted to group activities, were willing to participate in group activities with their peers, and increased their communication with their peers. Parents also expressed that their children with autism, who

continue their hemsball training, have made friends and their ability to play games in different environments has improved. Since the social environment is important for children with autism, a child with autism living in a positive environment has more advantages than a child with autism living in a negative environment. In this context, the environment where various sports opportunities are offered is a positive environment for the child with autism (Afacan 2020). Pan (2009) emphasized that social participation, which is thought to be a determinant for physical activity in children with autism, is partially related to physical activity. Parents who said that their children with autism were excluded in group activities stated that their children spent more time in front of the screen on weekends due to such social barriers (Must et al. 2015). Blagrave and Colombo-Dougovito (2019) show that physical activity can provide tremendous opportunities to build better connections in the community and improve quality of life, but families and their children with autism may not have the same opportunities to access physical activities. Also, in their study on parental perceptions of factors affecting participation in after-school physical activities, Obrusnikova and Miccinello (2012) reflected that gyms were too noisy and bright for the children with autism and that an adaptive physical education program could be more effective. Huang et al. (2020), according to the results of their meta-analysis study on the intervention effects of physical activities in children and adolescents with autism, stated that physical activity had a positive effect on social interaction and communication ability, motor, social and communication skills of children with autism, but had no significant effect on stereotyped behaviors. Past research on children with autism has shown that motor skills interventions have positive effects on social skills for children with autism, including reductions in maladaptive behaviors and improvements in functional engagement with peers (Colombo-Dougovitoand Block, 2019; Bremer and Lloyd, 2016; Ketcheson et al. 2017).

The sixth of the themes is psychological development; The trainer stated that children with autism who have just started to hemsball training show negative emotions such as fear of the hemsball ball, getting angry when they cannot do the movement shown, and being unhappy and sad. The trainer noted that as the trainings progressed, negative emotions decreased and the fear of touching the hemsball ball disappeared. Parents, on the other hand, stated that they observed that their children with autism were happy, their motivation increased and their sense of self-confidence improved with hemsball training. Some studies have reported that physical activity is associated with mental health and can improve psychological health (McPhail 2006; Lord and Patterson, 2008).

According to the research findings, the researcher revealed that hemsball is effective in motor, behavioral, academic, language and communication, sociological and psychological skills in children with autism by examining the views of parents and trainers. Considering the findings, it can be said that hemsball, which can easily include children with autism and allow individualized plans and adaptations, can benefit all sports experts, physical trainers and program providers who provide education to children with autism. In addition, longitudinal studies are also needed to reveal the effects of exercise interventions in more than one field.

In future studies, longitudinal studies can be conducted to reveal the effects of hemsball interventions in more than one area on children with autism.In addition, hemsball studies in which a child with autism is included in the same training as a parent or peer can also be included.

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Conflict of interest

No conflict of interest is declared by the author. In addition, no financial support was received.

Ethics Committee

In terms of compliance with research ethics, this study was conducted in accordance with Aydin Adnan Menderes University Social and Humanities Research Ethics dated 02.05.2022 and numbered 31906847/050.04.04.04-08-91. It has been reviewed and approved by the Board.

Author Contributions

Planned by the author: Study design, data collection, statistical analysis, data ınterpretation, manuscript preparation, literature search. author have read and agreed to the published version of the manuscript.

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RESEARCH ARTICLE

Investigation of University Students' Attitudes Towards Healthy Eating in Terms of Some Variables

Yılmaz AKSOY[1*] and Hacı Ali ÇAKICI[2]

[1,2]OrduUniversity, Faculty of Sports Science, Sport Management Department, Ordu / Türkiye
*Correspondingauthor: yilmazaksoy5552@gmail.com

Abstract
The aim of this study is to determine the attitudes of undergraduate university students towards healthy nutrition. A descriptive survey model was employed in the research, and a total of 275 students, comprising 167 males and 108 females, who were continuing their education in undergraduate programs at Ordu University during the 2022-2023 academic year, were included in the study. As the data collection instrument, the 'Attitude Scale for Healthy Nutrition,' developed by TekkurşunDemir and Cicioğlu (2019), was used in the research. According to the results of the normality assumption, Student's T-test was utilized for pairwise comparisons, and One-Way Analysis of Variance (ANOVA) and Tukey's multiple comparison test were employed for multiple comparisons in the study. Significant differences were detected in the residence status variable of students in terms of the sub-dimensions of positive nutrition and malnutrition with the Attitude Scale for Healthy Nutrition ($p<0,05$). However, no significant differences were found in terms of gender regarding students' attitudes towards healthy nutrition and its sub-dimensions ($p>0,05$). Concerning physical activity, significant differences were observed in the sub-dimensions of information on nutrition, positive nutrition, and malnutrition with the Attitude Scale for Healthy Nutrition ($p<0,05$). Additionally, it was determined that students who lived with their families and engaged in sports had higher mean scores compared to others. Hence, living with family and regularly participating in exercise positively influenced students' attitudes towards healthy nutrition. In conclusion, organizing seminars and educational programs regarding healthy eating habits for students is of utmost importance.

Keywords
Nutrition, Health, Sports, Attitude

INTRODUCTION

Every organism must nourishit self to sustain its life (Çalıştır, 2005). Likewise, human beings need to consume an adequate amount of nutrients to ensure their growth, development, and productivity (Demirezen and Coşansu, 2005). The fundamental factor for maintaining good health is that individuals' intake of nutrient saligns with the amount of energy they expend (Özçelik 2021). Consuming more nutrients than necessary on a sedentary day or consumingless than required on a day with high energy expenditure is one of the factors that can adversely affect health (Baysal 2007). Health is associated with an individual's lifestyle (Kusan & Sabah, 2022). In order to establish a healthy society, individuals must have good health (Taşdelen 2021). To achieve this, individuals need to develop balanced and sufficient dietary habits from birth on wards (Uluç and Durukan 2021). However, recently, it can be said that individuals face certain issues related to healthy eating. This situation leads to various illnesses and negative impacts. In our era, the significant role of proper dietary habits in reducing or preventing many diseases such as obesity,

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[1]**ORC**ID: 0000-0001-9036-1835 , [1]**ORC**ID: 0000-0001-9439-1118

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cardiovascular diseases, diabetes, and hypertension is well recognized (Saygın et al. 2011).

In balanced nutrition habits, proper and diverse eating plays a pivotal role in ensuring the balanced intake of essential components such as fats and carbohydrates, as well as proteins that affect the formation of fundamental building blocks like muscles and tissues, required for daily energy consumption (Merdol et al. 2004; Şahin and Taş 2020). Individuals with good health contribute to forming a healthy society. Societies that are healthy are those free from anxieties about the future, peaceful, and physically fit. Individuals who have adopted a balanced nutritional routine and can lead a consistent, healthy life from birth on wards are defined as healthy individuals (Taşdelen 2021).

Nutrition is defined as maintaining lifelong healthy and appropriate physical performance by meeting age-specific, daily activity-related, and individualized nutritional needs, and implementing regular dietary strategies (Baysal 2003; Uluç and Durukan 2021). Healthy nutrition involves balanced and sufficient eating, ensuring the provision of necessary nutrients to the organism, and optimal nourishment (Aksayan 1998). Overeating, irregular meal timing, consuming snacks during non-meal hours, skipping meals, and suppressing hungerlead to adverse effects on the body (Namlı 2019).

In the existing literature, there are numerous studies related to healthy nutrition. Particularly noteworthy is the abundance of research conducted on university students. In this regard, the current research findings also possess the quality of supporting these studies. Adopting a healthy nutritional habit is of significant importance for all individuals, and this is especially pronounced among young individuals. It can be asserted that the healthy nutrition of young individuals, specifically university students, holds a crucial role in fostering a healthy and well-orderedsociety. In light of this information, the aim of this study is to examine the attitudes of university students at the undergraduate level towards healthy nutrition and, based on these results, to take the necessary measures for university students to acquire healthy nutritional habits.

MATERIALS AND METHODS

Design of Study

The study employed a quantitative research method with a descriptive survey design. Survey research aims to reveal the characteristic features of groups. Accordingly, the strength of this approach lies in obtaining responses to measurable variables and examining participants' responses to specific questions related to the trait to be measured (Neuman 2012).

Ethics Statement

For the implementation of the scales and the collection of data in the research, approval was obtained from the Ethics Committee for Social and Human Sciences Research of Ordu University with the decision dated 15/06/2022 and numbered 2022/158.

Study Group

The population of the study consists of university students enrolled in undergraduate programs at Ordu University during the academic year 2022-2023. The sample includes 275 university students who are enrolled in undergraduate programs at Ordu University and were selected randomly and voluntarily.

Data Collection Tools

In the study, 'Personal Information Form' and 'Attitude Scale Regarding Healthy Nutrition' were utilized. The personally developed personal information form by the researcher includes variables such as gender, residency status, and physical activity.

The Attitude Scale Regarding Healthy Nutrition, developed by TekkurşunDemir and Cicioğlu (2019), consists of 21 items forming 4 sub-dimensions. Items numbered 1, 2, 3, 4 and 5 pertain to knowledge about nutrition, items 6, 7, 8, 9, 10 and 11 relate to emotional aspects of nutrition, items 12, 13, 14, 15 and 16 signify positive dietary habits, and items 17, 18, 19, 20 and 21 represent poor dietary habits. The attitude scale concerning healthy nutrition, developed in 2019, follows a 5-point Likert scale. Items 6, 7, 8, 9, 10, 11, 17, 18, 19, 20, and 21 encompass negative statements within this scale. Positive attitude items are scored in reverse order: 1, 2, 3, 4, and 5; while negative attitude items are scored as 5, 4, 3, 2, and 1. The minimum score achievable from the scale is 21, and the maximum score is 105.

Analysis of Data

Prior to the data collection process in the study, participants were provided with information about the research. During this process, no time constraints were imposed. In order to assess the assumption of normality, skewness and kurtosis values were examined. For the analysis, the student's t-test was used to compare scale scores according to gender, while One-Way Analysis of Variance (ANOVA) and Tukey's multiple comparison test were employed for residency status and physical activity variables. SPSS 22.0 was utilized as the statistical software package for all statistical calculations. Research findings were presented as n (%), mean, and standard deviation values, and results were considered significant at the $p<0.05$ level.

RESULTS

In the research, 108 of the participants (39.3%) are female, and 167 (60.7%) are male students. Among the participating students, 9 of them (3.3%) are in the 1st year, 46 (16.7%) are in the 2nd year, 98 (35.6%) are in the 3rd year, and 122 (44.4%) are in the 4th year. When their residence status is examined, 154 of them (56%) live with their families, 80 (29.1%) live with their friends, and 41 (14.9%) livealone. Regarding their sports history, 93 of the participating students (33.8%) have no sports background, 160 (58.2%) have participated in sports as amateurs, and 22 (8%) have a professional sports background. It is observed that 39 students (14.2%) do not engage in physical activity, 176 (64%) engage in irregular physical activity, and 60 (21.8%) engage in regular physical activity (Table 1).

Table 1. Frequency and percent distributions of demographic characteristics of participating university students

Variables		n	%
Gender	Female	108	39,3
	Male	167	60,7
Residence Status	With my family	154	56,0
	With my friends	80	29,1
	Alone	41	14,9
Physical activity	I don't do	39	14,2
	Irregularly	176	64,0
	Regularly	60	21,8

Table 2. University students' attitudes towards healthy eating according to residence status variable

Sub-dimensions	Residence Status	n	Mean	Sd.	p
Information on Nutrition	With my family With my friends	154 80	20,88 20,71	2,81 2,93	0,767
	Alone	40	20,54	3,09	
Emotion for Nutrition	With my family	154	16,44	4,05	0,563
	With my friends	80	16,10	4,00	
	Alone	41	15,71	3,39	
Positive Nutrition	With my family	154	17,97	3,50	0,000
	With my friends	80	16,21	3,55	
	Alone	41	17,22	3,24	
Malnutrition	With my family	154	17,76	3,94	0,000
	With my friends	80	16,30	4,45	
	Alone	41	15,44	4,82	
Attitude Scale for Healthy Nutrition	With my family	154	73,05	8,90	0,000
	With my friends	80	69,39	9,72	
	Alone	41	69,90	6,85	

In the study, it has been determined that there is a significant difference in the total score of the attitude scale towards healthy eating, as well as the sub-dimensions of positive dietary habits and negative dietary habits, according to the variable of students' residence status (Table 2).

Table 3. University students' attitudes towards healthy eating according to gender variable

Sub-dimensions	Gender	n	Mean	Sd.	p
Information on Nutrition	Female	108	20,80	2,74	0,940
	Male	167	20,77	2,98	
Emotion for Nutrition	Female	108	15,72	3,79	0,070
	Male	167	16,59	4,01	
Positive Nutrition	Female	108	17,44	3,77	0,710
	Male	167	17,28	3,41	
Malnutrition	Female	108	17,04	4,21	0,880
	Male	167	16,96	4,39	
Attitude Scale for Healthy Nutrition	Female	108	71,00	8,91	0,590
	Male	167	71,60	9,16	

In the study, it has been determined that there is no significant difference in the total score of the attitudescale towards healthy eating according to the gender variable (Table 3).

Table 4. University students' attitudes towards healthy eating according to physical activity variable

Sub-dimensions	Physical activity	n	Mean	Sd.	p
Information on Nutrition	I don't do	39	19,85	2,72	0,000
	Irregularly	176	20,66	2,79	
	Regularly	60	21,73	3,01	
Emotion for Nutrition	I don't do	39	16,79	3,33	0,375
	Irregularly	176	16,00	3,84	
	Regularly	60	16,62	4,55	
Positive Nutrition	I don't do	39	15,77	3,50	0,000
	Irregularly	176	17,16	3,39	
	Regularly	60	18,92	3,50	
Malnutrition	I don't do	39	15,72	4,28	0,040
	Irregularly	176	17,45	4,15	
	Regularly	60	16,45	4,63	
Attitude Scale for Healthy Nutrition	I don't do	39	68,13	7,67	0,010
	Irregularly	176	71,28	8,72	
	Regularly	60	73,72	10,23	

In the study, it has been determined that there is a significant difference in terms of nutrition knowledge, sub-dimensions of positive dietary habits and negative dietary habits, as well as the total score of the attitudescale towards healthy eating according to the variable of students' physical activity (Table 4).

DISCUSSION

This research was conducted to examine university students' attitudes towards healthy eating. A total of 275 students participated voluntarily in the study, including 108 females and 167 males, who were enrolled at Ordu University. In recent years in Turkey, the rate of scientific studies and activities related to healthy eating has increased due to the rising obesity rates. It is crucial for scientific research to have an informative aspect for the society. In addition to some studies serving this purpose (Göral and Yıldırım 2022; Sargın and Güleşçe 2022; Özenoğlu et al. 2021; Gürsoy Coşkun and Atmaca Demir 2021; Kırkbir 2020), this research aims to determine attitudes towards healthy eating and examines certain variables (gender, residence status, and participation in physical activity). Sub-dimensions of the attitude scale towards healthy eating and the total scale score, along with the variables of residence status and participation in physical activity, were analyzed for statistically significant differences in the research. Statistically significant differences were identified in the sub-dimensions and total scale score of the attitude scale towards healthy eating, as well as in residence status and participation in physical activity variables. However, no significant difference was found in the gender variable.

When examined according to the gender variable, no significant differences are observed in the sub-dimensions and total scale score of the attitudescale towards healthy eating. It can be said that gender does not have an impact on healthy eating. When the literature is reviewed, Ünalan et al. (2009), Çakır and Coşkuntürk (2022), and Uluç and Durukan (2021) show dissimilarity in their study results, while Süel et al. (2006) and Yılmaz et al. (2021) have congruent findings.

In a study conducted by Özenoğlu et al. (2021) to determine the nutrition literacy of adult individuals and examine its relationship with body mass index in terms of attitudes towards healthy eating, a significant difference in the emotional sub-dimension towards nutrition was found in favor of men, whereas a significant difference in the knowledge sub-dimension was found in favor of women. No significant difference was detected in the sub-dimensions of positive and negative dietary habits in terms of gender. Bıdıl (2020), in a study using the attitude scale towards healthy eating, did not find any significant differences between sub-dimensions and gender. This situation is thought to be related to both young minds having equal access to information regardless of gender and the direct influence of technological advancements.

In the study, significant differences were identified in the sub-dimensions of negative dietary habits, positive dietary habits, and the total score of the attitudescale towards healthy eating according to the variable of residence status. The analysis revealed that students living with their families had Higher mean scores compared to others. This findings suggests that students' eating habits are positively influenced by being with their families. However, it can also be said that students have not completely abandoned negative dietary habits. When reviewing the literature, it is observed that the results of the present study do not coincide with the findings of Ünalan et al. (2009). In the study, significant differences were found in the sub-dimensions of nutrition knowledge, negative dietary habits, positive dietary habits, and the total score of the attitude scale towards healthy eating according to the physical activity variable. According to the obtained findings, students who engage in regular physical activity have higher mean scores in terms of nutrition knowledge, positive dietary habits sub-dimensions, and the attitude scale towards healthy eating compared to others. However, for the sub-dimension of negative dietary habits, students engaging in irregular physical activity have higher mean scores. This result indicates the positive impact of exercise and sports on eating habits.Healthy eating can be considered a mandatory aspect of human life. Otherwise, problems may arise concerning societal order and the future of humanity. The present study examines university students' attitudes towards healthy eating. In this regard, having positive attitudes towards healthy eating among young individuals and university students can contribute to the advancement of society. When reviewing the study results, it can be concluded that students Generally exhibit positive attitudes towards healthyeating and acknowledge the potential benefits of engaging in sports. However, some negative dietary habits are also observed. This could potentially be attributed to the influence of socializing among university students. Directing university students towards sports is believed to

have a positive impact on fostering healthy eating habits. In conclusion, the adoption of healthy eating habits by university students is likely to yield positive outcomes for their academic achievements. Additionally, conducting activities and meetings related to healthy eating within the university campus for students would also be significant.

Conflict of Interest

No conflict of interest is declared by the authors. In addition, no financial support was received.

Ethics Statement

In order to ensure ethical compliance of the research, approval was obtained from the Ordu University Ethics Committee by submitting an application. The ethical approval was granted on 15/06/2022 under the reference number 2022-158. Participants were provided with explanations about the research by the researchers, and written and verbal consent was obtained, stating that the data obtained from the research would be used solely for scientific purposes and confidentiality would be maintained.

Author Contributions

Study Design, HAÇ, YA; Data Collection, YA; Statistical Analysis, HAÇ; DataInterpretation, YA, HAÇ; Manuscript Preparation, YA, HAÇ; Literature Search, YA, HAÇ. All authors have read and agreed to the published version of the manuscript.

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RESEARCH ARTICLE

Investigation of the Effects of Circuit Training in Unit Training in Wrestlers Aged 11-13

Serkan DAĞDELEN[1] and Alişan YAVUZ[2*]

[1]Akdeniz Üniversitesi, Sports Science Faculty, Department of Movement and Training, Antalya / Turkey
[2]İstanbul Yeni Yüzyıl Üniversitesi, Sports Science Faculty, Recreation Management Department, İstanbul / Turkey
*Corresponding author: alisan.yavuz@yeniyuzyil.edu.tr

Abstract
The aim of this research is to examine the effect of circuit strength training applied to wrestlers aged 11-13 on body composition and fluid balance in unit training. 20 male wrestling athletes with an average age of 11.44±1.15 years and an average height of 147.45±11.68 cm, who regularly perform their training in Davraz Sports Club and participate in circuit strength training at least once in these trainings, voluntarily participated in our research provided. Body composition values of the athletes were performed with the Inbody-720 bioelectrical impedance analyzer in accordance with the test protocols.Pre-post test measurements of body weight, total body water, body fat weight, protein, mineral, body fat ratio, BMI, skeletal muscle weight, visceral fat level, waist-hip ratio and in-body score of the athletes participating in our research were performed.In our study, there was no statistically significant difference in body fat weight, total body water, body fat ratio, protein, mineral, skeletal muscle weight, visceral fat level, BMI, in body score ($p>0.05$), but waist hip ratio. and body weight values were found to be significantly different ($p<0.01$). As a result of our study, it was determined that circuit strength training applied to wrestlers between the ages of 11-13 had positive effects on some body parameters measured by Bioelectrical Impedance technology and statistically significant changes occurred.

Keywords
Wrestling, Circuit, Training, Inbody

INTRODUCTION

Wrestling sports are mostly used anaerobic energy sources, strength, speed, endurance, coordination, flexibility, experience, etc. It is a combat sport where factors directly affect performance (Akgün, 1992; Akyüz, 2009; Aydos et al. 2009; Cisa et al. 1987; Johnson and Cisar, 1987).

Wrestling is the struggle of two athletes against each other by using their maximal performances within a certain period of time without using equipment and tools, without going out of the field, and bringing the opponent's back to the ground (Açak et al. 1997). In wrestling, very quick and sudden movements are made in a short time. For this reason, aerobic power and anaerobic power are very important in wrestling. Success in wrestling mostly depends on body strength. The strength of the athlete is of great importance in defense and attacking the opponent.

At the same time, it is important in countering the opponent's technique and applying the tactical technique against it (Agaoglu et al. 2010).The aerobic and anaerobic capacities, strength, speed, flexibility and endurance characteristics of wrestlers directly affect their performance, and in order to achieve success, these

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[1]**ORC**ID: 0000-0002-0139-051X , [1]**ORC**ID: 0000-0003-0842-3123

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characteristics must be reached to higher levels with appropriate training programs.Therefore, branch-specific strength training programs should be applied starting from childhood, taking into account the developmental periods, physiological and mental characteristics (Bağcı, 2016). The strength factor is one of the basic biomotoric characteristics of the athlete, and it is the ability to move a mass, overcome resistance or counteract with muscle power by voluntary contraction of the muscles. Strength is of great importance in revealing the sportive efficiency at the highest level and preventing possible injuries (Hatfield et al. 2006). The type of training called "Circuit-Training" in the field of sports sciences is expressed as circular training in our country.

Circular training consists of time-limited exercises performed one after the other, with different rest periods between exercise stations, transitioning to the next after each exercise station (Gambetta, 2004). Circuit training method is a training method that is carried out to increase the performance of the conditional properties and the performance of the strength continuity feature (Scholich, 2011). Circuit training; It is a form of conditioning training that includes endurance, strength, high-intensity aerobics and exercises similar to interval training. Strength development targets strength and muscular endurance. One set includes the completion of all set exercises in the "Circuit training" program. Once a set is complete, start again with the first exercise for the next set. Traditionally, the time between exercises in circuit training is short. This program was developed by RE Morgan and GT Anderson in 1953 at the University of Leeds in England (Shekhawat and Chauhan, 2021).

Circuit training is used to stimulate increases in muscle size and strength, as well as improvements in local endurance and aerobic system. However, the loads used during circuit training have been kept low to allow a greater amount of work to be done and to develop qualities important to wrestlers such as strength, speed, power and quickness (Hermassi et al. 2019; Zeraatgar et al. 2022). Due to its changing nature and high tempo, the effects of circuit training on the body are different from normal training. Circular training is an exceptional type of training because it prepares the body in a versatile way, regulates body composition and prevents injuries. Maximum performance is achieved in the shortest time by using time efficiently in circuit training. In this context, this training method is widely used due to the effective use of time and light loads (Baechle and Earle, 2000). Body composition parameters are the determining factor in the evaluation of athlete performance. Fat mass in the body has a variable structure, and there is a close relationship between lean mass and height. Fatty masses do not take part in the production of ATP, they prevent movement in the muscles and cause a lot of energy expenditure. For this reason, fatigue occurs quickly and a decrease in the performance of the athlete is observed. In athletes, body lean mass should be high and fat mass should be low (Malina and Geithner, 2011; Özer, 2009; Şenel et al. 2009).

Body composition parameters are of great importance for the evaluation of general health and athlete performance. A large number of measurement and analysis methods have been developed to analyze and examine these values. At the beginning of these techniques and methods is the Bioelectrical Impedance method, which is frequently used (Luque et al. 2014). Determining the muscle cell values of fat, organic substances, bone, intracellular and extracellular fluids that make up the components of the body, observing and evaluating the differences are directly related to general health and the performance of the athlete (Stewart and Sutton, 2012). BIA method; Since it is a safe, inexpensive, fast and effective analysis method, it is widely used by doctors in examining the body composition of patients (Mollaoğlu et al. 2006; Özçetin et al. 2017).

With electrical current, impedance is determined and by formulating the impedance value, body fat percentage (%), body fat value, lean body percentage value, lean body mass, amount of water in the body, body water percentage, extracellular and intracellular fluid values are determined. (Aydın, 2004; Sifîl et al. 2001). BIA analysis method is used safely in determining and examining body composition in children, young people, adults and the elderly, that is, in all age categories. BIA method gives reliable results in all healthy individuals with BMI values in the range of 16-34 kg/m2 without any abnormalities in fluid balance or body (Norman et al. 2012). Validity and reliability studies were carried out in literature studies, and it was reported that accurate results were obtained from BIA analyzes (Brantlov et al. 2017). The aim of this

study is to examine the effect of circuit strength training applied to wrestlers aged 11-13 on body composition and fluid balance in unit training.

MATERIALS AND METHODS

Study Design

20 male wrestling athletes, whose average age is 11.44±1.15 years and average height is 147.45±11.68 cm, who regularly perform their training at Davraz Sports Club and participate in circuit strength training at least once in these trainings, voluntarily participated in our research. Body composition values of the athletes were performed with the Inbody-720 bioelectrical impedance analyzer in accordance with the test protocols. Body weight, total body water, body fat weight, protein, mineral, body fat ratio, BMI, skeletal muscle weight, visceral fat level, waist-hip ratio and in-body score pre-post-test measurements of the athletes participating in our study were performed respectively.

Data Collection

The study was started after the approval of the Süleyman Demirel University Clinical Research Ethics Committee and the permission of the relevant persons and institutions. All participants gave their written informed consent, and our study was carried out following the Helsinki Declaration. The motivation of the subjects was tried to be increased by explaining the purpose and importance of the study. Before starting the test, the subjects were asked to meet their toilet needs, and the subjects did not go to the toilet during the training. The amount of water consumed by the athletes during the training was recorded as liters (lt). Body composition measurements were carried out by recording the personal information of the subjects before the training. Then, the circuit strength training in Table 1. was applied, and the measurements were repeated at the end of the training.

Bioelectrical Impedance Analysis (Inbody-720) measurements: Before starting the measurements, the importance and purpose of the study were explained to the athletes and their motivation levels were increased. Body composition analyzes of the subjects were performed with a bioelectrical impedance (Inbody-720) device with a sensitivity of 0.01 kg. Following the instructions in the user manual, personal information (age, gender, height) was loaded into the device and measurements were started. Subjects were allowed to step into the device by wearing light clothing, removing metal objects, socks and shoes. During the measurements, the athletes were asked to place the heels of their hands and feet on the electrodes. The measurement was carried out by holding the handles connected to the electrode on the device by the athletes during the measurement period. The device calculated information about electrical potential and body weight, body mass index, mineral, total water amount, protein and basal metabolic rate and collected the data of the results in computer environment.

Training Program

Table 1. Circuit training program

20 Min. General Warming Up
• Flat jogging around the mat, warm-up exercises in educational game format - fishing net game • Movements that train the main joints while running at a light tempo. • Injury prevention gymnastic exercises; somersaults and cushion movements • Short sprint output exercises with command
45 Min. Circuit Training
• 10 stations (push-ups, piolet, sit-ups, pull-ups, reverse sit-ups, squat thrusts, jump rope, rope climbing, free squat, medicine ball throwing) • 10 repetitions for each exercise, intensity 50-70%, working time 30 sec., rest 45 sec. • 3 sets, 3-5 minutes rest between sets
Cooldown- Finish
• 10 min (final exercises in educational game format - wheelbarrow game) • 5 minutes stretching cool-down

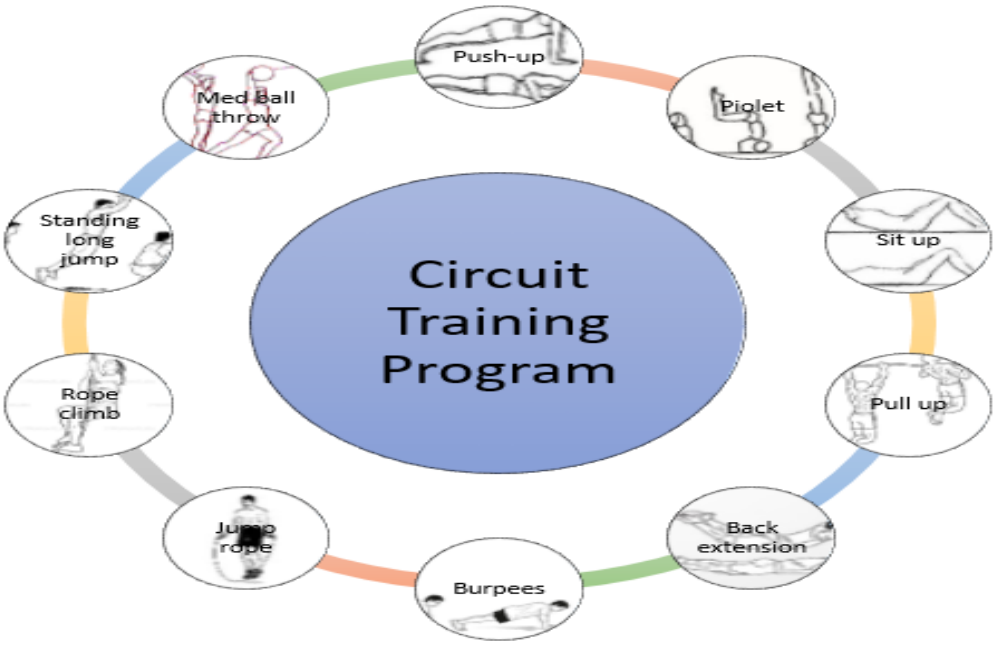

Figure 1. Circuit Training Program Application

Statistical Analysis

Statistics 26.0 and Excel programs were used in the analysis of the obtained data. After performing the Kolmogorov-Smirnov test to determine the distribution of all values, it was determined that the distribution was at a normal level and it was decided to perform analyzes in parametric tests. Paired Sample T-Test was used to analyze the pre-test and post-test data of the subjects. The significance level of the measurements in the interpretation and evaluation of the differences was determined as $p<0.01$ and $p<0.05$.

RESULTS

The findings obtained as a result of the statistical analyzes of the obtained data are as follows.

Table 2: Descriptive Data of Athletes

Group (20 male)	$\overline{X}$	**Ss**
Height (cm)	147.45	11.68
Age (year)	11.44	1.15

Table 3: Examination of Pre- and Post-Test Body Composition Values of Athlete

Test	**Uygulama**	**n**	$\overline{X}$	**Ss**	**t**	**p**
Total Body Water (kğ)	Pre-test	20	24.60	6.96	-.549	0.589
	Post-test	20	24.65	6.96		
Protein (kğ)	Pre-test	20	6.60	1.88	-.400	0.694
	Post-test	20	6.61	1.89		
Mineral (kğ)	Pre-test	20	2.28	0.65	0.584	0.566
	Post-test	20	2.26	0.63		
Body Weight (kğ)	Pre-test	20	41.08	14.33	7.646	0.000**

	Post-test	20	40.68	14.18		
Skeletal Muscle Weight (kğ)	Pre-test	20	17.91	5.69	-.859	0.401
	Post-test	20	17.98	5.70		
Body Fat Weight (kğ)	Pre-test	20	7.60	6.38	0.080	0.937
	Post-test	20	7.59	6.47		
BMI (kğ/m2)	Pre-test	20	18.34	4.01	-2.032	0.056
	Post-test	20	18.39	3.96		
Body Fat Ratio %	Pre-test	20	16.43	9.06	0.184	0.856
	Post-test	20	16.39	9.34		
In Body Score /100	Pre-test	20	77.20	4.70	0.000	1.000
	Post-test	20	77.20	4.91		
Waist Hip Ratio	Pre-test	20	0.77	0.04	-10.466	0.000**
	Post-test	20	0.80	0.04		
Visceral Fat Level	Pre-test	20	2.75	2.71	-1.000	0.330
	Post-test	20	2.85	2.87		

When the data in Table 3. is examined; While no statistical difference could be detected in body fat weight, total body water, body fat ratio, protein, mineral, skeletal muscle weight, visceral fat level, BMI, in body score ($p>0.05$), waist hip ratio and body significant difference was found in weight values ($p<0.01$).

DISCUSSION

Wrestling is an individual sport branch that includes repetitive and explosive maneuvers in which the anaerobic power of the lower and upper extremities, which is a strong determinant of performance success, is transferred to the kinetic chain (Dehnou et al. 2020). In our study, there was no statistical difference in total body water, protein, mineral, skeletal muscle weight, BMI, body fat ratio, body fat weight, in-body score and visceral fat level data ($p>0.05$), but body weight and waist-hip statistically significant difference was found in the rate data ($p<0.01$). It depends on the most efficient development of motoric features, which is the most important element in achieving successful results in sports and in the continuity of performance. The basis of motoric features is innate and increasing the performance of these features occurs with sports (Akçakaya, 2009). Wrestling is a sport branch in which intermittent exercises are performed for muscle strength performance in the upper and lower parts of the body (Bal et al. 2018). In addition to the exercises performed at the maximal or submaximal level, statistically significant differences were determined in the BIA analysis measurements performed before and after the exercise performed in the aerobic system in the literature studies, in body composition values such as body weight, muscle mass, body fat ratio, fluid amount, body fat percentage data. Similarity was detected (Babur et al. 2020; Cutrufello et al. 2016; Romanowski et al. 2015; Yavuz and Dağdelen 2021). Wrestling is a sport branch that is competed in weights depending on the kilogram, and therefore, athletes need to lose or gain significant weight in a short period of time close to the competitions. This situation, therefore, directly affects body composition and causes changes on body parameters (Oppliger and Bartok, 2002). The body composition of the athlete informs the trainers about the physiological structure of the individual, and the body components of an adult consist of 60% water, 15-20% fat, 16% protein, 4-5% minerals (Kehayias et al. 1997).

Studies have shown that the exercises applied in circular training increase the amount of fat burned. In strength training where large muscle groups are exercised, less rest between sets provides aerobic and metabolic benefits. At the same time, when comparing traditional aerobic training with circular training, it was determined that high-intensity circular training was more effective on fat burning. The short listening time between each station also ensures that the total exercise time is short. Circuit training program has been reported to be an ideal training program for

individuals who want to maximize their performance as soon as possible (Klika and Jordan, 2013). Teo et al. (2014) stated that the development of body fat structure in adolescent boys is different than in girls, therefore the level of physical activity is higher than in girls. In addition, the body weight, height, waist circumference and waist-hip ratio of adolescent boys were higher than girls, as expected; They reported that the total body fat percentage in girls was higher than in boys, as we found in our study.

Another study in which the Circuit training program was applied to school-age children found that total body fat and resting systolic blood pressure were significantly lower, while cardiorespiratory fitness significantly improved only in the training group ($P<0.05$), while Body Mass Index and total body fat percentage in the control group significantly increased compared to the period before and after the intervention (Giannaki et al. 2015). It has been reported that circuit training, in which lighter loads are lifted with minimal rest, increases MaxVo2, maximum pulmonary ventilation, conditioning capacity, strength and power, while reducing body fat and improving body composition (Camargo et al. 2008; Gettman et al. 1979; Harber et al. 2004; Monteiro et al. 2008).

In their study on the effects of the circular training program on the muscular and cardiovascular endurance and maintenance of school-age children aged 10-12, it was shown that the circular training program was effective in increasing and maintaining both muscular and cardiovascular endurance among schoolchildren (Mayorga-Vega et al. 2013). Ramos-Campo et al. (2021), as a result of their meta-analysis on 45 studies, determined that resistance-based circular training led to an increase in muscle mass (1.9%) and a decrease in fat mass (4.3%) and it is an effective method for improving the strength of the lower and upper limbs. In a recent study by Yoon and Moon (2018), significant changes occurred in body composition such as body weight, body fat, body fat percentage, BMI, and cardiorespiratory endurance, muscle strength, and muscular endurance through a circular training program. Lee et al. (2009), a circular training program using resistance exercise has been shown to be effective in improving body composition, flexibility, muscle strength, and muscular endurance. As a result, it was determined in the study that circuit strength training applied to wrestlers between the ages of 11-13 had positive effects on some body parameters measured by the Bioelectrical Impedance system and positively affected body composition.

Conflict of Interest

No conflict of interest is declared by the authors. In addition, no financial support was received.

Ethics Statement

For this study, the permission of the Faculty Ethics Committee was obtained from the Clinical Research Ethics Committee of Süleyman Demirel University Faculty of Medicine. (Approvel Nummer: 72867572-050. 01. 04 – 400922.

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Author Contributions

Study Design, SD; Data Collection, AY; Statistical Analysis, SD; Data Interpretation, AY; Manuscript Preparation, AY, SD; Literature Search, SD, AY. The published version of the manuscript has been read and approved by all authors.

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RESEARCH ARTICLE

Determination of Post-Earthquake Trauma Levels of University Students

Gökhan DOKUZOĞLU[1*] and Gamze ÜNALDI[2]

[1]Ministry of Education, Aydın /Türkiye
[2]Artvin Çoruh University, Faculty of Sports Science, Artvin / Türkiye
*Correspondingauthor: gkhndkz9@gmail.com

Abstract
Objective: The aim of this study is to evaluate the post-earthquake trauma levels of young people exposed to earthquake and to examine the effect of recreational sports activities on their social, physical and psychological recovery. **Method:** The study will focus on 10 provinces, Kahramanmaraş, Gaziantep, Hatay, Adıyaman, Adana, Osmaniye, Diyarbakır, Kilis and Şanlıurfa, which were affected by the earthquake disaster centered in Kahramanmaraş. A sample group of 275 people from Artvin Çoruh University will voluntarily participate in this study. Trauma level assessment scale and personal information form will be used to collect data. The research was evaluated at the $p<0.05$ confidence interval. **Result:** The findings of the study show that there is a significant difference between the excitement limitation and affective configuration sub-dimension of the post-earthquake trauma symptoms scale and the gender variable, and that there is a significant difference between the sleep problem dimension and the class variable ($p <0.05$). **Conclusion**: As a result, it is seen that the participants' behavioral problems, emotional limitation, affective structuring and scale total scores are at high levels, while their cognitive structuring and sleep problems are at medium levels.

Keywords
Earthquake, Trauma, Post-Earthquake Trauma Symptoms, University Students

INTRODUCTION

Trauma is a situation that occurs as a result of exposure to an event that threatens or significantly threatens an individual's life and can lead to the development of psychological stress disorder as defined by the American Psychiatric Associationin 2013. Another definition characterizes trauma as anegative impact. Accordingtothe World Health Organizationin 2018, it results from an event that endangers thelives of individuals or others or has the potential to cause serious injury. Trauma is usually the result ofa catastrophic event that can seriously disrupt daily life, such as natural disasters, accidents, attacks orwars. It is psychological trauma that particularly affects the mental health of the individual. This situation has revealed anxiety, which is expressed as the feeling of fear felt by individuals (Güler and Cicioğlu, 2021).

As a result, trauma behaviors can be observed in individuals. As stated in Aykut and Soner-Aykut's (2020) study, the negative effects of trauma can affect the psychological, social, economic and physiological health of the individual. According to the American Psychiatric Association (2013), the National Institute of Mental Health (2021) and the World Health Organization (2018), individuals are prone to experience fear, anxiety, sleep and mood disorders following a traumatic event. Inaddition research has shown that post traumatic stress disorder resulting from

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[1]**ORC**ID: 0000-0001-5407-4927 , [2]**ORC**ID: 0000-0001-7412-6798

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exposure to trauma has a negative impact on an individual's overall quality of life (Carlssonetal. symptoms such as depression, anxiety and stress, as Sabuncuoğlu et al. (2003) and Uğur et al. (2021). In some cases, posttraumatic stress disorder has been observed (Bedirli, 2014; Hacıoğlu et al.,2002) and a decrease in general well-being has been reported (De & Thamarapani, 2022). Tanhan and Kayri (2013) classified traumatic eventsintwo stages: acute and post traumatic period. The first phase of an individual after experiencing a traumatic event is known as the acute phase, which covers the first thirty days. During this period, clinical symptoms such as dissociation and anxiety arefrequently encountered. In addition to these, the individual may feel helpless, frightened, angry, guilty, extremely restless and may have trouble concentrating. They may try to avoid situations that remind them of the trauma or attempt to escape, and may experience physical discomfort. During this time, it is common for people to constantly replay the traumatic event in their minds. These symptoms are expected to resolve within thirty days. The post-traumatic period lasts for more than a month and is characterized by an exaggerated startle response, constant alertness, sleep disturbances, inability to concentrate and outbursts of anger. Negative thoughts about oneself and others and frequent dreams about the event may also occur during this period (Psychiatry Association, 2013). On February 6, 2023, two earthquakes measuring 7.7 and 7.6 on the Richter scale occurred in Pazarcıkand Elbistan districts of Kahramanmaraş, causing heavy damage in 11 cities in the region. As stated by Maslow (1943) in hihierarchy of needs, thewell-being of individuals is and safety levels after an earthquake. According to published statistics, more than 50,000 people losttheir lives, while 307,000 buildings and 893 separate areas were destroyed, affecting around 14 millionpeople. Following such a devastating disaster, individuals may exhibit post-traumatic symptoms due tothe threat to their basic needs for safety, such as shelter. These symptoms may manifest them selves as cognitive, mood, emotional, behavioral and sleep difficulties (Tanhan & Kayri, 2013). According to Sönmez (2022), depression, anxiety, sleepdisorders, 2006). Psychological research has also revealed that exposure to trauma can cause various physicalsymptoms, dissociation and sexual dysfunctions are potential effects of experiencing an earthquake. The relationship between psychological resilience and posttraumatic stress symptoms was examined by Sakaryaand Güneş (2013) in individuals who experienced the Van earthquake, and post traumatic stress symptoms such as avoid ance, reliving, and dysphoria increased, while resilience decreased. Ayas (2005) also examinedthe psychological symptoms of children living in the earthquake zone 42 months after the Marmara earthquake on August 17, 1999. Significant differences were found between endersinterms of phobic anxiety, eatingand sleep disorders. The2020 Elazığ earth quake was the subject of as tudy by Taşçıand Özsoy (2021) and it was found that in dividuals who directly experienced the earthquake had significantly higher Peritrauma Dissociation Scale and PTSD scores than those without the Checklist. These symptoms may make it difficult forpeople to continue their daily routines and may also negatively affect their capacity to cope with the traumatic experience. Inthis context, the study aimed to answer the following questions:

1. Is there are lationship between the sub-dimensions of post-earthquake trauma levels according tot he gender of the students?
2. Is the rearelationship between the sub-dimensions of post-earthquake trauma levels according to the department of the students?
3. Is the rearelationship between the sub-dimensions of post-earthquake trauma levels according to the class of the students?

MATERIALS AND METHODS

Ethical Permission

Before proceeding with the data collection phase of this study, ethical permission was obtained from Artvin Çoruh University Ethics Committee, dated 03.04.2023 and numbered E-18457941-050.99-87288. Before the study, all individuals were informed about the study and an'Informed Consent Form' was signed. Our study was conducted in accordance with the Principles of the Declaration of Helsinki.

Research Model

According to Karasar (2009), the research was conducted within the scope of the general survey model, which tries to reveal the situations as they are.

Working Group

The study group consisted of 378 students studying at Artvin Çoruh University who were affected by the earthquake in Kahramanmaraş. Convenient sampling method was used when creating the research group. In the selection process of the study group, the density of the student population in various faculties such as Education, Theology, Fine Arts, Engineering, Literature, Medicine, Veterinary Medicine, Economics and Administrative Sciences and Fan faculties were taken into consideration. The study group was selected from students studying at School of Physical Education and Sports, Faculty of Education, Faculty of Health Sciences, Faculty of Arts and Sciences and Faculty of Forestry.

Data Collection Tools

The Post-Earthquake Trauma Level Detection Scale (PTSDI) (Tanhan & Kayri, 2013) and the participant information form prepared by the researchers were used to collect data in the study. The internal consistency coefficient (Cronbach Alpha) of the scale developed by Tanhan and Kayri (2013) to measure the stress levels experienced by individuals after the earthquake was found to be 0.88. These values confirm the reliability of the measurement tool. The scale consists of 20 items and 5 dimensions.

Data Collection Process

For the data collection phase of the study, the questionnaires were handed out, filled in and collected again. In addition, the participants were informed that they would voluntarily participate in the study by explaining the purpose of the study and that the results would not be shared with others.

Data Analysis

The data obtained in the study were analyzed using SPSS 22.0 program. Numbers, percentages, means and standard deviations were used as descriptive statistical methods for data evaluation. In the normal distribution of the data, kurtosis and skewness coefficients were checked and found to be within ±2 values. According to this result, it can be determined that the data fit the normal distribution (George & Mallery, 2003). A t-test was used to compare quantitative continuous data between two independent groups and one- way ANOVA was used to compare quantitative continuous data between more than two independent groups. The Tukey test was used as a complementary post hoc analysis to identify differences after the ANOVA test.

RESULTS

The findings obtained from the statistical analyses conducted within the scope of the study are explained in tables under this heading.

Tables should be numbered and the title of the table should be written in 12 pt. Table title should According to Table 1, the majority of the students participating in the study were female students (53.8%), the highest number of participants in the department variable was School of Physical Education and Sports students (51.3%), and the highest number of participants in the class variable was 3rd grade.

Table 1. Descriptive statistics of the study group

		Frequency	Percent(%)
Gender	Woman	148	53,8
	Male	127	46,2
Section	School of Physical Education and Sports	141	51,3
	Facultyof HealthSciences	103	37,5
	Facultyof Education	22	8,0
	Facultyof Science andLetters	7	2,5
	Facultyof Forestry	2	0,7
Classroom	1st grade	25	9,1
	2nd grade	31	11,3
	3rdgrade	121	44,0
	4thgrade	98	35,6

According to Table 2, it is seen that the participants' behavioral problems, excitability, affective structuring and scale total scores are at high level, while cognitive structuring and sleep problems are at medium level.

Table 2. Descriptive values for the scales

Variables	$\bar{x}$	SD	Kurtosis	Skewness
BehaviorProblems	12,96	2,46	-,456	1,091
ExcitementLimitation	19,54	3,50	-,309	-,254
AffectiveConfiguration	12,78	2,02	-,004	-,476
CognitiveConfiguration	11,58	3,44	,026	-,708
SleepProblems	8,27	3,21	-,439	-,978
DSTDBÖ	61,96	12,17	-,456	-,405

According to Table 3, while there were significant differences in the emotional irritability and emotional configuration sub-dimensions in evaluating the degree of post-earthquake trauma ($p<0.05$), there was no possible difference in the other sub-dimensions ($p >0.05$). The study revealed that this difference determined by the emotional structure and emotional configuration sub-dimensions was in favor of women, whose average expectations were higher than those of men.

Table 3. t-test results regarding the sub-dimensions of post-earthquake trauma level of students according to gender

Alt Dimensions	Gender	N	$\bar{x}$	ss	t	p
Behavior Problems	Woman	148	13,01	2,64	,31	,75
	Male	127	12,91	2,25		
Excitement Limitation	Woman	148	16,61	2,95	1,92	,02*
	Male	127	15,91	3,10		
Affective Configuration	Woman	148	13,12	2,42	2,11	,02*
	Male	127	12,51	2,36		
Cognitive Configuration	Woman	148	11,85	3,22	1,36	,17
	Male	127	11,28	3,68		
Sleep Problems	Woman	148	8,33	2,94	,30	,76
	Male	127	8,21	3,52		
DSTDBÖ	Woman	148	62,92	11,64	1,42	,15
	Male	127	60,83	12,71		

*p<0.05

When Table 4 is examined, no significant difference was observed in the post-earthquake trauma levels of the participants according to the department of education variable.

Table 4. ANOVA Test results for the sub-dimensions of post-earthquake trauma level according to the department of the students

Sub Dimensions	Section	N	$\bar{x}$	ss	F	p
Behavior Problems	School of Physical Education and Sports	141	13,02	2,27	,57	,68
	Faculty of Health Sciences	103	12,77	2,72		
	Faculty of Education	22	13,60	2,20		
	Faculty of Science and Letters	7	12,71	2,50		
	Faculty of Forestry	2	12,50	6,36		
Excitement Limitation	School of Physical Education and Sports	141	16,45	2,98	1,50	,20
	Faculty of Health Sciences	103	16,20	2,83		
	Faculty of Education	22	15,73	4,06		
	Faculty of Science and Letters	7	17,29	2,69		
	Faculty of Forestry	2	12,00	4,24		
Affective Configuration	School of Physical Education and Sports	141	13,07	2,24	1,13	,34
	Faculty of Health Sciences	103	12,61	2,47		
	Faculty of Education	22	12,18	2,94		
	Faculty of Science and Letters	7	13,57	1,81		
	Faculty of Forestry	2	13,00	5,65		
Cognitive Configuration	School of Physical Education and Sports	141	11,73	3,45	,31	,87
	Faculty of Health Sciences	103	11,52	3,41		
	Faculty of Education	22	11,32	3,40		
	Faculty of Science and Letters	7	11,14	4,41		
	Faculty of Forestry	2	9,50	4,95		
SleepProblems	School of Physical Education and Sports	141	8,49	3,20	,60	,66
	Faculty of Health Sciences	103	8,19	3,18		
	Faculty of Education	22	7,73	3,17		
	Faculty of Science and Letters	7	7,43	4,20		
	Faculty of Forestry	2	6,50	4,95		
DSTDBÖ	School of Physical Education and Sports	141	62,77	11,72	,54	,70
	Faculty of Health Sciences	103	60,54	12,73		
	Faculty of Education	22	53,50	26,16		
	Faculty of Science and Letters	7	61,30	12,47		
	Faculty of Forestry	2	62,14	13,27		

When Table 5 is examined, a significant difference was found in the post-earthquake trauma levels of the participants according to the class variable in which they were educated, and according to the result of the Post Hoc Test for the determination of the source of the difference, it was found that the relevant difference was between the 2nd and 4th grades and the 3rd grade

Table 5. ANOVA Test results for the sub-dimensions of post-earthquake trauma level according tostudents'grades

Sub Dimensions	Classroom	N	$\bar{x}$	ss	F	p	Bonferonni
Behavior Problems	1st grade	25	12,92	3,24	1,57	,20	-
	2nd grade	31	12,71	2,30			
	3rd grade	121	12,69	2,12			
	4th grade	98	13,39	2,66			
Excitement Limitation	1st grade	25	16,08	3,15	,16	,92	-
	2nd grade	31	16,61	3,06			
	3rd grade	121	16,26	3,34			
	4th grade	98	16,28	2,62			
Affective Configuration	1st grade	25	12,52	2,28	,52	,67	-
	2nd grade	31	12,48	2,50			
	3rd grade	121	12,87	2,46			
	4th grade	98	13,00	2,36			
Cognitive Configuration	1st grade	25	11,96	4,21	,53	,66	-
	2nd grade	31	12,06	3,21			
	3rd grade	121	11,33	3,55			
	4th grade	98	11,66	3,18			
Sleep Problems	1st grade	25	8,88	3,69	3,31	,02 *	2,4>3
	2nd grade	31	9,03	2,69			
	3rd grade	121	7,60	3,32			
	4th grade	98	8,71	2,99			
DSTDBÖ	1st grade	25	62,36	15,09	,71	,54	-
	2nd grade	31	62,90	11,47			
	3rd grade	121	60,76	12,38			
	4th grade	98	63,04	11,33			

DISCUSSION

On February 6, 2023, the earthquake, which deeply affected 13 provinces in our country, negatively affected individuals in many ways. As a result of these negativities, our research aims to determine the post-earthquake trauma levels of university students exposed to earthquake and to reveal the effect of recreational sports activities on their social, physical and psychological recovery.

Our study revealed that university students who experienced earthquakes had high levels of post-earthquake trauma. A possible explanation for this may be the occurrence of two major earthquakes in Kahramanmaraş on the same day, followed by a 6.4-magnitude earthquake in Hatay's Defne district and the continuation of aftershocks. According to Çelik (2023), participants who experienced the earthquake in Pazarcık and Elbistan districts of Kahramanmaraş also showed high levels of post-earthquake trauma symptoms. Abolhadi et al. (2022) conducted a study almost 20 years after the earthquake and reached a similar conclusion that the participants had high levels of post-earthquake stress. In addition, Baral and Bhagawati (2019) concluded that individuals exposed to the Nepal earthquake experienced high levels of post-earthquake stress. Previous studies in Europe, Asia and Latin America have also shown that natural disasters, including earthquakes, cause posttraumatic stress disorder in 5% to 60% of individuals (Cairo et al., 2010). Different from our study, Kardaş and Tanhan (2018) investigated the Posttraumatic Stress Levels of University Students Who Experienced Van Earthquake. Their findings concluded that the

trauma levels of the participants were low. This result may be attributed to the fact that the study was conducted approximately 6 years after the earthquake.

The study revealed that there was a significant difference between the genders of the participants in the emotional irritability and emotional restructuring dimensions, which are the sub-dimensions used to measure the level of trauma left after the earthquake. This difference was observed in both emotional and emotional restructuring levels, with women experiencing more trauma than men. Dell'Osso et al. (2013) conducted research on the levels of trauma experienced by participants after the 2009 L'Aquila earthquake and concluded that female participants experienced higher levels of trauma than male participants. Similar findings have been documented in the literature (Baral and Bhagawati, 2019; Flores et al., 2014; Hacıoğlu et al., 2002). Atılgan examined the levels of post-traumatic stress experienced by survivors of the Van- Erciş earthquake in 2016. The study showed that female participants had higher levels of emotional irritability compared to their male counterparts. However, our study revealed different results in terms of behavioral problems, affective restructuring, cognitive restructuring and sleep problems. Although our study had parallel results with Atılgan's study, there were also dimensions that did not overlap. Similarly, Abolhadi et al. (2022) found that gender was not a significant variable in the development of posttraumatic stress disorder among survivors of the 2003 earthquake in Iran. Possible reasons for these different findings include the multiple earthquakes on February 6, 2023 and the subsequent aftershocks, loss of life and difficulties in meeting basic needs.

In the analysis, it is seen that there is no significant difference between the degree of trauma experienced by the participants after the earthquake according to the departments they study. In the literature review, no study investigating the relationship between the department and post-earthquake trauma levels was found. Our study aims to fill this gap in the literature and shed more light on this aspect of trauma research. Considering the education level variable, a significant difference was found between the participants' grade and the sub-dimension of sleep problems. The results showed that students in the 2nd and 4th grades had higher levels of sleep problems than those in the 3rd grade. Although there is a lack of research examining the relationship between class level and post- earthquake trauma levels, there are studies investigating the relationship between age and age level. In their study conducted in 2009, Dell'Osso et al. (2013) concluded that as the age level of the participants increased, their trauma levels also increased. Similar findings have been documented in previous literature (Abolhadi et al. 2022; Baral & Bhagawati, 2019).

• Our research was conducted with Artvin Çoruh University students. In future studies, students studying in the earthquake zone can also be included and comparisons can be made.

• Although the earthquake directly affected 13 provinces, the magnitude of the earthquake and the high number of casualties affected almost everyone in our country. Therefore, research can be conducted on the trauma levels of students who have and have not experienced an earthquake.

• Research can be conducted on what should be done to reduce the level of post- earthquake trauma, such as interviews with students caught in the earthquake.

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Conflict of Interest

No conflict of interest is declared by the authors. In addition, no financial support was received.

Ethics Statement

Before proceeding with the data collection phase of this research, ethical permission was obtained from the Ethics Committee of Artvin Çoruh University, dated 03.04.2023 and numbered E-18457941-050.99-87288.

Author Contributions

The authors contributed equally.

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RESEARCH ARTICLE

Comparison of Occupational Burnout and Organizational Commitment in Physical Education and Other Branch Teachers: Sport High School Example

Ufuk DİLEKÇİ[1*]

[1]Ministry of Education Ankara, Türkiye
*Corresponding author:ufukdilekci@gmail.com

Abstract
The aim of the research is to compare the occupational burnout and organizational commitment of physical education, sports and other branch teachers working in sports high schools. 513 physical education and sports teachers and 568 other branch teachers working in sports high schools throughout Turkey participated in the research. Data collection tools of the research are "Personal Information Form", "Maslach Burnout Inventory" and "Multidimensional Organizational Commitment in Teachers" scales. The comparison of burnout and commitment of physical education and sports and other branch teachers was determined by single-sample T-test and multi-sample Anova test. Burnout and commitment scales in the research; teaching branch ($p<0.05$), gender ($p<0.05$), age ($p<0.05$), marital status ($p<0.05$), educational status ($p<0.05$), professional seniority A significant difference was detected in the sub-dimensions ($p<0.05$) and sports high school working time ($p<0.05$). It can be said that it can be beneficial for the teachers working in the sports high school to develop themselves professionally and to follow the developments in the teaching branches closely.

Keywords
Vocational Burnout, Organizational Commitment, Sports High School

INTRODUCTION

Education can be expressed as the process of making an effort to create a change in the behavior of individuals in the desired direction originating from their own lives (Ertürk, 1972). It has been stated that sports high schools are schools that provide academic sports education to students who pass from the 8th grade to the 9th grade with an interest and ability in sports. Sports high schools are a type of school that offers academic courses as well as sports courses (Dilekçi, 2022).

Teachers working in educational institutions are in intense interaction and communication with many internal and external stakeholders such as students, parents, and superiors in educational activities. The burnout that they experience or may experience due to this situation can have a negative impact on their education and training activities as well as their own quality of life. Negative attitudes and behaviors that teachers may develop against educational goals and objectives, together with the burnout they experience, can cause a weakening or disappearance of the level of dedication that teachers should have, especially for education. Reducing or eliminating the burnout of teachers in the education system and increasing their dedication will significantly increase the quality of educational activities.

Burnout is a three-dimensional negative situation that occurs with the feeling of emotional exhaustion, depersonalization, and a decrease in personal success in employees who have to communicate with people about their work.

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[1]**ORCID:** 0000-0001-7859-0301

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Emotional exhaustion in burnout can be evaluated as not going to work and alienation from work together with individuals experiencing emotional depression. Depersonalization, on the other hand, causes the employee to be rude to the people he communicates with and to have a cynical attitude towards them due to the decrease in his ideal about his job and the increase in his discomfort (Cordes and Dougherty, 1993). The personal achievement dimension, on the other hand, emerges with similar factors such as avoiding communication with people, depression, low morale, and poor self-perception (Akçamete et al. 1998; Acar, & Karavelioğlu, 2022).

Buchanan (1974), defined organizational commitment as a fanatical commitment of the individual without expecting any benefit from the organization. Celep (2000), on the other hand; Beyond the formal and normative expectations expected from the individual, he tried to draw attention to the behavioral aspect of the organization by expressing organizational commitment as the behaviors of the individual towards his values as well as these goals. The individual's belief in the values of the organization, such as the goals of the organization, and the more than usual desire to achieve the goals of the organization and the desire to continue in the organization are important features in the emergence of organizational commitment (Mowday et al.1974; Acar, & Karavelioğlu, 2022).

The research was conducted to compare the burnout and dedication of sports high school physical education and sports and other branch teachers according to some demographic variables. The research is important in terms of preventing burnout and increasing the dedication of teachers who continue education and training activities with a student group with high hyperactive levels such as sports high schools. It is thought that it will contribute to increasing the dedication of physical education and sports teachers and other branch teachers in sports high schools that provide academic sports education, as well as providing important information about preventing burnout and what to do in cases where burnout occurs.

MATERIALS AND METHODS

Study design and population

A relational screening model was used in the research. The relational screening model is a method that is generally used to determine the existence and amount of interaction between multiple variables (Karasar, 2005). The research was carried out with a total of 1081 teachers, including 513 physical education and 568 other branch teachers (Turkish language and literature, religious culture and ethics, history, geography, mathematics, physics, chemistry, biology, philosophy, foreign language, visual arts, music, guidance) (Table 1).

Before starting the study, Istanbul Rumeli University Ethics Committee approval was obtained (Date: 21/12/2022 Decision No: 2022/11). Participants in the study were evaluated by mobile application and filled out data collection questionnaires. Our study was conducted in accordance with the Principles of the Declaration of Helsinki.

Measuring methods

Research and questionnaire studies were carried out with physical education and sports and other branch teachers working in sports high schools throughout Turkey. After obtaining the official research permissions from the necessary places for the research, the questionnaire forms prepared by transferring them to the online environment were delivered to the research participant teachers and applied voluntarily. Personal Information Form, Maslach Burnout Inventory and Teachers' Multidimensional Organizational Commitment Scale were used in the research.

The information form used in the research consists of variables (teaching branch, gender, age, marital status, education level, financial income, professional seniority, working time in sports high school) that are thought to affect the burnout and dedication of teachers working in sports high schools. In the preparation of the form, the literature was examined and the variables used in national and international research were used. Maslach Burnout Scale, developed by Maslach and Jackson consists of three sub-dimensions emotional exhaustion, depersonalization, and personal achievement. The burnout scale consists of 22 (twenty-two) questions. It was

determined that the factor structure of the scale, which was adapted to Turkish by Ergin (1992) and Çam (1992), was suitable for its original form. Internal consistency coefficients (Cronbach's alpha) were calculated as 0.83 for emotional exhaustion, 0.65 for depersonalization, and 0.72 for personal achievement. Test-retest reliability was 0.83, 0.67, and 0.72. While interpreting the data obtained with the scale, the scores for each sub-dimension are evaluated individually. After this process, the relevant criteria are examined to interpret the data obtained and understand what it means (Izgar, 2001). The emotional exhaustion sub-factor consists of 9 (nine) questions. The depersonalization sub-factor consists of 5 (five) questions. It consists of 8 (eight) questions for the sub-dimension of personal achievement (Maslach and Jackson, 1981).

Table 1. Demographic characteristics of the participants

Teaching Branch	Frequency (n=1081)	Percent
Physical Education and Sports	513	47,5
Other	568	52,5
Gender	Frequency (n=1081)	Percent
Male	667	61,7
Female	414	38,3
Age	Frequency (n=1081)	Percent
22-27	33	3,1
28-33	156	14,4
34-39	264	24,4
40-45	385	35,6
Over 46	243	22,5
Marital status	Frequency (n=1081)	Percent
Married	862	79,7
Single	219	20,3
Educational Status	Frequency (n=1081)	Percent
License	785	72,6
Degree	298	26,7
Financial Income	Frequency (n=1081)	Percent
3000-7000	33	3,1
7001-11000	36	3,3
11001-15000	311	28,8
15001-19000	460	42,6
19001 ve üzeri	241	22,3
Age of Occupation	Frequency (n=1081)	Percent
3-6	160	14,8
7-10	206	19,1
11-14	175	16,2
15-18	143	13,2
19 and Over	397	36,7
Working Time in Sports High School	Frequency (n=1081)	Percent
1-4	685	63,4
5-8	286	26,5
9-12	73	6,8
13-16	31	2,9
17 and Over	6	,6

The Multidimensional Organizational Commitment Scale developed by Celep (2000) and consisting of four sub-factors was used in the study. The scale consists of 28 (twenty-eight) items. As a result of the factor analysis performed by Celep (2000) on the "Multidimensional Organizational Commitment Scale", the sub-dimension factor values were

found to be between 0.38 and 0.79 for school dedication, and 0.38 to 0.77 for dedication to the teaching profession. , 56 and 0.72 values, and dedication to the study group were found to be between 0.57 and 0.77 (Celep, 2000).

In the analysis carried out according to the scores obtained from the burnout and dedication scales in the research, professional burnout scale, burnout scale mean (α = 0.742), emotional exhaustion (α = 0.864), depersonalization (α = 0.638), personal achievement (α = 0.784); organizational commitment scale, commitment average (α = 0.747), dedication to teaching profession (α = 0.809), dedication to school (α = 0.654), dedication to study group (α = 0,852), dedication to teaching work (α = 0.688) sub-dimensions. shows.

Statistical analyses

In the study, it was tested whether there was a statistically significant difference in the research groups according to the sub-factors of the burnout and dedication scales. Statistical analyzes of the study were performed using the "Statistical Package for Social Sciences" (SPSS) version 21.0 (SPSS inc. Chicago, IL, USA). Visual (histogram, probability graphs) and analytical methods (KolomogrovSmirnov/Shapiro-Wilk's test) were used to define whether the variables were normally distributed. T-test was used when the data showed normal distribution in two-group variables and the group variances were equal, and the parametric difference test, ANOVA (F), was used in cases where the normal distribution was provided in the variables with more than two groups and the group variances were equal. In the research, post-hoc tests were used in the groups with a significant difference between them to determine which groups caused this difference. Tukey HSD test was used as a post-hoc test for cases where a parametric difference test was applied.

RESULTS

In the study, it was tested whether the demographically determined variable groups differed significantly in the context of the research variables.

Table 2. Teaching branch variable t-test results

	Sub-Dimensions	Teaching Branch	N	x	sd	t	p
Occupational Burnout	Emotional Exhaustion	Physical Education and	513	2.1	2.1	0.839	**,000***
		Other Branches	568	2.28	2.28		
	Depersonalization	Physical Education and	513	1.64	1.64	0.548	0.539
		Other Branches	568	1.66	1.66		
	Personal Success	Physical Education and	513	4.06	4.06	0.828	**,000***
		Other Branches	568	3.84	3.84		
	Burnout Avg.	Physical Education and	513	2.6	2.6	0.191	0.676
		Other Branches	568	2.59	2.59		
Organizational Commitment	Dedication to the Teaching Profession	Physical Education and	513	4.21	4.21	0.909	**,000***
		Other Branches	568	3.98	3.98		
	Dedication to School	Physical Education and	513	3,54	3,54	0.824	**,000***
		Other Branches	568	3.14	3.14		
	Dedication to the Working Group	Physical Education and	513	3.64	3.64	0.917	**,009***
		Other Branches	568	3,52	3,52		
	Dedication to Teaching	Physical Education and	513	4.01	4.01	0.494	**,000***
		Other Branches	568	3.82	3.82		
	Dedication Avg.	Physical Education and	513	3.85	3.85	0.036	**,000***
		Other Branches	568	3.62	3.62		

No significant difference was found between physical education, sports, and other branch teachers in the sub-dimensions of occupational burnout, burnout average, and depersonalization. In the emotional exhaustion sub-dimension ($t_{(1081)}$ =8.39; p=.000), in favor of other branch teachers (X=2.280), in the personal achievement sub-dimension ($t_{(1081)}$ =0.00;

p=.000), A significant difference was found in favor of education and sports teachers (X=4,068). A significant difference was found between physical education and sports and other branch teachers in all sub-dimensions of organizational commitment. Dedication to the teaching profession ($t_{(1081)}$ =4.216; p=.000), dedication to school ($t_{(1081)}$ =3.541; p=.000), dedication to the study group ($t_{(1081)}$ =3.644; p=.009), A significant difference was found in favor of physical education and sports teachers in all sub-dimensions of dedication to teaching work ($t_{(1081)}$ =4,012; p=,000), mean dedication ($t_{(1081)}$ =3.6212; p=,000) (Table 2).

Table 3. Gender variable t-test results

	Sub-Dimensions	Gender	N	x	sd	t	p
Occupational Burnout	Emotional Exhaustion	Male	667	2.16	,674	-1.81	,070
		Woman	414	2.24	,659		
	depersonalization	Male	667	1.66	,506	,621	,534
		Woman	414	1.64	,513		
	Personal Success	Male	667	4.00	,421	5.47	**,000***
		Woman	414	3.86	,438		
	Burnout Avg.	Male	667	2.61	,323	1.51	,130
		Woman	414	2.58	,323		
Organizational Commitment	Dedication to the Teaching Profession	Male	667	4.06	,742	-2.09	**,002**
		Woman	414	4.15	,667		
	Dedication to School	Male	667	3.41	,562	6.29	**,000***
		Woman	414	3.19	,586		
	Dedication to the Working Group	Male	667	3.60	,744	1.27	,202
		Woman	414	3,54	,749		
	Dedication to Teaching	Male	667	3.94	,498	2.74	**,007***
		Woman	414	3.86	,465		
	Dedication Avg.	Male	667	3.75	,500	2.33	**,003***
		Woman	414	3.68	,453		

No significant difference was found between male and female teachers in the professional burnout scale burnout mean, emotional exhaustion, and depersonalization sub-dimensions. A significant difference was found in the personal achievement sub-dimension ($t_{(1081)}$ =5.47; p=.000) in favor of male teachers (X=4.00). There was no significant difference between male and female teachers in the sub-dimension of commitment to the study group of the organizational commitment scale. In the sub-dimension of dedication to the teaching profession ($t_{(1081)}$ =-2.09; p=.002), in favor of female teachers (X=4.15); In the sub-dimension of dedication to school ($t_{(1081)}$ =6.29; p=.000) in favor of male teachers (X=3.41); In the sub-dimension of dedication to teaching work ($t_{(1081)}$ =2.74; p=.007), in favor of female teachers (X=3.94); A significant difference was found in favor of female teachers (X=3.75) with the mean commitment ($t_{(1081)}$ =2.33; p=.003) (Table 3). No significant difference was found between the emotional exhaustion sub-dimension and the mean score value in the age variable of occupational burnout. A significant difference was found in the depersonalization sub-dimension ($t_{(1081)}$ =-2.65; p=.002) and according to the Post Hoc (Tukey) test results, the depersonalization sub-dimension was 34-39 (X=1.71), the age range was 40 It was found to be higher than the age range of -45 (X=1,64). A significant difference was found in the personal achievement sub-dimension ($t_{(1081)}$ = 5.77; p=.000), and according to the results of the Post Hoc (Tukey) test, the age range of 46 and above (X=4.03) in the personal achievement sub-dimension was determined. , 28-33 (X=3.87) age range and 34-39 (X=3.88) age range were found to be higher (Table 4).

Table 4. Age variable ANOVA results

	Sub-Dimensions	Age	N	mean	sd	F	Sig.	Difference
Occupational Burnout	Emotional Exhaustion	22-27	33	1.93	,630	1.84	,118	
		28-33	156	2.16	,672			
		34-39	264	2.25	,675			
		40-45	385	2.20	,650			
		46 and	243	2.17	,690			
	Depersonalization	22-27	33	1.58	,522	2.65	**,002**	3>5
		28-33	156	1.70	,521			
		34-39	264	1.71	,531			
		40-45	385	1.64	,504			
		46 and	243	1.57	,474			
	Personal Success	22-	33	3.96	,484	5.77	**,000**	5>2 5>3
		28-33	156	3.87	,424			
		34-39	264	3.88	,441			
		40-45	385	3.97	,392			
		46 and	243	4.03	,469			
	Burnout Avg	22-27	33	2.49	,306	1.26	,283	
		28-33	156	2.58	,346			
		34-39	264	2.61	,305			
		40-45	385	2.60	,316			
		46 and	243	2.59	,338			
Organizational Commitment	Dedication to the Teaching Profession	22-27	33	4.26	,709	1.73	,139	
		28-33	156	4.06	,686			
		34-39	264	4.01	,753			
		40-45	385	4.13	,662			
		46 and	243	4.11	,767			
	Dedication to School	22-27	33	3.36	,594	6.69	**,000**	4>2 4>3 5>2
		28-33	156	3.16	,570			
		34-39	264	3.26	,591			
		40-45	385	3.41	,559			
		46 and	243	3.38	,586			
	Dedication to the Working Group	22-27	33	3.41	,846	2.07	,083	
		28-33	156	3.49	,749			
		34-39	264	3,53	,761			
		40-45	385	3.61	,714			
		46 and	243	3.66	,756			
	Dedication to Teaching	22-27	33	3.99	,515	1.27	,278	
		28-33	156	3.91	,449			
		34-39	264	3.87	,501			
		40-45	385	3.90	,475			
		46 and	243	3.96	,510			
	Devotion Avg	22-27	33	3.76	,466	3.12	**,014**	4>2 4>3 5>2 5>3
		28-33	156	3.65	,443			
		34-39	264	3.67	,491			
		40-45	385	3.76	,470			
		46 and	243	3.78	,514			

No statistically significant difference was found in the sub-dimensions of organizational commitment, dedication to the teaching profession, study group, and teaching work. A significant difference was found in the sub-dimension of dedication to school ($t_{(1081)}$ =6.69; p=.000) and according to the results of the Post Hoc (Tukey) test, it was determined that the age range of 40-45 (X=3.41) was 28 years old in the sub-dimension of school dedication. It is higher than the -33 (X=3.16) age range and 34-39 (X=3.26) age range; It has been determined that the age range of 46 and over (X=3.38) is higher than the age range of 28-33 (X=3.16). A significant difference was found in the sub-dimension of dedication ($t_{(1081)}$ =3.12; p=.014) and according to the results of the Post Hoc (Tukey) test, the age range of 40-45 (X=3.76) was between 28-33 (X) =3.65) age range is higher than 34-39 (X=3.67) age range; It has been determined that the age range of 46 and over (X=3.78) is also higher than the age range of 28-33 (X=3.65) age range, 34-39 (X=3.67) (Table 4)

Table 5. Marital status variable t-test results

	Sub-Dimensions	Marital status	N	x	sd	t	p
Vocational burnout	Emotional Exhaustion	Married	862	2.20	,660	,728	,467
		Single	219	2.16	,702		
	depersonalization	Married	862	1.65	,505	,723	,470
		Single	219	1.63	,525		
	Personal Success	Married	862	3.96	,432	1,945	,052
		Single	219	3.90	,434		
	Burnout Avg.	Married	862	2.60	,317	1,752	,080
		Single	219	2.56	,345		
Organizational devotion	Dedication to the Teaching Profession	Married	862	4.10	,705	1,093	,275
		Single	219	4.04	,755		
	Dedication to School	Married	862	3.35	,577	2,007	**,005***
		Single	219	3.26	,595		
	Dedication to the Working Group	Married	862	3.63	,724	4,457	**,000***
		Single	219	3.38	,798		
	Dedication to Teaching	Married	862	3.91	,490	,265	,791
		Single	219	3.90	,478		
	Dedication Avg.	Married	862	3.75	,480	2,786	**,005***
		Single	219	3.65	,491		

No significant difference was found in the mean of occupational burnout, emotional exhaustion, depersonalization, personal achievement, and burnout, according to the marital status variable. There was no significant difference in the sub-dimensions of organizational commitment, teaching profession, and dedication to teaching jobs, according to the marital status variable. School dedication ($t_{(1081)}$ =3.35; p=.005), study group dedication ($t_{(1081)}$ =3.63; p=.000) sub-dimensions and the mean of dedication ($t_{(1081)}$ =3.75 ; p=,005) a significant difference was found in favor of married teachers (Table 5).

Occupational burnout in emotional exhaustion ($t_{(1081)}$ =2.31; p=.000) sub-dimension; depersonalization ($t_{(1081)}$ =1.75; p=.000) sub-dimension; undergraduate personal achievement ($t_{(1081)}$ = 3.89; p=.004); A significant difference was found in the burnout mean ($t_{(1081)}$ =2.65; p=.001) in favor of teachers with a graduate degree. According to the education variable, which is one of the organizational commitment sub-dimensions, no significant difference was found in the sub-dimensions of dedication to school and dedication to the study group. Undergraduate in the sub-dimension of dedication to the teaching profession ($t_{(1081)}$ =4.14; p=.001); undergraduate in the sub-dimension of dedication to teaching work ($t_{(1081)}$ =3.94; p=.001); A statistically significant difference was found in the mean of dedication ($t_{(1081)}$ =3.75; p=.005) in favor of undergraduates (Table 6).

Table 6. Educational status variable t-test results

	Sub-Dimensions	Educational Status	N	x	sd	t	p
Occupational Burnout	Emotional Exhaustion	License	785	2.15	,667	-3,586	**,000***
		Graduate	296	2.31	,659		
	depersonalization	License	785	1.61	,505	-3,996	**,000***
		Graduate	296	1.75	,507		
	Personal Success	License	785	3.97	,433	2,428	**,004***
		Graduate	296	3.89	,432		
	Burnout Avg.	License	785	2.57	,324	-3,476	**,001***
		Graduate	296	2.65	,316		
Organizational Commitment	Dedication to the Teaching Profession	License	785	4.14	,677	3,225	**,001***
		Graduate	296	3.97	,796		
	Dedication to School	License	785	3.35	,571	1,899	,058
		Graduate	296	3.27	,606		
	Dedication to the Working Group	License	785	3,58	,730	,153	,879
		Graduate	296	3,57	,789		
	Dedication to Teaching	License	785	3.94	,463	3,345	**,001***
		Graduate	296	3.82	,538		
	Dedication Avg.	License	785	3.75	,453	2,576	**,005***
		Graduate	296	3.66	,552		

No significant difference was found in the depersonalization sub-dimension and burnout averages according to the occupational seniority variable of the occupational burnout scale. A significant difference was found in the sub-dimension of emotional exhaustion (F=2,489; p=002) and according to the Post Hoc (Tukey) test results, emotional exhaustion was between 3-6 (X=2.12) years in the 11-14 (X=2.27) years range.) years and 7-10 (X=2.10) years; It was determined that the range of 15-18 (X=2.26) years is higher than the range of 7-10 (X=2.10) years. A significant difference was found in the sub-dimension of personal achievement (F=3,262; p=.005), and according to the results of the Post Hoc (Tukey) test performed, in the sub-dimension of personal achievement, 19 and over (X=4.01) years ranged from 3-6 (X=. 3.90) year range and 11-14 (X=3.90) year ranges (Table 7).

According to the organizational commitment scale professional seniority variable, no significant difference was found in the sub-dimension of dedication to teaching and commitment averages. A significant difference was determined in the sub-dimension of dedication to the teaching profession (F=2.803, p=003) and according to the Post Hoc (Tukey) test results, the range of 3-6 (X=4.17) years was 11-14 (X=3.98). the year range is higher than the 15-18 (X=3.98) year range; 11-14 (X=3.98) years range of 7-10 (X=4.14) years range is higher than 15-18 (X=3.98) years range; It has been determined that the range of 19 and over (X=4.12) years is higher than the range of 11-14 (X=3.98) and 15-18 (X=3.98) years. A significant difference was found in the sub-dimension of dedication to school (F=3.489 p=004), and according to the Post Hoc (Tukey) test results, the 19 and over (X=4.01) year range was between 3-6 (X=3.23) years. was found to be higher. A significant difference was found in the sub-dimension of dedication to the study group (F=2.797 p=002), and according to the Post Hoc (Tukey) test results, the range of 19 and over (X=4.12) years was 3-6 (X=4.17) years. range and 15-18 (X=3.98) years were found to be higher than the range (Table 7).

Table 7. Professional seniority variable ANOVA results

	Sub-Dimensions	Professional	N	x	sd	F	p	Difference
Occupational Burnout	Emotional Exhaustion	3-6 (1)	160	2.12	,666	2,489	**,002**	3>1 3>2 4>2
		7-10 (2)	206	2.10	,686			
		11-14 (3)	175	2.27	,673			
		15-18 (4)	143	2.26	,635			
		19 and over (5)	397	2.21	,666			
	Depersonalization	3-6 (1)	160	1.68	,531	1,198	,310	
		7-10 (2)	206	1.66	,538			
		11-14 (3)	175	1.70	,544			
		15-18 (4)	143	1.65	,462			
		19 and over (5)	397	1.61	,483			
	Personal Success	3-6 (1)	160	3.90	,439	3,262	**,005**	5>1 5>3
		7-10 (2)	206	3.93	,410			
		11-14 (3)	175	3.90	,422			
		15-18 (4)	143	3.91	,410			
		19 and over (5)	397	4.01	,451			
	Burnout Avg.	3-6 (1)	160	2.57	,342	1,403	,231	
		7-10 (2)	206	2.56	,329			
		11-14 (3)	175	2.62	,311			
		15-18 (4)	143	2.61	,297			
		19 and over (5)	397	2.61	,326			
Organizational Commitment	Dedication to the Teaching Profession	3-6 (1)	160	4.17	,712	2,803	**,003**	1>3, 1>4 2>3, 2>4 5>3, 5>4
		7-10 (2)	206	4.14	,691			
		11-14 (3)	175	3.98	,773			
		15-18 (4)	143	3.98	,708			
		19 and over (5)	397	4.12	,699			
	Dedication to School	3-6 (1)	160	3.25	,596	3,489	**,004**	5>2
		7-10 (2)	206	3.23	,593			
		11-14 (3)	175	3.36	,571			
		15-18 (4)	143	3.36	,561			
		19 and over (5)	397	3.39	,575			
	Dedication to the Working Group	3-6 (1)	160	3.45	,779	2,797	**,002**	5>1 5>4
		7-10 (2)	206	3,58	,744			
		11-14 (3)	175	3.60	,732			
		15-18 (4)	143	3.48	,726			
		19 and over (5)	397	3.65	,741			
	Dedication to Teaching	3-6 (1)	160	3.95	,474	1,903	,108	
		7-10 (2)	206	3.90	,475			
		11-14 (3)	175	3.86	,508			
		15-18 (4)	143	3.85	,483			
		19 and over (5)	397	3.95	,488			
	Dedication Avg.	3-6 (1)	160	3.71	,454	1,861	,115	
		7-10 (2)	206	3.71	,468			
		11-14 (3)	175	3.70	,511			
		15-18 (4)	143	3.67	,494			
		19 and over (5)	397	3.78	,485			

No significant difference was found in the sub-dimensions of depersonalization and personal achievement according to the variable of working time in the vocational burnout scale sports high school. A significant difference was found in the sub-dimension of emotional exhaustion (F=4,014; p=,003) and according to the results of the Post Hoc (Tukey) test, it was determined that the range of 5-8 (X=2.28) years was 1-4 (X=2.13). It has been determined that the range of 9-12 years is higher than the range of 1-4 (X=2.13) years. A significant difference was found in the mean burnout (F=3.58; p=.007) and according to the Post Hoc (Tukey) test results, it was 1-4 (X=2.13) between 5-8 (X=2.28) years. was found to be higher than that of the previous year (Table 8).

There was no significant difference in the sub-dimension of commitment to teaching work according to the working time in the organizational commitment sports high school. A significant difference was found in the sub-dimension of dedication to the teaching profession (F=2.41; p=.004) and according to the results of the Post Hoc (Tukey) test, the range of 13-16 (X=4.38) years was 5-8 (X=4). ,02) was found to be higher than the year range. A significant difference was found in the sub-dimension of dedication to school (F=7.35; p=.000) and according to the results of the Post Hoc (Tukey) test, the range of 13-16 (X=3.73) years was 1-4 (X=3, 28) year range, 5-8 (X=3.38) year range and 9-12 (X=3.38) year range were found to be higher; It has been determined that the range of 17 and over (X=3.92) years is higher than the range between 1-4 (X=3.28) and 13-16 (X=3.73) years. A significant difference was found in the sub-dimension of dedication to the study group (F=5.70; p=.000), and according to the results of the Post Hoc (Tukey) test, it was determined that the range of 5-8 (X=3.73) years was 1-4 (X=3,51) was found to be higher than the range of years. A significant difference was found in the sub-dimension of the mean of dedication (F=3.27; p=.002) and according to the results of the Post Hoc (Tukey) test, it was determined that the range of 9-12 1-4 (X=3.69) years was 1-4 (X) =3.71) year range and 13-16 (X=3.99) year range (Table8).

Table 8. Sports high school study period variable ANOVA results

	Sub-	Sports High School	N	x	sd	F	p	Difference
Occupational	Emotional Exhaustion	1-4 (1)	685	2.13	,660	4.01	**,003***	2>1, 3>1,
		5-8 (2)	286	2.28	,665			
		9-12 (3)	73	2.38	,745			
		13-16 (4)	31	2.25	,516			
		17 and over (5)	6	2.16	,879			
	Depersonalization	1-4 (1)	685	1.63	,510	,943	,438	
		5-8 (2)	286	1.68	,512			
		9-12 (3)	73	1.70	,497			
		13-16 (4)	31	1.62	,392			
		17 and over (5)	6	1.80	,857			
	Personal Success	1-4 (1)	685	3.94	,428	1.26	,281	
		5-8 (2)	286	3.95	,435			
		9-12 (3)	73	3.90	,482			
		13-16 (4)	31	4.10	,365			
		17 and over (5)	6	4.06	,674			
	Burnout Avg.	1-4 (1)	685	2.57	,322	3,58	**,007***	2>1,
		5-8 (2)	286	2.64	,316			
		9-12 (3)	73	2.66	,356			
		13-16 (4)	31	2.66	,270			
		17 and over (5)	6	2.67	,391			

Table 8. Continue

	Sub-	Sports High School	N	x	sd	F	p	Difference
Organizational	Dedication to the Teaching Profession	1-4 (1)	685	4.12	,704	2.41	**,004***	4>2,
		5-8 (2)	286	4.02	,739			
		9-12 (3)	73	4.02	,761			
		13-16 (4)	31	4.38	,464			
		17 and over (5)	6	4.08	,947			
	Dedication to School	1-4 (1)	685	3.28	,586	7.35	**,000***	4>1, 4>2, 4>3, 5>1,
		5-8 (2)	286	3.38	,565			
		9-12 (3)	73	3.38	,570			
		13-16 (4)	31	3.73	,406			
		17 and over (5)	6	3.92	,500			
	Dedication to the Working Group	1-4 (1)	685	3,51	,740	5.70	**,000***	2>1,
		5-8 (2)	286	3.73	,706			
		9-12 (3)	73	3,52	,898			
		13-16 (4)	31	3.78	,652			
		17 and over (5)	6	3.86	,551			
	Dedication to Teaching	1-4 (1)	685	3.92	,486	1.64	,161	
		5-8 (2)	286	3.88	,489			
		9-12 (3)	73	3.85	,470			
		13-16 (4)	31	4.07	,506			
		17 and over (5)	6	3.97	,530			
	Dedication Avg.	1-4 (1)	685	3.71	,481	3.27	**,002***	3>1, 3>4,
		5-8 (2)	286	3.75	,491			
		9-12 (3)	73	3.69	,495			
		13-16 (4)	31	3.99	,335			
		17 and over (5)	6	3.96	,549			

No significant difference was found in the sub-dimensions of depersonalization and personal achievement according to financial income of the occupational burnout scale. A significant difference was found in the sub-dimension of emotional exhaustion (F=6.99; p=.000), and according to the Post Hoc (Tukey) test results, 11001-15000 (X=2.31) financial income was 300-7000 (X=1, 80) financial income and 19001 and above (X=2.09) financial income. A significant difference was found in the burnout averages, and according to the Post Hoc (Tukey) test results, financial income of 11001-15000 (X=2.64) is higher than financial income of 3000-7000 (X=2.43), 15001-19000 (X =2.57) financial income was found to be higher than 3000-7000 (X=2.43) financial income (Table 9).

No significant difference was found in the organizational commitment scale according to financial income, the teaching profession, study group, teaching work sub-dimensions, and average dedication. A significant difference was found in the sub-dimension of dedication to school (F=4.44; p=.001) and according to the results of the Post Hoc (Tukey) test, teachers with financial income of 19001 and above (X=3.44) were 11001-15000 (X=. 3.25) were found to be higher than teachers with financial income (Table 9).

Table 9. Financial income variable ANOVA results

	Sub-Dimensions	Financial Income	N	x	sd	F	p	Differ
Occupational Burnout	Emotional Exhaustion	3000 -7000 (1)	33	1.80	,614	6.99	**,000***	3>1, 3>5, 4>1,
		7001-11000 (2)	36	2.17	,596			
		11001 -15000 (3)	311	2.31	,683			
		15001 -19000 (4)	460	2.19	,658			
		Above 19001 (5)	241	2.09	,655			
	Depersonalization	3000 -7000 (1)	33	1.53	,558	1.57	,180	
		7001-11000 (2)	36	1.71	,543			
		11001 -15000 (3)	311	1.70	,522			
		15001 -19000 (4)	460	1.63	,496			
		Above 19001 (5)	241	1.62	,501			
	Personal Success	3000 -7000 (1)	33	3.97	,554	2.22	,065	
		7001-11000 (2)	36	3.84	,403			
		11001 -15000 (3)	311	3.91	,427			
		15001 -19000 (4)	460	3.95	,435			
		Above 19001 (5)	241	4.00	,419			
	Burnout Avg.	3000 -7000 (1)	33	2.43	,327	4.01	**,003***	3>1, 4>1,
		7001-11000 (2)	36	2.57	,325			
		11001 -15000 (3)	311	2.64	,314			
		15001 -19000 (4)	460	2.59	,318			
		Above 19001 (5)	241	2.57	,334			
Organizational Commitment	Dedication to the Teaching Profession	3000 -7000 (1)	33	4.25	,645	1.09	,356	
		7001-11000 (2)	36	4.15	,635			
		11001 -15000 (3)	311	4.05	,761			
		15001 -19000 (4)	460	4.07	,728			
		Above 19001 (5)	241	4.14	,645			
	Dedication to School	3000 -7000 (1)	33	3.46	,602	4.44	**,001***	5>3,
		7001-11000 (2)	36	3.23	,453			
		11001 -15000 (3)	311	3.25	,589			
		15001 -19000 (4)	460	3.32	,578			
		Above 19001 (5)	241	3.44	,577			
	Dedication to the Working Group	3000 -7000 (1)	33	3,57	,769	1.03	,391	
		7001-11000 (2)	36	3.46	,634			
		11001 -15000 (3)	311	3,52	,761			
		15001 -19000 (4)	460	3.59	,771			
		Above 19001 (5)	241	3.64	,688			
	Dedication to Teaching	3000 -7000 (1)	33	3.85	,388	.94	,435	
		7001-11000 (2)	36	3.88	,377			
		11001 -15000 (3)	311	3.93	,478			
		15001 -19000 (4)	460	3.88	,517			
		Above 19001 (5)	241	3.95	,466			
	Dedication Avg.	3000 -7000 (1)	33	3.78	,415	1.86	,123	
		7001-11000 (2)	36	3.68	,376			
		11001 -15000 (3)	311	3.69	,485			
		15001 -19000 (4)	460	3.72	,513			
		Above 19001 (5)	241	3.79	,441			

DISCUSSION

The research was carried out on physical education, sports, and other branch teachers, who are teachers of sports high schools, who take students with special talent exams for students who have an interest and ability in the field of sports throughout Turkey. As a result of a comprehensive review of the literature, very few studies were found about sports high schools.

In the study, a significant difference was found in the sub-dimensions of professional burnout, emotional exhaustion, and personal achievement in the teaching branch variable. It can be said that this significant difference was determined in favor of other branch teachers in the emotional exhaustion sub-dimension, and it can be said that it emerged as classroom management problems, especially due to the inability of the student group with high hyperactivity to concentrate on the lesson in the classroom. It can be said that the determination in favor of physical education and sports teachers in the sub-dimension of personal success requires expertise in education and training activities in the field of sports in sports high school and may be due to the sportive success expected from physical education and sports teachers.

The burnout experienced as a result of not being able to cope with burnout will also affect other teachers and create a negative environment (Babaoğlan, 2007; Kayabaşı, 2007; Cemaloğlu and Şahin, 2007). A significant difference was found in the sub-dimensions of organizational commitment, dedication to the teaching profession, dedication to the school, dedication to the study group, dedication to teaching work, and dedication averages. It was determined in favor of physical education and sports teachers in all sub-dimensions and dedication averages. It can be said that the significant difference in the sub-dimensions of dedication and dedication in favor of physical education and sports teachers may be because physical education and sports teachers of sports high schools engage in intensive education and training activities and adopt their schools more due to their branch characteristics.

In the study, a significant difference was found in favor of male teachers in the sub-dimension of professional burnout and personal achievement in the gender variable. It can be said that this significant difference arises from male teachers' willingness to take responsibility due to their living conditions. L. A. Friedman (1991), male teachers have more burnout than female teachers; Fejgin (1995) found that male teachers in physical education and sports teachers experience burnout at a higher level than female teachers, in the same direction as the research conducted. In burnout research, there are studies in the same direction as the research, as well as different studies. Brudnik (2004) found a significant difference in favor of female teachers in emotional exhaustion in the gender variable of physical education and sports teachers. In the study conducted by Tunç (2013), while there was no significant relationship between the variables such as age, marital status, education level of history teachers and their burnout perceptions, it was determined that there was a significant difference in the gender variable; Deryakulu (2005), in his study, determined that computer teachers differed significantly according to the gender variable. In the study conducted by Ergül, Saygın, and Tösten (2013), it was concluded that classroom teachers experienced burnout in the dimensions of emotional exhaustion, depersonalization, and personal achievement.

A significant difference was found in the sub-dimensions of organizational commitment to the teaching profession, school, teaching jobs, and the average commitment. It can be said that the significant difference in favor of female teachers in the sub-dimension of dedication to the teaching profession arises from the high emotional commitment of female teachers to their profession. The fact that it was determined in favor of male teachers in the sub-dimension of dedication to school can be explained by the need for male teachers to spend more time in sports high schools, where there are intense physical facilities, especially in their fields. It can be said that the determination in favor of male teachers in the sub-dimension of dedication to teaching tasks is because male teachers are more active in school-related work and procedures. It can be said that the determination of the average dedication in favor of male teachers is because male teachers create their social lives over the sports high school, as well as being more active in school-related work and transactions.

In their research on dedication to the teaching profession, the sub-dimension of the dedication scale, Güner (2006), Eroğlu (2007),

Karagöz (2008), Alper Apak (2009), Ertürk (2011), Ekinci (2012) found a difference in dedication to the teaching profession in the same direction as the research. found that this difference was higher in favor of female teachers than male teachers. Since female teachers and male teachers give more importance to family roles in socialization, their level of commitment may be different from that of men (Balcı, 2003). In addition, the fact that the teaching profession is emotionally intense, and the emotional aspects of women outweigh the men, can positively affect the dedication of female teachers to the profession (Celep, 2014). It can be said that the high level of dedication of female teachers to the teaching profession compared to male teachers is because they are more interested in their profession and they are more involved in educational activities with a focus on school type.

In the study, a significant difference was found in the occupational burnout depersonalization sub-dimension in the age variable, while the 34-39 age group was compared to the 46 and over age group; It can be said that 34-39 age group teachers have become insensitive to the environment due to their social lives and their burnout is higher. While a significant difference was found in the personal achievement sub-dimension of burnout, it can be said that the fact that the 46 and over age group is higher than the 28-33 age group and 34-39 age group arises due to the professional attrition of the 46 and over age group teachers.

Studies show that young workers experience more burnout compared to older workers (Maslach & Jackson, 1981). Sarros and Sarros (1992) stated that the moral support that teachers received from teachers increased their burnout in some cases. Baysal (1995) found that there was a significant relationship between the age variable and burnout levels in his study, in which he examined secondary school teachers, and found that teachers had higher burnout, especially in the first five years. In the sub-dimension of organizational commitment, school dedication, the 40-45 age group, 28-33 age group, and 34-39 age group; The age group of 46 and over is higher than the age group of 28-33; It can be said that teachers in the 40-45 age group and 46 and over age group feel more belonging to the school compared to the teachers in the other age groups and are more committed due to the professional anxiety that occurs with age. On the average of dedication, 40-45 age group, 28-33 age group and 34-39 age group; It can be said that the fact that the 46 and over age group is higher than the 28-33 age group and the 34-39 age group is because teachers with a higher average age adopt the schools more and need to feel belonging, which increases their commitment.

The organizational commitment levels of young employees who are new to the profession may be lower than those of older employees, as they have new job opportunities. As older teachers reach a certain level of maturity with experience, they increase their level of organizational commitment in general, with their dedication to the school and the work group. Researchers Angle and Perry (1981), Allen and Meyer (1990), Zöğ (2007), Artun (2008), Alper Apak (2009) found that the level of commitment among employees increases with increasing age and there is a positive relationship between age and commitment. Ertürk (2011) and Ertürk (2014) found that there is a difference in the dimensions of dedication to teaching and the teaching profession.

In the study, no significant relationship was found in the sub-dimensions of professional burnout in the marital status variable.In his study with special education teachers, Yiğit (2007) emphasized that while there was no significant relationship between teachers' being married or single and their perceptions of burnout, marital status had nothing to do with burnout. Adioğulları and Gencay (2016) did not show a significant change according to the marital status variable of the professional burnout levels and sub-dimensions of physical education and sports teachers. Contrary to the research, some studies found a relationship between burnout and marital status variables. Kırılmaz, Çelen, and Sarp (2003) stated that the marital status variable affects the level of personal achievement and that unmarried teachers are more exhausted.

A significant difference was found in the sub-dimensions of organizational commitment, school dedication work group dedication, and commitment averages. It can be said that married teachers have a significant difference in the sub-dimensions of dedication to school and dedication to the study group, because married teachers do not want to change their living conditions due to their family life, and as a result of being socially

attached to a group of friends with whom they have strong communication within the school, their commitment is high. Some studies have determined that there is no difference in marital status in sub-dimensions of organizational commitment (Babil 2009; Gıcı 2011; Ekinci 2012; Mamaç, 2019). Ekinci (2012) found a significant difference in the dimensions of dedication to teaching and the teaching profession, while there was no difference in the dimensions of dedication to school and study groups. The fact that the organizational commitment levels of married teachers are higher than those of single teachers can be explained by the fact that married employees have higher family duties and responsibilities, financial concerns, have other dependents, and therefore have a higher sense of responsibility (Erdoğmuş, 2006; Karcıoğlu and Türker, 2010).

A significant difference was found in all sub-dimensions of occupational burnout and burnout averages. It can be said that the fact that teachers who completed their postgraduate education in the sub-dimension of emotional exhaustion and depersonalization experience more burnout compared to undergraduate graduates may be because graduate teachers want their personal and financial rights to be higher than undergraduate teachers in line with the education they have received. It can be said that the burnout of undergraduate teachers in the sub-dimension of personal achievement is because they feel academically deficient. It can be said that the burnout of postgraduate teachers in the averages of burnout occurs as a result of the education they receive, as a result of not being able to meet their expectations in educational activities.

For the relationship between educational status and burnout, some researchers stated that as the level of education increases, burnout will decrease (Özdemir, 2001). In the study conducted by Tunaboylu (2015), it was determined that the graduation status of teachers working in primary and secondary schools is the variable that increases the level of burnout. In the study conducted by Şahin (2007), a significant difference was found between the educational status of teachers and their burnout levels, and it was concluded that as the education level decreases, professional burnout increases. Karataş (2009) found that teachers with postgraduate education experience more burnout than teachers with undergraduate education.

A significant difference was found in the sub-dimensions of organizational commitment and dedication to the teaching profession and teaching work and in the average commitment. In the sub-dimensions of dedication to the teaching profession and teaching jobs, the fact that undergraduate graduates are more dedicated than graduate graduates and that undergraduate graduates have less chance of continuing outside of school than graduate graduates, such as the chance of continuing at a university outside of schools, increases the dedication to their profession, and the need to show themselves more in education and training activities is also related to teaching jobs. It can be said that it makes them very dedicated. It can be said that the average dedication is higher in undergraduate graduates because they allocate more time to education activities compared to graduate graduates.

As the education level of the individual increases, the expectation from the organization increases and the level of organizational commitment may decrease (Celep, 2014). Kızıl (2014) found that the organizational commitment of associate degree teachers was determined by undergraduate teachers; Ekinci (2012) found that teachers with associate degree degrees have higher levels of commitment to the teaching profession and workgroup and organizational commitment than teachers with both undergraduate and graduate degrees. Studies conducted in the same direction as the research (Celep et al, 2004; Güner, 2006; Alper Apak, 2009; Demirhan, 2010; Ekinci, 2012; Kızıl, 2014; Ekinci & Yıldırım, 2015; Aytekin, 2016; Kalaz, 2016; Altunay, 2017) was found to decrease as the level of education increased. The increase in the level of education also increases the expectations of teachers towards work, school, colleagues, and profession. It may be difficult for teachers who cannot meet their increasing expectations to be proud of their school, to increase their efforts towards their work, to be satisfied with their work, and to establish close relationships with their colleagues (Alper Apak, 2009).

A significant difference was found in the emotional exhaustion sub-dimension and burnout averages in the financial income variable of occupational burnout. It can be said that the fact that the 11001 -15000 financial income group has more emotional exhaustion than the 3000-7000 financial income group and the financial income

groups above 19001 is because they think that the wages they receive in return for their work are less. It can be said that the fact that the financial income group of 15001 -19000 shows more burnout than the financial income group of 3000-7000 in the average of burnout is the inability to meet the life that arises due to their social life. Teachers need to be efficient in education and training activities in terms of having a high financial income and thus leading a socially rich life. In the study conducted by Tuna (2010) on physical education teachers, it was determined that physical education and sports teachers found their income to be sufficient, and Yılmaz (2010) found that teachers' dissatisfaction with their financial income affected their emotional exhaustion and their burnout differed. Topaloğlu, Koç and Yavuz (2007) found that the burnout of teachers who were not satisfied with their financial income increased.

In the sub-dimension of organizational commitment, it is because the financial income group above 19001 is more committed than the income group of 11001 -15000 in the sub-dimension, the financial income group above 19001 intensively performs all their duties in schools (exercise, dyk, etc.) and in return, they provide financial income by their social life. can be said to have emerged. A significant difference was found in the professional seniority burnout, emotional exhaustion, and personal achievement sub-dimensions. In the sub-dimension of emotional exhaustion, teachers with 11-14 professional seniority have more emotional exhaustion than teachers with 3-6 professional seniority and 7-10 professional seniority, and this burnout is because there are too many problems that arise or may arise about educational activities. can be said. It can be said that the burnout of teachers with 15-18 professional seniority is more than teachers with 7-10 professional seniority, due to the increase in professional anxiety in educational activities. In the personal achievement sub-dimension, it can be said that teachers with 19 or more professional seniority are more consumed than teachers with 3-6 professional seniority and 11-14 professional seniority, and this is due to the vital anxiety of making progress in age as well as being in educational activities for many years. In the study conducted by Tuna (2010), physical education teachers' burnout levels differ significantly according to the seniority variable. Oruç (2007), in his study, found that teachers who worked for 1-5 years experienced more burnout than teachers who worked for 11 years or more; Yıldırım (2011) found a difference between teachers with a professional seniority of 1-5 years and 21-25 years in the sub-dimension of personal achievement, while they found that teachers with a professional seniority of 1-5 years were more consumed.

A significant difference was found in the sub-dimensions of organizational commitment, dedication to the teaching profession, school, and study group. In the sub-dimension of dedication to the teaching profession, it can be said that teachers with 3-6 professional seniority show more dedication than teachers with 11-14 professional seniority and 15-18 professional seniority because they are at the beginning of their teaching years. It can be said that teachers with 7-10 professional seniority show more dedication than teachers with 11-14 professional seniority and 15-18 professional seniority because they are newer in the teaching profession compared to teachers with other professional seniority. It can be said that teachers with 19 and above professional seniority show more dedication than teachers with 11-14 professional seniority, due to the high level of professional sensitivity and commitment. In the sub-dimension of dedication to school, it can be thought that teachers with 19 and above professional seniority show more dedication than teachers with 7-10 professional seniority, depending on the high professional seniority, resulting from increasing the quality of educational activities. In the sub-dimension of dedication to the working group, it can be said that teachers with 19 or more professional seniority show more dedication than teachers with 3-6 professional seniority and 15-18 professional seniority, with the power of communication and interaction given by being in vocational education activities for many years.

Celep (2000) found that the level of dedication of teachers increases as their professional seniority increases in the institution where they work. As the professional seniority increases, the employees' chances of finding a job in other organizations decrease, and the employee's commitment to his job and the organization increases (Özden, 1997). On the other hand, Doğruer (2006) found that with the increase in seniority, the level of organizational

commitment of teachers in the dimension of dedication to teaching work increases. In the dimension of devotion to the study group, In the literature, there are studies (Alper Apak, 2009; Atar, 2009; Çelik, 2011; Altunay, 2017;) that conclude that teachers' dedication increases as seniority increases. In their studies. A significant difference was found in the occupational burnout, emotional exhaustion sub-dimension, and burnout averages. In the emotional exhaustion sub-dimension, the 5-8 year group was compared to the 1-4 year group; It can be said that the emotional exhaustion of the 9-12 year group than the 1-4 year guru is due to various individual or institutional reasons as the working time in sports high schools increases. The fact that the burnout average is higher for the 5-8 year group than for the 1-4 year guru increases the number of students, parents, school management, etc. as the working time in sports high schools increases. It can be said that it arises due to situations related to education and training.

A significant difference was found in the sub-dimensions of organizational commitment, dedication to the teaching profession, school, study group, and commitment averages. In the sub-dimension of dedication to the teaching profession, it can be said that the 13-16 year group is more committed than the 5-8 year group, due to the increase in the commitment and sensitivity to the teaching profession over the years. In the sub-dimension of dedication to school, the 1-4 year group of the 13-16 year group, the 5-8 year group, and the 9-12 year group are more physically better for the educational activities of the school, which becomes a living space after a certain period professionally. It can be said that it appeared for becoming. It can be said that in the sub-dimension of dedication to the study group, the fact to the 5-8-year group showed more dedication than the 1-4-year group was because the 5-8-year group spent more time with the study group and had a strong relationship. On the other hand, it can be said that the 9-12 year group shows more dedication than the 1-4 year group and 13-16 year group in the average of dedication, due to the period in which they feel happy in the sports high school.

Teachers may prefer their relationships with their colleagues to many stakeholders related to educational activities (Becker, Billings, Eveleth, & Gilbert, 1996). Artun (2008) found that with the increase in the tenure of the teachers in the school where they work, their dedication to the study group, such as the teaching profession, also increased. As the working time of the teachers in their current schools increases, they get to know the school, their colleagues, and the school culture better, a culture of common living is formed in the school and the school culture can become stronger. As the employee's gains from the organization will increase with the increase in working time in his current school, his dedication will increase with this increase in gains (İnce and Gül, 2005). When the literature is examined, studies that conclude that teachers' perceptions of organizational commitment differ according to their working hours in their current schools (Celep et al, 2004; Demirhan, 2010; İnce and Gül, 2005; Uzun, 2011; Alper Apak, 2009; Atar, 2009; Altunay, 2017; Zöğ, 2007; Mamaç, 2019).

It can be said that physical education and sports and other branch teachers can improve themselves professionally and closely follow the developments in these fields in addition to their educational activities in sports high schools. Since sports high schools are involved in different educational activities, academic research on sports high schools should be increased. Research on sports in high school can also be done with different variables and different universe-sample (education-training, administrator, teacher, student) groups. It can be said that with the increase in the number of research, the increase in the recognition of sports in high schools will also increase the performance of the teachers who work.

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Author Contributions

Planned by the author: Study Design, Data Collection, Statistical Analysis, Data Interpretation, Manuscript Preparation, Literature

Search. Author have read and agreed to the published version of the manuscript.

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RESEARCH ARTICLE

Effects of Carbohydrate and Caffeine-Based Energy Gel Ingestion on Blood Glucose, Blood Lactate and Performance During Prolonged Cycling

Yusuf ULUSOY[1*] and Fatih KOÇAK[2]

[1]Fenerbahçe University, Faculty of Sport Science, Physical Education and Sports Teaching, Istanbul / Turkey
[2]Fenerbahçe University, Faculty of Sport Science, Exercises and Sport Sciences, Istanbul / Turkey
*Correspondingauthor: Yusufulusoy@gmail.com

Abstract
The aim of this study was to investigate the effects of carbohydrate and caffeine-based energy gels on blood glucose, blood lactate, heart rate, rating of perceived exertion (RPE), power output, cadence during prolonged cycling exercise.
This research was an experimental study in which 15 competitor cyclists were tested in 3 different conditions. 3 experimental trials in a randomized order, no gel intake and water only use (T1), gel intake every 30 minutes (T2), 1 gel intake 15 minutes before exercise, and gel intake every 45 minutes after first gel intake and 1 carbohydrate + caffeine gel at 75 min (T3). Water use was released within 3 trials. Each exercise trial included 2 hours of cycling followed by 15 min TT. Measurements were made at the beginning, every 30 min, and at the end of the exercise. This research found that energy gels increased blood glucose levels and time trial (TT) performance compared to trials without consuming something. A more frequent gel intake improved blood glucose levels and TT distance. In the TT, blood lactate concentration increased significantly in T3 compared to T1 ($p<0.05$). Heart rate and RPE did not make a statistical difference ($p>0.05$). Even though cadence, power output, and TT distance in T3 were not statistically significant, the differences that occur are important in terms of cycling. The research also found no correlation between energy gel feedings and water intake ($p>0.05$). The results were important for cyclists with the positive effect on endurance performance when energy gels are used in long-term cycling exercises.

Keywords
Cycling, Energy Gel, Caffeine, Blood Glucose, Blood Lactate

INTRODUCTION

Endurance athletes use carbohydrate supplementation (CHO) during exercise to improve performance. It has been investigated for many years that carbohydrate supplementation during exercise may be associated with performance. The first studies on this subject were investigated during the 1924 Boston Marathon and it was seen that carbohydrate supplementation helped maintain blood sugar concentration and increase running performance (Kozlowski et al., 2021). In recent times, there has been a notable diversification in the market for carbohydrate (CHO) supplements, with a shift from mostly including drinks to the emergence of extremely concentrated energy gels. Energy gels are highly concentrated sources of carbohydrates that have been specifically designed to be ingested either on their own or in combination with water. Gels are considered by athletes as a convenient way to carry energy easily during movement. Although there is much research supporting the ingestion of CHO drinks, few studies have analyzed the effects of energy gels and how often they should be ingested (Juekendrup, 2008; Pöchmüller et al., 2016).

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[1]**ORC**ID: 0000-0001-6442-8717 , [2]**ORC**ID: 0000-0002-9435-7320

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Few investigations on the effects of gel-based carbohydrate supplements on performance (Cermak, N. M., & van Loon, 2013). Performance improvements have been demonstrated in relation to Carbohydrate intake in endurance sports during a 3-hour workout at 70% VO_2max versus an artificially sweetened placebo after banana consumption (Murdoch et al., 1993). Based on many studies, it has been observed that the manner in which carbohydrate (CHO) intake is consumed, whether in solid, liquid, or gel form, does not seem to have an impact on its capacity to enhance performance during exercise(Juekendrup, 2004). In addition, the metabolic rates of a CHO fluid and gel gave similar results on cyclists when they cycled for 3 hours at a VO_2max intensity of 59% (Pfeiffer et al., 2010).

Considerable study is now being conducted on the optimal form of carbohydrate (CHO) for consumption, irrespective of its specific composition. Several studies have shown that the consumption of 60-90 grams of carbohydrates per hour may be necessary to get optimal performance outcomes during extended periods of endurance exercise (Stellingwerff & Cox, 2014; Juekendrup, 2004). On the other hand, several contemporary energy gel producers advocate for a much reduced carbohydrate (CHO) consumption, proposing a regimen that yields an intake rate of about 35-50 g CHO/hr. This approach aligns with the prevailing standards set out by the American College of Sports Medicine, which advocate for a carbohydrate intake range of 30-60 grams per hour for physical activities lasting longer than one hour (Rodriguez et al., 2009; Sawka et al., 2007).

While studies indicate that caffeine may contribute significantly to performance enhancement, some studies cannot provide clear evidence. Despite the widespread involvement of individuals in competitive endurance sports, there exists a dearth of knowledge about the potential impacts of carbohydrate (CHO) and caffeine consumption during prolonged exercise of this kind (Davis & Green, 2009).

Studies show that low muscle glycogen can lead to early fatigue and subsequent decreased skill level. For this reason, the preservation of muscle glycogen stores can be an important condition for endurance sports (Ali et al., 2007). Blood lactate concentration is one of the most frequently measured parameters during both clinical exercise tests and performance tests of athletes. An elevated blood lactate concentration may be indicative of ischemia or hypoxemia, while it may also be a "normal" physiological response to exertion. In response to "total" maximal effort lasting 30-120 seconds, peaks of ≈15–25 mM can be observed 3-8 minutes after exercise. It has a nature that increases gradually in response to progressive, incremental exercise, and then more rapidly as exercise becomes more intense. The rate at which blood lactate concentration increases exponentially [lactate threshold] is a better indicator of performance than VO_2max. It is also a better indicator of exercise intensity than heart rate. For this reason, control can be important for endurance athletes (Goodwin et al., 2007)

The experimental framework used in this research was specifically formulated to evaluate the impact of carbohydrate (CHO) and caffeine consumption on performance during physical exercise or engagement in similar activities. The ingestion of energy gels among endurance athletes has gained significant appeal. This investigation has one objective and three outcome variables. The objective of this research was to assess the impact of carbohydrate and caffeine energy gel consumption regimens on (a) blood glucose, (b) blood lactate, (c) heart rate and RPE, and (d) 15-minute TT performance after 2 hours of stable cycling exercise.

MATERIALS AND METHODS

Participants

This research is an experimental model in which the sample participant group (elite and master cyclists) is tested in three different situations. The sample of the study was determined by using the convenient sampling method. Buyukozturk et al. (2018) defined the convenient sampling method as a sampling method in which easily and quickly accessible units are preferred due to basic limitations such as labor force and time. Accordingly, it was planned to include 15 male road cyclists actively competing in the Turkish Cycling Federation races in the elite and master categories of the study on a voluntary basis. This study wasapproved by the Fenerbahçe University Non-Interventional Clinical Research Ethics Committee; 13.04.2022/15.2022fbu. Written informed consent was obtained from all participants.

Study Design and Data Collection

After anthropometric measurements and Vo_2max determination, each participant underwent three experimental exercise sessions in a randomized and counter-balanced way. These trials consisted of two ingesting trials and one fasting trial. Each trial day was applied as follows;
T1; Free to use water.
T2; 1 carbohydrate gel* every 30 minutes. Free to use water.
T3; 1 gel intake 15 minutes before exercise, and gel intake every 45 minutes after first gel intakeand 1 carbohydrate + caffeine gel (150mg caffeine) at the 75th minute, different from A1. Free to use water.

For each exercise trials, blood glucose, blood lactate, watt output, cadence, heart rateand Borg rating of perceived exertion (Williams, 2017) data was monitored at the beginning, every 30 minutes and at the end.

Research variables

The dependent variable
- VO_2Max, Blood Lactate, Blood Glucose, Performance test against time (TT).
Independent variable
Consumption of Carbohydrate Gel, Caffeine gel.

Inclusion Criteria

- To participate in federation races,
- To be 16 years of age or older,
- Athletes must have trained for 2 hours or more at least 4 days a week in the last 3 months.

Exclusion Criteria

- Athletes must not have any joint and/or ligament injuries in the last three years.
- BMI, 25 and below
- Not signing the informed consent form

Personal (age, body weight, etc.) data obtained from laboratory tests were recorded in a single data collection form created by the researcher.

Working Process

After obtaining permission from Fenerbahçe University Non-Interventional Clinical Research Ethics Committee; The working process has started by obtaining the necessary permissions from the participants and Fenerbahçe University Sports Research Application and Research Center.

After the measurement methods to be applied were explained to the participants, the measurement devices were optimized, and the measurement environment and the athletes were prepared. First, the participants; Anthropometric measurements (height and body weight) were taken. After the participants had a routine warm-up on the bike, the VO_2Max test was applied. Heart rate and power output were recorded during all tests.

Exercise trials were conducted with a Tacx (Garmin ltd, USA) brand smart trainer so that the cyclists could better adapt to the exercise. All 3 exercises trials were performed the same, with different nutrition protocolsin in a randomized order. The maximum watt output obtained during the VO2max analysis was determined. With 70% of this value, an endurance ride lasting 120 minutes was made. Then, a 15-minute time trial was performed.

The gel supplement used in our research was Bigjoy on the Go Progel, manufactured by Farmatek Iç ve Dış. Tic. A.Ş in Turkey. This particular product is well recognized and often employed by triathletes and endurance athletes. A single unit of Progel is composed of 96 calories, 24 grams of carbohydrates in the form of maltodextrin, and also includes electrolytes. The caffeine gel used in the research contains 150 mg of caffeine, unlike the standard gel.

Participants were asked to participate in all tests with equipment suitable for cycling competition conditions (cycling jersey and tights, cycling shoes). Participants were asked not to do high-intensity exercise, not to consume alcohol or high-caffeine-containing foods and foods within 48 hours before coming to the test. It was paid attention that the athletes who will participate in the study had their last meal between 09:00 and 17:00 on weekdays and 3 hours before the measurements, and they were included in the study at the normal satiety level.

Height and Body Weight Measurement

The height and length measurements of the volunteer athletes were measured with a stadiometer (Holtain Ltd, UK) fixed to the wall with an accuracy of ±0.1mm. Body weights were measured with an electronic laboratory scale (Seca, Vogel & Halke, Hamburg) with an accuracy of ±0.1 kg.

The subjects did not wear thick clothes and socks so that the appropriate body position could be given during the measurements. Measurements were taken with the heads of the subjects in the "Frankfort Horizontal Plan" position, the arms on the side of the body and the palms facing the legs,

of the subjects whose body weight was evenly distributed on both legs. When the heels touch each other, the angle on the inside of the feet is approximately 60°. All height measurements were taken with the heels, hips and scapula touching the platform in a vertical position and subjects in an upright position. Body weights were calculated by Lohman et al. (1988) suggested.

Oxygen Consumption Test

Oxygen consumption values of the participants will be measured with a PNOE (Palo Alto, CA, USA) brand metabolic analyzer. The analyzer consists of a cordless, lightweight and easily portable unit (120 × 110 × 45 mm, height, width, length, respectively) developed for measuring gas exchange rates. The device can be put on the participant with a vest and can be kept on during the tests. At the same time, the participant wears a mask of suitable size and passes through the flow sensor while breathing with it. Before and after each measurement, the device was calibrated in accordance with the manufacturer's instructions. An antibacterial filter is attached to the end of the mask and all parts, including the mask, are disinfected after each measurement. There will be only participant and two researchers in the measurement environment, while the tests were going on, entrance and exit to the laboratory could not be made. After a 10-minute warm-up, the participants will start the test by pedaling with a 200-watt load at their preferred pedal speed. During the first 6-minute period, the load will be increased by 50 watts every 2 minutes, then 25 watts every 2 minutes, and the test will continue. The test will be terminated at the point where the participant is exhausted (Harnish et al., 2001; Beam & Adams, 2013). In addition, a Garmin brand (Garmin ltd, USA) chest strap will be used to control the participants' heart rate.

Blood Glucose, Blood Lactate, Power Output, Cadance and Heart Rate Measurements

Blood Glucose measurements were made using On Call brand glucometer and sticks. Measurements were taken before the test, immediately after the test, and every 30 minutes.

Blood lactic acid measurement was made using a blood lactate analyzer (Lactate Scout) and sticks. The blood taken from the fingertip for measurement was immediately analyzed using the lactate oxide technique on the blood lactate analyzer lactate Scout measuring device by dripping onto the test strips. Blood lactic acid measurements were taken before the test, immediately after the test, and every 30 minutes.

Power output and cadence measurements were made by Tacx Smart Trainer (Garmin ltd, USA) Laboratory tests carried out within the scope of the study were carried out in Fenerbahçe University, Sports Research Application and Research Center in May – July 2022.

Statistical Analysis

For all variables, descriptive statistics (means ±SD) were computed. After examining the data visually and checking for kurtosis and skew, it was discovered that they were regularly distributed. Blood glucose, lactate, RPE, and Heart Rate within-subject differences across the 3 trials were examined using a 2-way (time point 3 ingestion schedule) analysis of variance (ANOVA) with repeated measurements. Simple effects for time were investigated when there were significant interaction effects, and main effects were evaluated when there were no significant interaction effects. The TT distance covered during the course of the three trials was compared using an ANOVA with repeated measurements. F-ratios for a main effect were shown to be significant using a Bonferroni post hoc test. A post-hoc statistical power calculation was performed to find changes in TT performance between three trials. All statistics were performed in SPSS 24 for Windows (SPSS, Inc., Chicago, IL).

RESULTS

Table 1 shows the demographic characteristics of the participants. Age, body weight, body height, BMI and body fat percentage of the athletes were determined.

An interaction effect was found between 3 measurements in blood glucose values (Table 2). There was no significant difference in blood glucose values between the 3 measurements at baseline (Figure 1). During T1, blood glucose dropped at 30 minutes and remained almost stable until the end of TT and did not rise again. During T2, blood glucose dropped similarly to T1 at 30 minutes but rose again at 60 minutes and remained almost stable until the end of TT. During T3, blood glucose dropped at 30 minutes but rose again at 60 minutes and gradually decreased until the end of 120 minutes, rising to peak at the end of TT. At the end of TT, blood glucose was statisticallysignificantly higher at T2 than at T1 (p

= 0.026) and at the end of TT, blood glucose was statistically significantly higher at T3 than at T1 (p = 0.001). There were significant differences in the effect of time on blood glucose in the 3 measurements (Table 2). Post Hoc analyses showed that during T1, blood glucose decreased significantly at 120 minutes (p = 0.008) and at the end of TT (p = 0.001) compared to baseline. During T3, blood glucose at the end of TT was statistically significantly higher than blood glucose at 30 minutes (p = 0.010) and 120 minutes (p = 0.003).

Table 1. Demographic characteristics of the participants (n=15)

	Mean (±SD)	Minimum	Maximum
Age (yr)	32.33 (9.58)	18	44
Body mass (kg)	74.33 (7.76)	62	89
Height (cm)	175.87 (6.70)	161	187
BMI ($kg \cdot m^{-2}$)	21.11 (1.86)	19.02	24.72
$\dot{V}O_2$ max ($mlO_2 \cdot kg^{-1} \cdot min^{-1}$)	60.77 (5.83)	52.00	72.40

BMI= Body Mass Index

Dependent measures across all time points and all 3 trials are presented in Table 2.

Table 2: Dependent variables across all time point and trials.

		Time (min)							
Dependent variable	Condition	0	30	60	90	120	TT	F	p
Blood glucose ($mg \cdot dl^{-1}$) mean (±SD)	T1	110.07 (6.18)	102.60 (9.67)	100.53 (11.07)	101.00 (8.13)	98.67 (4.17)µ	96.07 (10.05)¥	3.963	0.001§
	T2	111.60 (8.66)	102.13 (8.99)	110.73 (9.00)	110.33 (7.32)	107.27 (6.61)	109.07 (10.43)¶		
	T3	114.13 (11.60)	107.93 (6.53)	113.73 (8.74)	110.87 (7.61)	107.00 (12.97)	119.13 (12.50)‖¤ф		
Blood lactate ($mmol \cdot L^{-1}$) mean(±SD)	T1	1.87 (0.87)	3.62 (1.44)Ж	3.89 (1.71)Ж	4.36 (2.49)Ж	5.29 (2.43)¥Ж	10.97 (2.38)¥	2.732	0.004¦
	T2	1.54 (0.58)	3.93 (1.35)Ж	4.47 (2.74)ъЖ	3.61 (2.43)Ж	3.86 (1.31)Ж	12.95 (5.18)¥		
	T3	1.40 (0.59)	3.47 (1.84)Ж	3.56 (2.21)Ж	3.36 (2.11)Ж	4.09 (2.85)Ж	14.19 (2.68)¥¶		
Heart Rate (bpm) mean (±SD)	T1	64.33 (8.69)	144.73 (14.90)¥Ж	146.47 (16.10)¥Ж	150.53 (14.61)¥Ж	152.93 (14.04)¥Ж	182.73 (9.40)¥	0.887	0.546
	T2	64.33 (11.49)	146.80 (14.15)¥Ж	147.13 (12.43)¥Ж	150.00 (13.00)¥Ж	151.60 (14.28)¥Ж	184.60 (9.46)¥		
	T3	63.20 (10.02)	141.93 (12.17)¥Ж	142.07 (12.12)¥Ж	145.53 (12.01)¥Ж	149.87 (12.22)¥Ж	186.93 (7.94)¥		
RPE mean (±SD)	T1	-	4.67 (1.18)	5.67 (1.11)‖	6.40 (1.24)Ѳ	7.33 (1.29)ѲЂ	-	0.541	0.776
	T2	-	4.87 (1.13)	5.53 (1.06)	6.07 (1.10)ρ	7.07 (1.16)ѲЂЊ	-		
	T3	-	3.93 (1.28)	4.93 (1.34)‖	5.33 (1.35)Ѳ	6.20 (1.15)ѲЂ	-		

*TT = end of the time trial measurement; RPE = ratings of perceived exertion.

§ Significant interaction effect p<0.001

¦ Significant interaction effect p<0.01

‖ A significant difference from 30 minutes during the same trial p<0.05

ρ A significant difference from 30 minutes during the same trial p<0.01

Ѳ A significant difference from 30 minutes during the same trial p<0.001

Ђ A significant difference from 60 minutes during the same trial p<0.001

Њ A significant difference from 90 minutes during the same trial p<0.05

ϫ A significant difference from TT during the same trial p<0.001

¤ A significant difference from 120 minutes during the same trial p<0.01

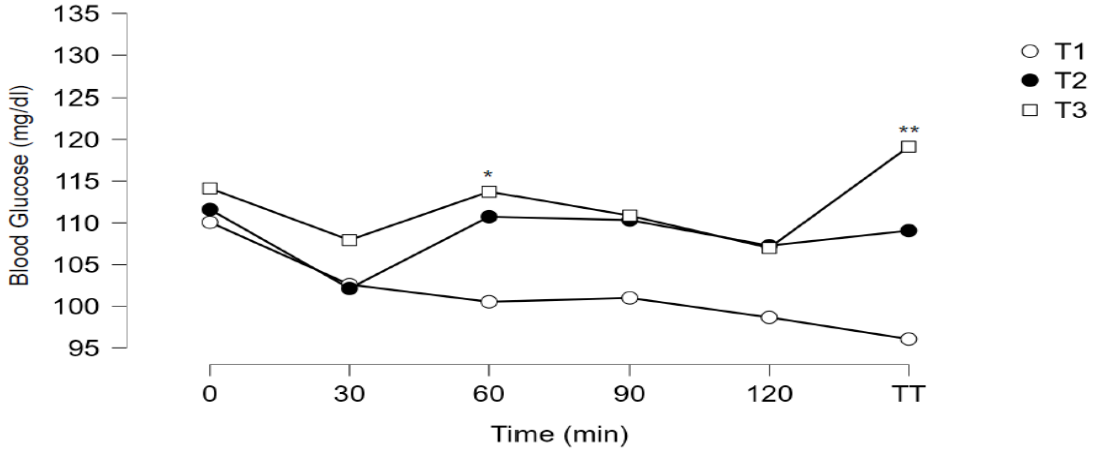
¶ A Significantly different from T1 at the same time p<0.05

ϕ A Significantly different from T1 at the same time p<0.001

ʉ A Significant difference from baseline measures from the same trial p<0.05

µ A Significant difference from baseline measures from the same trial p<0.01

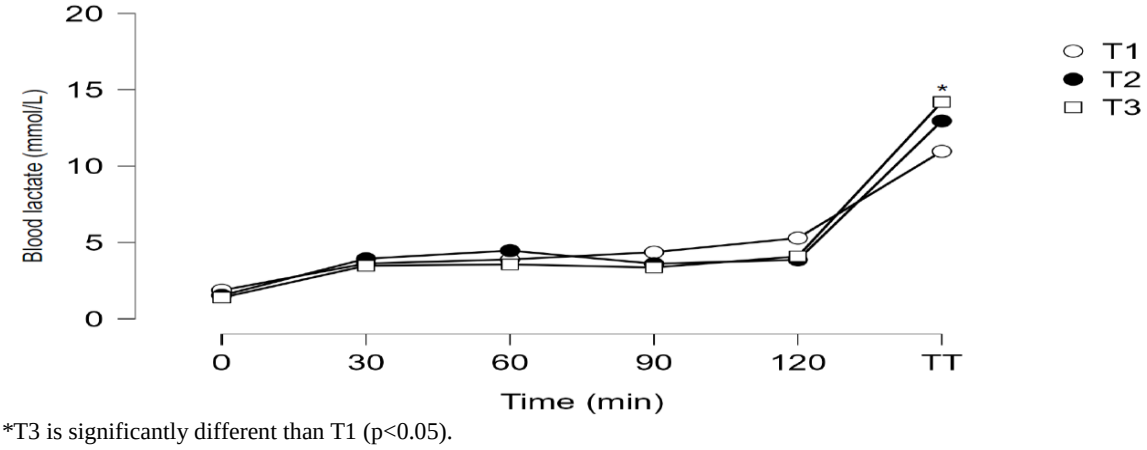
¥ A Significant difference from baseline measures from the same trial p<0.001



*T3 is significantly different than T1 (p<0.05). **T2 is significantly different than T1 (p<0.05); T3 is significantly different than T1 (p<0.001).

Figure 1. Mean blood glucose measures across all trials.

An interaction effect was found between 3 measurements in blood lactate concentration values (Table 2). There was no significant difference in blood lactate concentration values between the 3 measurements at baseline (Figure 2). Similarly in all 3 measurements; blood lactate concentration increased slightly at 30 minutes and remained almost stable until the end of 120 minutes, and blood lactate concentration increased similarly in all 3 measurements at the end of TT. At the end of TT, blood lactate concentration was statistically significantly higher at T3 than at T1 (p = 0.026). There were significant differences in the effect of time on blood lactate concentration in the 3 measurements (Table 2). In all 3 measurements, blood lactate concentration values at the end of TT were statistically significantly higher than baseline (p = 0.001). During T1, blood lactate concentration at 120 minutes was significantly higher compared with baseline (p = 0.001). During T2, the blood lactate concentration at 60 minutes was significantly higher compared to baseline (p = 0.019). In all 3 measurements, the blood lactate concentration at the end of TT was significantly higher than at 30, 60, 90 and 120 minutes (p = 0.001).



*T3 is significantly different than T1 (p<0.05).

Figure 2. Mean blood lactate concentrations across all trials.

No interaction effect was found between the 3 measurements in heart rate values (Table 2). There was no significant difference in heart rate values between the 3 measurements at baseline (Figure 3). Similarly in all 3 measurements; heart rate data increased at 30 minutes, progressed almost stably until the end of 120 minutes, and increased again similarly at the end of TT. There were significant differences in the effect of time on heart rate in the 3 measurements (Table 2). In all 3 measurements, heart rate data were statistically significantly higher at 30,60,90,120 minutes and at the end of TT compared to baseline (p 0 0.001). Heart rate data in all 3 measurements; the value at the end of TT was statistically significantly higher than the values at 30,60,90 and 120 minutes (0.001).

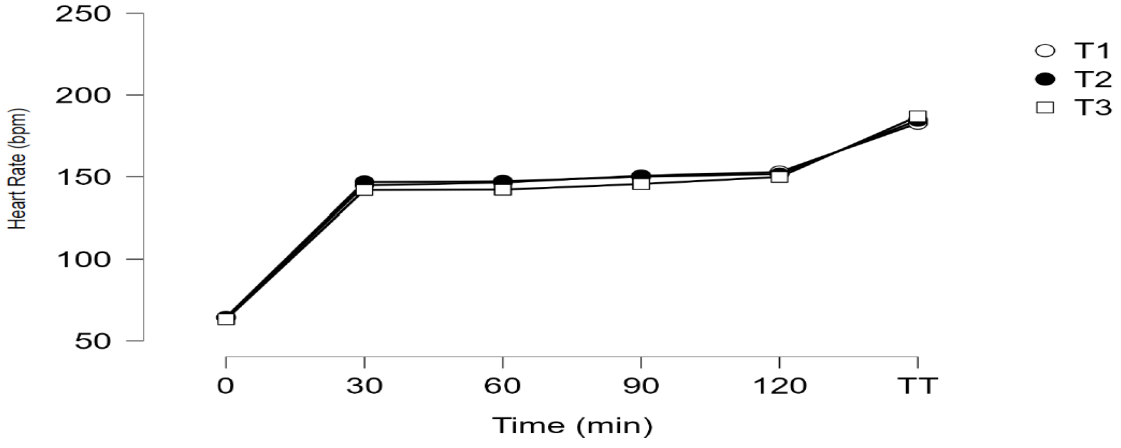


Figure 3. Mean heart rate datas across all trials

There was no interaction effect between the 3 measurements in the perceived degree of difficulty values (Table 2). There was no significant difference in perceived difficulty between the 3 measurements at baseline (Figure 4). Perceived degree of difficulty data increased gradually in all 3 measurements. There were significant differences in the effect of time on perceived difficulty in the 3 measurements (Table 2). The perceived difficulty at 90 and 120 minutes during T1 was statistically significantly higher than at 30 minutes (p = 0.001). The perceived degree of difficulty value at 60 minutes during T1 was statistically significantly higher than at 30 minutes (p = 0.05). The perceived degree of difficulty value at 120 minutes during T1 was statistically significantly higher than at 60 minutes (p = 0.001). The perceived degree of difficulty value at 90 minutes during T2 was statistically significantly higher than at 30 minutes (p = 0.01). Perceived difficulty at 120 minutes during T2 was significantly higher than at 30 minutes (p = 0.001), 60 minutes (p = 0.001) and 90 minutes (p = 0.05). Perceived difficulty at 60 minutes during T3 was significantly higher than at 30 minutes (p = 0.05). Perceived degree of difficulty values at 90 and 120 minutes during T3 were significantly higher than at 30 minutes (p = 0.001). The perceived degree of difficulty value at 120 minutes during T3 was statistically significantly higher than at 60 minutes (p = 0.001).

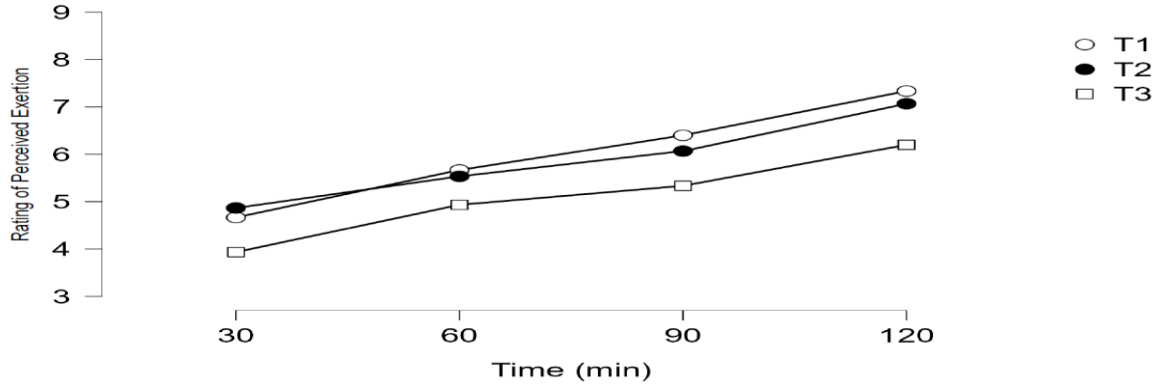


Figure 4. Mean ratings of perceived exertion across all trials.

Table 3. Shows the data of the time trials (15 minutes) and hydration

Dependent variable	Condition	Mean (±SD)	F	p
Mean power output TT (watt)	T1	246.87 (55.06)	0.130	0.879
	T2	241.80 (55.02)		
	T3	252.13 (56.51)		
Cadance TT (rpm)	T1	93.00 (6.89)	1.269	0.292
	T2	94.47 (6.26)		
	T3	96.67 (5.85)		
Distance covered during TT (km)	T1	9.87 (0.83)	0.537	0.589
	T2	9.89 (0.85)		
	T3	10.15 (0.78)		
Hydration (Liter)	T1	1.97 (0.49)	0.284	0.754
	T2	1.98 (0.53)		
	T3	1.87 (0.37)		

*rpm = revolutions per minute

No significant difference was found in mean power output, cadence, the distance covered and hydration values ($p>0.05$). When the distance traveled (figure 5) and average power output (figure 6) values were analyzed; it was seen that the values in T3 are higher, although there is no significant difference between the trials.

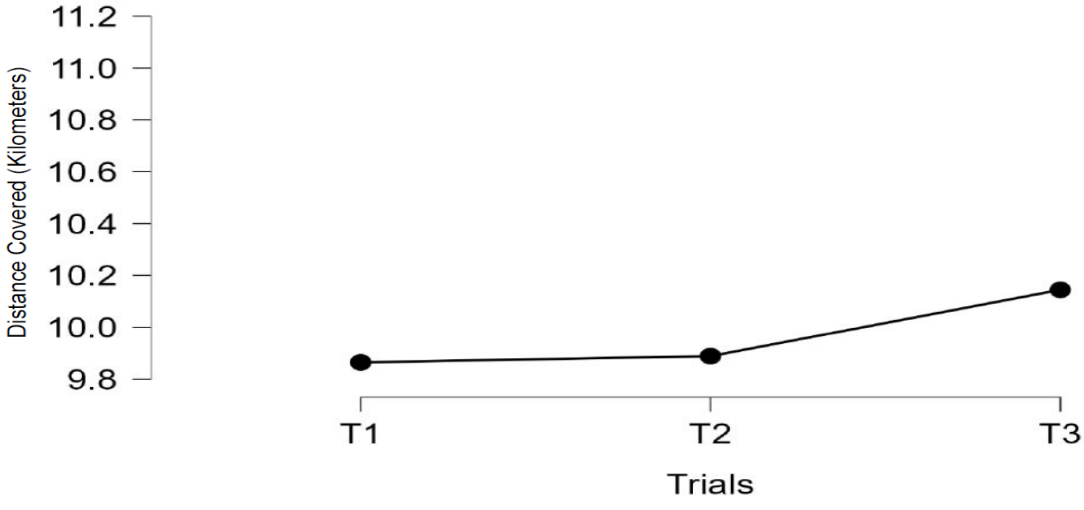


Figure 5. Distance in kilometers covered during the 15-minute time trial.

DISCUSSION

The aim of this study was to investigate the effects of carbohydrate gel use, which is frequently used by cyclists, on the performance of a 2-hour endurance exercise followed by a 15-minute TT. In the tests performed in 3 different conditions, blood glucose, blood lactate, heart rate, watt output, cycling cadence, RPE and TT were primarily analyzed. Our study showed that the use of carbohydrate-based energy gel created a significant difference compared to the tests performed with only water and maintained the blood glucose level. While no significant change was observed in blood lactate levels during the 120-minute exercise period for all three trials, a statistically significant increase in T3 compared to T1 occurred during the 15-minute TT performance. Heart rate and RPE values did not change significantly for a total of 135 minutes in all 3 trial types. However, although there is no significant difference in terms of cadence, watt output and distance covered during TT, the difference may be important in terms of

cycling. There was no significant relationship between energy gel and water consumption.

In a similar study by Kozlowski et al. (2021) found that carbohydrate gel feeding maintained blood sugar level, did not cause a change in blood lactate level, and increased performance in the TT cycling test during a 2-hour exercise. They mentioned the positive effect on performance of using a gel every 30 minutes, not at intervals of 45-60 minutes. One of the main findings in the research pertains to the role of energy gel consumption in maintaining blood glucose levels, while also demonstrating a favorable impact on the rating of perceived exertion (RPE) with repeated usage. Limited research has been conducted to assess the impact of energy gel consumption on glucose levels and physical performance during exercise. A research was conducted to examine the effects of pre-exercise carbohydrate gel consumption on athletes' blood glucose concentrations and other performance indicators during extra time in a simulated football match. The findings revealed that the carbohydrate gel intake resulted in higher blood glucose concentrations and improved dribbling performance among the athletes. However, no significant improvements were seen in other performance indicators such as sprinting or jumping (Harper et al., 2016). Another research found that the use of isotonic carbohydrate gel during high-intensity shuttle running resulted in a significant delay in the onset of tiredness and a notable enhancement in running capacity by 45% when compared to the group presented with a placebo. The feature of this study is the positive effect of carbohydrate supplementation on endurance capacity, consistent with previous research. In addition, it is the first study to investigate carbohydrates in gel form and to report its positive effects (Patterson & Gray, 2007). There is a positive trend in studies on carbohydrate supplements. According to a research, the consumption of a 6.9% carbohydrate (CHO) beverage immediately before to and during a 75-minute high-intensity shuttle run resulted in a notable 33% improvement in endurance capacity when compared to a placebo (Nicholas et al., 1995). An additional investigation revealed that the absence of a 4-second recuperation time subsequent to each sprint resulted in a 32% enhancement in high-intensity running performance when carbohydrate (CHO) intake in the form of a 6% solution was administered prior to and throughout exercise, as compared to a placebo (Davis et al., 2000). In a study conducted by Wels et al. (2002), it was discovered that the consumption of a 6% carbohydrate (CHO) drink before to the beginning of each 15-minute exercise session had a notable impact, while taking an 18% CHO fluid halfway through a 60-minute interval jog, extended the interval time to fatigue by 37%.

Although there are positive studies on carbohydrate intake, some studies with carbohydrate gels did not have the same positive effect. In one of the conducted instances, participants performed in a 5.2-kilometer training run, after which they ingested a 70-gram sachet of isotonic carbohydrate (CHO) gel, comprising 25 grams of carbohydrates. Following the administration of carbohydrate (CHO), the participants engaged in a 5 kilometer running experiment. Brooks et al. (2002) did not provide any performance data in their study. However, they did find that carbohydrate consumption had a substantial impact on blood glucose concentration, causing a lesser decrease in blood volume compared to the control or water conditions. The study conducted by Burke et al. (2005) is the second research endeavor aimed at examining the impact of carbohydrate gel consumption on performance. According to their research, the observed effect on performance was found to be negligible, as the duration was enhanced by a mere 14 seconds. Given that this investigation was carried out on a cohort of highly skilled athletes, a temporal discrepancy of 14 seconds may be seen as a noteworthy improvement in performance as time progresses.Recent studies in terms of the amount of carbohydrate supplementation during exercise recommend 1.5 g CHO intake per 1 minute. Gel manufacturers have recommendations for 1 packet (almost 35 gr CHO)15 minutes before exercise and 1 packet every 45 minutes.In the study, the use of more frequent energy gels against the recommendations of the gel manufacturers increased the TT performance by 7-12% compared to the non-reinforced condition. In terms of TT performance, the use of gel at 30 minutes and 45 minutes did not make a significant difference, while more frequent use showed a performance increase of 5% (Kozlowski et al., 2021). Similarly, in our study, there was no significant difference in the blood glucose level of the energy gel feeding used every 30 minutes and 45 minutes.

The data we obtained in our study revealed a statistically significant blood lactate value in the TT performance of T3 who started to use gel before exercise, took gel every 45 minutes, and used caffeine gel at 75 minutes. In a similar study, Kozlowski et al. (2021) found blood lactate values to be similarly high in TT performance when fed with carbohydrate gel.The metabolic path used for energy generation during exercise might be influenced by the glucose state inside the body. If there is a substantial rise in glycolytic metabolism, it may lead to an elevation in lactic acid generation if the oxidative cycle is incapable of managing the heightened synthesis of pyruvic acid. The observed elevation in lactate levels at T3, as compared to T1, is plausibly attributed to enhanced glucose accessibility resulting from a higher frequency of gel consumption throughout the time trial. Furthermore, it was observed that the performance distance exhibited a larger disparity in T2 and T3 as compared to T1. This discrepancy may likely be attributed to the heightened availability of substrates during these trials, which can be attributed to the preservation of muscle glycogen. Following the completion of the time trial (TT), participants were instructed to exert their utmost effort in certain topics for the last 15 minutes. Our observations revealed a notable inclination towards increased lactate generation during T2 and T3, particularly when exercise was often accompanied by the consumption of an energy gel. This phenomenon may indicate that the elevation in blood glucose levels is metabolized anaerobically and transformed into lactate while engaging in physical activity at an intensity above 70% of the maximum oxygen consumption (VO_2max). Additionally, the consumed substrate has a role in augmenting both the rate of energy generation and the formation of lactate.

Similarities might be seen in the lactate concentrations throughout various supplementation trials. In accordance with the results of our study, Steiner et al. (2009) reported a lack of statistically significant disparity in lactate levels between the group that received the carbohydrate supplement and the group that received the placebo during the 45-minute cycling session at 70% of maximum oxygen consumption (VO_2 max). A research investigating the effects of long-term exercise observed that the consumption of 58 g of carbs per hour during a self-paced treadmill run covering a distance of 24.14 km did not provide any statistically significant differences in lactate concentrations (Andrews et al., 2003).

Many studies have shown that carbohydrate supplementation is associated with low RPE (Anastasiou et al., 2004). Similarly, studies have found a relationship between carbohydrate supplementation and high RER values. This may indicate that subjects actually oxidized larger amounts of carbohydrates as the frequency of supplementation increased (Anastasiou et al., 2004; Andrews et al., 2003). Nevertheless, our investigation did not provide any statistically significant disparities in the values of perceived exertion (RPE) and heart rate. According to reports, exhaustion might potentially exist due to the breakdown of one or more connections within the pathway connecting the central nervous system (CNS) to the mechanism responsible for muscle contraction (Sahlin,1992). Nybo (2003) the current investigation examined the impact of administering a 6% glucose polymer solution at 15-minute intervals on the voluntary force generation throughout a 3-hour cycle trial, with a workload of 200 W at 90 revolutions per minute. The researchers reported that glucose homeostasis was sustained throughout the glucose study conducted during exercise, but it declined to hypoglycemia levels (~3.0 mmol/L) in the placebo trial. Furthermore, the occurrence of exercise-induced hypoglycemia was shown to result in a decrease in the mean force generated during prolonged maximum muscular contraction.

Existing research has shown that dehydration has the potential to cause an early onset of fatigue in both aerobic endurance events and high-intensity exercise (Davis et al., 2000). The amount of water consumed during the tests was measured in order to analyze the water consumption of the athlete in cases where different gels were used and only water was consumed.In our study, there was no significant difference in water consumption in 3 different feeding types.

Consuming caffeine 4-6 mg/kg before working out. provides energizing effects that are beneficial during high-intensity interval training for improving sprinting ability, muscle growth, and hand-eye coordination (Roberts et al., 2010). As an adenosine antagonist (Fredholm et al., 1999), Caffeine has the ability to easily pass the blood-brain barrier, so promoting its interaction with the main target inside the central nervous system (CNS) (Graham, 2001). The effects include a

reduction in the sense of work and discomfort (Roberts et al., 2010), increased central drive (Kalmar & Caffarelli, 1999), and, to a reduced degree, enhanced muscular strength and endurance (Warren et al., 2002). The co-ingestion of caffeine and carbohydrates has been seen to decrease the use of muscle glycogen during the first phases of physical activity, so preserving it for subsequent utilization and delaying the onset of exhaustion (Cox et al., 2002). In our study, carbohydrate gel containing 150 mg of caffeine was used in the T3 feeding type at the 75th minute. There is an expectation among athletes to increase endurance or increase performance, and research supports this expectation. Caffeine can have an effect on peak pace, highest power output, and longest distance, especially during TT.

Conclusion

The findings of this study indicate that the intake of energy gels during trials resulted in higher blood glucose levels and enhanced time trial (TT) performance compared to trials without feeding. Furthermore, an increased frequency of gel administration resulted in improvements in both blood glucose levels and the distance covered during the time trial (TT). The blood lactate concentrations were shown to be elevated after the time trial (TT) performance in all three trialsand a statistically significant increase in T3 compared to T1 occurred during the 15-minute TT. Heart rate and RPE values did not change significantly. In addition, even though cadence, power output and distance covered during TT in T3 were not statistically significant, they made a significant difference in terms of today's sporting expectations. The study also found no association between energy gel feedings and water consumption.

Conflict of interest

No conflict of interest is declared by the authors. In addition, no financial support was received.

Ethics Committee

This study is approved by Fenerbahçe University (FBU) Non-Invasive Clinical Research Ethics Committee (Approval Number: 13.04.2022/15.2022fbu)

Author Contributions

Planned by the author: Study Design, Data Collection, Statistical Analysis, Data Interpretation, Manuscript Preparation, Literature Search. Author have read and agreed to the published version of the manuscript.

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RESEARCH ARTICLE

Acute Effect of KinesioTaping on Technical Skills of Wheelchair Basketball Players

Kubilay ÇİMEN[1*], Alperen ŞANA[2], Gökmen ÖZEN[3], Özdemir ATAR[4] and Melissa ÜNSALAN[5]

[1]Istanbul Gelişim University, High School of Physical Education and Sport, Departmentof Recreation, İstanbul / Turkiye
[2]Çanakkale Onsekiz Mart University, Graduate Education Institute, Department of Spor Science, Çanakkale / Turkiye
[3]Çanakkale Onsekiz Mart University, Faculty of Sport Sciences, Department of Physical Education and Sport, Çanakkale / Turkiye
[4]Çanakkale Onsekiz Mart University, Faculty of Sport Sciences, Department of Coach Training, Çanakkale / Turkiye
[5]International Cyprus University, Department of Physical Therapy and Rehabilitation, Lefkoşa / TRNC.
*Correspondingauthor: alperensanal48@gmail.com

Abstract
The purpose of this research kinesiology taping (KT) is to increase the blood and lymph circulation under the skin and provide the athlete with a comfortable movement capacity. For this purpose, we aim to examine the effect of KT on the shoulder and supraspinatus muscles of wheelchair basketball players on the technical skills of athletes. Ten male wheelchair basketball players between the ages of 20 and 40 participated in the study. In the study, kinesiology tape was applied to the shoulder and supraspinatus muscle regions of the athletes. To evaluate the effect of KT regional shooting (2p), tourniquet, slalom, and sprint tests were applied before and after taping. SPSS 25 statistical program was used for the analysis of the data. The significance value for the analysis was accepted as 0.05. According to the research findings, it was determined that KT was effective in the 2nd, 3rd, and 4th regions in shooting from 5 regions, and KT was also effective in 20m sprint, right tourniquet throw, and slalom skills with and without the ball ($p<0.05$). We can say that KT affects shots made from positions that see the basket from the opposite and diagonal, increasing the dribbling skill and sprint performance. During the competition, it is recommended that the athletes do it on the shoulder and supraspinatus muscle areas.

Keywords
Wheelchair Basketball, Kinesiology Tape, Shooting, Sprint, Dribbling

INTRODUCTION

Wheelchair basketball is among the popular sports branches for disabled individuals (Jekielek et al., 2021). The number of wheelchair basketball players in the world is expressed as 30,000 (Yıldırım et al. 2019). This makes wheelchair basketball a more competitive sport. However, there are many factors that affect the performance of athletes, including wheelchair basketball players, during this competition. One of them is the problems in the shoulder area. In the literature, when the injuries experienced by wheelchair basketball players are examined, it is stated that the injuries mostly occur in the shoulder region (Jekielek et al., 2021). The reason for this is that the muscles in the shoulder region are the most effective muscle groups in actions such as passing,

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[1]**ORCID:** 0000-0003-1427-1208 , [2]**ORCID:** 0000-0002-6852-8990 , [3]**ORCID:** 0000-0001-5756-653X , [4]**ORCID:** 0000-0001-7941-2865 , [5]**ORCID:** 0000-0001-8323-4723

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shooting, rebounding, and moving the wheelchair (Karasuyama et al., 2022; Vanlandewijck et al., 2001). Excessive overhead movements increase the risk of injury to the athlete during the competition (Jost et al., 2005; Lin et al., 2018).The occurrence of the conditions that physically prevent the athlete directly affects the performance of the athlete in the competition. As a matter of fact, studies in the literature indicate that various factors such as fatigue accumulated in the muscles, cognitive unpreparedness of the athlete, and injury during the competition reduce the performance of athletes (Behm et al. 2021). Considering these situations, the muscle groups in the shoulder area should be protected and supported in order to minimize the performance decrease of the athletes during the competition in wheelchair basketball. Supporting and developing the muscle group around the shoulder plays an important role.However, a period of at least four weeks is needed to gain strength (Bompa and Buzzichelli, 2019).One of the methods used to shorten this process is the KT method, which came into our lives in a short time.

The KT technique was first developed by Dr Kenzo Kase in 1973.The main purpose of KT is to increase blood and lymph circulation under the skin.In this way, the range of motion is increased while the muscles and joints are supported.This provides positive effects such as inflammation and pain-reducing effect, nerve-muscle reduction, and performance improvement in athletes (Kase et al., 1996; Arslanoğlu et al., 2014).Researchers are developing different application methods of KT day by day, and studies on KT are increasing day by day (Çeliker et al., 2011).

When wheelchair basketball and kinesiological taping studies in the literature are examined, mostly sportive performances (strength, anaerobic and aerobic performance, flexibility) are examined (Ünüvar ve Sanioğlu, 2021; Bicici ve ark., 2012; Marrow ve ark., 20 11). However, its effects on dribbling, shooting, layup, and sprint, which are dynamics in the competition, have not been examined.The muscle groups in the shoulder area are effective in sportive performance for wheelchair basketball players.Injury and muscle fatigue affect these muscle groups, reducing athletic endurance (Garcia-Gomez et al., 2019).For this reason, our aim in this study is to examine the effect of the KT method in the shoulder area on various technical parameters such as shooting skill, layup, change of direction, and speed.

MATERIALS AND METHODS

Study Design

The research was carried out with a weak experimental design method with multiple subjects, which is one of the quantitative research methods. The sample selection in our study was determined by the convenient sampling method, which is one of the non-random sampling methods. While the convenient sampling method is a method that allows scientific research to be carried out faster, it is the situation where the researchers choose the environment or environments that the participants can easily reach (Gravetter & Forzano, 2012). The sample size of the study was calculated with a margin of error of 0.1 and a confidence interval of more than 0.8. As a result, the participation of 10 people in the 10% confidence interval is sufficient to represent the regional league universe. Ethics committee approval was obtained for the study from the Ethics Committee of Graduate Studies of Çanakkale University with decision number 22/61 dated 15.12.2022. Studies were carried out in accordance with the Declaration of Helsinki.

Participants

Ten male wheelchair basketball players between the ages of 20 and 40 participated in the study. The distribution of the physical characteristics of the athletes participating in the research is given in Table 1. In addition, the height measurements of the athletes were recorded by measuring the distance from the floor to the top of the athlete's head while on the wheelchair.

Table 1. Distribution of Physical Characteristics of the Athletes Participating in the Research.

	N	Min.	Maks.	X±SS
Age (year)	10	20,0	40,0	28,5±7,63
Height*(cm)	10	135,0	163,0	150,9±9,75
Weight (kg)	10	58,0	75,0	67,9±5,17

*Athlete's height when sitting in a chair.

Tests and Procedures

In the research, regional shooting (2p), layup, slalom, and sprint tests were applied to evaluate the effect of kinesiology tape application on the athletes. In the regional shot test, 10 shots were taken from the points that see the hoop from 5 different points from a distance of 4.225 meters from the hoop, and the number of basket was noted. Athletes were given 50 seconds for 50 shots

(Uzun and Pulur, 2018). The slalom test ends the test by coming back to the starting point by passing through the 5 slalom bars placed 1.5 m apart after the starting line, with or without the ball (Molik, Kosmol et al., 2010; Soylu et al. 2021).

Layup test throws turnstile by turning around the slalom bar at a distance of 4.225m from the hoop and advancing to the hoop.Then, he takes the ball, turns around the slalom bar and moves to the basket again and throws the layup (Figure 1).For this test, the athletes were given 5 shots and 30 seconds of time. The same test was performed on both the right and left sides.

The sprint test was carried out with the help of a two-door photocell on a flat parquet floor with a distance of 20m between the start and finish line (Molik et al., 2010).

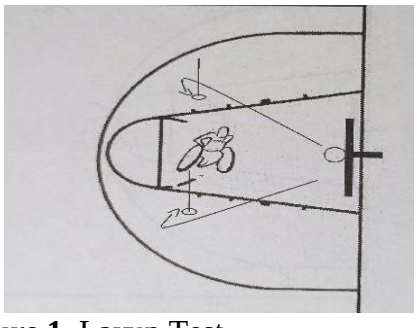

Figure 1. Layup Test

Kinesiotaping Aplication

Kinesio® Tex GoldTM FP, U.S.A. was used as kinesiology tape. While the participants were in the standing upright position, taping was applied to the skin cleaned with alcohol. The first kinesiology tape was cut in the form of a Y tape and was prepared for the supraspinatus muscle facilitation technique. The Y-cut tape is adhered to the greater tubercle of the humerus without tension. The first piece of the tape was adhered to the upper edge of the scapula with 15-25% tension, while the second piece was finished at the spina scapula. The second kinesiology tape was cut in the form of a Y tape and prepared for the facilitation technique for the deltoid muscle.The Y-cut tape is adhered to the acromina without tension.The first part of the Y tape was taken to the shoulder extension with 15-35% tension and adhered obliquely to the anterior part of the deltoid muscle, while the second part of the shoulder was horizontally abducted and applied towards the posterior part of the deltoid muscle.Two parts are joined on the subdeltoid bursa (Baltacı, 2020).In order to maximize the adhesion of the tapes, the tapes were heated by rubbing immediately after application (Figure 2).KT application was carried out in the presence of a specialist physiotherapist.

Figure 2. Kinesiologytaping

Statistical Analysis

SPSS 25 statistical program was used for the analysis of the data. As a result of the normality analysis, it was seen that the data were normally distributed (+1,-1). As a result, the Paired-Sample T test, which is one of the parametric tests, was used. The significance value for the analysis was accepted as 0.05.

RESULTS

Wheelchair basketball players' shots from 5 regions were tested before and after KT. Accordingly, while significant differences were detected in Region 2, Region 3 and Region 4 ($p<0.05$), no significant differences were detected in Region 1 and Region 5 ($p>0.05$) (Table 2).According to the significant difference, it was observed that the hit rate of the athletes' shots increased after KT.

Wheelchair basketball players' layup, slalom and sprint performances with and without the ball were tested before and after KT. Accordingly, while significant differences were detected in the right layup, with the ball and without the ball slalom, and 20m sprint tests ($p<0.05$), no significant difference was found in the left layup ($p>0.05$) (Table 3).According to the significant difference, it was seen that after the KT, the athletes made positive contributions to the right layup, slalom skills with and without the ball, and 20m sprint performances.

Table 2. Analysis of Regional Shots of the Athletes Participating in the Research Before and After KT.

	KT	N	X±SS	t	P
1. Region	Before	10	4,4±1,505	-1,861	,096
	After	10	4,9±1,663		
2. Region	Before	10	4,2±1,398	-4,392	,002*
	After	10	5,7±1,418		
3. Region	Before	10	5,20±1,398	-6,091	,000*
	After	10	6,5±1,178		
4. Region	Before	10	4,10±1,370	-3,000	,015*
	After	10	5,10±1,449		
5. Region	Before	10	3,80±1,873	-,958	,363
	After	10	4,50±2,068		

*p<0.05. KT: Kinesiotaping

Table 3. Tunike, Slalom and Sprint Test Analysis of the Athletes Participating in the Research Before and After KT.

	KT	N	X± SS	t	P
Right Layup	Before	10	4,20±,632	-3,000	,015*
	After	10	4,70±,483		
Left Layup	Before	10	4,30±,674	-1,809	,104
	After	10	4,70±,483		
Slalom With The Ball (sec)	Before	10	12,99±1,136	4,165	,002*
	After	10	12,63±1,294		
Slalom Without The Ball (sec)	Before	10	14,16±1,323	2,909	,017*
	After	10	13,78±1,611		
20m Sprint (sec)	Before	10	7,13±,703	3,055	,014*
	After	10	6,81±,833		

*p<0.05. KT:Kinesiotaping, sec:second

DISCUSSION

In our research, we aimed to examine the effects of KT on technical skills. For this purpose, shot shots from 5 different regions, which are 4.22m away from the basket, were examined. According to the research findings, 2-3-4. Kinesiology tapes affected the shots fired from the regions. But there was no difference in Regions 1 and 5. It is thought that the reason for this is that the athletes do not have the possibility of throwing by hitting the backboard. Because the athletes made most of their shots by hitting the backboard during the test. When we examined the right and left tourniquet shots again, KT affected the right tourniquet skill. It didn't affect the left.

KT provides advantages to athletes in many ways. Facilitation, increase in muscle strength, decrease in pain, and increase in range of motion are observed in the area where KT is applied (Li et al., 2023; Ünüvar and Sanioğlu, 2022; Sanchez et al., 2012). On the other hand, it is stated to be effective in features such as strength, motor unit activity, and muscle strength (Li et al., 2022; Ünüvar and Sanioğlu, 2022; Nunes et al., 2021). Mülazımoğlu et al., (2018), "Four-week training with shoulder kinesio-tape" significantly increased the shooting accuracy of athletes. The effect size of this increase in the average shooting score was found to be large. However, there are studies in the literature stating that they do not have positive effects on motor activity, pain, and strength (Martonick et al., 2020; Kalichman et al., 2016). KT also plays a role in preventing injury (Li et al., 2023; Çeliker et al., 2011). Although KT is a subject that is constantly being researched, there is no definite information about the effects of KT on technical skills. In terms of KT techniques and benefits, it is argued that KT especially prevents disability, reduces pain, and increases range of motion. In addition, it is known that the tension of kinesio taping varies according to studies. In this direction, 0-10% band tension for myofascial effects, 10-15% for muscle inhibition, 15-25% for muscle relaxation, 25-35% for correction, 50-75% band tension for ligament-tendon correction and mechanical correction techniques, 75- 100% mechanical correction and ligament correction techniques are applied at the beginning and end of

the tape with 5% cm 0% tension (Ünüvar and Sanioğlu, 2022; Kase et al., 2003). We applied 15-25% tension to the KT to facilitate movement and increase performance.

When the effect of KT on slalom and sprint performance was examined, there was an effect of KT on slalom skills with and without the ball and 20m sprint tests. This was an expected effect. Because dribbling and sprinting skills have important for teams in wheelchair basketball. As a matter of fact, athletes do a lot of dribbling and sprinting during the competition. The upper extremity muscles are actively working for the athletes to push their wheelchairs. The shoulder and back muscles are the most worked muscle groups. Increasing muscle fatigue has negative effects on the technical skills of athletes. This reduces shooting success and sprint performance. For this reason, the effects of KT on sprint and agility characteristics are extensively studied in the literature. Dowall et al., (2015) state that lower extremity KT (basketball, volleyball, track and field athletes) has a positive effect (Dowal et al., 2015). Yoshida and Kahanov (2007) state that KT can increase the range of motion (Yoshida and Kahanov, 2007). When the range of motion is considered in terms of wheelchair basketball, it has a positive effect on the movement of the wheelchair. Because the wider range of motion allows the athletes to produce better torque from the wheelchair. This has positive effects on both slalom and sprint skills.

This research was limited to 10 wheelchair basketball players. This hinders the dissemination of research results in general. Only 2-point shots were evaluated to determine shooting skill. Because 3-point shots are both few and difficult shots in wheelchair basketball. As a matter of fact, it is very difficult for athletes who have a high obstacle level to shoot 3-pointers. There is no specific test for tourniquet throws. That's why we adapted this test ourselves. This creates a limitation on the validity of the test.

According to the results of this study, we can say that KT may have positive effects on the technical skills (shooting, dribbling, sprinting) of wheelchair basketball players in the competition. More research is needed to reach a definitive conclusion.

Conflict of interest

No conflict of interest is declared by the authors. In addition, no financial support was received.

Ethics Committee

This study is approved by the Çanakkale Onsekiz Mart University (ÇOMU) Graduate Education Institute Ethics Committee (Approvel Nummer: 22/61).

Author Contributions

Study Design, AŞ, KÇ; Data Collection, AŞ, MÜ, KÇ; Statistical Analysis, GÖ, ÖA, KÇ; Data Interpretation, AŞ; Manuscript Preparation, AŞ, KÇ, GÖ, ÖA; Literature Search, MÜ, KÇ, GÖ. All authors have read and agreed to the published version of the manuscript.

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RESEARCH ARTICLE

Acute Low and Moderate Doses of Caffeine Improve Aerobic Endurance but Not Throwing Velocity in Trained Female Handball Players

Ulaş Can YILDIRIM[1*]

[1]Sinop University, Faculty of Sport Sciences, Department of Coach Training, Sinop / Turkiye
*Corresponding author: ulascanyldrm.ucy@gmail.com

Abstract
Handball is a high-intensity team sport requiring muscle power and high aerobic capacity. Caffeine is a commonly used ergogenic aid known to enhance sports performance. However, its effects on female handball players remain unclear. This study aims to investigate the effects of acute low (LCAF) and moderate (MCAF) doses of caffeine intake on aerobic endurance and throwing velocity in trained female handball players. Fifteen trained female handball players participated in this randomized, double-blind, crossover study. Participants completed four sessions, including a familiarization session and three test sessions. The test sessions involved ingesting either 3 mg/kg (LCAF) or 6 mg/kg (MCAF) of caffeine or a placebo (PLA). Throwing velocity and aerobic endurance were measured using a hand radar gun and the Yo-Yo Intermittent Recovery Test Level 1, respectively. The results showed a significant improvement in aerobic endurance with both LCAF and MCAF doses of caffeine compared to the PLA condition (f= 5,993; p= ,014; η2= ,480). However, there was no significant difference in throwing velocity between the caffeine and placebo conditions (f= ,040; p= ,961; η2= ,006). Acute LCAF and MCAF doses of caffeine supplementation can enhance aerobic endurance but do not affect throwing velocity in trained female handball players. These findings contribute to the limited literature on the effects of caffeine in trained female handball players and suggest that caffeine may be a useful nutritional strategy for improving performance in this sport.

Keywords
Handball, Caffeine, Aerobic Endurance, Throwing Velocity, Female Athletes

INTRODUCTION

Handball is an intermittent high-intensity team sport (Ortega-Becerra et al., 2020) that includes combined defensive and offensive actions as well as technical and tactical skills (Rocha et al., 2021). During a handball match, multiple interval running, jumping and ball throwing actions occur. Increasing the muscle power and aerobic capacity of handball players is an important component in improving the incompetition performance of their athletes (Ortega-Becerra et al., 2020). In order to increase muscle power and aerobic capacity, support can be obtained from some ergogenic aids as well as specific exercise training modalities.

Given the large body of research that supports its effects on athletic performance, caffeine (1,3,7-trimethylxanthine) is one of the most widely used ergogenic aids (Muñoz et al., 2020). Improvements in perceived exertion and neuromuscular performance due to its antagonist effect on adenosine receptors probably constitute the main mechanism of action of caffeine, unlike many other mechanisms (Grgic, 2021). Many studies have extensively demonstrated that caffeine ingestion at doses ranging from 3 mg/kg (LCAF) to 6 mg/kg (MCAF) 15-60 minutes before exercise can improve athletic performance in many sports (Berjisian et al., 2022; Pickering & Kiely, 2018; Venier et al., 2019; Wang et al., 2022). The

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[1]**ORCID:** 0000-0001-7767-8416

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recommendation for the duration of caffeine intake may vary depending on the form of caffeine consumed (capsule, anhydrous, chewing gum and other intake modalities). In last studies related with caffeine has been administered in either tablet or anhydrous forms ~60 minutes before an exercise protocol to allow for full absorption and reaching peak plasma caffeine concentrations (Pickering & Kiely, 2018; Wickham & Spriet, 2018). Also, dose recommendation may not be applicable to all athletes due to individual differences such as daily caffeine consumption level and side effects (Pickering & Kiely, 2018). Therefore, it is important for researchers to test different doses and observe metabolic responses in order to achieve optimal efficiency.

Although there are limited studies in the literature claiming the opposite (Pettersen et al., 2014), the general opinion is that low and moderate doses of caffeine increase aerobic endurance by 2%-7% between in many sports (Abian-Vicen et al., 2014; Anderson et al., 2000; Clarke et al., 2018; Hanson et al., 2019; Jenkins et al., 2008). For example, Abian et al. reported that 3 mg/kg caffeine increased aerobic endurance by 3.9% after the Yo-Yo IRT1 test they applied to 16 basketball players(Abian-Vicen et al., 2014). However, the effect of caffeine on aerobic capacity in female handball players has not been clearly determined yet. All of this evidence consists of sample groups consisting of sportsmen other than handball players. In a review conducted by Tan and his colleagues in 2022, examining the impact of caffeine on basketball performance outcomes, it was reported that LCAF and MCAF did not exert any significant effect on basketballspecific parameters such as shot accuracy. However, it was found that caffeine intake might contribute to the enhancement of physical parameters crucial for the game, such as intermittent long-term, low, or high intensity running performance(Tan et al., 2021). Basketball is similar to handball due to its which the upper extremity is important, requiring high-intensity intermittent movements such as sprinting and jumping for a long time (Abian-Vicen et al., 2014), and high level of power, speed, strength and aerobic-anaerobic capacity requirements (Chia et al., 2017). Therefore, the study results of Tan et al. can guide our research.

Although throwing velocity, which is one of the fundamental ability and performance variables in handball, is frequently examined in the literature, there is only one study (Munoz et al., 2020) on the effect to throwing velocity of caffeine. The fact that caffeine causes neuromuscular excitability through central mechanisms acting on adenosine receptors will enable high-intensity actions such as jumping and throwing during a match. Munoz et al. reported in a randomized, double-blind study that pre-exercise caffeine intake of 3 mg per kg improved ball throwing speed in elite female handball players. These result show us that caffeine supplementation can be a useful nutritional strategy for handball players (Munoz et al., 2020). A greater stature, mass and upper body power have been associated with higher throwing speed (Vila & Ferragut, 2019). Although the results are controversial (Rocha et al., 2021), there are studies reporting that anhydrous caffeine intake (3 mg/kg) increases muscle power (Gomez-Bruton et al., 2021; Munoz et al., 2020). Although there are limited studies directly related to the effect of caffeine on throwing velocity, examining the effect of caffeine on parameters that affect throwing velocity, such as muscle power, can give us an idea. However, the limited literature suggests that further studies are needed in the future.

Although the ergogenic effects of caffeine are clear, the literature on female handball players is limited. Also, recent evidence suggests that low or moderate dose of caffeine may provide a similar ergogenic benefit on exercise performance as higher doses, but with fewer side effects for athletes. However, it has been argued that a high daily frequency of caffeine consumption may create a tolerance and thus inhibit the ergogenic benefit of caffeine. The aim of this study is to examine the effects of acute LCAF and MCAF caffeine supplementation on aerobic endurance and throwing velocity in trained female handball players.

MATERIALS AND METHODS

Participants

15 trained female handball players (mean ± SD, age = 21 ± 3 years; BMI = 21.73 ± 36 kg/m2; height = 172.06 ± 7.24 centimetres; weight = 64.40 ± 10.68 kilogram) were included in the study. The sample size was calculated using the G Power statistical programme (version 3.1.9.4; Dusseldorf, Germany) using the following variables: ANOVA, repeatedmeasures, within-factors, effect size f (ES)

for 0.24, alpha = 0.05, power (1-error probability) = 0.90, statistical power = 90%, r = 0.85, one set of participants, and three test sessions were used in the statistical test. According to the power analysis, a sample size of at least 13 people was required to detect statistically significant differences in ball throwing speed and aerobic endurance levels in female handball players, between 3 mg/kg (LCAF) or 6 mg/kg (MCAF) of caffeine and placebo (PLA) conditions. Handball players were competing in the Handball Turkish 1st League and had at least five days training sessions and one match in a week. Participants did not have any musculoskeletal injuries in the last 3 months before the tests and did not use any ergogenic aids. Each participant signed an informed consent form after receiving full information about the study. The study was given the go-ahead by Sinop University's ethical committee (2023/170), in accordance with the most recent Helsinki Declaration.

Experimental Design

The study was design in a randomized, double-blind, counterbalanced, and cross-over. Participants were attended four sessions in total (one familiarization and three test session). The test sessions were including 3 mg/kg caffeine (LCAF) or 6 mg/kg caffeine (MCAF) or placebo (PLA). Participants were given adequate period between all sessions. All measurements were made at the same time of day to eliminate any circadian effect (09:00 – 10:00 a.m.). Additionally, participants were asked to watch on their diet also avoid hard exercise and consuming alcohol throughout the measurements. All players advised to maintain their standard daily caffeine consumption routines throughout the study since to avoid “abstinence” effect (Pickering & Kiely, 2019). In each session, each participant ingested LCAF or MCAF pure caffeine (ISO 14001; The Oxford Vitality Health Company ltd; London, UK) or cellulose as PLA in a glass with water 60 min before starting the tests. Doses were adjusted with a closed chamber precision laboratory scale (Shimadzu Company; Tokyo, Japan). Protocol was started 40 minutes after caffeine ingestion after a standard warm-up including 5 minutes of jogging, 10 minutes of stretching and 5 minutes of special warm-up. Pasman et al. (Pasman et al., 1995) also followed a similar protocol in their published study. Then, ball throwing speed test and Yo-Yo Intermittent Recovery Test Level 1 (IRT) were performed, respectively. Two attempts were made for ball throwing speed, with a halfminute recovery period between them. Two-minute rest was given between tests. Immediately after the completion of the experimental trials, participants were asked to have if any side effects.

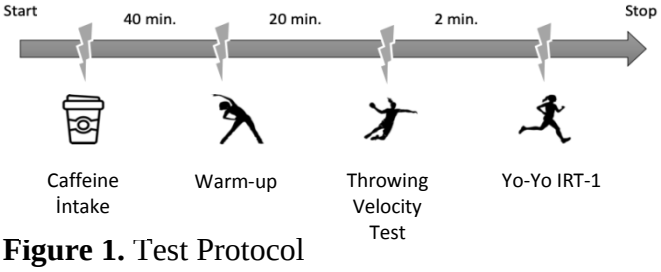


Figure 1. Test Protocol

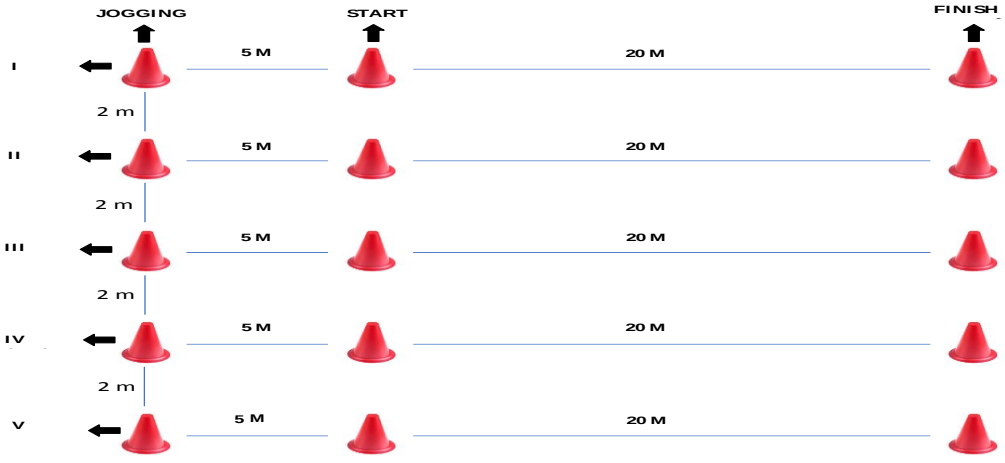
Throwing Velocity

On a handball court, the generation of specific explosive strength during a throw with the dominant hand was assessed. After the warm-up, the handball players were given a handball ball (size 3) in accordance with international standards and were asked to throw the ball from the 7-meter line to the goal at maximum effort. It was forbidden to take steps and fall to the ground before throw. Throw speed were measured with a hand radar gun (Bushnell Velocity Speed Gun, USA) from behind the goal and results recorded as mile. The players were allowed using wax to hand. Research group members supervised all throws to make sure the athletes were using the correct handball technique. Each handball player was performed two times with rest of halfminutes and best score recorded.

Aerobic Endurance

In the Yo-Yo Intermittent Recovery Level 1 (IRT-1) test, 20 meters of shuttle runs at increasing speeds were interspersed with 5 meters (10 seconds) of active recovery until exhaustion. The beeper used in the test was downloaded to a phone and connected via Bluetooth to a portable speaker (JBL; Los Angeles, United States). The players were ready for the test at the beginning that prepared side by side parallel to each other and started running towards the finish funnel from the funnel that indicated the starting point with the signal sound. With the second signal tone, they stepped on the line where the finish funnel was located and started running towards the funnel where they started again. After the participants came to the starting line simultaneously with the third signal, they jogged towards the resting funnel

behind the starting funnel. After ten seconds rest, again was started with the beep and continued the same protocol. The situation was noted as 'error 1' on the scale of the participant who returned to the relevant track after the beep. After the second fault or the players request, the test was terminated for the respective player and score in the last fault was the recorded as the final test result (Yildirim, 2022). All test sessions were held on the handball field that the players were familiar with. The procedure was similar to applied of Souhail et al. procedure (Souhail et al., 2010).



Statistical Analysis

Data's are reported as mean ± standard deviation (m ± SD) for all participants. The distribution of the data was confirmed by the Shapiro-Wilk normality test. Differences in performance variables following LCAF, MCAF and PLA groups was performed a one-way ANOVA with repeated measures. Partial eta square (η2) with Cohen's effect sizes ''trivial (< 0.2), small (0.2 – 0.5), moderate (0.5 – 0.8) and large (> 0.8)'' was used to evaluate the effect size (Cohen, 1988). The violations of the sphericity assumption were evaluated using the Geisser-Greenhouse epsilon correction. Post hoc analysis using the Bonferroni multiple comparison test was performed where any significant interactions and main effects werefound. A p value of < 0.05 was used to determine statistical significance. The all data was analysed using IBM SPSS Inc. 25.0 software (IBM Armonk, Chicago, USA).

RESULTS

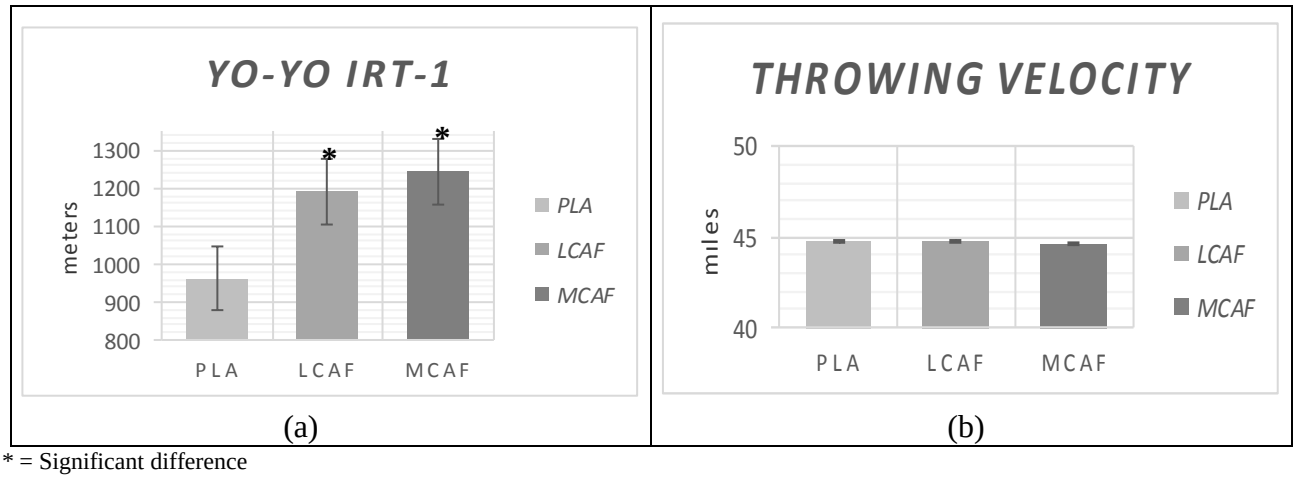
Table 1. and Figure 2. show descriptive analyses (mean, standard deviation) and one-way repeated ANOVA (frequency, significant and partial eta square) results of female handball players who intake LCAF, MCAF and PLA. When examined Table 1., there was a significant difference in Yo-Yo IRT performance between conditions (f= 5,993; p= ,014; η2=,480). Bonferroni post-hoc analysis showed Yo-Yo IRT performance better in LCAF (1190,66 ± 441,09 m) and MCAF (1242,66 ± 456,68 m) than PLA (962,66 ± 315,22 m) (Figure 2.).

Table 1. Yo-Yo Intermittent Recovery Test (Level) and throwing velocity parameters One-way repeated ANOVA outcomes.

Parameters	*f*	*p*	*η2*
YO-YO IRT-1 (m)	5,993	**,014**	,480
THROWING VELOCITY (mi)	,040	,961	,006

Yo-Yo IRT-1= Yo-Yo Intermittent Recovery Test Level 1; m= meters; mi= miles; f= frequency; p= significant; η2= partial eta square

According to Figure 2., mean and standard deviation throwing velocity values of female handball players are PLA (44.73 ± 4.19 mi) LCAF (44.80 ± 4.63 mi) MCAF (44.60 ± 4.54 mi), respectively. Also, there is no significant difference in throwing velocity between conditions (f= ,040; p= ,961; η2= ,006) (Table 1).



* = Significant difference

Figure 2. Yo-Yo IRT **(a)** and throwing velocity **(b)** performance outcomes during PLA, LCAF and MCAF.

DISCUSSION

The purpose of this study was to examine how trained female handball players' aerobic endurance and throwing velocity were affected by acute caffeine supplementation at two different doses (3 mg/kg or 6 mg/kg). The study concluded that LCAF (3 mg/kg) and MCAF (6 mg/kg) caffeine improved Yo-Yo IRT-1 performance compared to PLA. There was no significant difference between PLA, LCAF and MCAF trials in terms of throwing velocity.

Caffeine supplementation is recommended as an ergogenic aid for aerobic endurance performance (Maughan, 2018). In the current study, it was concluded that LCAF and MCAF caffeine doses increased aerobic endurance performance in trained female handball players with a moderate effect size (η2=.480). Previous studies have shown that caffeine intake of 3-9 mg per kg body weight is effective in various endurance activities (Abian-Vicen et al., 2014; MacIntosh & Wright, 1995; Wang et al., 2022; Wiles et al., 1992). In a study, it was reported that 6 mg/kg caffeine increased running distance by 16% in male and female team athletes during the Yo-Yo IRT-2 test (Mohr et al., 2011). In a recent meta analysis, it was reported that caffeine intake at doses ranging from 3-9 mg/kg increased the time to exhaustion in running performance by 16.97% with a moderate effect (Wang et al., 2022). There are studies reporting that different doses of caffeine also increase aerobic endurance performance (Dittrich et al., 2021; Ping et al., 2010). In their study, Ping et al gave 5mg/kg caffeine and placebo capsules to male runners 1 hour before an exercise trial performed on a treadmill until exhaustion at 70% of VO2max(Ping et al., 2010). As a result, caffeine was found to significantly increase aerobic endurance. Similarly, Dittrich et al. administered 300 mg of caffeinated gum to male runners in 2 separate trials until exhaustion at an intensity corresponding to 50% between the initial lactate threshold and maximal aerobic rate. At the end of the study, it was reported that exercise tolerance increased by 18% and longer distances were run in the caffeine condition (Dittrich et al., 2021). These findings are consistent with the results of our current study. However, it is seen that the subjects were mostly men. Especially the number of studies on female handball players is quite limited. Handball is a sport that involves repetitive high-intensity activities played in 2*30-minute halves. Aerobic endurance is therefore an important performance determinant to recover quickly between high-intensity activities and to maintain maximum performance throughout the entire game. In our study, 3 mg/kg and 6 mg/kg caffeine intake increased aerobic endurance in female handball players, indicating that caffeine is an effective ergogenic supplement. Blockade of adenosine receptors with caffeine affects the release of

norepinephrine, dopamine, acetylcholine and serotonin, among other neurotransmitters. This may delay fatigue by reducing pain sensation and perceived difficulty during exercise. This mechanism of caffeine may explain its ergogenic effect on aerobic endurance (Southward et al., 2018; Souza et al., 2017) and intermittent sports (Gomez-Bruton et al., 2021; Souza et al., 2017). Current findings and previous research suggest that caffeine doses between 3-6 mg/kg have a similar ergogenic effect on endurance performance. Therefore, individuals who may feel more sensitive to caffeine or wish to minimize potential negative side effects can use a low dose of caffeine (3 mg/kg) and maintain similar ergogenic effects with a moderate dose (6 mg/kg) (Southward et al., 2018).

In the present study, LCAF and MCAF caffeine intake did not increase throwing velocity in female handball players. Ball throwing velocity is one of the basic skill and performance parameters in handball. However, studies examining the effect of caffeine on ball throwing velocity are quite limited in the literature. In a study, it was reported that 3 mg/kg caffeine intake increased ball throwing velocity in elite female handball players (Munoz et al., 2020). In a similar study, it was reported that pre-exercise caffeine supplementation at a dose of 3 mg/kg increased ball throwing velocity from the 9 m line in professional handball players (16 men and 15 women) (Muñoz et al., 2020). In these studies, 3 mg/kg caffeine dose increased throwing velocity in handball, which contradicts the result of our current study. In our study, the ball throwing test was performed in a stationary standing position, whereas in other studies (Muñoz et al., 2020; Munoz et al., 2020), the throws were performed by vertical jumping after a three-step preparatory run. This may have made it easier for the subjects to better demonstrate the potential of caffeine to improve muscle power. Caffeine intake is also affected by individual differences. These differences seem to be due to genetic variations. Determining the genetic profile of athletes may help to optimize the effect of caffeine on physical performance and determine individual-specific doses (Pickering & Kiely, 2018). In the literature, there are also studies examining the effect of caffeine on upper extremity muscle strength with medicine ball throwing tests. In a study consistent with the results of our current study, Rocha et al, who examined the effect of caffeine on upper extremity strength in handball players, gave 5 mg/kg caffeine and placebo to 10 handball players and found no difference between the conditions in the medicine ball throwing test (Rocha et al., 2021). In another study, it was reported that only the highest dose of caffeine (6 mg/kg) increased medicine ball throwing performance, but lower doses (2 and 4 mg/kg) did not change medicine ball throwing performance (Sabol et al., 2019). In this study, 6 mg/kg caffeine dose increased medicine ball throwing performance, which is in contrast to our 6 mg/kg caffeine dose result, but the results showing that lower doses do not change performance seem to be compatible. The reason for these differences may be the individual differences of the subject groups and the different tests applied. In the current study, a handball was shot from the 7-meter line to the goal. However, other studies (Rocha et al., 2021; Sabol et al., 2019) applied a medicine ball throwing test. It should be emphasized that there are differences in these two tests in terms of both the weight of the balls and the application technique.

Some limitations should be considered when evaluating the results of the current study. In the study, only aerobic endurance and ball throwing velocity were examined with different doses of caffeine. However, vertical jump, anaerobic capacity, sprint and change of direction speed parameters are also critical in determining performance. Investigating these parameters in future studies may better explain how caffeine affects physical performance in female handball players. In addition, the fact that the daily caffeine consumption frequency of the participants was not determined in the current study can be considered as another limitation. Because participants with high caffeine consumption may have adapted to caffeine, which may reduce the ergogenic effect of caffeine.

Conclusions

LCAF and MCAF dose caffeine ingested 60 min prior to exercise improved Yo-Yo IRT-1 performance, but not ball throwing speed in trained female handball players. These findings suggest that caffeine intake may be an ergogenic aid to increase aerobic endurance before handball trainings or competitions. After determining the appropriate doses for handball players, coaches can use caffeine to contribute to the aerobic endurance level before handball matches. In the future, more

studies examining different caffeine doses and different motoric and technical skills are needed to better understand handball specific performance parameters.

Acknowledment

We thank participants for contributing to the study.

Conflict of interest

No conflict of interest is declared by the authors. In addition, no financial support was received.

Ethics Committee

This study is approved by the Sinop Unıversıty The Human Research Ethıcs Commıttee (Approvel Nummer: 2023/170).

Author Contribution

Planned by the authors: Study Design, Data Collection, Statistical Analysis, Data Interpretation, Manuscript Preparation, Literature Search. Author have read and agreed to the published version of the manuscript.

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RESEARCH ARTICLE

Positional Comparison of Footballers' Ball Kicking Techniques, Leg Strength and Shooting Accuracy Percentages

Gökhan ATASEVER[1*] and Fatih KIYICI[2]

[1,2]Ataturk University, Faculty of Sport Science, Department of Coaching Education, Erzurum /Türkiye
*Corresponding author: gokhan.atasever@atauni.edu.tr

Abstract
The aim of the study was to investigate the differences of foot pressure points, shot accuracy percentages, leg strength values of footballers at the moment of kicking the ball with different techniques according to their positions. The research group consisted of U-17 and U-19 football players of Erzurumspor FK team. W-INSHOE brand device was used to determine the knee and hip strength of the footballers at 60^o angular velocity and foot pressure points at the moment of kicking the ball. SPSS v20 package programme was used for data analysis and statistical significance was accepted as $p<0.05$. The normal distribution of continuous variables was analysed by Shapiro Wilk-W test, Kolmogorov Simirnov test, Q-Q graph, skewness and kurtosis. According to the results, it was determined that there was a statistical difference in favour of defenders in the pressure parameter in the L2 and L5 sensors inside the foot and in the L2 sensor outside the foot, in favour of forwards in the L6 sensor above the foot, in favour of forwards in the technical score parameter the second score when kicking the ball outside the foot and in the total score outside the foot, in the knee and hip strength parameter, in the peak torque extension movement in the hip joint, in favour of forwards. As a result, it is seen that the strikers who participated in the study are better in both technical scoring and hip strength in line with the needs of the position they play compared to other positions.

Keywords
Positional, Ball Kicking Techniques, Leg Strength, Shooting Accuracy Percentages

INTRODUCTION

Football is a popular sport that millions of people around the world are passionate about and follow with great interest. The skills of soccer players have a decisive influence on their performance in the game. Especially shooting skill is an important factor that can determine the outcome of matches. Soccer players' kicking techniques and leg strength have a significant effect on the accuracy of their shots (Duffield, & Drinkwater 2008).

Wireless plantar foot pressure systems, which have been increasingly used in recent years, aim to provide low-cost systems for mobile gait analysis, activity monitoring and rehabilitation. These systems are used by placing them as insoles inside the shoe. Thanks to the instantaneous data received from the sensors in the insoles, it can be determined which part of the foot is used and how intensely. On the other hand, the position and anatomical posture are associated with the data obtained. Today, the foot pressure system guides doctors both for scientific research purposes and for surgical decision-making(Firth et al., 2007).

When the literature is examined, it is seen that most of the studies examine temporal-spatial gait parameters. These parameters are walking speed, stride length and stride duration. 3D gait analysis is generally difficult and reporting of spatiotemporal gait parameters is also less common (Murphy et al., 2005). Among the factors affecting the physical performance of soccer players, leg strength plays an important role. For example, in

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[1]**ORCID:** 0000-0003-3222-9486 , [2]**ORCID:** 0000-0003-1982-3894

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one study, leg strength was found to increase performance parameters such as kick speed, jump height and running speed of elite level soccer players. (Yilmaz et al., 2023).

There is a relationship between leg strength and shooting accuracy in soccer players. It is important for soccer players to have strong legs in order to take a good shot. Leg strength increases the ability to put more power on the ball during the shot and to send the ball faster. Strong legs can also increase the chances of scoring from long range. (Korkmaz, 2022).

As in all sports branches, it is known that technical skill training is one of the most important criteria that determine the performance of the player in soccer. Skills such as dribbling, shooting and tackling play an important role both for the performance of the athlete and for the pleasure of the fans. (Bangsbo, 1994; Reilly et al., 2000).

While the factors that make soccer more interesting and interesting can be listed as aggressive and exciting duos, skillful combinations and transitions between regions, different and interesting dribbling, fast-paced play, exhilarating goal positions and goal kicks, and the incredible physical placement of goalkeepers, the importance of technical skill cannot be ignored in order for soccer players to do these in the best and fastest way (Bizanz, 1991). For this reason, technical skill is of great importance for soccer (Ilxomovich ,2023).

When soccer players shoot, which part of the foot they apply pressure to can vary depending on the type of shot and how they shoot. In general, soccer players use three main areas when shooting. These are the ankle, the inside of the foot and the outside of the foot. Footballers shoot using different areas depending on their technical skills and preferences. Shooting techniques are also related to the player's skills, position and style of play. In addition, body balance and movement are also important when soccer players shoot. Therefore, training and practice are of great importance for correct shooting technique. (Ma, 2023). The aim of this study was to determine the specific shooting skills and leg strength of soccer players at different positions and to analyze the effects of these characteristics on shooting accuracy percentages. It is thought that this type of research can contribute to football coaches, performance specialists and soccer players to optimize their individual abilities and physical characteristics.

MATERIALS AND METHODS

Statement of Compliance with Ethical Principles

I have obtained the data, information and documents I have presented in this thesis within the framework of academic and ethical rules; I present all information, documents, evaluations and results in accordance with scientific ethics and morals; I declare that I have made full reference to all data, thoughts, results and information that do not belong to me in this study, in accordance with scientific ethical rules, and that I have cited the source. This study was conducted with ethical and informed consent in accordance with the rules stated in the Declaration of Helsinki.

Participants

The population of the research is the U-17 and U-19 teams of Erzurumspor FK team, which competes in the Turkish Football Federation Development Leagues (Elite League). The sample of the research was formed by a total of 37 football players in the positions of defender, midfield and striker.

Research Location

Laboratory measurements were made at Atatürk University Sports Sciences Application and Research Center and field measurements were made at Erzurumspor FK facilities.

Data Collection

Anthropometric Measurements

Footballers' height (cm) was measured using a portable stadiometer.

Body Composition

BODPOD Gold Standard tracking system, which provides high accuracy, safe, comfortable and fast test results, was used to determine the body composition of soccer players. Body fat percentage, body mass index, body weight, body fat-free mass and basal metabolic rate data were obtained with the device. Before the measurements, soccer players were informed about the device and the rules to be followed during the measurements were specified.

Foot Sole Pressure Measurements

W-INSHOE brand device was used. Insoles were placed in both the right and left shoes of the soccer players before they made their shots in the determined kicking techniques and trial shots were made to fully understand the exercise protocol. The

soccer players were given a total of nine throws averaging both the maximum amount of pressure they applied and how actively they used it for the from three throws each. Data were obtained by three throws made in each striking technique.

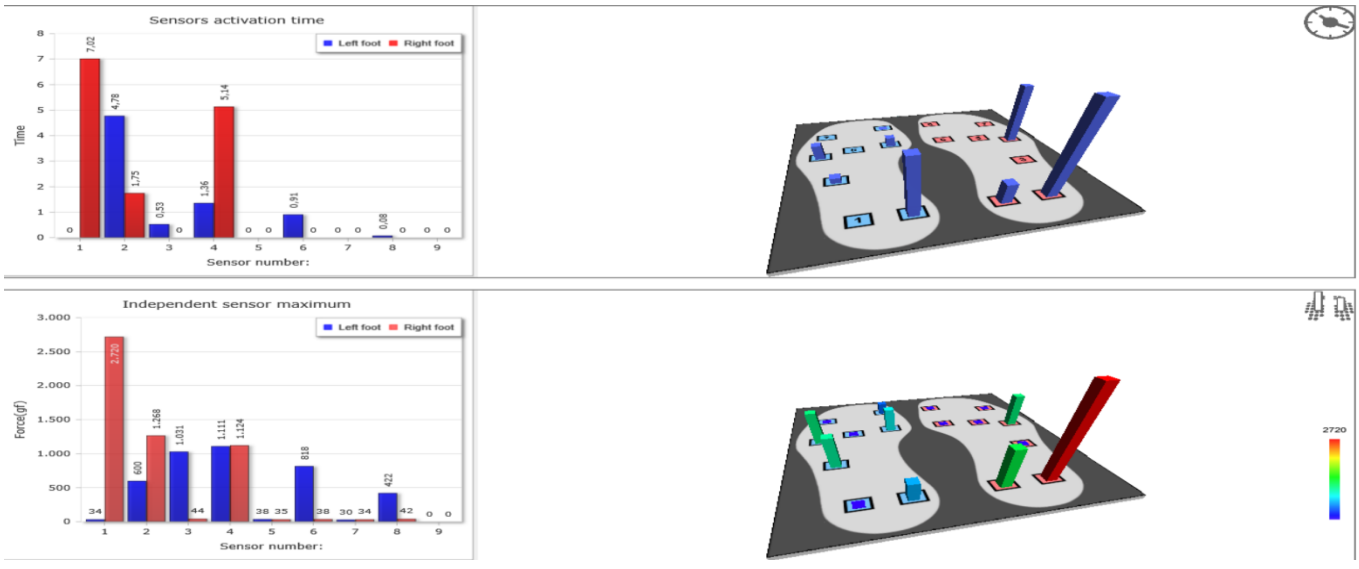

Figure 1. Example of foot sole pressure analysis of soccer players

Leg Strength Measurement

ISOMED 2000 isokinetic measuring device was used to determine the leg strength of soccer players. Knee and hip flexion/extension measurements were taken. Before starting the test, soccer players were warmed up for 15 minutes. In this warm-up, 5 minutes of general warm-up was done with wattbike at 70-80 kw load and the remaining 10 minutes of special warm-up was done to ensure that the knee flexor and extensor muscles, joints, tendons and ligaments were ready for exercise. The dynamometer equipment was positioned in accordance with the instructions specified specifically for each soccer player. After the axis of the dynamometer was adjusted to the lateral epicondyle of the femur, the load sensor was placed on the ankle. For the knee joint, the test speed was 60° m/s and 10 repetitions were performed.

Table 1. Reference Values for Isokinetic Knee Flexion/Extension Measurements (Yılmaz, 2023)

Reference Values for Knee Flex/Elex	
Dynamometer Direction	90 to the floor^{o}
Dynamometer Inclination	Neutral - 0^{o}
Seat Orientation	90 to the floor^{o}
Seat Tilt	70 -85^{oo}
Axis of Rotation	Lateral Femoral Condyle in the Sagittal Plane.
Starting Position	Full extension

Figure 2: Technical analysis visualisation

Technical Analysis Measurement

Technical analysis measurements were carried out in the wall training section of the training field in Erzurumspor FK facilities. Footballers were made to hit the target numbered from 1 to 9 at a distance of 20 meters in-foot, on-foot and off-foot respectively. The average of the three shots made in each kicking technique was taken and the data in different kicking techniques were obtained. Technical scoring system;

Statistical Analysis

Analyses were performed with IBM SPSS 20 statistical analysis programme.Data were presented as mean, standard deviation, median, minimum, maximum, percentage and number. Normal distribution of continuous variables was analysed by Shapiro Wilk-W test, Kolmogorov Simirnov test, Q-Q plot, skewness and kurtosis. In the comparison of continuous variables with more than two independent groups, ANOVA test was used when the normal distribution condition was met, and Kruskal Wallis test was used when it was not met. Post-hoc tests after ANOVA test were performed using Tukey's test when variances were homogeneous and Tamhane's T2 test when variances were not homogeneous.For post-hoc tests after Kruskal Wallis test, Kruskal Wallis 1-way ANOVA (k samples) test was used.Statistical significance level was taken as $p<0.05$.

RESULTS

Table 2. Foot strike time of soccer players in different kicking techniques

	Location						
	Defense		Midfield		Striker		
	Mean	Median (Min-Max)	Mean	Median (Min-Max)	Mean	Median (Min-Max)	P
				Insole			
L1	1,53 ± 1,20	1,47 (0,19-3,71)	1,89 ± 1,57	1,8 (0,21-5,26	1,59 ±1,76	0,82 (0,50-5,67)	0.818
R1	2,30 ± 1,48	2,44 (0,49-4,68)	1,80 ± 1,44	1,36 (0,48-4,56)	1,35 ±0,82	1 (0,56-2,51)	0.328
L2	2 ± 1,18	1,54 (0,43-4,16)	1,46 ± 1,21	1,29 (0,20-3,41)	0,93 ±1,18	0,42 (0,12-3,41)	0.064
R2	2,11 ± 1,58	1,71 (0,10-4,80)	1,08 ± 1,09	0,76 (0,18-3,31)	0,93 ±0,92	0,51 (0,13-2,82)	0.123
L3	2,03 ± 0,90	1,86 (0,98-3,51)	2,66 ± 1,83	2,51 (0,64-6,31)	1,66 ±1,93	1,04 (0,38-6,25)	0.142
R3	2,16 ± 1,73	1,67 (0,62-6,43)	2,9 ± 1,47	3,25 (0,68-4,45)	1,35 ±0,97	1,3 (0,34-3,41)	0.122
L4	5,34 ± 2,74	5,14 ± (0,84-9,13)	3,16± 3,04	3,15 (0,16-9,76)	3,03 ±2,60	2,3 (0,93-9)	0.140
R4	5,14 ± 2,38	4,69 ± (1,21-8,88)	5,38±2,19	5,48 (2,69-9,16)	3,09 ±2,18	2,83 (0,27-7,75)	0.103
L5	2,16 ± 1,33	2,55 ± (0,41-4,19)	1,95± 1,49	1,61 (0,30-4-37)	2,51 ±1,25	2,46 (0,97-4,70)	0.707
R5	2,62± 2,61	1,78 ± (0,17-8,72)	1,93± 1,47	1,52 (0,11-4,94)	1,54 ±0,44	1,62 (0,72-2,22)	0.467
L6	3,76 ± 2,72	3,27 ± (0,41-7,71)	3,38± 2,24	2,96 (1,02-6,81)	2,44 ±1,22	2,69 (0,64-3,97)	0.459
R6	3,21 ± 2,17	2,42 ± (0,97-7,76	2,87± 1,43	3,15 (0,37-4,40)	2,12 ±0,70	2,16 (1,25-3,36)	0.371
L7	1,56 ± 0,95	1,87 ± (0,17-2,84)	1,35± 1,63	0,65 (0,17-4,18)	1,09 ±1,17	0,65 (0,08-3,80)	0.492
R7	1,2 ± 1,08	0,56 ± (0,12-3,05)	1,95± 1,49	1,44 (0,16,4,28)	1,49 ±0,88	1,65 (0,21-2,59)	0.426
L8	1,96 ± 1,94	1,49 ± (0,53-6,68)	2,48± 1,11	2,20 (1,08-3,91)	2,19 ±1,24	2,02 (0,37-4,21)	0.779
R8	2,23 ± 1,43	2,06 ± (0,81-5,52)	1,84± 1,68	1,33 (0,24-5,36)	1,58 ±0,54	1,52 (1,02-2,73)	0.599
				Out of foot			
L1	1,38±0,95	1,11 (0,14-2,78)	1,92±0,93	1,6 (1,03,63)	1,07 ± 0,89	0,9 (0,06-2,71)	0.205
R1	1,96±0,99	1,79 (1,09-4,19)	1,96±1,21	2,07 (0,40-3,73)	1,49 ± 1,15	1,42 (0,25-3,62)	0.621
L2	1,62±0,78	1,65 (0,41-2,99)	1,8±1,34	1,6 (0,14-4,03)	0,94 ± 0,63	0,79 (0,17-2,11)	0.186
R2	2,05±1,01	2,25 (0,18-3,28)	1,29±1,39	0,73 (0,17-4,29)	1,29 ± 0,79	1,34 (0,23-2,48)	0.163
L3	1,91±1,02	1,77 (0,52-3,41)	3,12±3,01	2,28 (0,64-9,57)	1,49 ± 1,06	0,98 (0,24-3,04)	0.220
R3	3,36±2,84	2,11 (0,22-8,45)	3,16±1,58	2,87 (1,08-5,71)	2,52 ± 2,18	1,88 (0,08-6,07)	0.744
L4	4,03±2,55	3,22 (0,88-9,17)	3,88±3,20	3,37 (0,14-9,80)	2,55 ± 1,68	2,79 (0,67-4,94)	0.444
R4	5,09±1,81	4,35 (3,21-7,44)	6,28±2,98	7,19 (2,08-9,66)	3,54 ± 1,45	3,69 (1,92-6,09)	0.088
L5	2,3±1,56	1,88 (0,84-5,84)	1,94±1,61	1,52 (0,37-4,79)	2,52 ±1,71	2,05 (1,12-6,60)	0.554
R5	3,01±2,25	2,22 (0,15-6,22)	1,38±0,73	1,59 (0,18-2,11)	2,36 ±1,07	2,44 (0,62-4)	0.115
L6	2,62±1,89	2,07 (0,17-5,21)	3,11±1,73	2,82 (1,21-5,79)	2,38 ± 0,92	2,42 (0,95-3,94)	0.650
R6	2,74±1,95	2,55 (0,55-6,83)	2,77±1,30	2,53 (1,11-4,74)	2,91 ±0,98	2,91 (1,32-4,23)	0.968
L7	1,28±1,05	1,38 (0,22-3,76)	1,6±1,35	1,29 (0,19-3,77)	1,71 ± 0,80	1,81 (0,63-2,68)	0.501
R7	1,97±2	1,49 (0,31-5,49)	2,76±2,47	1,8 (0,55-7,36)	1,54 ± 1,09	1,50 (0,20-3,04)	0.569
L8	2,03±1,25	1,38 (0,80-3,95)	2,06±1,18	1,91 (0,72-4,14)	2,18 ± 0,90	2,44 (0,67-3,16)	0.843
R8	1,62±0,49	1,42 (1,12-2,46)	2,01±1,27	1,76 (0,52-4,68)	2,39 ± 0,97	2,16 (1,21-3,76)	0.272

Table 2. Continue

	Location						
	Defense		Midfield		Striker		
	Mean	Median (Min-Max)	Mean	Median (Min-Max)	Mean	Median (Min-Max)	P
				Insole			
			On Foot				
L1	1,45± 1,11	1,41 (0,12-3,33)	1,88± 0,93	1,90 (0,67-3,46)	1,43 ± 0,87	1,57 (0,17-2,46)	0.582
R1	1,89± 1,20	1,82 (0,41-3,86)	2,18± 1,68	1,67 (0,18-4,56)	1,76 ± 1,42	1,54 (0,39-4,77)	0.836
L2	1,48 ± 0,83	1,5 (0,27-2,88)	1,28 ±1,37	0,85 (0,28-4,53)	1,05 ± 0,71	0,92 (0,24-2,21)	0.491
R2	2,43 ± 1,92	2,13 (0,11-6,40)	0,89 ±0,71	0,66 (0,11-1,83)	1,37 ± 1,12	1,05 (0,10-3,47)	0.080
L3	2,38 ± 2,35	1,75 (0,36-8,06)	2,5 ±1,32	2,23 (1,32-5,28)	1,65 ± 1,14	1,76 (0,05-3,16)	0.552
R3	2,04 ± 2,23	1,38 (0,55-7,67)	1,85 ±1,10	2,17 (0,26-3,11)	1,67 ± 1,23	1,81 (0,13-3,35)	0.857
L4	4,1 ± 1,96	4,47 (1,77-7,96)	2,75 ±2,01	2,26 (0,14-6,25)	2,72 ± 2,20	1,68 (0,69-6,60)	0.301
R4	5,08 ± 2,61	5,93 (1,53-9,21)	5,35 ±2,72	6,46 (0,55-8,37)	3,27 ± 1,71	3,33 (1,14-5,91)	0.189
L5	2,52 ±1,50	2,41 (0,34-5,83)	1,52 ±1,52	1,33 (0,12-4,93)	3,28 ± 1,70	3,04 (1,29-5,75)	0.055
R5	2,66 ± 2,38	2,09 (0,95-8,72)	1,21 ±0,99	1,13 (0,18-3,37)	2,05 ± 1,08	1,9 (0,72-3,63)	0.216
L6	2,48 ± 2,46	1,06 (0,28-6,68)	2,87 ±2,13	2,18 (0,81-6,02)	2,66 ± 1,40	2,50 (0,96-5,01)	0.928
R6	2,56 ± 2,12	1,49 (0,84-7,27)	2,62 ±1,73	2,61 (0,55-5,25)	2,46 ± 1,42	2,46 (0,85-5,42)	0.985
L7	1,62 ±1,82	1,07 (0,11-5,72)	1,32 ±1,27	1,07 (0,07-3,77)	1,59 ± 1,31	1,35 (0,15-3,67)	0.885
R7	1,23 ±0,56	1,03 (0,48-2,25)	2,33 ±2,42	0,88 (0,16-6,63)	1,29 ± 0,97	1,15 (0,16-3,36)	0.981

When table 2 was analysed, it was determined that there was no statistically significant difference between the foot strike times of footballers in different kicking techniques.

Table 3. Pressure applied by footballers in the foot area in different kicking techniques

	Location							
	Defense (D)		Midfield (M)		Striker (S)			
	Mean	Median (Min-Max)	Mean	Median (Min-Max)	Mean	Median (Min-Max)	P	Post-Hoc
				Insole				
L1	2974,11±3217,20	1905 (184-8919)	4328,13±3704,84	3727,5 (854-12443)	2367±2808	1647,5 (97-5811)	0.441	
R1	4768,66±2915,02	3687 (1421-11119)	4705,13±2845,46	4953,5 (99-8736)	4200,63±2056,35	4454,5 (1537-6754)	0.893	
L2	2243,78±1745,24	1627 (481-6281)	2380,88±1703,09	1850,5 (795-5956)	798,5±841,29	404 (84-2005)	**0.045***	
R2	3179,11±1818,87	3224 (1037-6575)	2084±1460,76	1761 (115-4823)	2410,25±1656,81	2343 (80-5544)	0.389	
L3	1630,44±984,41	1643 (77-3314)	1984,75±1428,89	1534 (820-4910)	1741±472,37	1823 (1032-2331)	0.734	
R3	2295,11±1706,18	1720 (654-6375)	2577,38±2375,73	1805 (1319-8441)	1815,75±292,06	1730,5 (1452-2165)	0.919	
L4	3613,22±26838	2251 (1443-9285)	2864,13±2025,33	1893 (1424-7160)	2745,5±1552,73	2099,5 (1817-6417)	0.591	
R4	4005,11±2876,93	3140 (897-9494)	4481,13±3740,04	3228 (1836-13466)	5307±2518,71	5347,5 (1206-8796)	0.422	
L5	2942,89±1994,95	1949 (1261-6595)	2109±2166,55	1533,5 (364-7202)	4025,5±3596,44	2776,5 (1905-12597)	**0.044***	
R5	3040,22±2876,54	1999 (1214-10408)	2378±1468,58	1963,5 (656-5340)	2720±1178,01	2486 (1239-4379)	0.764	
L6	4641,67±3887,18	3628 (1434-14189)	3166,38±2663,67	1969 (1690-9526)	6766,875±4561,22	6808 (1634-13148)	0.223	
R6	4657±2745,68	4459 (1542-8608)	5835,13±4326,37	5073,5 (934-11614)	4936,625±3998,93	2883,5 (1792-12751)	0.942	
L7	1012,22±879,43	941 (64-2187)	1581,63±820,67	1674,5 (72-2890)	1849,375±1099,46	1749 (471-3941)	0.192	
R7	1437,56±599,15	1667 (69-2096)	1927,63±1736,79	1401,5 (65-5135)	2317±962,67	1963,5 (1399-4217)	0.140	
L8	1646,78±308,58	1696 (1108-2185)	2788,63±2523,68	1722 (674-7374)	1955,63±422,99	1896 (1203-2647)	0.275	
R8	2607,89±1157,82	2050 (1707-5207)	2115,88±670,35	1879,5 (1710-3744)	2000,75±306,32	1934,5 (1640-2542)	0.558	
				Out of foot				
L1	4611±3286,90	2154 (495-9391)	2933,25±2079,13	1904 (1241-6404)	4737,5±4015,62	3627 (718-12126)	0.717	
R1	4479,33±2504,54	3364 (1954-9936)	4064,13±2619,39	3647 (195-8897)	4658,38±3106,34	4471 (114-9048)	0.906	
L2	2420,56±1394,25	1971 (834-5494)	1987,25±1821,47	1572,5 (608-6303)	1093,63±1355,52	833,5 (80-4190)	**0.039***	D-S
R2	2783,22±1312,03	2540 (1055-4874)	1756,38±979,93	1853 (149-3210)	2022,63±976,07	2022,5 (79-3398)	0.162	
L3	3125,89±3133,85	1768 (941-11127)	2621±2142,04	1830 (954-7512)	1889,38±550,37	1822,5 (1041-2931)	0.958	
R3	3350,89±3083,40	2637 (1256-11302)	2737,38±1842,57	2217 (1438-7141)	1651,38±639,92	1807,5 (286-2190)	0.190	
L4	4599,78±3849,69	3185 (941-12157)	3723,88±3420,39	2567,5 (876-10706)	3593,5±2841,72	2318 (1730-9981)	0.925	
R4	6183,33±3748,36	4847 (1845-13683)	4900,63±2931,22	4394 (1741-10906)	4483,5±2551,79	4372 (1839-7741)	0.501	
L5	3370,11±3617,20	2154 (921-12804)	2887,5±2105,26	1876,5 (1204-6725)	3728,25±2091,26	2690,5 (1994-7214)	0.183	
R5	4250,44±2831,67	4024 (1514-9367)	2827,38±1948,29	1969 (1009-6606)	2623,75±1469,19	2092 (1353-5917)	0.265	
L6	4328,22±4459,96	2179 (854-14461)	2876,75±1715,95	2100,5 (1595-6724)	7332,63±5706,43	6083 (1329-16933)	0.195	
R6	5099,89±3160,68	5887 (818-9567)	5964,88±5178,25	3674 (1540-15353)	4879,63±4347,44	3782,5 (984-14241)	0.941	
L7	1668,11±616,02	1519 (941-2846)	2506,13±3346,51	923 (163-8256)	2208,13±1409,17	1762 (164-4165)	0.339	

Table 3. Continue

	Location							
	Defense (D)		Midfield (M)		Striker (S)			
	Mean	Median (Min-Max)	Mean	Median (Min-Max)	Mean	Median (Min-Max)	P	Post-Hoc
R7	1558,56±460,80	1653 (779-2193)	2498,75±2388,38	2014,5 (64-7909)	1914,5±370,06	1836,5 (1339-2628)	0.338	
L8	1780,89±446,86	1980 (779-2154)	2504,5±1594,12	1778 (854-5395)	1805,13±801,10	1816,5 (100-2791)	0.958	
R8	2943,11±1685,93	2268 (1454-6115)	3301,25±3299,43	2204,5 (1859-11183)	2310,75±574,59	2127,5 (1690-3341)	0.984	
				On foot				
L1	2307,11±1430,41	1942 (258-5303)	2543,63±1276,22	2276,5 (812-4282)	2219,63±1827,75	1805 (99-4888)	0.908	
R1	4619,33±2435,77	5068 (1424-9401)	3799±2632,49	3468 (168-8736)	4618,13±3385,13	4280,5 (699-10693)	0.798	
L2	2215,44±1327,02	1661 (841-4863)	1913,13±2047,14	1662,5 (81-6741)	1225±996,01	1154 (88-3274)	0.221	
R2	2924,44±1463,74	3069 (672-5030)	1967,25±±1664,13	1536 (153-4823)	2412±1286,75	2131 (692-4880)	0.424	
L3	2831,44±2325,21	1814 (1054-8247)	2478,13±1861,28	1789,5 (842-5826)	2101±1056,87	1858 (811-4227)	0.884	
R3	2014,11±621,03	1836 (1341-3349)	2238,5±827,28	1887,5 (1319-3636)	2537,378±58	1971,5 (1447-5838)	0.670	
L4	4919±3897,88	3072 (841-12164)	2615,38±1762,99	2032,5 (854-5450)	2830,5±1236,94	2584 (1682-5305)	0.226	
R4	4003,67±2584,63	3366 (512-7992)	5069,63±3149,44	4387 (1567-9834)	5881,88±4103,25	3808 (2665-14651)	0.492	
L5	1883,67±1029,61	1801 (71-3965)	2976,63±2968,22	1308 (724-8958)	3144,378±1989,57	2616,5 (1584-7840)	0.290	
R5	2707,78±1933,55	2052 (941-7575)	2271,13±1973,39	1686 (656-6958)	2934,38±1745,88	2211 (1570-6638)	0.346	
L6	4171,78±3655,37	2824 (954-12966)	3718,63±4667,66	1854 (1548-15183)	9283,63±4252,97	11471,5 (3038-13619)	**0.018***	S-M
R6	4703,11±3850,19	3760 (1214-12317)	4378,63±4005,15	2883 (934-11657)	4026,5±3946,32	2807 (1234-13418)	0.944	
L7	1156,89±591,97	1270 (64-1787)	1176,5±1165,45	904 (62-3580)	1677,75±808,80	1754 (67-2781)	0.410	
R7	1609,22±719,86	1630 (826-3282)	1616,25±1254,91	1781 (68-3682)	2157,38±527,50	2056,5 (1460-3152)	0.371	

Table 3 When the pressure applied by footballers to the foot area in different kicking techniques is analysed by position, it is determined that there is a statistically significant difference between L2-L5 sensors when kicking the ball inside the foot, there is a statistically significant difference between defenders and forwards in favour of forwards in L2 sensor when kicking the ball outside the foot, and there is a statistically significant difference between forwards and midfielders in favour of forwards in L6 sensor when kicking the ball above the foot.

Table 4. Positional comparison of knee and hip strength of football players

	Location						
	Defense (D)		Midfield (M)		Striker (S)		
	Mean	Median (Min-Max)	Mean	Median (Min-Max)	Mean	Median (Min-Max)	P	Post-Hoc
PTF-RK	146,98±24,74	142,6 (116,10-192,10)	145,36±16,39	140,95 (127,30-183,10)	147,93±45,19	133,7 (116,80-253,60)	0,594	
PTF-LK	139,31±28,72	142,3 (107,80-192,60)	140,44±17,52	139,1 (119,80-172,60)	126,49±14,61	122,1 (110,40-146,40)	0,367	
PTE-RK	226,62±36,90	240,9 (151,60-254,10)	231,24±36,64	219,85 (185,80-293,80)	213,73±42,55	216,35 (160,60-265,30)	0,814	
PTE-LK	217,9±40,49	218,8 (149,40-268,30)	225,98±39,52	220,85 (180,60-279,10)	207,28±42,62	214,45 (144,10-259,60)	0,661	
PTF-RH	148,61±19,67	144,6 (126,60-191,80)	151,74±30,20	146,45 (124,30-219,60)	172,88±28,49	175,85 (135,90-219,10)	0,175	
PTF-LH	145,54±27,87	134,8 (120,10-186,90)	155,73±32,62	147,95 (125,40-218,80)	165,34±25,57	164,6 (130,30-203,10)	0,241	
PTE-RH	281,17±45,88	290,8 (206,10-346,60)	334,86±40,59	337,1 (263,10-379,30)	344,59±50,84	341,6 (240,10-398,10)	**0,019***	D-S
PTE-LH	296,24±49,74	291,9 (198,10-379,30)	311,45±40,11	308,2 (249,10-371,80)	324,38±52,09	334,85 (228,90-390,60)	0,488	

PTF-RK: Peak Torques Flex Right-Knee , PTF-LK: Peak Torques Flex Left-Knee , PTE-RK : Peak Torques Ext. Right-Knee, PTE-LK: Peak Torques Ext. Left-Knee , PTF-RH : Peak Torques Flex Right-Hip , PTF-LH : Peak Torques Fleks Left-Hip, PTE-RH : Peak Torques Ext. Right-Hip , PTE-LH : Peak Torques Ext. Left-Hip,

In Table 4, when both knee and hip strengths of the football players were examined, it was determined that Peak Torques Ext. Right-Hip there was a statistically significant difference between defenders and forwards in favour of forwards.

Table 5. Technical scoring system of footballers

	Location							
	Defense (D)		Midfield (M)		Striker (S)			
	Mean	Median (Min-Max)	Mean	Median (Min-Max)	Mean	Median (Min-Max)	P	Post-Hoc
Insole-1	4,22±2,17	5 (1-8)	4,88±3,44	4 (0-9)	6,5±1,77	6,5 (4-9)	0,194	
Insole-2	3,78±3,46	3 (0-9)	5,13±3,18	4,5 (1-9)	3,38±3,85	2,5 (0-9)	0,444	
Insole-3	6,11±2,85	7 (2-9)	3±2,62	3 (0-9)	4±2,98	4 (0-8)	0,088	
Total inside the foot	166,67±63,25	150 (70-260)	143,75±47,79	135 (80-230)	161,25±68,54	125 (110-280)	0,684	
On foot-1	4±3,94	5 (0-9)	3,63±3,62	3 (0-8)	3,13±3,52	2 (0-8)	0,840	
On foot-2	4,11±4,17	4 (0-9)	4,13±4,45	3,5 (0-9)	3,5±3,93	2,5 (0-9)	0,910	
On foot-3	7,22±2,54	8 (1-9)	4±4,31	3,5 (0-9)	5,63±2,72	5,5 (0-9)	0,142	
Total on foot	183,33±60,62	200 (90-280)	141,25±93,57	110 (0-280)	137,5±79,42	135 (0-280)	0,416	
Out of foot-1	2,33±2,06	2 (0-5)	4,38±4,21	4 (0-9)	3,88±3,23	3 (0-9)	0,570	
Out of foot-2	2,44±3,05	1 (0-9)	3,13±2,75	2,5 (0-9)	6,88±2,90	7,5 (0-9)	**0,046***	D-S
Out of foot-3	2,33±2,78	1 (0-8)	4,63±3,42	4 (0-9)	5,25±2,71	5 (0-9)	0,125	
Total out of-foot	88,89±65,28	80 (20-190)	156,25±90,70	140 (50-290)	186,25±68,23	195 (80-290)	**0,039***	D-S
Total	447,78±150,65	410 (230-660)	440±139,08	445 (280-620)	478,75±138,82	460 (310-750)	0,849	

DISCUSSION

The aim of this study was to investigate the different kicking techniques, leg strength and shot accuracy percentages of soccer players in terms of position. Erzurumspor FK U-19 team, which competes in the T.F.F. development league, participated in the study. This study was considered because both physical and technical training were not performed together. When the findings of the study are examined, it is seen that there is a statistically significant difference between defenders and forwards in favor of defenders in the L2 and L5 sensors when kicking the ball inside the foot, between defenders and forwards in favor of defenders in the L2 sensor when kicking the ball outside the foot, and between forwards and midfielders in favor of forwards in the L6 sensor when kicking the ball above the foot.

When the findings of the study in terms of technical scoring are examined, it is seen that there is a statistically significant difference between defenders and strikers in favor of strikers in the 2nd kick score, and between defenders and strikers in favor of strikers in the total out-of-foot score. It is estimated that the reason for this situation is both because strikers have better technical capacity than defenders and because they are at a better level in terms of finishing than defenders. When the findings of the study in terms of knee and hip strength are examined, it is seen that there is a statistically significant difference between the defenders and forwards in the peak torque extension movement in the hip joint in favor of the forwards. It is estimated that this is due to the fact that the forwards constantly engage in bilateral struggles with the opposing defenders during the competition and especially when shooting, they start the striking step from the hip to increase the shooting speed. In a study by Menard et al. in which the risk of foot and ankle injuries in soccer players was investigated using a sole pressure system, it was reported that soccer players had a risk of injury due to the heel outer part of the sole of the foot and the arch in the fourth and fifth part of the forefoot (Ménard et al.,2021).

In a study examining the variables of body mass index and foot pressure in soccer players and non-footballers on static and dynamic ground, it was reported that BMI had a statistical relationship with the mean pressure of the dominant foot only in the control group and there was no statistically significant difference in soccer players (Hawrylak,2021). In a different study conducted on soccer players, in a biomechanical analysis of the sole pressure during walking in soccer players with normal hip alpha angle (NA) and above normal hip alpha angle (IA), it was reported that IA soccer players produced both lower power in the heel of the foot and lower relative power in the heel of the foot. They reported that the relative power of IA soccer players increased in the middle region of the sole of the foot and in the toe (Hagen et al.,2015). Carvallahis (2013) performed isokinetic evaluations at 60 °/sec and 300 °/sec angular velocity in their study on 164 professional soccer

players from different positions and reported that peak torque and total work values were at normal levels, there was no difference in peak torque, total work and fatigue index evaluations according to positions, and knee flexors had a higher fatigue index than knee extensors in both legs (Carvallahis et al.,2013). Wong and Wong (2009) evaluated the isokinetic strength of elite soccer players at angular speeds of 60 º/sec, 120 º/sec, 180 º/sec and 240 º/sec and stated that peak torque and relative torque had significant differences between angular speeds, while H/Q ratio did not create a difference, increased with increasing speed and remained within normal values (Wong, & Won, 2009).

Śliwowski vd.(2021) compared peak torque and H/Q ratios at an angular velocity of 60 º/sec and total work parameters at an angular velocity of 240 º/sec. As a result of the study, it was determined that there were bilateral differences in both flexor and extensor muscles in the national level subjects, while there were bilateral differences only between the flexor muscles in the international level subject group. In addition, it was determined that H/Q ratios were at normal levels in both groups and there was no difference between dominant and non-dominant legs. At 240 º/sec angular velocity, it was stated that the results were similar to the results of peak torque values at total work levels (Śliwowski et al.,2021). In the study examining the effect of different narrow field games on the technical skills of female soccer players, it was reported that both 26 x 34 m and 30 x 40 m playgrounds can be applied for a short period of time in studies for the development of technical actions of female soccer players. (Say et al.,2020). In the study examining the effect of coordination training on the technical development of development league soccer players, it was reported that there was a statistically significant difference between the experimental groups and the control group and that there was an 11.83% improvement in shooting technical skill (Köksal,2020).

In the study in which the technical parameters and motor performances of life kinetic exercises on young soccer players were examined, it was reported that the exercise protocols positively affected both technical parameters and motor performances, especially in dribling, accurate passing and accurate shooting performance parameters (Arslan & Ermiş 2023). In the study in which the relationship between some motoric characteristics and technical skills of soccer players in the development league was examined, it was reported that when the relationship between attention skills and technical and motor skill performances of Soccer Players Was Examined, There Was A Low Level Negative Significant Relationship Between Tm And Hufa1 And 30 M-St Results, There Was A Low Level Negative Significant Relationship Between Tm-H And Hufa1, Hufa2, Ist And 30 M-St, And There Was A Low Level Negative Significant Relationship Between Kp And Hufa2 Test.(Kurt & İnce 2022). In a different study on footballers in the development league, they reported a statistically significant difference between the 8-week complex training on football skills, especially on ball bouncing with the head, accurate shooting and shooting speed.(Kılıç & Taşkıran (2023).

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Conflict of interest

The authors declare no conflict of interest. No financial support was received.

Ethics Statement

Approval for the study was obtained from Atatürk University Faculty of Sports Sciences Scientific Research Ethics Committee. (Protocol number 70400699/11.00-190066441).

Author Contributions

Study Design, GA; Data Collection, GA and Statistical Analysis, FK; Data Interpretation, GA and FK; Manuscript Preparation, GA; Literature Search, GA and FK. All authors have read and agreed to the published version of the manuscript.

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RESEARCH ARTICLE

The Comparison of Reaction Times in Competing Karate Athletes

Ufuk DİLEKÇİ[1*]

[1]Ministry of Education Ankara / Türkiye
*Corresponding author: ufukdilekci@gmail.com

Abstract
The aim of the research is to compare the reaction times of kata and kumite athletes participating in national and international competitions in karate. A total of 108 male competitive athletes, including 40 kata competition athletes between the ages of 18-32 and 68 kumite competition athletes between the ages of 18-29, participated in the research voluntarily. In the research, some physical characteristics of kata and kumite athletes and right-left hand visual and right-left hand auditory reaction time tests were performed. T-Test was applied to determine the difference between groups at the α=0.05 significance level in all independent groups. A statistically significant difference was detected in training age, height and right hand visual reactions ($p<0.05$) among male kata and kumite athletes participating in the competitions. It can be said that these differences are due to the differences in kata and kumite training methods.

Keywords
Kata, Kumite, Karate, Performance

INTRODUCTION

Karate is a traditional physical practice that people used to engage in on the island of Okinawa in the past, as a means of unarmed self-defense. Today, karate is practiced in every country around the world and has been included in the Olympic Games. Through karate training, individuals not only achieve mental discipline built on a specific foundation but also enhance their physical fitness. Moreover, the competition methods within the realm of karate sports have demonstrated significant advancements in terms of athlete performance from the past to the present.

The distinctions between the kata and kumite branches, which are two styles of karate competition, have further fueled athletes' motivation to improve themselves through these branches. While karate is rooted in kihon (basic techniques) exercises, it acquires significance through kata routines, and kumite reaches its final form with mutual attack and defense techniques. The sport of karate can also be described as "the art of controlling punches and kicks, wherein strikes delivered at full speed are retracted without causing harm to the opponent, stopping three or five cm before the opponent's body" (Dilekçi, 2021).

Karate is a popular combat sport that has been officially included in the Tokyo 2020 Olympic Games. Successful participation in karate necessitates athletes to possess a specific physical and physiological profile alongside high technical expertise (Chaabene et al., 2012). In terms of physical performance, athletes must execute techniques with swift and explosive force during competitions to score points (Tabben et al., 2018). Karate tournaments are divided into two main parts: kumite and kata. Athletes in kumite competitions use many karate techniques. Kumite competitions are high-intensity events involving kicks, punches, and quick movements. It can be

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[1]**ORCID:** 0000-0001-7859-0301

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easily understood that the fundamental skills that need to be developed by kumite athletes are perceptual and predictive. On the other hand, kata competition consists of an imaginary series of offensive and defensive moves performed without the presence of an opponent. Kata and Kumite competition styles have different training periods, both before and after the competition. Regarding performance in karate, reaction time, maximum speed, and explosive power are important performance indicators. While karate trainers used to organize their training programs similarly for both kata and kumite competition athletes, separate training programs are now arranged due to changes in the competition rules. With these changes, the training of Kumite athletes has become more dynamic compared to the training of kata athletes (Imamura et al., 2002; Mori et al., 2002; Macan et al., 2006; Franchini and Stanislaw 2009; Chaabene et al., 2015; Nedeljkovic et al., 2017; Filingeri et al., 2012; Guler and Ramazanoglu 2018; Molinaro et al., 2020).

When examining the studies, it was concluded that balance control is an essential component of performance, particularly in martial arts, and that balance-related research should receive special attention, especially in training (Gauchard et al., 2018). Additionally, senior male karate athletes are characterized by low body fat and a mesomorphic-ectomorphic somatotype, and it has been suggested that success depends on burst muscle strength in both the upper and lower limbs (Loturco et al., 2014). Each discipline exhibits distinct physical, physiological, motor, technical, and tactical features. The enhancement of these inherent attributes contributes to an elevation in sports performance, and within this progression, warm-up routines, training regimens, competitive events, and nutrition play pivotal roles. However, one of the most critical factors is the design of a training program tailored to the specific discipline. To effectively structure such a program, it is imperative to identify the salient characteristics unique to that discipline (Harmancı and Karavelioğlu, 2017; Karavelioğlu et al., 2017; Ünveren et al., 2013; Karavelioğlu et al., 2021).

In the existing literature, numerous studies scrutinize the motor and anthropometric traits of karate athletes. After these investigations, factors such as limb proportions, balance, explosive strength, and body types emerge as pivotal elements influencing the success of karate athletes (Nedeljkovic et al., 2017; Filingeri et al., 2012; Güler and Ramazanoğlu, 2018; Loturco et al., 2014). However, the quantity of studies dedicated to the separate analysis of karate athletes specializing in Kumite and kata is relatively limited in the literature. It is speculated that discerning the anthropometric characteristics and reaction times of kumite and kata athletes will provide essential data for athlete selection within this discipline and for the formulation of effective training protocols. Given this context, the current research endeavors to ascertain the reaction times of karate kata and kumite athletes, aiming to uncover potential differences between these two categories.

MATERIALS AND METHODS

Study design and population

A total of 108 male competitive athletes, including 40 kata competition athletes between the ages of 18-32 and 68 kumite competition athletes between the ages of 18-29, participated in the research voluntarily. Attention was paid to the fact that the participant group of the research were kata and kumite competition athletes who train at least three days a week and do not have any health problems.

Before starting the study, Istanbul Rumeli University Ethics Committee approval was obtained (Date: 23/08/2023 Decision No: 2023/08). Participants in the study were evaluated by mobile application and filled out data collection questionnaires. Our study was conducted in accordance with the Principles of the Declaration of Helsinki.

Measuring methods

A personal information form consisting of two parts was prepared by the researcher. In the first part, information about the age, training age, weekly training number and participation in the competitions of the athletes were entered into the personal information form. In the second part of the study, the height (cm), weight (kg), right-left hand auditory (mls), right-left hand visual (mls) reaction time measurement information of kata and kumite athletes were processed. Before the research measurements, the athletes were met and informed about the measurements. The research was conducted in the clubs where athletes trained. The information was entered by the athletes

themselves into the information form prepared by the researcher. Height measurements of kata and kumite athletes were recorded in cm by taking the head upright, knees tense, heels together and body upright. Length measurements were determined with a Gulick anthropometric tape measure with an error of ± 1 mm. The weight measurements of the athletes were recorded by standing on the scale in the head-to-head position, with an error of 0.5 kg. Weight measurements of all athletes were taken when they were wearing karate suits.

Power 2000 New Test Simple Reaction Time Measurement Tool was used to measure the reaction times of kata and kumite athletes. The reaction time device sends sound or visual stimuli at regular intervals. Reaction time measuring device; It can measure both light and sound reaction time and display the obtained result on the digital screen. The athlete touches the button with his index finger to respond as quickly as possible to the stimulus sent by the sensitive button in front of him. In reaction time measurements, the athlete touches the button with his hand in order to respond as quickly as possible to the stimulus sent by the sensitive button in front of him. The time between when the athlete responds to the sent light or sound stimulus and when the stimulus arrives is recorded as milliseconds (mls). Reaction times of the athletes were measured in a quiet environment when the athletes were not tired.

Kata and kumite athletes were taken one by one into a large room at different times. Athletes were allowed to sit comfortably on the chair with their hands on the table. The concentration of the participants was ensured and they were allowed to touch the tool in a comfortable way, first with their right and then with their left fingers. Individuals were asked to respond to first sound and then light stimuli given at unequal intervals. Sound and light stimuli were given five times at different time intervals, and the response time given to this stimulus with the right and left hands was recorded in seconds and the best three measurement results were evaluated. The best three scores among the five reaction time scores achieved by the athletes were analyzed.

Statistical analyses

Statistical analyzes of the study were performed using the SPSS version 22.0. Visual (histogram, probability graphs) and analytical methods (KolomogrovSmirnov/Shapiro-Wilk's test) were used to define whether the variables were normally distributed. After it was determined that the research data had a normal distribution, a T-Test was performed between independent groups at the $\alpha = 0.05$ significance level to determine whether there was a significant difference between the measurements. In the research, it was tested whether there was a statistically significant difference between the age, training age, height, weight, right-left hand auditory and right-left hand visual reaction times of kata and kumite athletes.

RESULTS

Table 1. Age and training age values of kata and kumite athletes

	N		Min-Max		X ± Sd		p
	Kata	Kumite	Kata	Kumite	Kata	Kumite	
Age (year)	40	68	18-32	18-29	23,95±1,59	22,77±2,23	,098
Training Age (year)	40	68	2-20	2-17	12,75±3,51	7,44±2,35	,014*

*p<0.05

The mean age values of kata and kumite athletes; kata athletes 23.95±1.59 years; Kumite athletes' age was determined as 22.77±2.23 years. Independent Sample T-Test was applied between the ages of kata and kumite athletes at the $\alpha=0.05$ significance level. Ages of kata and kumite athletes Independent T-Test values; 0, .098<0.05; It was determined as . Since P>0.05 was found, no statistically significant difference could be detected between the ages of kata and kumite athletes in the study (Table 1).

The mean training age values of kata and kumite athletes; kata athletes 12.75±3.51 years; Kumite athletes' age was determined as 7.44±2.35 years. Independent Sample T-Test was applied between the training ages of kata and kumite athletes at the α=0.05 significance level. Independent T-Test values of kata and kumite athletes, training ages; 0.014<0.05; It was determined as. Since P was found to be <0.05, the training ages of kata and kumite athletes in the study were; A statistically significant difference was detected between.

Table 2. Height and weight measurement values and statistical test results of kata and kumite athletes

Physical measures	N		Min-Max		X ± Sd.		P
	Kata	Kumite	Kata	Kumite	Kata	Kumite	
Height (cm)	40	68	168,0-176,3	167,8-190,1	169,55±4,07	179,55±5,27	,035*
BodyWeight (kg)	40	68	63,0-86,7	54,9-86,2	73,67±3,51	71,88±6,08	,982

*p<0.05

The mean height scores of kata and kumite athletes; kata athletes 169.55±4.07 cm; Kumite athletes were determined to be 179.55±5.27 cm. Independent Sample T-Test was applied between the heights of kata and kumite athletes at the α=0.05 significance level. Independent T-Test values of kata and kumite athletes are 0.035<0.05; It was determined as. Since P was found to be <0.05, a statistically significant difference was detected between the heights of the elite kata and kumite athletes participating in our study. The mean body weight scores of kata and kumite athletes; kata athletes 73.67±3.51kg; Kumite athletes were determined to weigh 71.88±6.08 kg. Independent Sample T-Test was applied between the weights of kata and kumite athletes at the α=0.05 significance level. Independent T-Test values of kata and kumite athletes were determined as weight (kg) 0.982>0.05. Since P>0.05 was found, no statistically significant difference could be detected between the weight (kg) of kata and kumite athletes participating in the study (Table 2).

Table 3. Right hand auditory reaction times of kata and kumite athletes

Reaction Times	N		Min-Max		X ± SS		p
	Kata	Kumite	Kata	Kumite	Kata	Kumite	
Right Hand Auditory (mls) (1)	40	68	162,0-254,00	157,0-252,2	191,16±26,38	186,77±21,7	0,461
Right Hand Auditory (mls) (2)	40	68	165,0-228,00	163,0-248,7	182,37±24,77	179,04±19,07	0,355
Right Hand Auditory (mls) (3)	40	68	169,1-255,09	167,0-238,4	187,62±25,54	188,8±22,74,0	0,222

*p<0.05

The mean values of right hand auditory reaction time of kata and kumite athletes, 1st measurement of kata athletes 191.16±26.38 (mls); 2nd measurement 182.37±24.77 (mls); 3rd measurement 187.62±25.54 (mls), kumite athletes 1st measurement 186.77±21.7 (mls); 2nd measurement 179.04±19.07 (mls); The third measurement was determined as 188.88±22.74 (mls). To investigate whether there was a significant difference between the right hand auditory reaction times of kata and kumite athletes, a t-test was applied at the α = 0.05 significance level. Independent T-Test values of kata and kumite athletes, right hand auditory reaction time; 1. Measurement 0.461>0.05, 2. Measurement 0.355>0.05, 3 measurements 0.222>0.05 were determined. Since P>0.05 was found in all right hand auditory reaction time measurements, no statistically significant difference could be detected between the right hand auditory reaction times of kata and kumite athletes (Table 3).

Table 4. Right hand visual reaction times of kata and kumite athletes

Reaction Times	N		Min-Max		X ± SS		p
	Kata	Kumite	Kata	Kumite	Kata	Kumite	
Right Hand Image (mls) (1)	40	68	165,0-255,12	159,33-234,07	183,11±23,17	177,22±20,7	,027*
Right Hand Image (mls) (2)	40	68	167,0-251,07	163,0-245,2	179,62±25,82	180,06±18,00	,012*
Right Hand Image (mls) (3)	40	68	168,2-254,22	166,74-237,9	187,27±25,54	182,77±21,35	,039*

*p<0.05

The mean values of right hand visual reaction time of kata and kumite athletes, 1st measurement of kata athletes 183.11±23.17 (mls); 2nd measurement 179.62±25.82 (mls); 3rd measurement 187.27±25.54 (mls), kumite athletes 1st measurement 177.22±20.7 (mls); 2nd measurement 180.06±18.00 (mls); The 3rd measurement was determined as 182.77±21.35 (mls). In order to investigate whether there is a significant difference between the right hand visual reaction times of kata and kumite athletes, t-test at α=0.05 significance level was applied. Independent T-Test values of kata and kumite athletes are right hand visual reaction time; 1. Measurement 0.027<0.05, 2. Measurement 0.012<0.05, 3 measurements 0.039<0.05 were detected. Since P<0.05 was found in all right-hand visual reaction time measurements, a statistically significant difference was found between right-hand visual reaction times of kata and kumite athletes (Table 4).

Table 5. Left hand auditory reaction times of kata and kumite athletes

Reaction Times	N		Min-Max		X ± SS		p
	Kata	Kumite	Kata	Kumite	Kata	Kumite	
Left Hand Auditory (mls) (1)	40	68	169,1-255,09	167,0-238,4	181,52±24,44	188,88±22,74	0,222
Left Hand Auditory (mls) (2)	40	68	170,0-238,00	169,0-256,7	187,58±22,88	178,44±22,21	0,255
Left Hand Auditory (mls) (3)	40	68	167,0-233,87	165,0-244,8	184,38±24,92	174,04±21,15	0,368

*p<0.05

Kata and kumite athletes' left hand auditory reaction time mean values for kata athletes' 1st measurement were 181.52±24.44 (mls); 2nd measurement 187.58±22.88 (mls); 3rd measurement 184.38±24.92 (mls), kumite athletes 1st measurement 188.88±22.74 (mls); 2nd measurement 178.44±22.21 (mls); The 3rd measurement was determined as 174.04±21.15 (mls). To investigate whether there is a significant difference between the left hand auditory reaction times of kata and kumite athletes, t-test was applied at the α=0.05 significance level. Independent T-Test values of kata and kumite athletes are left hand auditory reaction time; 1st measurement was determined as 0.222>0.05, 2nd measurement as 0.255>0.05, 3rd measurement as 0.368>0.05. Since P>0.05 was found in all left hand auditory reaction time measurements, no statistically significant difference was found between left hand auditory reaction times of kata and kumite athletes.

Table 6. Left hand visual reaction times of kata and kumite athletes

Reaction Times	N		Min-Max		X ± SS		p
	Kata	Kumite	Kata	Kumite	Kata	Kumite	
Left Hand İmage (mls) (1)	40	68	159,0-246,00	169,0-253,3	186,70±22,77	185,75±19,58	0,253
Left Hand İmage (mls) (2)	40	68	169,0-248,00	165,0-238,7	183,77±20,12	174,99±22,12	0,299
Left Hand İmage (mls) (3)	40	68	167,20-252,12	165,0-228,8"	189,82±24,94	184,77±23,64	0,257

*p<0.05

The mean values of left hand visual reaction time of kata and kumite athletes, 1st measurement of kata athletes 186.70±22.77 (mls); 2nd measurement 183.77±20.12 (mls); 3. measurement 189.82±24.94 (mls), kumite athletes 1st measurement 185.75±19.58 (mls); 2nd measurement 174.99±22.12 (mls); The third measurement was determined as 184.77±23.64 (mls). To investigate whether there was a significant difference between the left hand visual reaction times of kata and kumite athletes, a t-test was applied at the $\alpha = 0.05$ significance level. Independent T-Test values of kata and kumite athletes, left hand visual reaction time; 1st measurement was determined as 0.222>0.05, 2nd measurement as 0.255>0.05, 3rd measurement as 0.368>0.05. Since P>0.05 was found in all left hand visual reaction time measurements, no statistically significant difference could be detected between the left hand visual reaction times of kata and kumite athletes.

DISCUSSION

In the research, the age, training age, height, body weight, right-left hand auditory and right-left hand visual reaction time measurements of kata and kumite athletes, which are the competition branches of karate, were determined. The prominent features of kata and kumite athletes will be determined. The research is designed to guide talented athletes to kata and kumite branches and to develop these branch athletes in their training programs. The anthropometric characteristics of an athlete are extremely important in karate. It is stated that examining the anthropometric features of karate players is important in terms of revealing the most suitable morphological and functional biotype for this sport (Chaabene et al. 2012). It has been revealed that karate players competing at high and medium levels have the same somatotype characteristics (Giampietro et al. 2003). In addition, as a result of studies on Italian and German karate athletes, concluded that being in an ectomorphic structure positively affects performance in karate players (Pieter and Bercades 2009; Fritzsche and Raschka 2007). It supports the athletes to be tall and ectomorphic.

In the vast majority of branches with intermittent high-intensity loads, the energy requirement is met by the anaerobic energy system. For this reason, we can say that the basis of decisive movements that will make karate players successful depends on the anaerobic energy system (Francescato et al. 1995; Beneke et al. 2004). Anaerobic power makes it possible to make defensive or offensive movements in the shortest time in karate. Besides anaerobic power, reaction time is thought to be extremely important. The reaction time or the speed of movement in the face of a stimulus has a critical importance in many sports branches, including karate (Mori et al. 2002). In addition, the number of studies that determine the reaction times of kata and kumite artists and reveal the difference between them is very limited. In the event of a competition, he must choose one of the many actions that can respond to the action of the opponent. The delay time in response to such stimuli increases in proportion to the number of alternative responses. With the increase, the athlete responds to his opponent by choosing the most appropriate response action. In high-performance karate athletes, the selective reaction time will be fast enough to approach the simple reaction time (Deliu, 2001).

Mori et al. (2002) and Williams and Elliot (1999) found that there was a significant difference in reaction times in their studies on karate players at different levels and competing in different categories. In another study, it was determined that the reaction times of the 3rd and 4th dan black belt karate players were better than the reaction times

of the 1st and 2nd dan karate athletes (Fontani et al. 2006). However, Layton's (1993) study on elite karate players competing in different competition categories found that there was no significant difference between reaction times. In our study, a result was found in parallel with the study of Fontana et al. (2006). Considering the studies examining the reaction time, it can be concluded that the reaction time increases as the level increases, so it can be said that it is inevitable to include studies to improve reaction time if it is desired to be an elite-level athlete or to be trained. When we look at the literature, it is seen that the number of studies examining the physical and motoric characteristics of kata and kumite athletes is quite limited. In this study, it was aimed to examine some physical and reaction times of kata and kumite athletes and to determine the differences between them. It was determined that there were significant differences between height, training age, and right-hand visual reaction times.

In the study, it can be said that the kata movement series of the kata athletes between the training ages are repeated with intense work over a long time, and the technical details are overemphasized in each repetition. It can be said that they have reached technical perfection at the end of long training years since the kata branch focuses only on rapid movements and has a lot of technical work. In the study, it can be said that the height of the kata and kumite athletes is due to the weight competition of the Kumite branch according to the kata branch and the weight difference of these weight athletes. In addition, it can be said that the technical details of karate kata exercises (dachi stances) emerged from the fact that they turned to kumite branches since they made too much effort for tall athletes. In the study, it can be said that these features have improved as a result of the right-hand visual reaction times of Kumite athletes, unlike kata athletes, who do different types of movements during training and competition and react quickly to incoming movements in training competitions. It can be said that it is also effective for kumite athletes to use their right hand as the dominant hand and to use this hand excessively to attack during the competition.

It is necessary to increase the number of studies that will enable karate athletes to be more successful in competitions and measure the distinctive athlete characteristics specific to the karate branch. In addition to revealing the differences between kata and kumite athletes, studies that measure the physical and motor characteristics of karate athletes competing in different categories and weights should be increased. It is necessary to carry out analysis and comparison studies according to gender differences by including the gender factor. In addition, studies that examine the relationships between the physical and motor characteristics of karate athletes who are ranked in national and international competitions and their success should be increased. This research aims to determine the differences that may be important for the selection, training methods, and physical tests of karate competition athletes in the future by testing some physical performance profiles of kata and kumite athletes. For this determined purpose, the data of a total of 108 (one hundred and eight) kata and kumite athletes, including 40 (forty) kata athletes and 68 (sixty-eight) Kumite athletes, were analyzed and evaluated. Since kata and kumite athletes were tested in the research, it is thought that it may be important for both the selection and training designs of karate athletes based on these findings. It will be possible to determine the profiles of competition athletes specific to kata and kumite disciplines, with more anthropometric measurements, physical performance, and skill-specific tests, and by expanding the same research on female karate athletes.

Conflict of Interests Statement

There are no conflicts of interest for the contributing author.

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Ethics Statement

Ethical approval of the research was obtained at the meeting of the Rumeli University Rectorate Ethics Committee, dated 23.08.2023 and numbered 2023/08. The research was conducted with volunteer participants.

Author Contributions

Planned by the author: Study Design, Data Collection, Statistical Analysis, Data Interpretation, Manuscript Preparation, Literature Search. Author have read and agreed to the published version of the manuscript.

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RESEARCH ARTICLE

Evaluation of FMS Scores of Competitive CrossFit Athletes by Gender

Yeliz YOL[1*]

[1]Istanbul University of Health Sciences, Hamidiye Faculty of Life Sciences, Department of Exercise and Sports Sciences, Istanbul / TURKEY
*Correspondingauthor: yeliz.yol@sbu.edu.tr

Abstract
Functional Movement Screening System (FMS) is a testing and assessment protocol used to evaluate the body movement and movement capacity of athletes or physically active individuals. Analysis of FMS scores by gender can provide important information to personalize training programs, identify weak points, and improve the movement quality of athletes. Therefore, the aim of this study was to evaluate the FMS scores of competitive CrossFit athletes according to gender. A total of 22 athletes, 14 males with a mean age of 26.79±5.16 years and 8 females with a mean age of 32.38±3.74 years participated in the study. Participants were administered the FMS™ test consisting of seven tasks (per the FMS™ manual). In the analysis of the data, after the normality distribution was made, the Man-Whitney U test was performed for the data that did not show the normal distribution in an independent two-group comparison. A statistically significant difference was found in the right(p=0.04) and left (p=0.04) shoulder mobility score, shoulder mobility final score (p=0.01), and active straight leg raise score-right (p=0.02) measurements of the athletes according to gender. As a result, females were found to have higher 'shoulder mobility' and 'active straight leg raising' scores than males on a movement basis. In addition, the total FMS scores were found to be above average for both genders.

Keywords
Crossfit, FMS, Gender, Injury Prevention

INTRODUCTION

CrossFit is one of the fastest-growing physical activities of high-intensity functional training, which emerged in the late 1990s and early 2000s. This strength and conditioning program is employed to enhance various physical abilities, including flexibility, cardiovascular and respiratory endurance, strength, speed, power, balance, agility and coordination. CrossFit training is characterized by its emphasis on high-intensity, functional movements (Claudino et al. 2018; Clifford, 2016; Feito et al. 2018). Some of the reasons behind the popularization of CrossFit training are that it includes three different sports branches (gymnastics, condition, and Olympic weightlifting), and its constantly changing philosophy that encourages functional movements (Summitt et al. 2016). Due to the fact that it has more than one branch, individuals need to push and develop themselves in this, and they need to have a certain level of mobilization and stabilization in order to do this. This indicates a substantial risk of injury for athletes. In addition, the literature has shown that CrossFit athletes are at the highest risk for upper extremity injuries (Rodriguez et al. 2021; Stracciolini et al. 2020; Toledo et al. 2021; Weisenthal et al. 2014). According to a 2014 study by Weisenthal et al., the injury rate among CrossFit athletes in the United States was found to be 19.4%, based on survey responses from 386 participants (Weisenthal et al. 2014). In another study, 97 (73.5%) of 132

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[1]**ORCID:** 0000-0002-0859-6238

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participants reported that they experienced musculoskeletal injuries during CrossFit training (Summitt et al. 2016). Sarıçam et al. (2022) also reported that the areas with the highest number of injuries were the shoulder, back, waist, arm, and elbow. It has been reported that male athletes are more likely to experience injury than female athletes. However, the participants in these studies are not competitive athletes (Shim et al. 2023; Weisenthal et al. 2014).

To achieve peak performance and minimize the risk of injury, it's crucial to detect any irregularities or weaknesses in intramuscular and intermuscular coordination. Data from multiple studies have shown that FMS levels can predict injury and these data identify a potential level of proficiency barrier (Bardenett et al. 2015; Chorba et al. 2010; Kiesel et al. 2007; Letafatkar et al. 2014). The objective of FMS is to pinpoint areas of weakness, reduced stability, or limited mobility within the body, within a dynamic and functional context (Cook et al. 2014; Kiesel et al. 2007). FMS is an assessment tool that defines the quality of movement and requires both balance and stability. It is popular in many fitness and rehabilitation areas (Cook et al. 2006; Gulgin and Hoogenboom, 2014). The FMS test consists of seven core exercises, including the hurdle step, the deep squat, the inline lunge, the active straight leg raise, shoulder mobility, rotary stability, and trunk stability push-ups. It is evaluated on a scale of 0 to 3 according to specific grading criteria (Cook et al. 2006). The FMS test is designed to detect mobility issues and subsequently suggest exercises tailored to address identified dysfunctions and limitations. So it enhances both strength and flexibility (Frost et al. 2012; Needham and Chockalingam, 2015). Several studies have indicated that a minimum total FMS score of ≥14 is recommended for the prevention of disabilities (Bardenett, 2015; Chorba et al. 2010; Kiesel et al. 2007; Letafatkar et al. 2014). However, studies on the injury levels of competing athletes and gender-related injuries are limited. Therefore, the aim of this study is to determine the types of gender-related injuries in high-intensity CrossFit exercises as a preventive measure for future injuries.

MATERIALS AND METHODS

Participants

This research was conducted in Istanbul on 14 male and 8 female volunteer athletes who have been doing CrossFit at a professional level for at least 2 years and participated in at least 1 national or international competition. The test was done in the gym where they trained the athletes and in a quiet. Before the research, each participant was informed about the structure of the research and its possible risks. Athletes were told that they could leave the test at any time. In addition, before the test, the athletes were told not to do any mobility and stretching exercises. Athletes who had undergone any injury, surgery, or medical procedure in the past three months were excluded from the study. In addition, written and signed consents were obtained from all participants. The research has been approved by the Scientific Research Ethics Committee that the research structure is in compliance with the Helsinki Declaration on "Ethical Principles in Medical Research on Humans" (2023/15- 23/494).

Data Collection

The FMS assessment was conducted by researchers holding FMS Level 1 certifications, and an overall FMS score was documented for each individual athlete. The researchers conduct FMS assessments for each athlete, utilizing the FMS test kit and accompanying manual provided by Functional Movement Systems to uphold the test's integrity. Athletes underwent the complete FMS assessment, sequentially performing all seven movements while being evaluated by the researcher. The FMS assessment encompasses the following movements: hurdle step, deep squat, inline lunge, active straight leg raise, shoulder mobility, rotary stability, and trunk stability push-ups.

FMS Score

The researchers applied the FMS scoring protocol to assess each test, assigning ratings on a scale from 1 to 3 (1 = unable to perform the movement pattern as described, 2 = movement completed with compensation(s), 3 = movement completed perfectly as verbally described without any compensations). A composite score for each athlete was calculated and recorded, as well as individual scores for each of the seven test positions.

FMS Test Measurements

Deep squat test

The athlete, held the bar with the legs slightly wider than shoulder-width apart and with both hands with the elbows at 90°. With his arms up and over his head, he squatted slowly and tried

to keep both feet on the ground. Keeping the natural curvature of the head and trunk, holding the bar over the head 3 times in a row, and the test score was recorded.

Hurdle step test

The feet of the athletes were close to each other and their fingers were under the hurdle. The hurdle was adjusted to the same height as the athlete's tibial tubercle. The athlete slowly lifted one leg over the hurdle and the support leg remained upright. The athlete touched the ground with the heel, and slowly returned to the starting position. Completed 3 times in a row and recorded the test score. Then athletes did the other leg in the same way and the test was completed.

Inline lunge

The length of the individual from the ground to the tuberosities tibia is measured. The subject places one foot on the wooden block, opens the other foot to the length of the tibia determined, and positions it so that it is in line with the back foot. The hand on the opposite side of the front foot holds the measuring stick in the cervical region, while the other hand grasps it in the lumbar region. While maintaining an upright posture, the person lowers the back knee enough to touch the surface behind the heel of the front foot and returns to the starting position.

Shoulder mobilitiy test

Hand length is determined by measuring the distance from the distal wrist bend to the tip of the third digit. The individual is instructed to make a fist with both hands and to assume a position of maximum adduction, extension, and internal rotation with one shoulder and maximum abduction, flexion, and external rotation with the other. During the test, the hands should remain in fists and the fists should be placed comfortably on the back. In this position, the distance between the nearest bony prominences in the fists is measured.

The active straight leg raise test

Participants lie in the supine position with the FMS platform placed below the knee joint. Hip and knee position in the center; one leg is lifted while the other leg is kept in contact with the test board. After both legs are completed 3 times in a row, the score is recorded.

Trunk stability push-ups

The athlete stands in a prone position with feet together and hands shoulder-width apart. He brings the ankles to dorsiflexion while bringing the knees to full extension. Then, with the strength of the arm and abdominal muscles, it brings the body to the push-up position without any delay in the spine. Males start with their thumbs at the top of the forehead, while females start with their thumbs at the chin level.

Rotary stability

The athlete performed a quadrupedal position using the board in the FMS test kit. They then simultaneously raised and extended the arm and leg on the same side of their body.

Data Analysis

All data were analyzed on the computer using the SPSS (Statistical Package for Social Sciences) 26 program. Shapiro-Wilk test was used to decide the normality of the distribution and it was determined that the measured values did not show normal distribution by looking at the skewness-kurtosis coefficients of the data and the histogram, normal Q-Q plot and box-plots normal distribution curve. Those who did not show normal distribution were compared with the Man-Whitney U test in the comparison of two independent groups. The significance level of 0.05 was accepted as a criterion in interpreting whether the obtained values were significant or not.

RESULTS

According to Table 1, in order to determine whether the FMS measurement values obtained from the athletes show a normal distribution, Shapiro-Wilk test results and other indicators of normal distribution, histogram, normal Q-Q graph, and box-plots normal distribution curve, kurtosis skewness coefficients, and sample number are taken into consideration. It was decided that the data did not show normal distribution. The significance level of 0.05 was used as a criterion in interpreting whether the obtained values were significant or not.

Table 1. Findings Related to Normal Distribution of the Data

	Tests	Shapiro-Wilk			Skewness	Kurtosis
		Statistics	n	p		
Male	DSFS	0,30	14	0,00	0,30	-0,66
	HSS-R	0,64	14	0,00	-0,57	1,12
	HSS-L	0,65	14	0,00	-0,55	-0,01
	HSFS	0,52	14	0,00	-2,41	4,35
	ILS-R	-	14	-	0,46	-2,09
	ILS-L	-	14	-	0,15	-2,31
	ILFS	-	14	-	1,67	0,90
	SMS-R	0,81	14	0,01	-	-
	SMS-L	0,77	14	0,00	-	-
	SMFS	0,77	14	0,00	-	-
	ASLRS-R	0,65	14	0,00	0,26	-0,51
	ASLRS-L	0,58	14	0,00	-0,55	-0,39
	ASLRFS	0,65	14	0,00	0,31	-0,40
	TSPFS	-	14	-	-0,15	-2,31
	RSS-R:	0,30	14	0,00	-1,18	-0,73
	RSS-L:	-	14	-	-0,15	-2,31
	RSSFS	-	14	-	-3,87	15,00
Female	DSFS	0,64	8	0,00	0,77	2,43
	HSS-R	0,83	8	0,06	-0,30	0,02
	HSS-L	0,66	8	0,00	0,80	-0,20
	HSFS	0,83	8	0,06	-1,23	-0,84
	ILS-R	-	8	-	-0,60	-0,35
	ILS-L	-	8	-	-0,37	-2,80
	ILFS	-	8	-	-0,60	-0,35
	SMS-R	0,72	8	0,00	-	-
	SMS-L	0,42	8	0,00	-	-
	SMFS	0,72	8	0,00	-	-
	ASLRS-R	-	8		-1,76	2,36
	ASLRS-L	0,42	8	0,00	-2,65	7,00
	ASLRFS	0,42	8	0,00	-1,76	2,36
	TSPFS	0,57	8	0,00	-	-
	RSS-R:	-	8	-	-2,65	7,00
	RSS-L:	-	8	-	-2,65	7,00
	RSSFS	-	8	-	-2,65	7,00

DSFS (deep squad final score), HSS-R (hurdle Step score-right), HSS-L (hurdle step score-left), HSFS: (hurdle step final score), ILS-R (inline lunge score- right), ILS-L (inline lunge score- left), ILFS (inline lunge final score), SMS-R (shoulder mobilitiy score-right), SMS-L (shoulder mobilitiy score-left), SMFS (shoulder mobilitiy final score), ASLRS-R (active straight leg raise score-right) , ASLRS-L (active straight leg raise score-left), ASLRFS (active straight leg raise final score), TSPFS: (trunk stability push-ups final score), RSS-R (rotary stability score-right), RSS-L (rotary stability score-left), RSSFS (rotary stability score final score)

According to Table 2, the age of male athletes participating in the study is between 19-36, with an average of 26.79±5.16 years, while the age of female athletes is between 27-40, with an average of 32.38±3.74. The mean weight of male athletes is 80.36±7.34, while the weight of females is 59.63±5.95. The average height of the male athletes is 177.07±5.51 and the height of the females is 162.50±5.04.

Table 2. Descriptive Statistics of Some Measurements of Athletes

Tests	Male (n:14)				Female (n:8)			
	Min	Max	$\bar{X}$	SS	Min	Max	$\bar{X}$	SS
Age (year)	19	36	26,79	5,16	27	40	32,38	3,74
Weight (kg)	72	93	80,36	7,34	50	69	59,63	5,95
Height (cm)	170	185	177,1	5,51	157	172	162,5	5,04
FMS								
DSFS	2	3	2,93	0,27	2	3	2,63	0,52
HSS-R	2	3	2,43	0,51	1	3	2,25	0,71
HSS-L	2	3	2,50	0,52	2	3	2,50	0,53
HSFS	2	3	2,21	0,43	1	3	2,25	0,71
ILS-R	3	3	3,00	0,00	3	3	3,00	0,00
ILS-L	3	3	3,00	0,00	3	3	3,00	0,00
ILFS	3	3	3,00	0,00	3	3	3,00	0,00
SMS-R	1	3	1,79	0,70	1	3	2,50	0,76
SMS-L	1	3	2,36	0,63	2	3	2,88	0,35
SMFS	1	3	1,64	0,63	1	3	2,50	0,76
ASLRS-R	2	3	2,50	0,52	3	3	3,00	0,00
ASLRS-L	2	3	2,71	0,47	2	3	2,88	0,35
ASLRFS	2	3	2,50	0,52	2	3	2,88	0,35
TSPFS	3	3	3,00	0,00	2	3	2,75	0,46
RSS-R	2	3	2,07	0,27	2	2	2,00	0,00
RSS-L	2	2	2,00	0,00	2	2	2,00	0,00
RSSFS	2	2	2,00	0,00-	2	2	2,00	0,00
FMS-TS	15	20	17.28	1.27	16	20	18.0	1.31

DSFS (deep squad final score), HSS-R (hurdle Step score-right), HSS-L (hurdle step score-left), HSFS: (hurdle step final score), ILS-R (inline lunge score- right), ILS-L (inline lunge score- left), ILFS (inline lunge final score), SMS-R (shoulder mobilitiy score-right), SMS-L (shoulder mobilitiy score-left), SMFS (shoulder mobilitiy final score), ASLRS-R (active straight leg raise score-right) , ASLRS-L (active straight leg raise score-left), ASLRFS (active straight leg raise final score), TSPFS: (trunk stability push-ups final score), RSS-R (rotary stability score-right), RSS-L (rotary stability score-left), RSSFS (rotary stability score final score), $\bar{X}(ortalama)$, SS (standart deviation)

According to Table 3, the "Shoulder mobility right score" measurement values of the athletes show a statistically significant difference according to the gender of the athletes (Z=-2.07, p<0.05). "Shoulder mobility left score" measurement values of the athletes show a statistically significant difference according to the gender of the athletes (Z=-2.01, p<0.05). "Shoulder mobility final score" measurement values of the athletes show a statistically significant difference according to the gender of the athletes (Z=-2.44, p<0.05). Also, "Active straight leg raise right score" measurement values show a statistically significant difference according to the gender of the athletes in the comparison of the FMS measurements of the athletes by gender (Z=-2.37, p<0.05).

Table 3. Results of Comparison of All FMS Measurement Values of Athletes by Gender

Tests		n	$\bar{X} \pm SS$	Z	p
DSFS	M	14	2,93±0,27	-1,74	0,08
	F	8	2,63±0,52		
HSS-R	M	14	2,43±0,52	-0,54	0,59
	F	8	2,25±0,71		
HSS-L	M	14	2,5±0,52	0,00	1,00
	F	8	2,5±0,54		
HSFS	M	14	2,22±0,43	-0,29	0,77
	F	8	2,25±0,71		
ILSR	M	14	3±0	0,00	1,00
	F	8	3±0		
ILSL	M	14	3±0	0,00	1,00
	F	8	3±0		
ILFS	M	14	3±0	0,00	1,00
	F	8	3±0		
SMS-R	M	14	1,79±0,7	-2,07	**0,04***
	F	8	2,5±0,76		
SMS-L	M	14	2,36±0,64	-2,01	**0,04***
	F	8	2,88±0,36		
SMFS	M	14	1,65±0,64	-2,44	**0,01***
	F	8	2,5±0,76		
FMS-TS	M	14	17.28±1.27	0.30	0.22
	F	8	18.0±1.31		
ASLRS-R	M	14	2,5±0,52	-2,37	**0,02***
	F	8	3±0		
ASLRS-L	M	14	2,72±0,47	-0,85	0,40
	F	8	2,88±0,36		
ASLRFS	M	14	2,5±0,52	-1,72	0,09
	F	8	2,88±0,36		
TSPFS	M	14	3±0	-1,92	0,06
	F	8	2,75±0,47		
RSS-S	M	14	2,08±0,27	-0,76	0,45
	F	8	2±0		
RSS-L	M	14	2±0	0,00	1,00
	F	8	2±0		
RSFS	M	14	2±0	0,00	1,00
	F	8	2±0		

DSFS (deep squad final score), HSS-R (hurdle Step score-right), HSS-L (hurdle step score-left), HSFS: (hurdle step final score), ILS-R (inline lunge score- right), ILS-L (inline lunge score- left), ILFS (inline lunge final score), SMS-R (shoulder mobilitiy score-right), SMS-L (shoulder mobilitiy score-left), SMFS (shoulder mobilitiy final score), FMS-TS (functional movement screen- total score), ASLRS-R (active straight leg raise score-right) , ASLRS-L (active straight leg raise score-left), ASLRFS (active straight leg raise final score), TSPFS: (trunk stability push-ups final score), RSS-R (rotary stability score-right), RSS-L (rotary stability score-left), RSSFS (rotary stability score final score), $\bar{X}(ortalama)$, SS (standart deviation), M (male), F (female)

DISCUSSION

The aim of this study was to determine the types of injuries related to gender in high-intensity CrossFit exercises. When the FMS total scores were examined in the study, the score of the male CrossFit athletes was 17.28±1.27, while the score of the female CrossFit athletes was 18.0±1.31. Multiple studies reported that the total FMS score should be ≥ 14 for disability prevention (Kiesel et al. 2007; Chorba et al. 2010; Letafatkar et al. 2014; Bardenett, 2015). From this point of view, it can be said that the probability of injury of all athletes participating in the study is low because the FMS total scores of the female and male athletes in this study are above 14. Although Crossfit athletes are in the risk-free group according to their FMS scores, this does not indicate that there is no risk of injury. In a survey conducted with 424 people, 204 participants reported that they at least got injured once while doing Crossfit (Szajkowski et al. 2023), and the results showed that the shoulder and lumbar region were the regions with the highest number of injuries (Szajkowski et al. 2023).

Apart from the total scores, when the scores of 7 movements between the two genders were examined, it was observed that the highest scores were 'Inline Lunge' and 'Trunk stability push-ups' in males, and 'Inline Lunge' in females. It was observed that the lowest score belonged to the 'Shoulder mobility' test in men and the 'Rotary stability' test in females. In addition, when comparing the FMS scores of the athletes by gender, it was determined that there were significant differences between the two groups in the "Shoulder mobility right, left and final score", and "Active straight leg raise" scores. Female athletes have higher shoulder mobility scores than male athletes. Therefore, the results of this study by Szajkowski et al. (2023) show similarities with the results. Additionally, similar to our study, it has been reported in studies that male athletes are injured more often than female athletes (Shim et al. 2023; Weisenthal et al. 2014).

Conclusion

In this study, it was aimed to determine the types of injuries that may occur in CrossFit exercises based on gender, and as a result;

1. In the findings obtained, it was determined that the total FMS scores of the athletes who do CrossFit were above the average for both genders.

2. When evaluated according to gender, it was found that females had higher 'shoulder mobility' and 'active straight leg raising' scores compared to men on the basis of movement.

3. There was no statistically significant difference in terms of other parameters.

Conflict of Interest

The author declare no conflict of interest. No financial support was received.

Ethics Statement

The approval of the Ethics Committee of Hamidiye scientific research was obtained for the study (2023/15- 23/494).

Author Contributions

Study Design, YY; Data Collection, YY; Statistical Analysis, YY; Data Interpretation, YY; Manuscript Preparation, YY; Literature Search, YY.

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RESEARCH ARTICLE

Investigation of the Effects of Game and Yoga Training on Social Integration and Subjective Wellness

Meriç ÖDEMİŞ[1*] and Emriye GÜMÜŞ[2]

[1]Alanya Aladdin Keykubat University, Sport Science Faculty, Recreation Department, Antalya / Türkiye
[2]Alanya Aladdin Keykubat University University, Faculty of Economic, Administrative and Social Sciences, Economics Department, Antalya / Türkiye
*Corresponding author: meric.odemis@alanya.edu.tr

Abstract
The aim of this study is to examine the effect of games played before yoga on social integration and the effect of yoga training on subjective wellness. A total of 34 people with a mean age of 24,88±5,20 years, who had never practised yoga before, participated in the study. The participants were divided into two groups as game-supported yoga group (n:17) and yoga-only group (n:17). The first group consisted of those who played intra-group acquaintance and mingling games before each beginner-level yoga practice and then practiced yoga (Game+Yoga), while the second group regularly participated in beginner-level yoga practices. Both groups were asked to fill out the Social Integration Scale in Sport (Yılmaz 2006) and Subjective Wellness Scale (Uysal 2014) before and after 8 weeks. Descriptive statistics, Independent T-test, Paired Sample T-test and One Way Anova test were used in the analysis of the data through Spss 24 software. As a result of the findings obtained from the research, it was seen that there was no significant difference between the groups in terms of social integration and subjective wellness in terms of pre and post test values ($p>0.05$). However, when in-group comparisons were examined, it was determined that there were statistically significant differences between the pre-post test ($p<0.05$). According to the results of the study, it can be said that game-supported yoga training has no effect on social integration, but 8-week yoga training positively affects the level of social integration and subjective wellness.

Keywords
Game, Yoga, Wellness

INTRODUCTION

Although the exact starting date of yoga is not known, it is seen that yoga postures are depicted on stone carved seals dating back to 3000 BC (Gürsoy, 2019). Yoga is a comprehensive exercise programme that includes muscle development, mobility and endurance in adults (Grabara & Szopa, 2015). Urban life and hustle and bustle weaken people's ties with nature and more importantly with themselves. Individuals who need to re-understand and recognise themselves and participate in recreational activities are confronted with yoga with its increasing popularity as well as many alternatives. Yoga, which is no longer an activity performed only in yoga centres, is finding increasing application areas in universities, hospitals, kindergartens and schools, workplaces and homes during the pandemic process through online or offline recordings. Yoga can be a useful form of exercise to improve balance and flexibility in healthy children in the school environment (Donahoe-fillmore, B. et al. 2019). Having school-age people practice yoga is beneficial not only for their mental state but also for increasing their physical activity

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[1]**ORC**ID: 0000-0002-2034-4295 , [1]**ORC**ID: 0000-0002-2125-5059

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levels (Forseth et al. 2022). Yoga, which is used as a supportive method in the treatment of all diseases, especially physical diseases, is now accepted as a serious discipline in developed countries such as European countries, America and Japan (Gürsoy, 2019). Yoga gives good results as a support for addiction and depression treatments with its stress-reducing effect, which has become a permanent part of today's life (Omelan et al. 2022).

According to Chang (2022), participation in sporting activities, in addition to the benefits it provides to individual health and happiness, helps nations and societies create and develop social capital and encourages the establishment of collective identities. Through these different dimensions, as a result of its proper implementation, it is expected to have an impact on both the personal fitness and social attitudes of individuals. However, the prejudice and stress that individuals who will come together for the first time and experience this may create due to various factors may delay their getting used to the group, getting used to a new practice and achieving these expected benefits.

Playing games can be considered as the most direct and easy way for people to leave their social anxieties and masks aside, regardless of their age. The most important person who cannot be mentioned without mentioning the game and its effects on human life is undoubtedly the Dutch history professor Johan Huizinga, who introduced the concept of "Homo Ludens". According to Huizinga, the game is a culture maker and is older than all acts, even culture (Gönül, 2019). Play does not emerge from various cultures, but is one of the most important features in the formation of cultures (Koçyiğit et al. 2007). Beyond providing learning, play also requires research, trial and error, relationship building, control and problem solving (Gülsoy, 2019). Social interaction is one of the most frequently cited benefits of sport organisations and can bring together people from different backgrounds who might not otherwise come together (Logan et al., 2019). Health benefits of physical activity and participation in sport organisations may also include better overall mental health in young adolescents (Vella & et al., 2017).

According to Yılmaz et al. (2006), "Sport fulfils the function of social integration from past history to the present". Before social integration, it is necessary to look at what is meant by the concept of "integration" in terms of sociology, integration in sociology is the state of fusion between different elements of the social structure. The fact to be emphasised with the concept of social integration is that each society has its own material and immaterial cultural elements. This situation will naturally make it necessary to address the concept of integration in a society-specific manner and the need to develop measurement tools that will serve this purpose will arise. The concept of social integration, as stated in Yılmaz et al. (2006), corresponds to the complementarity of the cultural elements in the society in such a way that they come together and form a functioning whole. When the importance of the concept is recognized, it can be said that social integration is related to the individual's sense of belonging and thus quality of life. According to Charles-Rodriguez et al. (2023), physical activity, stress reduction, and well-being are related through social cohesion. From this point of view, considering the meditative aspects of yoga, which does not only consist of physical movements but also provides psychological gains that will contribute to integration such as belonging and rooting, it was thought that it would have an effect on social integration as well as subjective wellness in this study.

Vitality is associated with a sense of power and calm energy and is a subjective experience of having both physical and mental high energy (Popovych et al. 2021). Ryan & Frederick (1997) define subjective vitality as the energy that emerges from the essence of the individual rather than environmental conditions and the conscious experience that the person has energy and vitality. People who feel subjectively fit can cope with stress more easily and see themselves as mentally healthier (Ryan & Frederick, 1997). Analysing the studies in the literature, Uysal et al. (2014) concluded that subjective vitality, which means subjective well-being, is negatively associated with depressive symptoms, internet addiction, anxiety and emotional instability, sadness, external locus of control and physical pain, and positively associated with subjective happiness, social, psychological and emotional well-being and life satisfaction. When we look at the effect of yoga practices in studies on young people, it has an effect on anxiety, depression, stress, and positive mood. In addition, it has been observed that it has a positive effect on physical performance (He et al.

2018; Ju et al. 2019; LaSala et al. 2021). When the literature is examined, the effects of yoga on well-being have generally been examined and no other study has been found that examines the effects of yoga on wellness and social integration at the same time. In line with this information, the aim of the study is to examine the effect of games to be applied before yoga on social integration and the effect of yoga training on subjective wellness.

MATERIALS AND METHODS

In order to examine whether there is a difference in the social integration and subjective well-being of people receiving game-supported yoga and yoga-only practice, a quasi-experimental model with a pretest-posttest unequalized control group model design was used among quantitative methods. It was foreseen that 45 people over the age of 18, who had no previous experience of regular yoga practice and who were randomly selected on the basis of volunteerism would participate in the study. The participants were divided into two groups. The first group consisted of 22 people (8 males and 14 females) who played intra-group acquaintance and mingling games before each yoga practice and then practised yoga (Game+Yoga), while the second group consisted of 23 people (8 males and 15 females) who regularly participated in beginner-level yoga practices (Yoga) once a week for a total of eight weeks.

Inclusion criteria

-Participants must be over 18 years of age and healthy

-Experiencing yoga practice for the first time

-Voluntary participation

Exclusion criteria

-One male participant from the yoga-only group was excluded from the study due to

orthopaedic problem because of the rule that if the participant has any health problem that prevents him/her from practising, he/she will be excluded from the study.

- A total of 10 participants, two of whom were male, who did not complete the measurements or yoga practices were also excluded from the study.

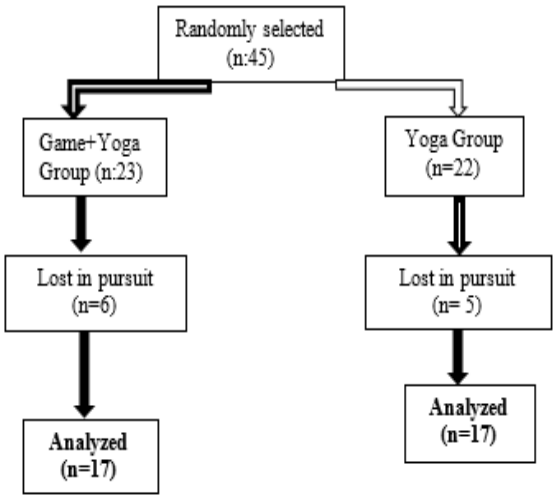

Figure 1. Participant Flowchart

The study was completed with a total of 34 participants (mean age 24,88±5,20 years), including 17 participants (Game+Yoga group mean age 22±4,29 years and yoga group mean age 26,88±5,37 years) in both groups.

Ethics

The study was approved by the Scientific Research Ethics Committee of Alanya Alaaddin Keykubat University, Social Sciences and Humanities (Decision No: 2022/14, Decision date 07.12.2022)

Procedure

Before starting the study, the participants were informed about the study and a signed consent form was obtained according to the Declaration of Helsinki. Yoga training given by a certified yoga instructor was completed at the end of 8 weeks, 1 day a week in Alanya Youth Centre multi-purpose hall. Before the study and at the end of eight weeks, the participants were asked to fill out the scales.

Data Collection Tools

Subjective Wellness scale and Social Integration Scale in Sport were used in the study. The Turkish form of the Subjective Wellness scale developed by Ryan and Frederick (1997) was developed by Uysal (2014) by conducting validity and reliability tests, and the scale consists of 7 questions of 7-point Likert type. Cronbach Alpha internal consistency reliability coefficient of the scale was found to be .84 and test-retest correlation coefficient was found to be.79. The Social Integration Scale in Sport, which was developed by Hall (2004) and adapted into Turkish by Yılmaz (2006), consisted of 7 sub-dimensions and 32 5-point Likert-type scale questions. Cronbach's

Alpha internal consistency value of the scale was 0.91.

Game content

In the first group that performed game-supported yoga, 30-minute group games (Table 1) were played by the yoga instructor before yoga one day a week for 8 weeks. In the first weeks, introductory games were played, while in the following weeks, entertainment-oriented games that were integrative and mobilising were preferred. The games were further coloured by asking the players who got burned and lost in the games with fire and punishment to do the poses they drew from the children's yoga cards.

Table 1. Games Played

Weeks	Games	
1.	İsim-Bitki	Battaniye/ Paravan
2.	Soğan- Sarımsak	Patlıyor- Patlıyor-Patladı
3.	Müzikli Balonlar	Bana Öykünü Anlat
4.	Tuvalet Kâğıdı	A'yı Kovala, B'den Kaç
5.	Düğüm	Aaaa-Şiişşt
6.	Elektrikli Çit	Köpekbalığı-Küçük Balık
7.	Kulaktan Kulağa	Gözler Kapalı Dans
8.	Ev Sahibi ve Kiracı	Bana Beni Anlat

Picture 1. Image from Game (Game names are turkish language)

Yoga content

In the first weeks, yoga practices, which are based on correct breathing, correct posture and balance alignments, have started to turn into routine flows in the future. With 3-4 minutes of breath-oriented, guided meditation, it is aimed to enable the participant to come to the mat with his/her whole self from the rush of daily life, and each session starts in this way, starting with the opening mantra. Mantra means special Sanskrit sentences or sounds that colour yoga practices with their Sanskrit sound. This is followed by warm-up movements synchronised with the breath that warms the neck and joints. In particular, warm-up exercises that warm and stretch the neck, shoulder blades, knees, backs of legs, wrists and ankles and warm-up exercises that mobilise the energy body are included. The warm-up exercises are followed by the Surya Namaskar (Salutation to the Sun) series. Afterwards, various asana practices are performed in accordance with the goal of the day, while various resting asanas and breathing breaks are added in between. Asana is the name of physical movements in yoga practice. Asanas are synchronised with the breath as much as possible. By experiencing yoga asanas, it can be seen that it has stress reduction benefits that reduce psychological distress despite increasing life stress conditions (Franklin et al. 2018). While applying the asanas, modifications or preliminary preparation asanas were made according to the development of the participants, and gradual progress was adopted. Towards the end, relaxation, relaxation exercises and deep resting Shavasana are taken towards Shavasana, and in the Shavasana part, there are also directions for breathing and relaxation, and Shavasana lasts at least 10 minutes. After Shavasana, the participants are awakened to return to daily life in a calm manner, the Infinite Sun song is sung, and a total of 60 minutes of practice is completed with the closing mantra and salute.

Picture 2. Image from Yoga

Analysis

Spss 24 statistical programme was used for the mean and frequency values, standard deviation, and comparisons of descriptive statistics of the participants. The kurtosis-skewness test was applied to test normality. Since the data showed normal distribution as a result of the analysis, Independent T test was performed in binary independent variables, Paired Sample T test in pre-post test comparisons, One Way Anova test in the comparison of multiple variables. The significance level was accepted as $p<0.05$.

RESULTS

Table 2. Demographic data of the participants

Variable	Group	N	%
Activity type	Game±Yoga	17	50
	Yoga	17	50
	Total	34	100
Sex	Woman	21	61,8
	Man	13	38,2
	Total	34	100
Age	18-22 years	15	44,1
	23-27 years	10	29,4
	28 years and over	9	26,5
	Total	34	100
Educational level	Bachelor	24	70,6
	Master	1	2,9
	Ph. D	7	20,6
	Graduate	2	5,9
	Total	34	100

Table 2 shows that 61.8% of the participants were female, 52.9% were 23 years of age or older, 70.6% were undergraduate students and 50% were 17 people who received only yoga education.

Table 3. Comparison between groups

	PRE			POST		
	GROUP	**MEAN±SD**	**p**	**GROUP**	**MEAN±SD**	**p**
SOCIAL INTEGRATION TOTAL	Game+Yoga	129,17±14,12	0,948	Game+Yoga	135,94±15,5	0,493
	Yoga	129,58±21,47		Yoga	139,76±16,6	
Sub dimenson **Personal development**	Game+Yoga	27,94±3,71	0,733	Game+Yoga	29,35±4,3	0,447
	Yoga	28,47±5,13		Yoga	30,47±4,15	
Sub dimenson **Socialising**	Game+Yoga	29,35±2,97	0,511	Game+Yoga	30,58±3,31	0,668
	Yoga	28,29±5,81		Yoga	31,11±3,8	
Sub dimenson **Physical benefit**	Game+Yoga	21,29±3,29	0,599	Game+Yoga	21,05±3,39	0,114
	Yoga	21,88±3,16		Yoga	22,88±3,14	
Sub dimenson **Integration**	Game+Yoga	17,88±1,96	0,166	Game+Yoga	18,11±2,64	0,653
	Yoga	16,35±3,95		Yoga	18,47±1,8	
Sub dimenson **Psychological development**	Game+Yoga	16,11±2,54	0,477	Game+Yoga	16,94±2,77	0,728
	Yoga	15,47±2,69		Yoga	16,58±3,08	
Sub dimenson **Moral development**	Game+Yoga	9,23±3,78	0,167	Game+Yoga	11,29±3,15	0,461
	Yoga	10,82±2,67		Yoga	12±2,29	
Sub dimenson **Emotional development**	Game+Yoga	7,35±1,99	0,129	Game+Yoga	8,58±1,66	0,495
	Yoga	8,29±1,49		Yoga	8,23±1,3	
Subjectıve Wellness	Game+Yoga	32,647±6,28	0,94	Game+Yoga	37,64±4,68	0,189
	Yoga	27,23±11,16		Yoga	34,47±8,47	

$p<0,05$

When Table 3 is analyzed, no difference was found between the two groups in the mean scores of social integration and subjective well-being ($p>0.05$).

Table 4. Within group comparison

GAME±YOGA				YOGA		
	Variable	**Mean±SD**	**p**	**Variable**	**Mean±SD**	**p**
SOCIAL INTEGRATION TOTAL	Pre	129,17±14,12	**0,018**	Pre	129,58±21,47	**0,002**
	Post	135,94±15,5		Post	139,76±16,60	
Sub dimenson **Personal development**	Pre	27,94±3,71	0,124	Pre	28,47±5,13	**0,028**
	Post	29,35±4,30		Post	30,47±4,15	
Sub dimenson **Socialising**	Pre	29,35±2,97	0,101	Pre	28,29±5,81	**0,001**
	Post	30,58±3,31		Post	31,11±3,80	
Sub dimenson **Physical benefit**	Pre	21,29±3,29	0,781	Pre	21,88±3,16	0,098
	Post	21,05±3,39		Post	22,88±3,14	
Sub dimenson **Integration**	Pre	17,88±3,29	0,722	Pre	16,35±3,95	**0,015**
	Post	18,11±2,64		Post	18,47±1,80	
Sub dimenson **Psychological development**	Pre	16,11±2,54	0,13	Pre	15,47±2,69	0,064
	Post	16,94±2,77		Post	16,58±3,08	
Sub dimenson **Moral development**	Pre	9,23±3,78	**0,006**	Pre	10,82±2,67	**0,024**
	Post	11,29±3,15		Post	12±2,29	
Sub dimenson **Emotional development**	Pre	7,35±1,99	**0,006**	Pre	8,29±1,49	0,791
	Post	8,58±1,66		Post	8,23±1,30	
Subjectıve Wellness	Pre	32,64±6,28	**0,011**	Pre	27,23±11,16	**0,004**
	Post	37,64±4,68		Post	34,47±8,47	

Table 4 shows that there was a significant difference in the total score of social integration and moral and emotional sub-dimensions of the game-supported yoga group between the pretest and posttest. In addition, a significant difference was also found in subjective well-being mean scores. It was also found that there were significant differences in the total score of social integration, personal development, socialisation, integration and moral sub-dimensions of the yoga-only group between the first and last measurement. It was also found that there was a statistically significant difference between the first and last measurement of subjective wellness mean scores ($p<0.05$).

DISCUSSION

The aim of the study is to examine the effect of games played before yoga on social integration and the effect of yoga training on subjective wellness. There was no statistically significant difference in the mean scores of social integration and subjective wellness in the first and last measurements between the group who played games before yoga training and the group who only did yoga ($p>0.05$). This result may be due to the fact that yoga shows a holistic development of the individual. Macovei & Popescu (2022) examined the cognitive development of primary school children who played movement games and stated that movement games are an ideal educational tool both in terms of movement, motor, and cognitive development and in terms of shaping personality and social integration. Özbek (2020) states that hunting, which is one of the oldest sports found in archaeological artefacts, and wrestling and similar physical games found in pharaonic tombs have positive contributions to social integration and society. It is certain that people will have gains in the direction of social integration by gathering in certain areas to watch the games, taking sides, laughing and having fun. The effects of the game are not limited to those who play. It also affects the people and the environment in which it takes place. Positive contributions to cognitive functions, social integration and quality of life have been described after the use of yoga in chronic conditions (Dietz et al. 2020). At the end of the research conducted on

adolescent students aged 13-15 years in order to evaluate the effects of Yoga Nidra on various dimensions of Well-being, the psychological general well-being of the participants increased (Vaishnav et al. 2018). In a study, Yoga was reported to improve the psychological well-being of retired people (Borotikar et al. 2023). In the study evaluating the effectiveness of Yoga Therapy on Psychological well-being and Quality of Life in anxiety disorders (mild to moderate categories), participants' Psychological well-being and Quality of Life levels increased (Annapoorna et al. 2011). In the study examining the effect of 12-week yoga training on the quality of life of individuals with schizophrenia, it was determined that there was a difference between the study and control groups as a result of the last measurement and that this difference was due to the improvement in the study group (Sertel et al. 2022). However, when we examined another study, no significant relationship was found between yoga exercises, well-being perceptions of individuals, and yoga training (Güler, 2010).

In our study, there was a significant difference in the total score of social integration and in the sub-dimensions of moral development and emotional development between the first and last tests of the game-supported yoga group ($p<0.05$). In addition, a significant difference was found in subjective well-being mean scores ($p<0.05$). On the other hand, it was found that there were significant differences in the total score of social integration, personal development, socialisation, integration and moral development sub-dimensions between the first and last measurement of the yoga group ($p<0.05$). In addition, it was found that there was a statistically significant difference between the first and last measurement of subjective well-being mean scores ($p<0.05$). As a result of in-group pre-post test comparisons, it was observed that the average scores of social integration and subjective wellness increased in both groups, that is, there was an improvement. It can be said that 8-week yoga training positively affects both social integration and subjective wellness of individuals. Sarnowska et al. (2018), in their project by establishing a homeless team for the Petanque Games in order to mobilise the homeless in Poland, is a good example to show those interested how movement classes can improve the quality of life in a shelter in an environment that allows social integration and does not exclude the homeless. Offering yoga as group classes enables more meaningful relationships with the community, thus increasing social integration and well-being (Pearson et al. 2020). Asthanga yoga includes sadhana and practices that control and balance the chakras to achieve personal and social integration (Jordan, 2016). Yoga, which does not only mean spiritual or mental relaxation, also includes a large number of physical asanas. It can be said that there is a positive relationship between physical mobility and social integration. Hassmen (2000), in his study for Finland to determine the relationship between physical mobility and psychological well-being, found that those who exercise 2-3 times a week have a stronger sense of coherence and social integration than those who exercise less.

In a study conducted on young people, it was observed that yoga had a positive effect on well-being (Akhtar et al. 2013). A 10-day yoga-based short lifestyle change and stress management programme improved the subjective well-being of individuals (Sharma et al. 2008). It has been reported that the psychological well-being of inmates undergoing Yoga Prana Vidya System therapy increased (Nanduri & Revathi, 2020). The researchers stated that as a result of a total of 12 weeks of yoga training, one day a week for 90 minutes, there was a statistically significant difference between the psychological well-being pre-post test scores of female athletes in the experimental group and yoga had a positive effect on psychological well-being (Öner & Biçer, 2017). After the 8-week play training programme applied to university students, it was observed that there was a statistically significant difference in the subjective well-being levels of the study group in the pre-post follow-up test (Özdemir, 2019). As a result of the 12-week yoga exercise programme, which was determined as two days a week for 40 minutes, it was reported that it had a positive effect on the quality of life of women with premenstrual syndrome (Kılıç & Hakan, 2020). In another study, at the end of a study in which yoga exercises were performed three times a week for a total of 10 weeks, it was determined that the quality of life values of the participants improved in the post-test results (Demirezer & Biçer, 2023). However, Atılgan & et al. (2018) reported that yoga-based exercises did not have a significant effect on quality of life, physical activity and depression.

According to the results of the study, it can be said that game-supported yoga training does not have a significant effect on social integration, but 8-week yoga training positively affects social integration and subjective wellness. In new studies, the effect of increasing the duration or frequency of play before yoga training on social integration can be examined.

Conflict of Interests Statement

There are no conflicts of interest for the contributing author.

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Ethics Statement

The study was approved by the Scientific Research Ethics Committee of Alanya Alaaddin Keykubat University, Social Sciences and Humanities (Decision No: 2022/14, Decision date 07.12.2022)

Author Contributions:

Study Design, MÖ; Data Collection, EG Statistical Analysis, MÖ; Data Interpretation, MÖ, EG; Manuscript Preparation, MÖ; Literature Search, MÖ, EG. All authors have read and agreed to the published version of the manuscript.

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RESEARCH ARTICLE

Investigation of The Effects of Combined and Traditional Trainings Applied to Football Players in the Infrastructure on Multiple Performance Developments

Serkan DAĞDELEN[1*] and Fatih KILINÇ[2]

[1]Akdeniz Üniversitesi, Sports Science Faculty, Department of Movement and Training, Antalya / Turkey
[2]IspartaUniversity of Applied Sciences, Department of Recreation Management, Isparta / Turkey
*Corresponding author: serkandagdelen0250@gmail.com

Abstract
The aim of this research is to investigate the effects of combined and traditional training applied to football players on multi-faceted performance development. Experimental research model from quantitative research was used in this study. This study sports infrastructure Antalyaspor the average age of 12,3±0,2 a year, training the average age of 3,5±0,7 with 12 years Combined Training Group (CTG) and the mean age of 12,2±0,1 years of training average age 4,0±0,7 year 12 Normal Training Group (NTG) to 24 male soccer player voluntarily participated. Before and after the 8-week training period, anthropometric measurement (length, width, circumference, subcutaneous fat), posture analysis, physiological tests; heart rate measurements, blood pressure, biomotoric tests; strength, sprint, flexibility, vertical jump, maximal strength (1RM), sit-ups, push-ups, standing long jump, jump rope, sit-reach, FutTech Technical tests (slalom, dribbling, passing, shooting, running), body temperature, ambient temperature and determination of perceived difficulty level tests were carried out. When the CTG and NTG pre-test and post-test data were examined, a statistically significant difference was found in the pre-test biomotoric tests in standing long jump, lat pull and FutTech time values ($p<0.05$). A statistically significant difference was found in the lat pully and abdominal values of the CTG and NTG end test values in the biomotanical tests ($p<0.05$). Based on the data we have obtained, it has been determined that combined training performed in children in the infrastructure contributes to the development of some biomotoric features and supports the development of football-specific technical skills compared to normal training programs.

Keywords
Football, Combined Traning, Performance, Futtech

INTRODUCTION

Football; It is the art of scoring and not scoring goals with or without the ball, which is based on the principles of attack and defense, which alternates between attack and defense, and which is based on running away, creating an empty field, man and field marking, and includes many variations with or without the ball (Dağdelen, 2022). Although football has many different definitions today, the most effective and short definition is the expression "beautiful game" made by the world-famous football star Pele (Kirkendall and Sayers, 2020).

With the introduction of the football game to boarding schools and the establishment of clubs, it is possible to see various elements in the development of today's football, including debates on whether football will be a recreational tool or a profession as amateurs (Koller & Braendle, 2015). Football, which has managed to reach large masses due to the popularity of football and its loving

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[1]**ORCID:** 0000-0002-0139-051X , [1]**ORCID:** 0000-0002-6426-3948

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practice by various communities, is one of the branches with the highest level of interest (Stolen et al., 2005). Football physiologically, aerobic and anaerobic performance are applied respectively, strength, endurance, power, mobility, speed, skill and agility, etc. It is the branch of sports in which the elements affect the performance at the primary level. In football, which is considered as a branch based on such a variety of performance activities in order to achieve success, besides physical, physiological, mental, technical and tactical, the anthropometric and motoric characteristics of the athlete are of great importance. At the same time, it has been reported that there have been significant increases in the technical, tactical, physical, physiological and mental capacities of football players due to the changes and developments in football in recent years (Carling et al., 2012).

From an early age, children and young people play football everywhere and under all conditions, and some of them take this sport to professional levels by getting their education from the infrastructure. In professional football, children and young people need to develop some skills and undergo a serious training in the infrastructure in order to show better performance and improve themselves in this branch (Çolak, 2016: 3). Football is a sports activity that is followed by everyone due to various sporting variations (passing, shooting, dribbling, sudden movements, acceleration, stopping, deceptions, etc.), in order to be successful, physical, physiological and physiological performance and successful results for football player children and youth. It is of great importance to analyze motoric, tactical and morphological aspects (Zakas, 2005). In addition, coaches and sports scientists today practice dribbling with or without the ball, sprinting, shooting, passing, etc. technical skills and strength, speed, endurance, coordination, flexibility, etc. In addition to using traditional exercises to improve motoric performance, they also try modern new training methods. Among the new training methods, combined training, core training and various new training models, which are considered to be helpful, can be applied in order to make these features more efficient and to take them to the next level (Aslan, 2014). Even if football is played everywhere and on any ground, a long-term education and training process is needed. Taking into consideration the long-term education and training of the condition, technical and tactical needs of the game in football, and the developmental characteristics of the game, athletes should do exercises at an increasing level and intensity (Spirduso, 1995). The high number of young people in our country is an indicator of the need to attach great importance to club infrastructure and the efforts made for their development. For this reason, football trainings to be applied to children and young people must be scientific and coordinated (Eniseler, 2009).The aim of this research is to investigate the effects of combined and traditional training applied to football players on multi-dimensional performance development.

MATERIALS AND METHODS

Study Design

The research was carried out with 24 male football players in the age group of 12 struggling in the infrastructure of Antalyaspor Club. Inclusion criteria for the study; All football players participating in the study were boys, were 12 years old when the study was conducted, actively participated in their own training, documenting that they were licensed athletes, having a sports history of at least 3 years, not having been injured in the last 6 months, having family approval, participating voluntarily, not having any chronic disease and not using drugs continuously. Athletes who met the research criteria were divided into 2 groups as 24 male football players, 12 Combined Training Group (CAG) and 12 Normal Training Group (NTG). The study was initiated after the approval of the Akdeniz University Clinical Research Ethics Committee.

Data Collection

As a research methodology; anthropometric measurement (length, width, circumference, subcutaneous fat), posture analysis (anterior, lateral), physiological tests; heart rate measurements, blood pressure, biomotoric tests (strength, sprint (5m / 10 m / 20 m), flexibility, vertical jump, maximal strength test (1RM), sit-ups, push-ups, standing long jump, jump rope, sit-reach, FutTech Teknik tests (dribbling, passing, shooting), body temperature, ambient temperature, perceived difficulty level (RPE- Rating Of Perceived Exertion) were planned and carried out. The first measurements were made before the training and after the combined training programs, which were carried out 3 times a week for 8 weeks

(including 1-1.5 hours of warm-up phase-main phase-cooling-down phase on Monday, carried out again at the end of the training program. 15 minutes per unit training. In the warm-up-preparation, 30-45 minutes main phase, a combined training program was applied to improve strength, technique, sprinting, mobility, flexibility, dribbling, passing, shooting and similar features. The finishing phase is 10 minutes. It is finished with cooling and stretching work.

Postür Analiz

Wednesday, Friday /day), measurements were

In the APPA-Postural analysis system, angular analyzes were made from the anterior and lateral directions on the photograph via a computer program. Photographs were taken with a Canon camera. Head, neck, shoulder, back, elbow, wrist, chest, hip, knee, ankle and heel regions were evaluated according to the ideal posture accepted as standard (Kılınç, 2021).

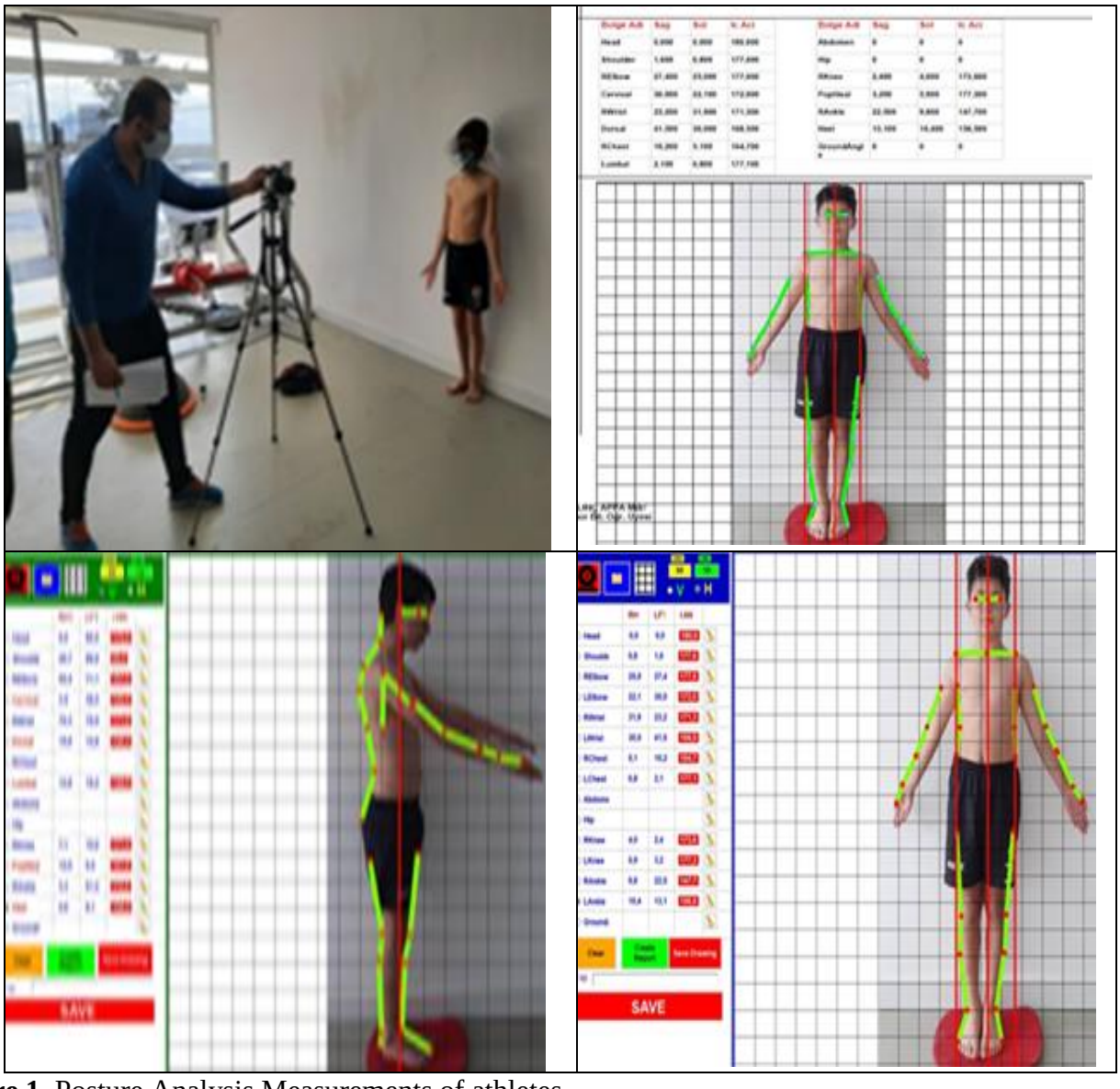

Figure 1. Posture Analysis Measurements of athletes

FutTech Technical Test

Before starting the test, heart rate, ambient and body temperature, blood pressure were measured, and then the subject was asked to leave. The athlete, who comes out of the starting point through the photocell, first sprints for 10 meters, dribbles between the cones 5 meters, and then approaches the ball 2,5 meters. To the miniature castles at a distance of 5 meters from behind, first the right foot, then the left foot, goal kick, 10 meters sprint, 5 meters wall pass, then back to the center point, then 15 meters straight sprint running

by turning, at the end immediately inside the right foot and inside the left foot throwing the ball to the targets, dribbling for 10 meters with the remaining ball, at the end of the ball to the target from the cone, then the 1st ball standing on the penalty area arc will cross the goal with the right foot, the 2nd will shoot the ball with the free foot to the desired point, and the 3rd will shoot the ball to the diagonal corner with the left foot immediately At the end of the test, the athletes will finish the technical test by running at full speed to the finish point. At the end of the test, slalom (6 x 5 points = 30 points), accurate passes to small goals (2 x 10 points = 20 points), wall passes (1 x 5 points = 5 points), right-left in-foot hits on targets (2 x 10 points =20 points), long pass after dribbling (1 x 10 points=10 points), goal kick to big goal (3 x 5 points =15 points) are indexed to a total of 100 points and FutTech score is calculated by taking into account the finishing times. At the end of the FutTech (football technical test), heart rate, ambient and body temperature, blood pressure values were taken again**.**

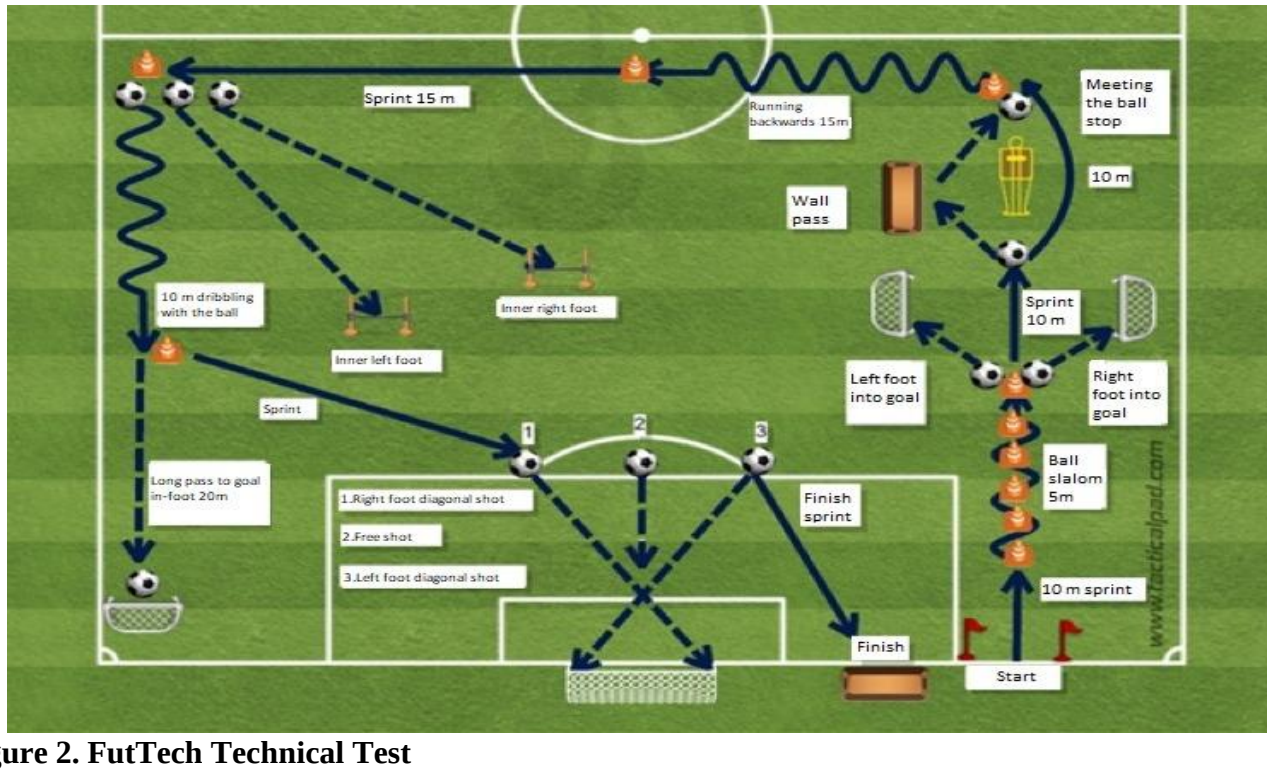

Figure 2. FutTech Technical Test

Determining the Rating of Perceived Exertion (RPE)

It is a method used to measure the perceived exertion rate of the person or the degree of difficulty of the exercise. The highest value on the scale is 20 and the least is 6. The increasing value between the numbers 6 and 20 indicates that the perceived difficulty level of the exercise increases. The scale was created in 1982 by Gunnar Borg. The players will be shown the 6-20 Borg scale and asked how much they push themselves while applying the FutTech Test. The answers given by the athletes are recorded in the measurement form and evaluated as the degree of difficulty perceived by the athlete during the exercise.

Statistical Analysis

Calculated using Statistics 26.0 and Excel (Analyes Tool Pack) program for statistical analysis. After applying the Kolmogorov-Smirnov test to determine the distribution of all measurements, it was determined that the distribution was at a normal level and it was decided to apply parametric tests. First, descriptive statistics of the data were performed and Paired T test and Independent T test were used in statistical analysis. Paired T test was used to compare within-group pre-test and post-test mean, and Independent T test was used to compare between-group means. Standard deviation and arithmetic mean values were calculated for all variables. In this study, the alpha value will be accepted as 0.05 in all statistical analyzes.

RESULTS

Table 1. Length measurement findings of combined and normal training group

VARİABLE (cm)	GROUP	AO±SS (pre-test)	AO±SS (post-test)	t (Pre-test)	t (Post-test)	P (Pre-test)	P (Post-test)
Fathom	CTG	150.8±9.5	151.1±9.7	-.383	-.330	.706	.745
	NTG	152.1±6.0	152.2±6.0				
Bust	CTG	78.2±2.9	78.3±2.9	-1.262	-1.247	.220	.225
	NTG	79.7±2.8	79.8±2.8				
Whole arm	CTG	65.6±3.5	65.6±3.5	.120	.114	.906	.910
	NTG	65.4±3.2	65.5±3.2				
Shoulder-elbow	CTG	26.8±1.7	26.9±1.7	.245	.228	.809	.822
	NTG	26.6±1.5	26.7±1.5				
Forearm	CTG	24.8±1.6	24.9±1.6	1.364	1.393	.186	.179
	NTG	24.0±1.1	24.1±1.1				
Thigh	CTG	39.1±3.1	39.2±3.1	-.522	-.551	.607	.589
	NTG	39.6±1.7	39.8±1.6				
Calf	CTG	37.1±2.8	37.2±2.9	,081	.071	,936	.944
	NTG	37,0±2,0	37.1±2.1				
Foot	CTG	22,4±1,4	22.5±1.4	-1.030	-.925	.314	.365
	NTG	23,0±1,4	23.0±1.4				

Note: CTG: Combined Training Group, NTG: Normal Training Group

Table 2. Width measurement findings of combined and normal training group

VARİABLE (cm)	GROUP	AO±SS (pre-test)	AO±SS (post-test)	t (Pre-test)	t (Post-test)	P (Pre-test)	P (Post-test)
Biacromial	CTG	32.7±1.8	32.7±1.8	-1.839	-1.841	083	.083
	NTG	33.8±1.0	33.9±1.0				
Chest diameter	CTG	23.4±1.1	23.5±1.2	-.985	-.869	.336	.394
	NTG	23.9±1.2	23.9±1.2				
Chest depth	CTG	17.7±1.1	17.8±1.1	.395	.432	.697	.670
	NTG	17.5±1.0	17.6±1.0				
Biiliac	CTG	24.1±1.4	24.1±1.4	-1.465	-1.504	.157	.147
	NTG	25.0±1.5	25.0±1.5				
Bitrhroconteric	CTG	26.7±1.4	26.8±1.4	-.904	-.884	.376	.386
	NTG	27.3±1.5	27.3±1.5				
Humerus bicondiler	CTG	5.8±0.4	5.9±0.4	-.284	-.129	.779	.899
	NTG	5.9±0.5	5.9±0.4				
Wrist	CTG	4.7±0.4	4.8±0.3	.688	.738	.498	.468
	NTG	4.6±0.3	4.7±0.3				
Femur bicondiler	CTG	9.6±0.6	9.7±0.6	.255	.471	.801	.643
	NTG	9.6±0.6	9.6±0.6				
Ankle	CTG	7.0±0.4	7.0±0.4	-.077	-.385	.939	.704
	NTG	7.0±0.6	7.1±0.6				

Note: CTG: Combined Training Group, NTG: Normal Training Group

Table 3. Perimeter measurement findings of the combined and normal training group

VARİABLE (cm)	GROUP	AO±SS (pre-test)	AO±SS (post-test)	t (Pre-test)	t (Post-test)	P (Pre-test)	P (Post-test)
Shoulder	CTG	86.1±4.6	86.3±4.6	-1.639	-1.598	.117	.126
	NTG	88.9±3.4	89.0±3.4				
Chest normal position	CTG	72.5±3.7	72.6±3.7	.967	1.039	.344	.310
	NTG	71.0±3.6	71.0±3.6				
Chest expirations	CTG	70.2±3.7	70.4±3.8	.626	.725	.537	.476
	NTG	69.3±3.7	69.3±3.7				
Chest ınspiration	CTG	76.4±4.0	76.7±4.0	.786	.907	.440	.374
	NTG	75.2±3.6	75.2±3.6				
Abdomen	CTG	69.8±4.4	70.8±5.0	-.729	-.091	.474	.928
	NTG	71±3.2	70.9±3.2				
Hip	CTG	78.8±5.0	78.9±4.9	-.589	-.520	.562	.609
	NTG	80.0±4.8	80.0±4.7				
Thigh	CTG	47.0±3.9	47.2±3.9	.288	.417	.776	.681
	NTG	46.6±2.6	46.6±2.6				
Calf	CTG	31.4±3.1	31.5±3.1	.782	.932	.443	.362
	NTG	30.4±2.8	30.3±2.7				
Biceps flexion	CTG	23.7±2.3	23.8±2.4	-.994	-1.321	.332	.202
	NTG	24.6±1.8	25.4±3.4				
Forearm	CTG	21.6±1.4	21.7±1.4	-.782	-.693	.442	.495
	NTG	22.0±1.3	22.1±1.3				

Note: CTG: Combined Training Group, NTG: Normal Training Group

Table 4. Subcutaneous fat measurement findings of the combined and normal training group

VARİABLE (cm)	GROUP	AO±SS (pre-test)	AO±SS (post-test)	t (Pre-test)	t (Post-test)	P (Pre-test)	P (Post-test)
Thigh	CTG	11.9±4.0	12.5±3.3	.656	.776	.519	.447
	NTG	10.9±2.9	11.5±2.6				
Calf	CTG	8.0±2.3	7.8±2.3	1.191	1.296	.246	.209
	NTG	6.9±2.2	6.6±2.2				
Suprailiac	CTG	6.2±2.0	6.0±1.9	1.718	1.711	.101	.102
	NTG	4.9±1.4	4.8±1.4				
Abdominal	CTG	9.3±3.7	9.0±3.8	.518	.536	.609	.597
	NTG	8.5±3.8	8.2±3.8				
Subscapulaa	CTG	5.4±1.0	5.2±1.0	-.879	-.753	.390	.460
	NTG	5.8±1.5	5.6±1.4				
Triceps	CTG	9.2±1.8	8.9±1.6	.063	.270	.950	.790
	NTG	9.2±2.5	8.7±2.6				
Biceps	CTG	5.7±2.4	5.8±2.7	1.563	1.867	.144	.082
	NTG	4.5±1.2	4.2±1.1				
Chest	CTG	6.1±1.9	6.2±1.9	.177	.688	.861	.499
	NTG	6.0±2.1	5.7±2.2				
Body fat percentage (%)	CTG	7.9±1.1	7.9±1.0	.731	.947	.473	.354
	NTG	7.6±0,8	7.5±0.9				

Note: CTG: Combined Training Group, NTG: Normal Training Group

Table 5. Posture analysis anterıor measurement findings of combined and normal training group

VARİABLE	GROUP	AO±SS (pre-test)	AO±SS (post-test)	t (Pre-test)	t (Post-test)	P (Pre-test)	P (Post-test)
Head	CTG	175.2±4.3	176.3±2.6	-.049	1.563	.962	.133
	NTG	175.3±4.8	174.4±3.3				
Shoulder	CTG	176.4±2.8	177.0±2.5	-.054	-.157	.958	.877
	NTG	176.4±2.5	177.2±1.8				
Right elbow	CTG	171.5±4.6	174.8±3.8	-1.809	.624	.084	.539
	NTG	174.9±4.4	174.0±3.0				
Left elbow	CTG	172.6±5.2	174.0±3.8	-.716	.662	.482	.515
	NTG	174.0±4.0	173.0±3.6				
Right hand wrist	CTG	172.0±6.3	170.5±6.6	-2.457	-.657	.073	.518
	NTG	172.0±5.2	172.2±6.0				
Left hand wrist	CTG	164.3±5.1	163.6±8.7	-.047	-.880	.963	.388
	NTG	164.4±4.4	166.6±7.9				
Chest right	CTG	174.5±5.1	175.3±4.1	1.489	1.187	.151	.249
	NTG	171.3±5.4	173.0±5.5				
Chest left	CTG	173.4±4.5	173.5±4.4	1.529	.470	.141	.643
	NTG	170.5±4.7	172.5±5.0				
Right knee	CTG	170.3±5.2	174.5±3.6	-2.619	1.664	.016	.113
	NTG	175.2±3.9	171.2±5.7				
Left knee	CTG	175.1±4.4	174.0±2.9	-.514	.787	.614	.440
	NTG	175.9±2.0	173.2±2.3				
Right foot	CTG	150.6±4.9	154.6±4.0	-1.021	.849	.321	.405
	NTG	153.7±9.0	153.0±4.8				
Left foot	CTG	154.2±4.8	151.2±3.9	-.568	-1.848	.576	.078
	NTG	155.2±3.6	154.4±4.5				

Note: CTG: Combined Training Group, NTG: Normal Training Group

Table 6. Posture analysis lateral measurement findings of combined and normal training groups

VARİABLE	GROUP	AO±SS (pre-test)	AO±SS (post-test)	t (Pre-test)	t (Post-test)	P (Pre-test)	P (Post-test)
Head	CTG	175.3±3.0	172.4±4.0	1.689	-.022	.109	.93
	NTG	172.4±5.1	172.4±3.4				
Shoulder	CTG	59.1±7.7	54.8±8.3	.170	1.292	.866	.210
	NTG	58.5±7.6	50.3±8.9				
Right elbow	CTG	169.5±8.9	173.5±4.7	.332	-1.093	.745	.286
	NTG	166.2±33.3	175.5±4.3				
Neck	CTG	140.7±10.4	142.5±11.8	1.552	-.102	.135	.920
	NTG	134.4±9.5	142.9±11.4				
Right wrist	CTG	173.4±4.9	174.7±4.0	-.970	-.828	.344	.418
	NTG	175.1±3.4	175.8±2.7				
Dorsal	CTG	157.3±7.3	156.9±6.5	-.903	.960	.378	.348
	NTG	159.6±4.7	154.0±7.9				
Lumball	CTG	140.9±5.2	142.8±2.7	-1.282	-1.904	.216	.072
	NTG	144.7±8.5	145.5±3.9				
Right knee	CTG	173.7±5.1	174.0±6.7	-.707	.156	.490	.569
	NTG	174.9±2.5	173.6±5.5				
Popliteal	CTG	165.4±3.7	168.9±4.8	-.547	.578	.591	.569
	NTG	166.5±6.0	167.7±5.0				
Right ankle	CTG	112.2±4.0	113.9±4.5	-2.323	-1.573	.031	.130
	NTG	117.3±6.3	117.2±5.4				
Heel	CTG	161.5±6.2	161.4±6.0	.115	-.075	.910	.941
	NTG	161.8±4.1	161.6±6.0				

Note: CTG: Combined Training Group, NTG: Normal Training Group

Table 7. Physiological measurement findings of the combined and normal training group

VARİABLE (cm)	GROUP	AO±SS (pre-test)	AO±SS (post-test)	t (Pre-test)	t (Post-test)	P (Pre-test)	P (Post-test)
Heart beats beginning	CTG	94.9±15.7	100.2±16.0	.772	.271	.449	.789
	NTG	90.2±13.8	98.2±19.8				
Heart beats finishing	CTG	124.7±14.1	158.5±23.8	.951	-.424	.352	.676
	NTG	119.6±12.0	162.2±18.0				
Systolic beginning	CTG	123.9±12.1	118.5±13.3	-.560	1.228	.581	.235
	NTG	126.7±12.5	113.0±7.8				
Diastolic beginning	CTG	79.2±11.8	73.2±10.5	-1.257	-1.146	.224	.265
	NTG	87.0±17.7	77.6±8.1				
Systolic finishing	CTG	141.5±18.0	146.5±21.1	-.889	-.435	.384	.669
	NTG	148.9±22.1	149.6±13.8				
Diastolic finishing	CTG	85.8±20.1	91.7±19.9	.138	-1.466	.892	.164
	NTG	84.9±11.1	100.9±8.3				
Body temperature start	CTG	35.9±0.3	36.3±0.6	-1.082	.658	.292	.519
	NTG	36.1±0.4	36.1±0.3				
Body temperature finish	CTG	36.3±0.3	37.0±1.0	-1.859	-.432	.076	.672
	NTG	36.6±0.3	37.1±0.4				
Environment temperature start	CTG	17.1±0.0	41.1±0.0	-1.483	-3.370	.152	.126
	NTG	17.1±0.0	41.2±0.0				
Environment temperature finish	CTG	17.1±0.0	41.1±0.0	-1.483	-3.370	.152	.126
	NTG	17.1±0,0	41.2±0.0				

Note: CTG: Combined Training Group, NTG: Normal Training Group

Table 8. Maximal 1RM measurement findings of combined and normal training group

VARİABLE (cm)	GROUP	AO±SS (pre-test)	AO±SS (post-test)	t (Pre-test)	t (Post-test)	P (Pre-test)	P (Post-test)
Leg press	CTG	26.5±3.6	27.1±3.4	1.503	.408	.148	.688
	NTG	24.5±2.7	26.6±2.4				
Leg extentıon	CTG	38.7±11.7	38.7±10.1	.508	.022	.617	.983
	NTG	36.6±8.0	38.6±8.6				
Leg curl	CTG	35.0±7.9	38.0±8.2	-.549	-.084	.589	.934
	NTG	36.6±6.8	38.3±6.1				
Calf raise	CTG	21.0±4.7	23.0±5.4	.861	.985	.400	.341
	NTG	19.6±3.1	21.4±2.2				
Biceps curl	CTG	17.3±2.8	19.5±3.9	-1.317	-.518	.202	.610
	NTG	18.7±2.2	20.4±3.9				
Lat puly	CTG	18.7±3.1	20.5±3.1	-2.940	-3.234	.009	.005
	NTG	24.1±5.5	26.2±5.2				
Butter fly	CTG	11.2±3.7	13.5±4.0	-.573	-1.040	.573	.310
	NTG	12.0±3.3	15.2±3.7				
Abdominal	CTG	9.0±1.6	10.5±2.1	-4.435	-3.580	.000	.002
	NTG	12.2±1.9	14.4±3.0				
Triceps	CTG	16.6±4.0	19.6±4.3	.506	.465	.618	.647
	NTG	15.8±4.0	18.7±5.2				

Note: CTG: Combined Training Group, NTG: Normal Training Group

Table 9. Biomotoric tests measurement findings of the combined and normal training group

VARİABLE (cm)	GROUP	AO±SS (pre-test)	AO±SS (post-test)	t (Pre-test)	t (Post-test)	P (Pre-test)	P (Post-test)
Standing long jump (cm)	CTG	168.8±15.1	192.9±22.6	2.383	1.428	.026	.169
	NTG	152.8±17.6	181.7±14.8				
Flexibility (cm)	CTG	15.9±5.5	26.8±34.5	1.707	1.308	.102	.216
	NTG	11.9±5.7	13.6±5.0				
Push-up (pcs)	CTG	26.7±4.2	26.4±3.6	.945	1.029	.358	.318
	NTG	24.1±8.4	24.2±6.3				
Crunch (pcs)	CTG	23.0±7.5	21.1±4.0	.793	.085	.438	.933
	NTG	21.0±4.3	21.0±5.4				
Rope (pcs)	CTG	63±15.8	62.4±15.7	.681	.713	.503	.484
	NTG	58.7±14.7	58.0±14.5				
Vertical jump double foot (cm)	CTG	31.0±6.6	32.5±6.1	1.311	1.624	.204	.119
	NTG	27.7±5.8	28.7±5.3				
Vertical jump right foot (cm)	CTG	16.5±3.0	19.1±3.7	.529	.995	.603	.331
	NTG	15.6±4.4	17.5±4.0				
Vertical jump left foot (cm)	CTG	16.8±3.9	19.1±3.7	1.681	1.549	.107	.136
	NTG	14.2±3.5	16.8±3.6				
5m Sprint (sec/ss)	CTG	1.4±.10	1.4±0.3	-1.096	-.396	.290	.698
	NTG	1.4±.21	1.4±0.1				
10m Sprint (sec/ss)	CTG	2.3±.15	2.1±0.1	.315	-1.306	.756	.205
	NTG	2.2±.17	2.2±0.1				
20m Sprint (sec/ss)	CTG	3.8±.20	3.6±0.2	-1.148	-1.861	.267	.077
	NTG	3.9±.38	3.9±0.3				

Note: Cm: centimeter, Sec: second, Pcs: piece, Ss: split second, CTG: Combined Training Group, NTG: Normal Training Group

Table 10. FutTech Technical test measurement findings of combined and normal training group

VARİABLE (cm)	GROUP	AO±SS (pre-test)	AO±SS (post-test)	t (Pre-test)	t (Post-test)	P (Pre-test)	P (Post-test)
Funnel slalom	CTG	29.5±1.4	29.5±1.4	-1.000	-1.000	.339	.339
	NTG	30±0.0	30±0.0				
2 Passes from foot inner	CTG	5.8±5.1	6.6±7.7	-.348	.928	.732	.365
	NTG	6.6±6.5	4.1±5.1				
Wall rust	CTG	5±0.0	5±0.0	1.000	1.483	.339	.166
	NTG	4.5±1.4	4.1±1.9				
2 Passes to target	CTG	1.6±3.8	1.6±3.8	-.920	-.484	.368	.633
	NTG	3.3±4.9	2.5±4.5				
Long pass (1 pcs)	CTG	1.6±3.8	1.6±3.8	-.920	.000	.368	1.000
	NTG	3.3±4.9	1.6±3.8				
3 Shots on goal	CTG	13.3±2.4	12.5±4.5	-348	.886	.732	.385
	NTG	12.9±3.3	10.8±4.6				
Total score futtech	CTG	57.9±8.3	57.0±11.9	-.604	.863	.552	.398
	NTG	60±8.5	53.3±9.1				
Time	CTG	3481.7±2106.4	4283.3±271.7	-2.457	-.407	.030	.688
	NTG	5009.3±450.0	4339.9±397.3				
BORG	CTG	9.6±2.4	9.5±1.5	-1.202	-1.013	.242	.322
	NTG	10.8±2.3	10.2±1.7				

Note: CTG: Combined Training Group, NTG: Normal Training Group, Pcs: piece

DISCUSSION

According to our findings; When the pre- and post-test data of the Combined Training Group and Normal Training Group were examined, a statistically significant difference was detected in the standing long jump, lat pully and FutTech time values in the pre-test biomotoric tests ($p<0.05$).In the post-test values of the Combined Training Group and Normal Training Group, a statistically significant difference was detected in the lat pully and abdominal values in biomotoric tests ($p <0.05$). We can say that the combined training carried out in children in the infrastructure contributes to the development of some motor skills, has positive effects on body composition and supports the development of football-specific technical skills.

Rinaldo (2021) found the mean height of the athletes as 152.58± 8.15 in the first measurement, and 157.42±8.92 in the second measurement, in the study carried out on 48 male football players with an average age of 12.54±0.50. Toselli et al. (2021), 61 basketball players, 62 football players and 68 athletes with a mean age of 13.0±1.1, in the study examining the Differences between Maturity, Anthropometric and Morphological Characteristics among non-athletes, reported that it was 159.0±13.5. In the study of Nıcolaidis (2011) on Anaerobic Strength in Adolescence in Football Players, the average age of the athletes was 12.67 years, and the body weight was 47.60±10.40 kg. Vänttinen et al. (2010) in the study carried out on football skills in adolescent football players, the average age of the athletes was reported as 12.04 years and body weight as 42.30±8.40 kg. Abdullah et al. (2016) In a study investigating football technical skills related to the relative performance of young football players on 184 male football players with a mean age of 15.2±2.0 years in Malaysia, the mean bust length was 86,860± 5,763 cm. as detected. Clemente et al. (2021) 486 athletes under the age of 13 (N=22) with an average age of 12.4 ± 0.4 years participated in the study, in which the relationship between anthropometry, body composition, maturation and competition selection in young football players, the bust length of athletes with an average age of 77.8 ± 3.6 cm participated Dec. it has been identified as. Gontarev et al. (2016) in the study examining the anthropometric and somatotype characteristics of young Macedonian football players, the mean wrist width measurements of 14 year old football players were 5.36±0.39 cm., the average knee width measurements were 9.98±0.64, the average elbow width was 7.42±0.69 cm. as reported.

Canhadas et al. (2010) in a study in which anthropometric characteristics and physical fitness parameters were determined in football players aged 10-13; elbow width for subjects aged 10 years; 5.8± 0.5 cm. and for the 11 age group; 5.8±0.5 cm., and the mean knee width for the 10-year-old subjects; 8.6±0.7 cm. and for the 11 age group; They found it to be 8.8±0.6 cm.. Karabulak (2013) In a study investigating the effects of combined training in male players aged 12–14, circumference was measured from shoulder, one shoulder, arm, forearm, chest normal position, chest inspiration, chest expiration, abdomen, hip, quadriceps, calf points and only circumference was measured by one single circumference. significant difference was found in shoulder values ($p<0.05$). Vithanege et al. (2008) compared skinfold thickness with different techniques and methods in children and compared the mean triceps skinfold thickness of girls; 15.7±6.3 mm., mean triceps Skin Fold Thickness of the male group; 12.3±6.6 mm., mean suprailiac skin fold thickness of girls; 19.5±9.9 mm., the mean suprailiac Skin Fold Thickness of the male group; 15.7 ± 11.4 mm., mean subscapula Skin Fold Thickness of girls; 15.4±9.4 mm., the mean skinfold thickness of the male group subscapula; 11.5±9.1 mm., mean calf skinfold thickness of female athletes; 17.9±7.9 mm., and the mean calf skinfold thickness in the male group was 15.6±8.6 mm. as they found. Gontarev et al. (2016) in the study examining the anthropometric and somatotype characteristics of young Macedonian football players, the average of the biceps Skin Fold Thickness of 14-year-old football players was 6.52±6.23 mm, the mean of the triceps Skin Fold Thickness was 9.80 ±3.35 mm, the thigh Skin Fold Thickness was 4.94±5.17 mm., the subscapular skin Mean Fold Thickness 8.77±3.19 mm, calf Skin Fold Thickness 12.23±3.56 mm, abdominal Skin Fold Thickness 9.00±4.00 mm. have been detected.

Polat (2019) examined the effect of posture analysis on physical performance in football players aged 10-12, and it was reported that no significant difference was found between the level of foot straightening and outward turning in the posture anterior analysis, and performance, and

there was a significant difference between the knee inward movement and flexibility values. In the same study, a significant difference was found between the waist pit and flexibility values in the analysis performed in the Lumbo Pelvic-Hip Complex sections, and as a result, it was reported that postural elements and performance values were directly related in football players aged 10-12.

In addition, in another study examining posture and sports injuries in football players, it was reported that asymmetry in the shoulder and back may be related to back injuries, and abduction limitations in the scapula (Grabara, 2015). The development from childhood is very important to ensure healthy and standard posture development (Łubkowska, 2014). Due to the rapid growth, development and maturation in this period, the development and changes in posture are mostly observed in school-age children (Murphy, 2004). It has been demonstrated by scientific studies that it is possible to protect spine health with posture training to be done in adolescence. It has been observed that exercise is given importance for children during adolescence in developed countries (Feng, 2018; Kamali et al., 2016; Senthil, 2017; Yoo, 2013). In another study conducted with adolescents, it was reported that after 6 weeks of stretching and resistance exercises, the muscles in the head and thoracic region were strengthened, resulting in a reduction in head anterior tilt and protraction in the shoulder part (Ruivo et al., 2017). Some studies have been carried out in the literature on sports and health in individuals at different ages in fixed posture and mobile positions (Jackson et al., 2019; Mahdavie et al., 2017;Kılınç, 2021). One of the main purposes of postural analysis has been reported in studies emphasizing the importance of identifying postural disorders in individuals, providing physical follow-up, and treating postural disorders, starting from a young age. (Kılınç et al., 2009; Rosenblum et al., 2020; Protic-Gava et al., 2019; Lauenroth et al., 2021). In the study investigating the effects of combined training on performance in male football players aged 12–14 years, in the comparison of the first and final measurements of the combined training group, the initial pre-measurement averages of Heart Rate were determined as 102.4±16.9 beats/min, the Heart Rates of initial and final measurement averages of 102.46±13 beats/min. Beat Count at the end of the test pre-measurement averages 185.8±7.4 beats/min. Heart Rates at the end of the test mean measurements at 165.6±30.9 beats/min. as detected.

In the convectional (normal) training group, the initial pre-measurement mean of the Heart Rate was 106.8±11.9 beats/min, the mean of the initial (post-measurement) Heart Rate was 107.4±12.7 beats/min, and the mean of the pre-measurement of the Heart Rate at the end of the test was 180.6±21.9 beats/min., Heart Rate found the mean of the last measurement at the end of the test as 169.4±32.3 beats/min. They determined the pre-measurement mean of the normal training group as 14.9±0.5 beats/min and the final measurement averages as 7.6±0.5 beats/min (Karabulak, 2013). Işıldak (2013) A study conducted in male and female athletes aged 12-15 aimed to Decipher the effects of swimming training on heart function, and when resting heart rate was examined, it was reported that there was a statistically significant decrease in the number of initial heart rate, warming-up heart rate, maximal heart rate, post-training heart rate. When combined training programs are included in the training plan and scheduling more broadly; We think that it will be more effective in terms of providing versatile development in terms of physiological, biomotoric, technical and postural aspects. In a study carried out on Australian male individuals whose mean age was determined as 12.8 years during adolescence, he reported systolic blood pressure value as 113.3±10.9 mmHg and diastolic blood pressure value as 64.4± 8.6 mmHg (Gopinath et al., 2012:352).

In a study conducted on male individuals aged 12-18 years, he reported resting heart rate as 90.6 beats/min, systolic blood pressure as 116.6 mmHg, and diastolic blood pressure as 67.8 mmHg (Kwok et al., 2013). Waterhouse (2005) states that body temperature is one of the basic variables of body rhythm and many performance indicators follow body temperature values. Franchi et al. (2014) found in their study that after 10 weeks of training, an eccentric 44% 1RM increase and a concentric 36% 1RM increase occurred. However, in their studies on leg press, 5-8% muscle increase in the eccentric group in the distal part and 7-11% muscle increase in the medial region in the concentric group were reported. A similar increase occurred in the groups in the proximal part.Narici et al. (1996) reported

an increase in muscle volume of 8.5% after 6 months of strength training performed in leg extension. It is reported that the strength development that occurs with strength training occurs due to the increase in muscle hypertrophy and nerve activation (Mc Ardle et al., 2010). Negra et al. (2020), in a study investigating the effects of resistance training and plyometric training in young football players with a mean age of 12.8±0.2 years, the standing long jump pretest mean resistance training group was 1.66 ±0.19 meters, the plyometric training group was 1.61±0.23 meters, the control group was 1.58±0.13 meters., At the end of the 8th week, the measurements were determined as 1.78±0.19 meters in the resistance training group, 1.76±0.21 meters in the plyometric training group, and 1.57±0.08 meters in the control group.

Jukic et al. (2019), in his study to examine the motor skill levels of U10 category football players, the standing long jump average of the 1st team football players was 151.33 ± 10.55 cm. the average of the standing long jump of the 2nd team football players was 150.70 ± 11.71 cm. as detected In the research conducted on swimmers aged 11-13, it was reported that a statistically significant performance increase occurred in the push-up values of the swimmers at the end of the training (Selçuk, 2013). In the study conducted on 24 young football players with a mean age of 11.3±0.70 years, the mean of jumping rope in the right foot, pre-training experimental group was determined as 140.50 ±16.28, the mean of the control group was determined as 133.10 ± 12.99, the mean of jumping rope in the experimental group before the training was 139.08 ± 18.62, and the mean of the control group was 133.75 ± 11.94. After the training, the mean skipping rope of the right foot experimental group was determined as 144.44 ±17.36, and the average of the control group was 134.21 ±11.65, and the average of the left foot experimental group after the training was reported as 143.00 ±17.83, and the average of the control group was 134.67 ±12.15. Short-term jump rope training in 24 pre-adolescent young football players during an eight-week warm-up of 15 minutes. They examined the effects of jump rope training on balance performance and general motor coordination and revealed that jumping rope training caused a significant increase in balance performance and motor development of pre-adolescent children, as well as football-specific skills (Trecroci et al., 2015). They reported that there was a statistically significant difference in vertical jump data in child athletes aged 12-14 who were given movement training (Hoffman, 2006).

The vertical jump average of the 10-year-old subjects participating in the research they carried out on young football players aged 10-13; 36.1±5.9 cm., mean vertical jump of 11 year old subjects; 35.2±4.9 cm., vertical jump average of 12 year old subjects 40.1±6.2 cm, vertical jump average of 13 year old subjects 42.9±7.8 cm. (Canhadas et al., 2010). In a study investigating the effects of in-season plyometric training on young football players whose mean age was determined as 13.3±0.6 years, an increase of 2.11% and 3.72% was detected in the 5 meter and 10 meter durations, respectively, in the training applied to 14 male athletes for 8 weeks (Meylan and Malatesta, 2009). It has been reported that there are significant differences in the 20-30-40 meter sprint data at the end of the training performed 3 times a week in children aged 10-12 (Diallo et al., 2001). In addition, the FutTech test program, which we use to determine the technical skills of football players, has always been seen to be used practically in training, and it has been thought that it can be used in multi-dimensional development studies for trainers working in the infrastructure.

In the study examining the effect of combined training on football players aged 12-14, when the FutTech final measurement data were examined, the Heart Rate was at the beginning; Combined Training Group mean 102.4±13 beats/min, Normal Training Group average 107.4±12.7 beats/min, Heart Rate at the end of the test; Combined Training Group mean 165.6±30.9 beats/min, Normal Training Group average 169.4±32.3 beats/min, systolic blood pressure initial measurement; Combined Training Group mean 111.3±15.9 mmHg, Normal Training Group mean 114±11.2 mmHg, systolic blood pressure test end; Combined Training Group mean 124±18.4 mmHg, Normal Training Group average 124.6±18.8 mmHg, diastolic initial; Combined Training Group mean 74.6±8.3 mmHg, Normal Training Group mean 76±11.8 mmHg, end of diastolic blood pressure test; Combined Training Group mean 79±5.4 mmHg, Normal Training Group average 78.6±6.3 mmHg, body temperature at baseline; 36.5±0.3°C, Normal Training Group mean 36.1±0.7°C, body temperature test end;

Combined Training Group average 36.4±0.3°C, Normal Training Group average 36±0.6°C, ambient temperature; Combined Training Group average 7.7±0.4°C, Normal Training Group average 7.6±0.5°C, FutTech; Combined Training Group average is 38.5±2.3, Normal Training Group average is 43.6±3.5, test values; The average of the Combined Training Group was 48.4±10.6, and the average of the Normal Training Group was 31.6±9.2. When the football technique (FutTech) test data applied to the combined and convectional training athletes were examined, a statistically significant difference was reported only in the baseline FutTech and body temperature data ($p<0.05$), it was reported that no statistically significant difference was observed in the other test results. ($P>0.05$) (Karabulak, 2013).

It is necessary to emphasize the importance of school-family-club cooperation in order for young children to carry out their football training in a healthier way. Therefore, it can be suggested that combined training should be given more space in training planning in order to use the time allocated to football training more effectively and to provide versatile development. In terms of its wide content and application, if combined trainings are planned and carried out in accordance with the developmental characteristics of children and young people; It will enable children to develop their physical, physiological, biomotoric, technical and skill features in a more scientific way. In order to provide multi-faceted development to children and young people, detailed information about the importance of combined training can be provided, and gains can be achieved more effectively. In the study investigating the effect of basic technical training on motoric and technical ability development in football players aged 10-13 years, they reported that there was a significant difference between the pre-test and post-test in the data of bouncing, passing, dribbling, shooting and wall pass ($p<0.05$) (Kurban and Yalçınkaya, 2017).

Conflict of interest

Conflict of interest No conflict of interest is declared by the authors. In addition, no financial support was received.

Ethics Statement

For this study, the permission of the Faculty Ethics Committee was obtained from the Clinical Research Ethics Committee of Akdeniz University Faculty of Medicine. (Approvel Nummer: 2012-KAEK-20, Decision No:105. Date:10.02.2021 .

Author Contributions

Study Design, SD; Data Collection, AY; Statistical Analysis, SD; Data Interpretation, AY; Manuscript Preparation, SD, AY; Literature Search, SD, AY. The published version of the manuscript has been read and approved by all authors.

Statement of contributorship

All authors contributed to the development of the study methodology, data collection and analysis. All authors participated in writing, reviewing and editing the manuscript, and approved the final version.

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RESEARCH ARTICLE

The Effect of Personality Factors on Social Appearance Anxiety and Life Satisfaction

İsa ÇİFTÇİ[1*] and Veli Ozan ÇAKIR[2]

[1]Bingol University, Sports Science Faculty, Department of Physical Education and Sports, Bingol / Türkiye
[2]Gazi, University, Sports Science Faculty, Department of Recreation, Ankara / Türkiye
*Corresponding author: ciftciisa23@gmail.com

Abstract
The purpose of this research is to investigate the association between social appearance anxiety levels and the influence of different personality traits on life happiness. The study's sample consists of 488 university students registered in the Faculty of Sports Sciences at Bingol University, 221 (45.3%) of whom are female and 267 (54.7%) of whom are male. The Five Factor Personality Scale, Social Appearance Anxiety Scale, and Life Satisfaction Scale were used to gather data. The data was rigorously analyzed using the SPSS 26 program, as well as numerous statistical approaches and data analysis tools. The research findings indicate that the sub-dimensions of extraversion (β = -.111), agreeableness (β = -.159), self-control (β = .114), neuroticism (β = -.098), and openness to experience (β = -.324) appear to predict social appearance anxiety. Furthermore, the sub-dimensions of personality characteristics, extraversion (β = .149) and neuroticism (β = -.129), predict life satisfaction considerably. As a consequence, these findings show that personality characteristics have a major impact on people's social appearance, anxiety levels, and life happiness. Notably, subpersonality traits like extraversion and neuroticism play a decisive role in these effects.

Keywords
Personality, Personality Traits, Social Appearance, Life Satisfaction

INTRODUCTION

Personality is a holistic structure that combines the fundamental characteristics determining people's thoughts, feelings, and behaviors. These features remain stable throughout an individual's life (Matthews et al. 2009). Within the realm of sports science, the role of personality factors in individual sports participation and performance, as well as their impact on overall health, has been meticulously studied. However, in recent years, there has been an increase in research evaluating the social and psychological dimensions of personality traits. In this context, the social appearance anxiety and general life satisfaction that individuals experience while participating in sports are viewed as central elements of sports psychology and the psychological well-being of individuals. Anxiety concerning one's outward appearance is termed 'social appearance anxiety. It can be characterized by individuals' negative evaluations of their own physical appearance and their comparisons of these evaluations with societal standards (Hart et al. 2008). The impact of such anxieties can become more pronounced, especially among individuals engaged in sports and exercise activities. The growing tendency towards physical idealization, influenced by social media, can heighten social appearance anxiety by impacting how individuals perceive themselves. The importance of this work becomes evident in several ways. First, because sports science students often encounter high levels of social action and competition, social appearance anxiety and life

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[1]**ORCID:** 0000-0002-7056-3146 , [1]**ORCID:** 0000-0001-7996-2138

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satisfaction are important factors for their psychological health and academic success (Schwebel and Smith, 1991; Petrie and Greenleaf, 2012; Diener and Ryan, 2009). Second, as a recognized factor, personality features may have a significant impact on these two essential areas: social appearance and life happiness. The purpose of this research is to determine the entire scope and dynamics of this impact (McCrae and Costa, 1999; Caspi et al., 2005). Third, the findings of the research may be used to improve sports science teaching methodologies and practices. Greater knowledge of the influence of personality variables on social appearance anxiety and life satisfaction might assist educators in dealing with students' issues, boost their life contentment, and teach them healthy social interaction skills. Finally, this research may help to expand our understanding of the links between personality, social appearance anxiety, and life happiness in the area of sports sciences in general. This might serve as a useful starting point for future research and existing uses.

The purpose of this research, as seen through the lens of sports sciences, is to explore the relationship that exists between the degrees of social appearance anxiety that people feel and the levels of life satisfaction that are connected with particular personality types. The effects of personality factors on social appearance anxiety and how these effects relate to life satisfaction will be researched in this context. These personality traits include self-control, openness to experience, extroversion, neuroticism, and agreeableness. The research aims to help us understand how different personality types can shape social anxiety levels and, accordingly, the impact of individuals on life satisfaction.

MATERIALS AND METHODS

The investigation was conducted utilizing the relational screening approach. The relational screening model aims to determine whether there is a relationship between two or more variables and, if there is a relationship, the direction and level of this relationship (Büyüköztürk et al. 2018).

Study Design

Study Design

In order to calculate the number of participants in the study, power analysis was performed with the G*Power 3.1 program. In the correlation coefficient, .10 indicates low, .30 indicates medium, and.50 indicates large effect size (Cohen, 1998). In this direction, with an effect size of.20, 99% power, and.05 margin of error (two-tailed), Correlation: In the bivariate normal model, G*Power recommends including at least 450 participants in the study. In this research, we employed the convenience sampling technique. Through this method, the researcher selects the most readily available respondents to form the desired sample size, or they choose a sample that is easily accessible and offers the greatest efficiency. (Cohen et al. 2005). In this context, data for the study were gathered from 488 university students at Bingöl Universities, 221 (45.3%) of whom were female and 267 (54.7%) of whom were male. The participants' ages ranged from 16 to 42 years (Mort = 22.97, SD = 2.74). In addition, 29.9% of the participants are trained in teaching, 27.9% in coaching, 39.5% in management, and 2.7% in recreation.

The research adhered to the standards of the Declaration of Helsinki, and all methodologies involving human participants were sanctioned by the Scientific Research and Publication Ethics Committee of Bingol University Health Sciences, with reference number 23/18.

Data Collection Tools

Five-Factor Personality Scale

The five-factor personality scale developed by Rammstedt and John (2007) was used in the study. Horzum Ayas and Padır (2017) carried out the adaptation of the scale to Turkish culture. Following the completion of the analysis, a structure that included 10 items and 5 factors was obtained. This structure was able to account for 88.4% of the total variance and had 100% congruence with the items that were present in the initial form. It was defined as “Extraversion”, “Mildness”, “Self-control”, “Neuroticism” and “Openness to Experience”. The fit indices and minimum chi-square value ($\chi 2$=46.139, N = 25, p=0.00) of the model obtained by confirmatory factor analysis were found to be significant. RMSEA =.062, GFI =.96, AGFI =.91, CFI =.98, NFI =.97, and SRMR =.035. considering the criteria of the fit indices, perfect fit was obtained for the GFI, AGFI, CFI, NFI, and SRMR indices. These fit indices reveal that the Turkish version of the Five Factor Personality Scale has acceptable values. In this study, the reliability coefficients of the sub-dimensions "Extraversion", "Amiability", "Self-control", "Neuroticism" and "Openness to

Experience" were calculated as 0.79, 0.80, 0.81, 0.80, and 0.79, respectively.

Social Appearance Anxiety Scale

Hart et al. (2008) Social appearance anxiety scale, which was subsequently adapted into anxiety is high. According to the analyze is results, item factor loadings range from .34 to.78. A single dimension explains 42.72% of the variance. The scale was found to have a test-retest correlation of.80. The total correlations of the items ranged from .29 to .72. Goodness values according to confirmatory factor analysis AGFI: 0.90, GFI: 0.93, NFI:0.93, RFI:0.91, CFI: 0.95, RMR: 0.038, IFI: 0.95, RMSEA: 0.066. These fit indices reveal that the scale has acceptable values. In this study, the Cronbach alpha reliability coefficient of the scale was calculated at 0.94.

Life Satisfaction Scale

The "Satisfaction with Life Scale" developed by Diener et al. (1985) underwent a validity and reliability investigation in Turkey, which was carried out by Köker (1991). The scale has five items on a seven-point Likert scale, ranging from 1 (not at all) to 7 (very acceptable). In studies conducted in Turkey, it has been reported that the internal consistency coefficient of the scale varies between .75 and .79. A high total score indicates that the participant's level of life satisfaction is also high. In this study, the Cronbach alpha reliability coefficient of the scale was calculated at 0.80

Procedure

Data for this study were gathered from students at Bingöl University's faculty of sports sciences. The research data were gathered with the Turkish by Doğan (2010), was employed in this study. The scale has a one-dimensional structure consisting of 16 items and is of the 5-point Likert type. Only Item 1 is scored in reverse. High scores obtained from the scale indicate that appearance approval of the Ethics Committee of Bingöl University. The participants were provided with information regarding the methods used for data collection in the research study, and thereafter, the scales were administered online through the use of Google Forms for a duration of 5 to 10 minutes. The data was collected by asking volunteer students to confirm their approval by checking the checkbox at the beginning of the form.

Statistical Analysis

Pearson correlation coefficients and regression analyses were employed to examine the data acquired in this research. The Pearson correlation coefficient was employed to quantify and assess the strength of the association between variables. Regression analysis is used to predict the influence of one or more independent variables on a dependent variable. These analyses were applied to reveal the main findings of the study and the relationships between variables in more detail.

RESULTS

The Pearson correlation coefficient was used in the study to analyze the connections between social anxiety, life satisfaction, and the five component personality characteristics. "Table 1" displays the correlation analysis findings.

Table 1. Results of the pearson correlation analysis

Variables	1	2	3	4	5	6	7
1.Extraversion	1						
2. Mildness	.159**	1					
3. Self-control	.295**	.357**	1				
4.Neuroticism	-.131**	-.146**	-0.96*	1			
5. Openness to Experience	.225**	.163**	.279**	-.116*	1		
6. Social Appearance Anxiety Scale	-.246**	-.431**	-.346**	.203**	-.234**	1	
7. Life Satisfaction Scale	.197**	-.030	.147**	-.160**	.099*	-.044	1
$\bar{x}$	7.16	7.69	7.55	5.81	6.87	35.47	18.81
SD	1.76	1.76	1.76	1.68	1.64	14.08	6.57

***p<0.01, *p<0.05*

When Table 1 is examined, it is seen that there are negative and significant relationships between social appearance anxiety and extraversion, agreeableness, self-control, and openness to experience. It is also seen that there is a positive and significant relationship between

social appearance anxiety and neuroticism. In addition, there are positive and significant relationships between life satisfaction and extraversion, self-control, and openness to experience. Additionally, a negative and strong

The findings of the regression analysis used to ascertain the five-factor personality characteristic sub-dimension's ability to predict life happiness and social anxiety are displayed in Table

link between neuroticism is seen. There is no significant relationship between life satisfaction and agreeableness. There is no significant relationship between social appearance anxiety and life satisfaction.

3. The data were analyzed in terms of regression assumptions prior to the regression analysis, and the findings are shown in Tables 2, Table 3, and Figures 1 and 2.

Table 2. Assumption 1 for descriptive statistics and regression

Variables	*N*	Min.	Max.	Skew.	Kurt.	VIF	CI
Extraversion	488	2	10	-.217	-.285	1.137	7.860
Mildness	488	2	10	-.497	-.300	1.169	11.179
Self-control	488	2	10	-.465	-.165	1.278	11.607
Neuroticism	488	2	10	.044	-.137	1.040	13.537
Openness to Experience	488	2	10	-.067	-.042	1.122	21.467
Social Appearance Anxiety Scale	488	16	80	.616	-.249		1.000

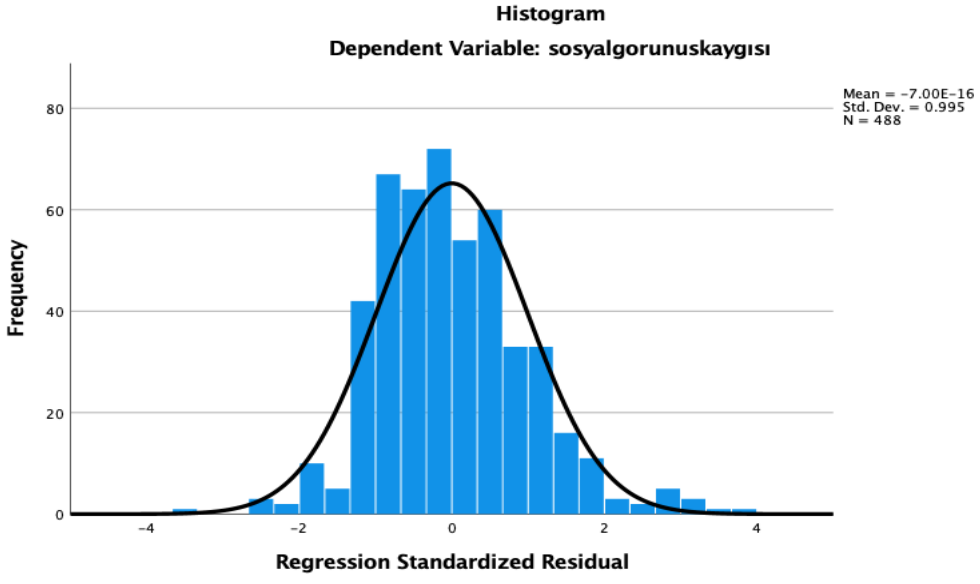

Figure 1. Normal distribution curve of social appearance anxiety

Table 3. Assumption 2 descriptive statistics and regression

Variables	*N*	Min.	Max.	Skew.	Kurt.	VIF	CI
Extraversion	488	2	10	-.217	-.285	1.132	7.304
Mildness	488	2	10	-.465	-.165	1.158	10.580
Self-control	488	2	10	.044	-.137	1.027	11.486
Neuroticism	488	2	10	-.067	-.042	1.118	18.261
Life Satisfaction Scale	488	5	35	.118	-.344		1.000

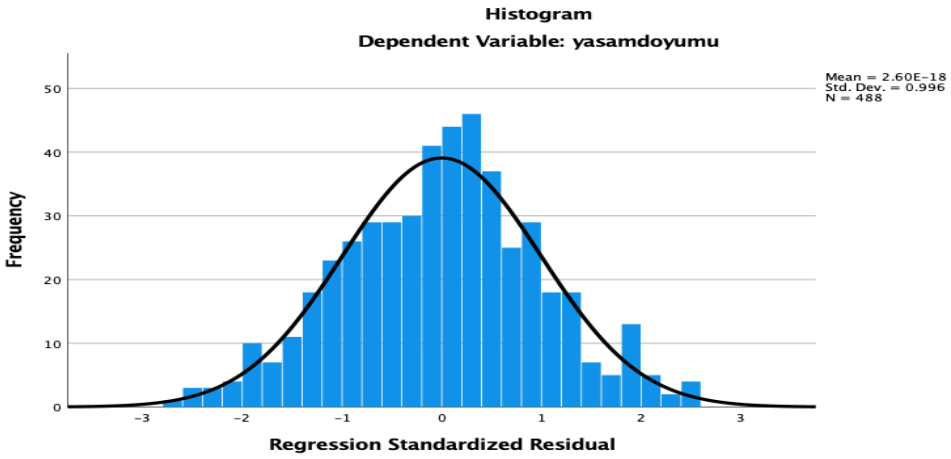

Figure 2. The normal distribution curve of life satisfaction

Table 4 shows the regression results for social appearance anxiety, which is one of the dependent variables of the study. From the results in Table 4, extraversion sub-dimension (β = -.111), agreeableness sub-dimension (β= -.159), self-control sub-dimension (β= .114), neuroticism sub-dimension (β=-.098) and openness to experience sub-dimension (β= -.324) seem to predict social appearance anxiety. When these results were examined, it was determined that the openness to experience sub-dimension (β= -.324) predicted social appearance anxiety at the highest level. In addition, 26% of the change in social appearance anxiety score can be explained by five factor personality traits (R =.518, R2 =.268, p<0.05).

Table 4. Regression analysis results of social appearance anxiety

Model	Non-standardized Coefficients		Standardized Coefficients	**t**	***p***
	B	**S.E.**	**β**		
Constant	71.492	4.427		16.149	<.001
Extraversion	-.886	.332	-.111	-2.671	<.05
Mildness	-1.274	.352	-.159	-3.619	<.001
Self-control	.956	.332	.114	2.879	<.05
Neuroticism	-.840	.354	-.098	-2.374	<.05
Openness to Experience	-2.581	.336	-.324	-7.678	<.001

Dependent variable: social appearance anxiety

Table 5 shows the regression results for life satisfaction, which is another dependent variable of the study. From the results in Table 5, it is seen that the extraversion sub-dimension (β = .149) and the neuroticism sub-dimension (β=-.129) significantly predict life satisfaction. However, it was observed that the sub-dimensions of self-control and openness to experience did not significantly predict life satisfaction (p>.001). In addition, 6% of the change in life satisfaction score can be explained by extraversion and neuroticism sub-dimensions (R =.255, R2 =.065, p<0.05).

Table 5. Regression analysis results for life satisfaction

Model	Non-standardized Coefficients		Standardized Coefficients	**t**	***p***
	B	**S.E.**	**β**		
Constant	14.670	2.141		6.851	<.001
Extraversion	.556	.175	.149	3.187	<.050
Self-control	.310	.177	.083	1.755	>*.001*
Neuroticism	-.504	.174	-.129	-2.900	<.050
Openness to Experience	.108	.186	.027	.580	>*.001*

Dependent variable: life satisfaction

DISCUSSION

There are negative and significant relationships between social appearance anxiety and extraversion, agreeableness, self-control, and openness to experience. It is also seen that there is a positive and significant relationship between social appearance anxiety and neuroticism. According to the studies in the literature, in their study on university students, they found a positive relationship between social appearance anxiety and personality traits of individuals, including extraversion, neuroticism, and agreeableness. No significant relationship was found between social appearance anxiety and openness to responsibility and experience (Öztürk et al. 2015). In research carried out with high school students, a positive correlation was found between social appearance anxiety and traits such as extraversion, agreeableness, self-discipline, and openness to new experiences. Furthermore, a notable, moderately negative correlation was identified between social appearance anxiety and neuroticism (Fidan, 2021). According to the results of the study named "The relationship between personality traits of adolescents and their levels of resilience", there was a positive, low-level, and significant relationship between personality traits of extraversion, responsibility, and compatibility, while a positive, moderate, and significant relationship was observed with openness to development. In addition, a low-level and significant negative correlation was found between personality traits such as extraversion, emotional inconsistency, and negative valence (Uçar, 2020).The reasons for the differences in results may include the application of different studies in various demographic groups, the differences in the measurement tools used, and the effect of cultural norms and expectations on personality traits and social appearance anxiety.

There are positive and significant relationships between life satisfaction and extraversion, self-control, and openness to experience. It is also seen that there is a negative and significant relationship between neuroticism. There is no significant relationship between life satisfaction and agreeableness. There are a number of studies in the literature that give parallel results to our study. In a study conducted on university students, they found a negative relationship between life satisfaction and emotional instability; they found a positive relationship with agreeableness, extroversion, and conscientiousness. However, no relationship was found between openness to experience and life satisfaction (Bulut and Yıldız, 2020). In a meta-analysis of a study examining the relationship between personality and life satisfaction from different nationalities, there was a negative relationship between life satisfaction and emotional instability. It was concluded that there is a positive relationship with extraversion, agreeableness, and responsibility. However, no significant relationship was found between life satisfaction and openness to experience (Steel et al. 2008). In a study called Five Factor Personality Traits and Life Satisfaction, it was found that there was a positive relationship between life satisfaction and extraversion, openness to experience, and responsibility, and a negative relationship with emotional instability. However, no significant relationship was found between life satisfaction and compatibility (Köksal, 2015). In the research involving university students, a positive correlation was observed between life satisfaction, accountability, and extraversion, while a negative correlation was noted with emotional instability. However, they could not detect a significant relationship between life satisfaction, openness to experience, and adaptability (Toker and Kalıpçı, 2017). In the study examining the relationship between personality traits and life satisfaction, neuroticism has a low negative relationship with life satisfaction, while extraversion, agreeableness, and responsibility factors have a low level of positive correlation with life satisfaction (Ercan, 2019). Life satisfaction was shown to be positively correlated with extraversion and negatively correlated with neuroticism in teenagers when using descriptive statistics and regression assumptions (Huebner, 1991a); They found a positive relationship between life satisfaction and extraversion (McKnight et al. 2002). They discovered that life happiness was inversely related to neuroticism, and that it was positively related to extraversion, openness to experience, agreeableness, and responsibility. In addition, they observed that life satisfaction was positively related to responsibility (Weber and Huebner 2015). In a study conducted on a sample of university students' life satisfaction, it was found that there is a positive relationship with personality traits such as extraversion, agreeableness,

responsibility, and openness and a negative relationship with the neuroticism personality trait (Aytekin and Akbay 2020). In the doctoral thesis study conducted on physical education and sports teachers, a weak positive relationship was found between life satisfaction, openness to experience, and extraversion personality traits, but no significant relationship was found with other personality traits (Acar, 2022). In another study, there was a positive relationship between life satisfaction and extraversion, openness to experiences, and responsibility. A negative relationship was found between emotional instability (neuroticism) and life satisfaction. However, no significant relationship was found between life satisfaction and compatibility (Ada, 2021).

There is no significant relationship between social appearance anxiety and life satisfaction. In the literature, there are also findings contrary to the results of our research. Research based on adolescent data showed a moderate negative correlation between social appearance anxiety and life satisfaction (Erçevik, 2021). In the study conducted on elite-level athletes and physically disabled individuals who do not do sports, it was determined that there is a moderately negative relationship between social appearance anxiety and life satisfaction (Atasoy, 2020). They found a negative relationship between life satisfaction and social appearance anxiety in individuals doing fitness (Hazar and Özpolat, 2023). They found a moderately negative correlation between social anxiety and life satisfaction. They also stated that the variance in life satisfaction due to social anxiety was the only explanatory variable (Castella et al. 2014). In another study, it was determined that there is a negative and significant relationship between social appearance anxiety and life satisfaction in adults (Ürün and Öztürk, 2020). Various research methods, measurement tools, sample groups, and interactions of other variables can be found among the reasons for the differences in these research results.

The regression results of social appearance anxiety, one of the dependent variables of the study, show that extraversion, agreeableness, self-control, neuroticism, and openness to experience predict social appearance anxiety. There are a number of studies in the literature that give parallel results to our study. According to the research conducted on university students, the subscales of the five-factor personality traits scale positively predicted social appearance anxiety (Öztürk et al. 2015). In another similar study, emotional instability or nuroticism, extraversion, openness to experience, amenability, and responsibility were determined to be among the factors affecting social appearance anxiety in university students. In particular, it was determined that the personality traits of emotional imbalance, nuroticism, and extraversion have a significant effect on social appearance anxiety (Klavuzoğlu, 2018).

The regression results of life satisfaction, which is another dependent variable of the study, showed that the extraversion sub-dimension and the neuroticism sub-dimension significantly predicted life satisfaction. However, it was observed that the sub-dimensions of self-control and openness to experience did not significantly predict life satisfaction. There are a number of studies in the literature that give parallel results to our study. States that adolescents' personality traits predict their level of life satisfaction (Ercan, 2019). According to another similar study, the neuroticism and extraversion dimensions of personality traits are determinative of life satisfaction (Diener and Lucas, 1999; Heidemeier and Göritz, 2016; Schimmack et al. 2002). According to the results of the study, it was found that personality traits such as neuroticism, extraversion, agreeableness, and responsibility have a significant effect on life satisfaction (Weber and Huebner, 2015; Suldo et al. 2015). In the study titled Investigation of Social Media Usage Motivations in Terms of Personality Traits and Life Satisfaction, it was determined that personality traits of adaptability, neuroticism, and openness to experience have a significant effect on the life satisfaction of social media users (Karaca, 2021). The personality qualities of extraversion and neuroticism were shown to have a substantial influence on life satisfaction in a study of university students. According to the same research, agreeableness, responsibility, and openness were not significant predictors of life satisfaction (Aytekin and Akbay, 2020). It was discovered in PhD research of physical education and sports instructors that emotional balance was a personality feature that substantially predicted life happiness. However, openness to new experiences, agreeableness, responsibility, and extrovert personality qualities were shown to have no

significant predictive influence on life satisfaction (Acar, 2022).

In conclusion, this research investigated the intricate links between personality factors, social appearance anxiety, and life happiness. The results show strong correlations between personality qualities and social appearance anxiety, as well as significant relationships between life happiness and personality traits. These findings add to our knowledge of the role of personality traits in psychological well-being and social appearance anxiety. However, further study is required to investigate these correlations in greater detail and in diverse circumstances.

Conflict of interest

All authors declare no conflict of interest.

Ethics Committee

The Bingol University Health Sciences Scientific Research and Publication Ethics Committee has approved this research under reference number 23/18.

Author Contributions

The authors were responsible for the study's design, data collection, statistical analysis, data interpretation, article writing, and the literature review. They have reviewed and authorized the final version of the published manuscript.

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RESEARCH ARTICLE

Comparative Analysis of the Effects of Sport and Music on the Respiratory System

Coşkun YILMAZ[1*] and Serhat ERAİL[2]

[1]Gümüşhane Universitesi Kelkit Aydın Doğan MYO, Gümüşhane / Turkey
[2]Ondokuz Mayis University, Yasar Dogu Sports Science Faculty, Samsun / Turkey
*Corresponding author: coskun.yilmaz@gumushane.edu.tr

Abstract
It is known that the respiratory system develops in response to exercise. However, it is not clear whether sport or music has a greater effect. The aim of this study was to investigate whether different types of sport and music have a greater effect on the development of the respiratory system. Individuals who continued their active sports and music life, who exercised regularly at least 3 days a week and whose FEV_1/FVC ratio was above 75% were included in the study, while individuals with a history of lung disease, upper respiratory disease and less than 6 years of experience were excluded from the study. MGC Diagnostics brand spirometry was used to measure forced expiratory volume in one second (FEV_1), FEV_1/FVC, forced vital capacity (FVC), slow vital capacity (SVC), inspiratory capacity and maximal volumetric capacity, maximal inspiratory pressure (MIP), maximal expiratory pressure (MEP) and MicroRPM (Kent, UK) electronic respiratory pressure device. In our study, basketball players had higher respiratory muscle strength than opera singers ($p<0.05$). Differences were found in pulmonary function tests for forced vital capacity, forced expiratory volume in one second, slow vital capacity and maximal voluntary volume ($p<0.05$). It was observed that athletes had higher values in pulmonary function tests (FVC, FEV_1, SVC, MVV) and maximal inspiratory MIP and MEP parameters than musicians ($p<0.05$). Therefore, exercise has a greater effect on the respiratory system than music.

Keywords
Respiratory system, sports, music

INTRODUCTION

Adaptation of the respiratory, circulatory and musculoskeletal systems to increased loads is critical to the cardiovascular health and exercise capacity of athletes (Wilson et al., 2016). Cardiovascular conditioning focuses on maximising perfusion capacity to prevent lactic acid accumulation, which leads to a decline in performance (Plentz et al., 2012). Most importantly, however, is the training and development of the respiratory muscles (McConnell, 2009).

Physiological variables are related to the general physical condition of the individual and include complementary aspects such as age, gender, general health, genetic predisposition and natural muscle fibre type (Mazic et al., 2015). Performance variables are specific to the type of training and include the duration and intensity of the target exercise (Bostancı et al., 2019). These individual differences between athletes are framed within established training paradigms in which strength, endurance or mixed training programmes are developed. Occupationally, there are large differences between individuals, even in professions such as singers and wind instrumentalists (Johnson and Sandage, 2019).

Compared to the general population, athletes develop different physiological adaptations in the respiratory system depending on the sport performed. A significant change in respiratory

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[1]**ORCID:** 0000-0002-2826-1566 , [1]**ORCID:** 0000-0001-5413-2656

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function occurs in respiratory volume and frequency with training (Bostancı et al., 2019; Kocahan et al., 2017).

The main instruments of singers and wind players are the upper and lower airways. The respiratory system, which is the main part of sound production for singers and wind players, also affects the quality and performance of the voice (Leanderson and Sundberg, 1988; Antoniadou et al., 2012). Singers and wind instrumentalists, known as vocal athletes, need to control lung volume and adjust sound pressure levels appropriately to achieve superior performance (Ray et al., 2018). Breathing manoeuvers performed by singers and wind instrumentalists to produce sound provide strength and improve their function by forcing the respiratory muscles (Ray et al., 2018; Yılmaz et al., 2022). Professional musicians need to practice regularly and have stronger respiratory function to achieve superior performance (Antoniadou et al., 2012; Dries et al., 2017; Ray et al., 2018; Yılmaz et al., 2022). To produce a sound, it is necessary to regulate airway pressure (subglottal pressure), laryngeal resistance and airflow. This concept, known as breath control or breath support, is considered one of the requirements for excellent singing (Ray et al., 2018; Yılmaz et al., 2022).

The respiratory muscles allow for changes in ventilation, exercise-related breathing patterns, and changes in pressure and airflow required for speaking and singing (Leanderson and Sundberg, 1988; Antoniadou et al., 2012; Dries et al., 2017; Ray et al., 2018; Yılmaz et al., 2022). Singing requires more lung volume than speaking (60%). It has long been known that the control of lung volume has a direct effect on Ps, which regulates the sound pressure level (SPL) and thus the loudness of phonation (Leanderson and Sundberg, 1988; Ray et al., 2018).

The concept that the respiratory system develops better in athletes because of the training programmes they follow, and in singers and wind players because of the efforts they make to produce sound, is not fully explained in the literature. However, the functional status of the respiratory system can be compared between the two branches using traditional measurements of lung volume and capacity. The aim of this study was to examine whether regular exercise or music has a greater effect on the development of the respiratory system.

MATERIALS AND METHODS

Study Design

A total of 100 subjects were enrolled in the study, who continued to be active in sports and music, who continued to train regularly at least 3 days a week (1 training session: 90 - 120 minutes) specific to their branch, and whose FEV_1/FVC ratio was above 75%. The study groups consisted of singers, brass instrument players, football players, basketball players and martial artists living in Samsun. Subjects with a history of lung disease, upper respiratory tract disease, and less than 6 years of experience were excluded from the study.

This study was conducted in accordance with the Declaration of Helsinki. Written informed consent was obtained from each study participant in accordance with the ethical standards of the Declaration of Helsinki. The study was approved by the Ethics Committee of Gümüşhane University.(2022/02;E-95674917-108.99-137506).

Data collection

Anthropometric characteristics

Participants' body weights were measured using SECA (Hamburg, Germany) brand scales (accuracy + 0.1 kg). Height was measured using a wall-mounted stadiometer (Holtain Ltd, UK) to the nearest 0.1 cm between the top of the head and the standing position. Each subject was measured in shorts and a T-shirt and barefoot.

Pulmonary function tests (PFTs)

Participants were informed about the measurements before the test. Pre-tests were performed to familiarise them. Forced expiratory volume in one second, FEV_1/FVC, forced vital capacity, slow vital capacity, inspiratory capacity and maximal volume capacity were measured using an MGC Diagnostics spirometer (ATS/ERS, 2002).

Measurement of respiratory muscle strength (maximal inspiratory pressure (MIP) and maximal expiratory pressure (MEP)) (RMS)

Respiratory muscle strength (MIP and MEP) were measured using a MicroRPM electronic respiratory pressuriser (CFMM, UK). The measurement was repeated until there was a difference of 10 $cmH2_O$ between the two best measurements and the best result was recorded in $cmH2_O$ (ATS/ERS, 2002).

Data analysis

Statistical analyses were performed using SPSS version 21.0 (SPSS Inc., Chicago, IL). The Kolmogorov-Smirnov test was used to assess normality. One-way ANOVA and independent samples t-test analyses were performed to determine differences in respiratory parameter measurements for normally distributed data groups.

RESULTS

Table 1. Demographic characteristics

	Football (n:20)	M.A (n:20)	Basketball (n:20)	W.I (n:20)	S. (n:20)	Total(n:100)
Age (year)	22,70±0,73	21,90±2,27	22,25±6,64	25,45±7,78	25,95±5,19	23,65±6,70
Weight (kg)	72,17±8,31	71,80±11,19	81,60±16,35	69,10±15,59	75,40±24,99	74,01±16,54
Height (cm)	180.45±4.72	174.95±6.63	187.85±9.37	170.05±9.29	172.05±10.63	177.07±10.47
BMI (kg/m^2)	22,11±1,72	23.39±2.83	22.88±2.34	24.34±4.94	25.31±6.68	23.61±4.20
Deneyim yılı	8.70±2.03	8.60±3.14	8.70±3.67	8.95±5.02	7.95±1.64	8.58±3.53
FEV_1 (L)	4,38±0,82	4,27±0,63	4,5±0,67	3,57±0,76	3,84±0,74	4,11±0,80
FVC (L)	5,10±0,98	4,87±0,82	5,54±1,06	4,12±0,86	4,47±0,94	4,82±1,04
FEV_1/FVC(%)	86,30±5,94	87,70±7,80	83,55±8,34	88,15±4,02	83,25±7,28	85,79±7,02
SCV(L)	4,52±1,12	4,80±0,71	4,97±1,13	3,79±1,11	3,95±1,20	4,40±1,15
İC (L)	3,01±0,83	3,32±0,54	3,64±1,16	2,95±0,81	3,17±0,84	3,22±0,88
MVV (L/min)	182,75±35,24	166,65±51	188,4±35,13	143,9±52,47	146,8±37,02	165,7±45,79
MİP (cmH_2O)	115,65±25,63	125,95±41,12	131,9±25,24	108,95±26,06	100,15±24,56	116,52±31,34
MEP(cmH_2O)	146,9±35,56	143±36,23	155±22,25	130,4±30,08	118,05±23,6	138,67±32,27

BMİ: Body Mass Index, M.A: Martial Arts, W.I: Wind Instrumentalist, S: Singers, FEV_1:Forced expiratory volume in one second, FVC:Forced vital capacity, SVC: Slow vital capacity, IC: Inspiratory capacity, MVV: Maximal volume capacity.

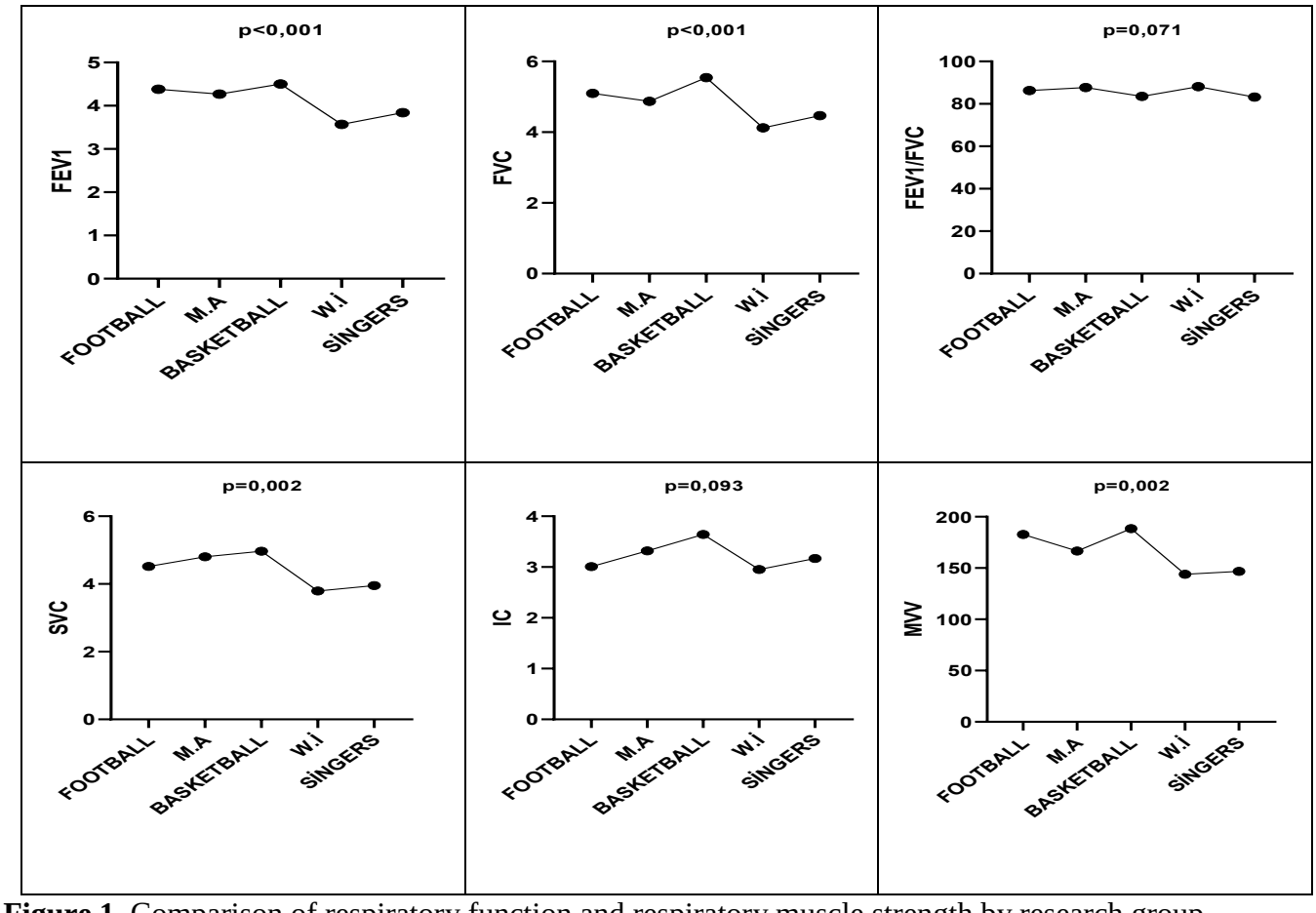

Figure 1. Comparison of respiratory function and respiratory muscle strength by research group

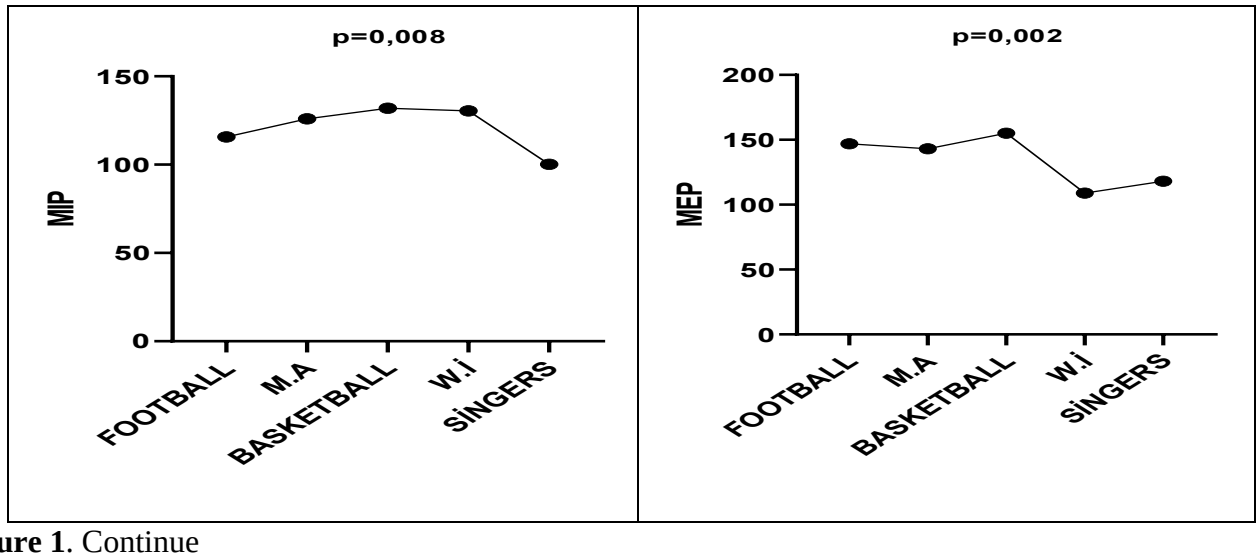

Figure 1. Continue

A significant difference was found between basketball and opera singers in MIP (p=0.008) and MEP values (p=0.002) when comparing branch and respiratory muscle strength. In pulmonary function tests, differences were observed in forced vital capacity, forced expiratory volume in one second, slow vital capacity and maximum voluntary ventilation. Basketball players were found to have higher values for all parameters except FEV_1/FVC.

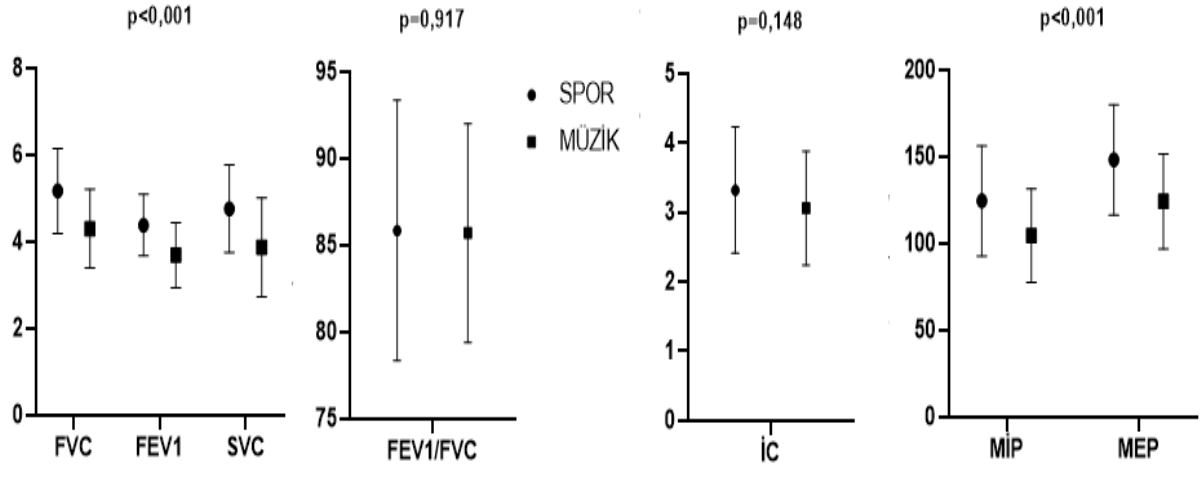

Figure 2. Comparison of respiratory values between athletes and musicians

It was observed that athletes had higher values in pulmonary function tests (FVC, FEV_1, SVC, MVV) and respiratory muscle strength parameters (MIP, MEP) than musicians ($p<0.05$).

DISCUSSION

Music has been shown to increase adherence to physical activity (Clark et al., 2016; Hutchinson et al., 2018), stimulation (Terry et al., 2020), relaxation (Karageorghis et al., 2018), positive emotional state (Hutchinson et al., 2018; Laukka and Quick, 2013; Elvers and Steffens, 2017), physical effort (Carlier et al., 2017), increased strength and power output (Karageorghis et al, 2018; Hutchinson et al., 2011), increased endurance (Terry et al., 2012; Savıtha et al., 2013), improved work rate (Chtourou et al., 2012; Lee & Kimmerly, 2016), synchronised movement to music (Hutchinson et al., 2018; Terry et al., 2012; Stork et al., 2015; Çelik, 2022) are known to facilitate recovery after physical activity (Çelik, 2022; Eliakim et al., 2012; Jia et al., 2016). It is not clear which of music and sport, which are known to affect the respiratory system, has a greater effect on the respiratory system. The aim of our study was to find an answer to the question of which has

a greater effect on the respiratory system: sport or music.

The study found a significant difference in MIP and MEP values between basketball and opera singers when comparing branch and respiratory muscle strength. In pulmonary function tests, differences were observed in forced vital capacity, forced expiratory volume in one second, slow vital capacity and maximum voluntary ventilation. Basketball players had higher values for all measures except FEV_1/FVC. Athletes had higher values for pulmonary function tests (FVC, FEV_1, SVC, MVV) and respiratory muscle strength parameters (MIP, MEP) than musicians ($p<0.05$).

Studies of sedentary people, athletes and musicians have shown that athletes have higher respiratory parameters. Any type of regular exercise is known to increase an individual's respiratory activity and capacity (Kocahan et al, 2017; Hutchinson et al, 2018; Akdur et al, 2001; Bernardi et al, 2006; Tang et al, 2008; Cossette et al, 2008; Wendy, 2008; Natalie et al, 2016; Traser et al, 2017; Zuskin et al, 2009). During exercise, metabolic rate increases and respiratory frequency and volume increase to provide the required amount of O2 (Yiğit, 2001). Respiratory efficiency and O2 diffusion capacity also increase with exercise. The mechanical functioning of the respiratory system is largely dependent on the capacity of the respiratory muscles (Kantarson et al, 2010). It is known that respiratory muscle strength increases in exercising individuals due to the increase in tidal volume with exercise (Yiğit, 2001).

It is known that the breathing manoeuvres used by singers and brass players (trumpet, trambone and horn) to produce sound also strengthen and improve the respiratory muscles (Ray ve ark., 2018). Music can be defined as a relaxing exercise that allows a person to exercise at a low heart rate while using fewer calories and oxygen. This is because it improves respiratory efficiency without increasing workload. Vocal and instrumental forms of the same type of music have a similar effect on respiratory demand (Savıtha ve ark., 2013). Basketball is a sport based on aerobic and anaerobic structures. Due to the height of the athletes, the lung volume and diameter are larger than in other sports and music forms. This is thought to be the reason why respiratory function and respiratory muscle strength are higher. Subjects with a history of lung disease, upper respiratory tract disease, less than 6 years of experience and an FEV_1/FVC ratio below 75% were excluded from the study.

As a result, it was found that doing sports improves the respiratory system more than making music, and basketball and martial arts improve CCT and SFT parameters more than other branches. It is recommended that musicians train in basketball or martial arts (judo and wrestling) to have better respiratory parameters.

Conflicts of interest

There are no potential conflicts of interest in this article.

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Ethics Statement

The study was approved by the Ethics Committee of Gümüşhane University.(2022/02; E-95674917-108.99-137506). Written informed consent was obtained from participants before the study began.

Author Contribution

Study Design, CY; Data Collection, CY; Statistical Analysis, CY, SE; Data Interpretation, CY, SE; Manuscript Preparation, CY, SE; Literature Search, CY, SE. Authors have read and agreed to the published version of the manuscript.

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RESEARCH ARTICLE

Evaluation of Mountaineering Education and Practices in the Perspective of Connectedness to Nature and Environmental Awareness

Zafer DOĞRU[1*] and Yetkin Utku KAMUK[2]

[1]Hitit University, Faculty of Sports Sciences, Department of Physical Education and Sport, Çorum / Turkey
[2]Hitit University, Faculty of Sports Sciences, Department of Training Education, Çorum / Turkey
*Corresponding author: zaferdogru@gmail.com

Abstract
The aim of this study is to evaluate the theoretical and practical education and practices provided in the "Get in touch with the nature - Live healthy, Protect Your Environment" project in terms of connectedness to nature and environmental awareness. The study group consisted of 46 university students who were members of mountaineering clubs and participated in mountaineering education and practices. In the study, the scale of connectedness to nature adapted by Bektaş et al. (2017) was used. A one-group pretest- posttest design was used. In addition, the answers given to the structured interview questions in the information collection form were evaluated qualitatively. There was a significant difference between pre-test averages and post-test averages in the dimension of being part of the nature ($p<.01$), suggesting that the education and practices influenced the dimension of being part of the nature, a sub-dimension of attachment to nature. An examination of the averages of the integration with nature sub-dimension and the overall averages of the scale revealed that the post-test scores increased. The results revealed that the scale score averages of the participants were increased at the end of the education period. It was also found that the participants' reasons for taking part in outdoor activities changed during the course of the study, with "interest" ranking first in the pre-test being replaced by the "desire to be with friends" in the post-test. The results of the present study suggest that the education had an impact on nature connectedness and environmental awareness.

Keywords
Connectedness to Nature, Environmental Awareness, Mountaineering

INTRODUCTION

Environment is defined as "the physical, biological, social, economic and cultural environment in which humans and other living things interact and maintain their relationships throughout their lives" (Environmental Law, 1983). Forests and mountainous areas are among the most important outdoor sports areas in terms of quality and quantity. Especially activities for nature and environmental awareness are increasing day by day (Atik et al., 2013) and For this reason, sustainability is important in all kinds of outdoor sports activity areas. Human behavior significantly affects environmental health and negative attitudes and misbehaviour lead to environmental problems (Evans et al., 2007). Based on environmental awareness, environmental sensitivity is also formed at an early age. Educators have important responsibilities in environmental education and structuring forming children's relationships with nature, which can positively influence children's behaviors towards the environment (Kahyaoğlu & Yetişir, 2016; Özdemir, 2010). It is important that children become aware of environmental awareness. However, the acquired behaviors also need to be reinforced throughout the lives of individuals. Has this awareness already been formed in university students? Have teachers really done anything to influence this? Considering that

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[1]**ORCID:** 0000-0002-8902-0301 , [2]**ORCID:** 0000-0001-5976-7503

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they participate in a limited number of the nature sports or activities of questionable quality, it is very important to make necessary efforts to ensure that university students have love for, and awareness of, nature.

The Ministry of Youth and Sports supports various projects regarding the nature, one of which is the "Get in touch with the nature - Live healthy, Protect Your Environment". The ministry's support for this particular project can be considered as an indicator of the importance it attaches to the environmental awareness. It is an academic responsibility to determine how the activities carried out within the scope of the project influence the participants and to share the results with the public. Hence, it is important to evaluate this project in which mountaineering education and practice is provided, and to determine and report its positive effects, if any. With the evidence it provides for future studies, this could be a very valuable contribution. It may also be very important that it promotes environmental awareness and encourages participation in outdoor sports. In this way, the number of supported projects will be increased and participation in outdoor sports will be promoted, contributing to the environmental awareness of more people and the formation of a social structure that is connected and sensitive to nature. The form created to collect participant data was used to determine whether the education created behavioral changes in the participants. The obtained results may also contribute to guiding future educations and projects, and establishing quality standards.

The aim of this study is to evaluate the theoretical and practical training provided within the scope of the "Get in touch with the nature - Live healthy, Protect Your Environment" project in terms of connectedness to nature and environmental awareness.

This study is important as it is different from other studies (Çınar & Duran, 2021; Derince, 2019; Kural et al., 2020; Tağrikulu et al., 2021) in that it explains whether there is a change in the current level of connectedness to nature as a result of outdoor sports training and practices as well as measuring their current level of connectedness to nature.

MATERIALS AND METHODS

The present mixed-method experimental study uses a single group pretest-posttest design. Data was collected by using a personal information form and structured interview questions developed by the authors and the scale of connectedness to nature adapted by Bektaş et al. (2017). The connectedness to nature scale (CNS) is a scale developed to measure individuals' experiential and emotional attachment to the nature. The 5-point Likert-type CNS consists of two sub-dimensions and a total of 8 items. It measures the participants' connectedness to nature, scored between Strongly Disagree (1 point) and Strongly Agree (5 points). The closer the average of the CNS scores, the higher the level of connectedness to the nature of the participant is. The reliability coefficient (α) of the CNS is 0.81. The reliability coefficients of the sub-dimensions of the CNS "Being a Part of the nature (BPN)" that consists of items 3 to 8, and "Integration with Nature (IWN)" that consists of items 1 and 2 are α=0.82 and α=0.63, respectively.

Data was collected from the participants before and after the involvement in the education and practice sessions. The data obtained was evaluated by the pretest-posttest comparisons. In addition, the answers to the structured interview questions in the information collection form were evaluated qualitatively.

The ethics committee permission required for the study was obtained from Hitit University Non-Interventional Researches Ethics Committee (Approval Number: 2022/17).

Participants

The study group was comprised of a total of 46 university students (22 female and 24 male) who were members of mountaineering clubs and participated in educations and practices. Participants with missing data in paired sample tests were excluded from the study group, and the data obtained from a total of 36 participants (19 women and 17 men) was analyzed.

Male participants comprised (n=24) 52.2% of the study group and (n=22) 47.8% of the participants were female; half of the participants were aged between (n=23) 18 and 21 years, with the other half between (n=23) 22 and 25 years. An analysis of the distribution of the participants according to their academic grade point average (GPA) showed that that (n=24) 52.2% of them had a GPA average between 2.50 and 2.99, (n=7)

15.2% of them had a GPA average between 2.00 and 2.49, (n=14) 30.4% of them had a GPA average between 2.50 and 3.00, and one participant above 3.50, with no participants having an average below 2.0.

Education Program and Practice Procedure

The program, which included the theoretical subjects of mountaineering and their practices prepared by the researchers, was implemented by athletes, mountaineering coaches and faculty members (researchers) who had completed their basic education in mountaineering. After the education, five practice sessions (applications of the theoretically explained topics) were applied. The content of the theoretical subjects consisted of the physiological, psychological, and sociological effects of sports activities in nature as well as environmental awareness and mountaineering sport-specific subjects. The theoretical education program is presented;

Contents of the education

1. Mountaineering Education and Its Effects
   - Physiological changes and adaptation in mountaineering athletes
   - Psychological effects of mountaineering sport on individuals
   - Sociological effects of mountaineering sport on individuals
   - Mountaineering sport and the process of creating environmental awareness
2. Mountaineering and Education
   - Introduction and definition of mountaineering sport
   - The Importance of Education in Mountaineering
3. Materials Used in Mountaineering and Its Presentation
   - Materials used and their classification
4. Hiking Knowledge and Organization in Mountaineering
   - Basic walking knowledge and organization (Summer and Winter)
5. Camp Site Selection
   - Camping Site Selection and Camping in Mountaineering
6. Direction Finding in Mountaineering
   - Orientation in nature (digital applications and usage)
   - Approaching a route, finding a route, choosing
7. Mountaineering, Accidents and First Aid
   - Accidents in nature, altitude sickness and first aid
8. Mountaineering and Nutrition
   - Nutrition in mountaineering
   - Properties of nutrients
   - Fluid intake
9. Mountaineering and Training
   - Training principles in mountaineering
   - Training Planning
10. Mountaineering and Ecology
    - Environment and ecology in outdoor sports (mountaineering)
11. Mountaineering and Safety
    - Knots in mountaineering
    - Safety in mountaineering, safe climbing and its organization

The education lasted for 7 weeks, one day in the first, second, and the last weeks but two days in the remaining weeks.

After the completion of the education period, the practice sessions started. The post-test data of those who participated in at least three practices were compared with their pre-test data. The practice sessions program is presented below.

Practice

Activity 1: North Campus – Frequency Nature Park 13 km. (Hiking

Activity 2: Hamamlıçay - Kösedağ 15 km. (Hiking)

Activity 3: Çomar Dam Environmental Cleaning

Activity 4: 19 May Commemoration of Atatürk, Youth and Sports Day Parade (İncesu – Çoban Pınarı-Kale–İncesu–Kybele (In the Canyon); 15 km.) (Doğru, 2022b)

Activity 5: Rock climbing (Cımbar Valley) and Emler Summit Climbing (Doğru, 2022a)

Data Analysis

The data was tested for normality to determine which statistical analysis should be used to interpret the responses to the nature connectedness scale.

Since the data was not normally distributed, “being a part of the nature” was analyzed by using a non-parametric test while t-test was used for “overall” and “integration with nature” components which were normally distributed.

RESULTS

Evaluations were made within the framework of the participants' past experiences in hiking / trekking and mountaineering and are presented in Table 1.

Table 1. Description of the study group in terms of the outdoor sports

		Female		Male		Total	
		f	*%*	*f*	*%*	*f*	*%*
Status of taking hiking/trekking education before	Y*	2	9.1	5	20.8	7	15.2
	N*	20	90.9	19	79.2	39	84.8
Status of taking mountaineering education before	Y	3	13.6	5	20.8	8	17.4
	N	19	86.4	19	79.2	38	82.6
Status of participating in hiking/trekking activity before	Y	7	31.8	9	37.5	16	34.8
	N	15	68.2	15	62.5	30	65.2
Status of participating in mountaineering activity before	Y	2	9.1	3	12.5	5	10.9
	N	20	90.9	21	87.5	41	89.1
Status of participating in sport activities in outdoor before participating in the education within the scope of the project	Y	6	27.3	6	25.0	12	26.1
	N	16	72.7	18	75.0	34	73.9

Analysis of the participants' past experiences in hiking/trekking and mountaineering showed that 82.6% of them did not participate any mountaineering education, 84.8% did not participate in any hiking/trekking, 89.1% of them did not participate in mountaineering activities, 65.2% of them had never been hiking/trekking before, and lastly, 73.9% of the participants had not participate in an outdoor sports activity before the project (Table 1).

Table 2. Independent variables and means

				Pre-Test		*Post-Test*	
			n	***X***	***SD***	***X***	***SD***
Gender	BPN*	Female	19	3.39	.937	4.13	.847
		Male	17	3.76	.793	4.03	.780
	IWN**	Female	19	3.57	.753	3.89	.680
		Male	17	3.84	.508	4.11	.595
	Overall	Female	19	3.53	.776	3.96	.687
		Male	17	3.83	.512	4.09	.567
GANO	BPN	3.0 (-)	26	3.54	.824	4.15	.809
		3.0 and (+)	10	3.65	1.055	3.90	.809
	IWN	3.0 (-)	26	3.73	.665	4.04	.635
		3.0 and (+)	10	3.64	.659	3.87	.675
	Overall	3.0 (-)	26	3.68	.672	4.07	.618
		3.0 and (+)	10	3.64	.709	3.88	.664
Receiving status of hikinig/trekking education before	BPN	No	32	3.48	.847	4.03	.822
		Yes	4	4.25	.957	4.50	.577
	IWN	No	32	3.65	.661	3.97	.660
		Yes	4	4.08	.516	4.21	.479
	Overall	No	32	3.61	.670	3.99	.646
		Yes	4	4.13	.569	4.29	.426
Participating status of hiking/trekking activities before	BPN	No	25	3.56	.917	3.94	.821
		Yes	11	3.59	.831	4.41	.701
	IWN	No	25	3.73	.591	3.97	.675
		Yes	11	3.62	.809	4.06	.582
	Overall	No	25	3.69	.627	3.96	.662
		Yes	11	3.62	.797	4.15	.550

**Being Part of the Nature; **Integration with Nature*

Table 2 presents that the lowest and highest means for the pretest are in the dimension of "being a part of the nature". In this dimension, the lowest mean (X=3.39±.937) belongs to the female participants, while the participants who have previously received outdoor sports education have the highest mean (X=4.25±.957). The post-test scores revealed that the participants with a GPA "3.0 and above" had the lowest mean (X=3.87±.675) in the dimension of "integration with nature". The participants who had "previously received trekking education" in the dimension of "being a part of the nature" had the highest mean (X=4.50±.577).

Table 3. CNS: Pre-post test means

Connectedness to Nature (n=36)*	$\bar{X}$	***SS***
Being Part of the Nature (Pre-test)	3.5694	.87955
Being Part of the Nature (Post-test)	4.0833	.80623
Integration with the Nature (Pre-test)	3.7003	.65511
Integration with the Nature (Post-test)	3.9953	.64156

**Paired sample t-Test was conducted, candidates with pre- and post-test data were evaluated.*

It was found that post-test means were higher than pre-test means as presented in Table 3.

Table 4. Being a part of the nature" dimension pre-post test comparison (Wilcoxon)

Pre-test – post-test: Part of the nature	***n***	***Mean Rank***	***Sum of Ranks***	***Z***	***p***
Negative Ranks	5[a]	7.30	36.50	-3.432	.001*
Positive Ranks	20[b]	14.43	288.50		
Ties	11[c]				
Total	36				

a. Post-test: Part of the Nature < Pre-test: Part of the Nature
b. Post-test: Part of the Nature > Pre-test: Part of the Nature
c. Post-test: Part of the Nature = Pre-test: Part of the Nature

**p<.01*

The scores given in the “being a part of the nature” sub-dimension (pre-post test) was not normally distributed. According to the Wilcoxon Signed Ranks Test, which was conducted to determine whether the difference was significant or not, the difference was significant at the p<.01 level, and the theoretical education and practices were effective in the dimension of "being a part of the nature" (Table 4). This effect is a result that emerged without taking into account independent variables such as gender and academic achievement.

Table 5. CNS: Integration with the nature dimension pre-post test comparison

	X	***SD***	***t***	***df***	***p***
IWN** (**Pre**-test)	3.70	.655	-4,673	35	.000*
IWN (**Post**-test)	4.00	.642			
Overall (Pre-test)	3.67	.672	-5,288	35	.000*
Overall (Post-test)	4.02	.628			

**p<.01; **Integration with Nature*

The means of the integration with nature sub-dimension (Table 5) were examined, it is seen that the post-test scores increased. The scores given in this sub-dimension are normally distributed, it was seen that the difference is significant at p<.01 level according to the result of the Paired Sample t-Test conducted to determine whether the difference is significant or not. The theoretical educations and practices made a difference in the participants' integration with nature. This effect is a result that emerged without taking into account independent variables such as gender and academic achievement.

There was no difference in the comparisons made in terms of gender and academic achievement variables. In addition, in the pair group comparisons created by the researchers, these groups were: a) those who had and had not received hiking/trekking education before, b) those who had and had not participated in hiking/trekking activities before, c) those who had and had not participated in Activity #1 (A1), d) those who had and had not participated in Activity #2 (A2), e) those who had and had not participated in Activity #3 (A3), f) those who had and had not participated in Activity #4 (A4), and g) those who had and had not participated in Activity #5 (A5). There was a significant difference between the means of being a part of the nature (post-test) only between those who participated in the final activity of the project (A5) "Rock climbing (Cımbar Valley) and Emler Summit Climbing" and those who did not participate in the project, but there was no significant difference in other comparison tests. Independent sample t-Test was used in the evaluation of Being Part of the nature (Pre-test), Integration with Nature (Pre-test), Integration with Nature (Post-test), Overall (Pre-test) and Overall (Post-test) data. Since the post-test data for the dimension of being a part of the nature were not normally distributed, they were evaluated with the Mann-Whitney U test. The findings related to these analyses are presented in Tables 6 and 7.

Table 6. Participation in Rock Climbing-Emler Summit Climbing activity (t-Test)

		n	*X*	*SD*	*t*	*df*	*p*
BPN* (Pre-test)	No	21	3.52	.798	-.364	34	.718
	Yes	15	3.63	1.008			
IWN** (Pre-test)	No	21	3.64	.604	-.596	34	.555
	Yes	15	3.78	.736			
IWN (Pos-test)	No	21	3.90	.642	-1,094	34	.282
	Yes	15	4.13	.637			
Overall (Pre-test)	No	21	3.62	.596	-.557	34	.581
	Yes	15	3.74	.783			
Overall (Pre-test)	No	21	3.89	.607	-1,503	34	.142
	Yes	15	4.20	.631			

**Being Part of the Nature; **Integration with Nature*

There is no difference between those who participated in rock climbing and summit climbing activities and those who did not in the pre-test of being a part of the nature, the pre-post tests of integration with nature and the pre-post tests of the overall scale (Table 6).

Table 7. Participation in Rock Climbing-Emler Summit Climbing activity (MWU)

		n	*X*	*SD*	*Mean Rank*	*Sum of Ranks*	*U*	*Z*	*p*
BPN** (Post-test)	No	21	3.86	.744	15.43	324.0	93.0	-2,12	.034*
	Yes	15	4.40	.806	22.80	342.0			

**p<.05; **Being Part of the Nature*

Table 7 is examined, it is seen that the post-test means are higher for those who participated in the rock climbing-Emler summit climbing activity than those who did not, and this difference is significant in the dimension of "being a part of the nature" (p<.05).

Table 8. Reasons for participating in outdoor sports (mountaineering)

Pre-test		*Causes*	*Post-test*	
Rank	***n***		***Rank***	***n***
1	29	to have an interest	4	20
2	23	desire to be with friends	1	24
3	22	positive effect on my health	3	21
4	19	to relieve boredom and stress	8	12
5	17	acquiring new skills	2	23
6	15	desire to get rid of monotony	5	20
7	14	integration with nature	6	20
8	14	influence of those around me	7	19
9	11	entering a new environment	11	8
10	9	using the new skills I have acquired	10	11
11	8	relaxing and increasing my work efficiency	9	11
12	5	feeling of loneliness	12	3
13	3	be a well-known	15	2
14	0	being a good role-model to my family	13	2
15	0	being a good role-model to my friends	14	2

When the reasons for participating in outdoor sports are examined, it is seen that the thoughts of the participants has changed during the project. The "area of interest", which ranked first in the pre-test, has been replaced by the "desire to be with friends". The "desire to be with friends", which ranked second, was changed to "acquiring new skills", and the "positive effect on health", which ranked third, remained in place. The options of "being a good role-model to my family and friends" was not selected at all in the pre-test, whereas they were selected as reasons in the post-test, even though it is rare (Table 8).

The researchers asked the participants to write down their positive and negative thoughts about the formation of connectedness to nature and environmental awareness during the educations and practices they participated in. The statements and codes that emerged within this framework were presented in Tables 9 and 10.

Table 9. Participants' statements and categories under the theme of negative thoughts

Expressions	**Categories**
P-04: This is the first time I can say that my legs and ankles hurt so much. P-07: Fatigue P-08: Feeling faster or slower than the team. P-09: For myself, it was the first time I felt so tired, and my pulse rate was high, this was the only negative thing I saw for me. Everyone was very aggressive due to fatigue, and these are the negative aspects for me. P-11: The difficulty of walking with the camp load P-17: I have difficulty in long-term climbs because I don't participate in such activities before. P-19: Having a headache at the altitude I climbed for the first time. P-24: It was the first time I was so dehydrated and weak at the end of the walk. P-28: For the first time in my life, getting sick from fatigue and hurting my hand left me behind in my other work. P-34: Falling down all the time was the first time in my life that I fell down so much. P-35: Fatigue caused by lack of fitness,	Not having adequate physical fitness
P-11: Experiencing fear of heights. P-12: People think negatively about anything, no matter how good the activity is. P-14: Being afraid of heights while rock climbing. P-14: Not trusting the material. P-20: It was the first time I walked in places that required hard struggle. They were high and scary places.	Fears and negative thoughts

Table 9. Continue

P-11: Difficulty of walking at night. Effect of altitude. P-16: The weather is too hot. P-18: Weather conditions P-21: Landing in stony area P-27: I had a headache because the air pressure changed while summit trekking. P-29: It is difficult to walk through the bushes in nature. P-29: It is very muggy and dusty in hot weather. P-32: Animals like ticks are dangerous. P-35: The route is very steep and stony.	Environmental challenges and risks
P-05: When I was climbing, I was very disturbed by the fact that the environment was full of plastic and glass waste, even though there was no human community living around. P-09: The environment is very dirty. P-24: Garbage. I was really surprised and saddened by the fact that people use nature very badly. I realized how much people pollute and misuse nature. P-25: Pollution of the nature	Pollution
P-02: Disruption of group unity P-06: During the activity, there are people who behave in a way that disturbs the peace of the team and ignore the warnings. P-08: Having team members who can make inappropriate jokes even during stress and fatigue. P-10: There were problems due to miscommunication. P-15: There was no team cohesion. P-33: I think that some reluctant friends have a negative impact on us.	Incompatibility and lack of communication (demotivating factors)
P-04: My lack of experience. My body is not used to it. P-26: I learned how important it is to wear a helmet by hitting my head on a stone. P-27: I experienced camping for the first time, and it was difficult to stay in the tent due to the weather conditions. Since it was the first experience of most of my friends, there were situations where we could not adjust the timing well (being late ect.).	Inexperience
P-01: Fall hazard due to not using appropriate materials. P-03: When the necessary materials are not used, the walk is very difficult. P-35: A. Choosing the wrong shoes, B. Mistakes in choosing clothes.	Unsuitable materials / equipment

P-#: Participant number

The reasons that negatively affected the participants in the post-implementation process can be listed under the following main topics:

a) Not having adequate physical fitness,
b) Fears and negative thoughts,
c) Environmental challenges/risks,
d) Pollution,
e) Disharmony, inability to communicate,
f) Not being experienced
g) Unsuitable materials/equipment.

Table 10. Expressions and categories under the theme of positive thoughts of the participants

Expressionss	**Categories**
P-01: Unity and solidarity are at the highest level. P-08: Witnessing that for the most part everyone is well-meaning and helpful. P-10: When a friend of mine moves slowly and falls behind, I take him/her to the front and adjust the speed accordingly. P-10: the importance of acting as a team. P-12: Whenever there is a difficulty, everyone tries to help together. P-16: To act together. P-24: I shared many things with my friends in a different environment from the city. P-27: We acted together and gained different experiences. P-28: I realized and saw how important friendship and help are. P-29: It is very fun to be in a group. P-31: Being with friends	Cooperation, helpfulness, and trust in other
P-12: Increased self-confidence after doing rock climbing activities after saying I couldn't do it. P-18: Increasing my self-confidence, realizing what I can do.	Self-confidence

P-24: It was the first moment we reached the "Çorum Obası". I never expected that we would reach there. P-27: I climbed for the first time, and I felt happy when I realized that it was not as difficult as I thought it would be. P-12: People knowing their limits and going back in order not to disrupt the order of the team.	Self-efficacy Learning their limits (seeing what they can and cannot achieve)
P-13: Gaining experience. P-23: Gained summit climbing experience	to achieve experience
P-14: Seeking and finding a way to overcome my own limitations.	problem solving
P-15: We made new discoveries. P-20: Discovering new places, I discovered new places thanks to this walk. P-21: Exploring new places. P-24: There are many places to explore, and they are very close by. P-31: Discovering new places. P-35: Gaining new experiences. P-05: With my first climb, I experienced a feeling I had never seen or tasted before.	New things, novelty, a sense of novelty
P-17: Climbing for the first time in the project and in my life. P-04: It was the first time I got this close to the sky. P-04: Positively, I stayed in nature for so long for the first time. P-09: I gained rock climbing skills; these are things I have done for the first time in my life. P-09: I had the opportunity to see "Niğde Aladağlar", without such an education, maybe I would never have known that there was such a place.	Firsts, things done for the first time, the feeling of being the first
P-16: Being in touch with nature. P-18: Integration with nature P-31: Integration with nature P-21: Landscapes	Integration feeling as a part of the earth (nature)
P-15: We saw beautiful landscapes. P-19: Capturing beautiful landscapes. P-16: A good experience P-24: As it rises, the view gets better.	Beauty, sense of beauty and fulfillment
P-17: I felt mentally relaxed and more energetic. P-02: Observing that people who go out in nature are happy P-32: We find peace P-35: A state of peacefulness towards the landscape.	Peace, relaxation, and contentment.
P-20: When we reached the summit, we had completely different feelings. P-25: Seeing that beauty with my eyes and being in that environment. P-29: Waking up early and implementing plans in a prepared manner. P-28: I saw that students and professors are actually more sincere, fun and talkative outdoor (in nature). P-03: We try to overcome the difficulties we experience in nature and gain experience. P-35: Sense of accomplishment P-04: Happiness after reaching the summit. P-06: Everyone willingly participates in the activities, and this motivates me	Positive emotions/thoughts
P-27: We gained the experience of living in harmony in nature. P-32: We recognize nature. P-35: Experiencing how to apply the rules applied in nature. P-09: It was a positive aspect for me that the places we visited were common areas for all people and that these areas were used appropriately by people. P-07: Camping and staying in nature. P-28: For the first time, I enjoyed a walk-in nature without being connected to my phone.	Environmental awareness
P-04: I think it positively affects health	Health
P-08: Although it was my first-time trekking, I realized that I was more resilient than I expected.	Self-awareness

P-#: Participant number

The reasons that positively affected the participants in the post-implementation process can be listed under the following main topics:

a) cooperation, helpfulness, and trust in others,
b) self-confidence
c) self-efficacy - learning their limits (seeing what they can and cannot achieve)
d) achieving experience
e) problem solving
f) new things, novelty
g) firsts, things done for the first time, the feeling of being the first
h) integration, feeling as a part of the earth (nature)
i) beauty, sense of beauty and fulfillment
j) peace, relaxation, and contentment.
k) positive emotions/thoughts
l) environmental awareness
m) health
n) self-awareness

It was considered that the positive and negative opinions of the participants are important information to increase the quality and effectiveness of new studies on environmental awareness and connectedness to nature.

In addition, according to the researchers' diaries, participants wore a safety harness during rock climbing, attached to a rope with real mountaineering material, trusted someone else to ensure their belaying, rappelled by trusting an anchor (safety point), climbed using natural handholds and steps, took the belaying (safety) of a friend and ensured that their friends came down safely, spent the night in a tent, woke up early to reach a goal (reach at the Emler summit), felt that their breathing became constricted as they ascended in nature, experienced the difficulty of moving with a camping load in nature, get very tired but happy and witnessed that it was not like any sport practiced in the city for the first time. These are some of the results that the participants expressed during the process and that emerged from the semi-structured interview form and the researchers' diaries.

DISCUSSION

Until the present day, the issues that have emerged from studies on environmental sustainability and that have been of interest are attitudes, persuasion, connectedness, and incentives. Initially, environmental awareness was concerned with specific environmental issues such as garbage disposal and recycling, but now more and more areas of interest and study are emerging. In order to reconceptualize the relationship with nature, initial and limited meanings have been moved beyond. How to increase interest in nature through empathy and how identity is shaped by the natural environment have been discussed (Mayer & Frantz, 2004). Theories are being developed about people's psychological relationship with the natural world. Connecting with nature is now one of the main themes on the agenda of today's people. Fisher (2002) states that when people see the environment (land) as their own community (human, living being), the environment can be used with love and respect. He thinks that people can learn to recognize the natural world as a social and psychological space just like the human community.

The developers of the scale used in this study stated that they tried to "assess whether feeling connectedness to nature actually leads to ecological behavior" (Mayer & Frantz, 2004). Education and practices are evaluated in general; these were seen that the averages of the participants increased numerically at the end of the pre-test and post-test educations. This shows that the educations had an impact on their connectedness to nature and environmental sensitivity (Tables 3 and 4). People who practice nature sports generally have more positive environmental awareness levels (Gökdayı & Demirel, 2018). Individuals interested in nature sports cause less harm to nature (Gürer et al., 2019), for instance, while there are is no sign of environmental pollution in the Geyikbayırı rock climbing area, it is not the same for the picnic areas at the nearby locations. Involving in nature sports creates a significant awareness for the environmental awareness.

Soykan (1999) and Somuncu (2004) indicated that rural tourism has both positive and negative aspects, and points out that the negative aspects can be eliminated through education (education tourism personnel and local people). The current study is one of the special studies that can be cited as an example of user education. Similarly, the alpine National Parks have relied principally on regulations and education. There is a series of seven minimal-impact posters and brochures intended to make users aware of their impacts and ways to minimize them. There are also bans on the use of wood fires and restrictions on

camping in particularly fragile environments such as the catchments of alpine lakes (Buckley et al., 2000, p. 40). Mountains and natural areas are one of the important activity areas in tourism. In this context, Somuncu (2004) stated that on the management of mountain areas must be strived for a careful balance between the protection of natural resources, the needs of local people, and the desire of tourists.

Adventure tourism (outdoor sports can also be included in this) is at the cutting edge of world tourism, and its newness merits a comprehensive examination, unhindered by the confines of traditional delineations (Swarbrooke et al., 2003). Apart from environmental relations, it is also possible to say about some effects on personality, personal characteristics, and behaviors (consumption behavior ect.). Individuals who engage in physical activity, both licensed and recreational, are more likely than individuals who do not engage in physical activity; It has been determined that individuals who do physical activity in nature (outdoor) show a more positive sustainable consumption behavior than those who do not do physical activity and those who do physical activity indoors (Polat et al., 2019). The group of activities carried out for the artificial wall climbing led to a positive development in the children's perception of locus of control and it was seen that children's beliefs on what's happening around them is under their control and they can turn their lives in whichever direction they want were positively influenced (Özen et al., 2018). One of the important findings (Table 10) of the study is its contribution to problem-solving skills revealed in the codes and categories obtained in the qualitative section. Rock climbing activities may have provided this even if they were done for an experience for the short time. Consequently, activities done during artificial wall climbing were shown to cause positive development in problem solving skills and perception levels of the university students (Özen & Vatansever, 2017). It was shown that the activities such as trekking, camping and rock climbing do not have a significant effect on trait anxiety scores of the participants, however; camping and rock climbing cause a significant increase on state anxiety scores. (Özen, 2017). The fact that the participants in the study had little or no previous experience in outdoor sports may have caused them to experience some negative emotions. This is considered as a temporary situation.

One of the important findings of the study (Table 10) is the perceptions of self-confidence and self-efficacy that emerged in the codes and categories obtained in the qualitative section. Yıldız et al. (2016) stated that it could be concluded that the outdoor activity series had a positive effect on the perceived self-efficacy of the participants. The whole camp life and activities created with rope trails have positive impact on perceptions of the participants' self-efficacy (Özen et al., 2014) The thoughts put forward by the participants in this study regarding their perception of self-efficacy (learning their limits - seeing what they can and cannot achieve, etc.) can be explained as the effect of education on this issue. Climbing on artificial walls and real rock surfaces as a leisure activity was found to have a statistically significant and positive effect on the social anxiety levels of subjects in the climbing community (Özen, 2015). First of all, doing activities in nature requires getting away from urban life and the stereotype (clichéd) relationships it brings. People's understanding that they need each other (to keep each other safe and secure, etc.) and to help each other can also help them organize their social relationships. They will be able to make more realistic decisions about what is more important for a quality life. In addition, the activities carried out during this study are also a very important experience for seeing the positive effects of being in a group and acting together.

Nature education allows individuals to learn about natural processes. It increases their predisposition to nature, makes them more sensitive and conscious, and contributes to their becoming more independent, creative and critical thinking individuals (Güler, 2009; Keleş et al., 2010; Phenice & Griffore, 2003; Thoe & Lin, 2006). When the educations and practices are evaluated as a whole, it can be said that the participants in the study had a high level of positive process in terms of "connectedness to nature" and "environmental awareness" according to the results obtained. It was seen that the educations had an impact on nature connectedness and environmental awareness. It was observed that the participants were satisfied with the fact that they had a real nature experience and that they saw (theoretically and practically) many events described. They can ensure that mountaineering

sports and culture are established at their university. Club members can participate in mountaineering and extreme sports activities in a safe, environmentally sensitive manner. They can be organized to do their own mountaineering activities through the education and practices they receive.

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Conflict of interest

No conflict of interest is declared by the authors. In addition, no financial support was received.

Ethics Committee

The ethics committee permission required for the study was obtained from Hitit University Non-Interventional Researches Ethics Committee (Approval Number: 2022/17).

Author Contributions

Study Design, ZD; Data Collection, ZD, YUK; Statistical Analysis, ZD-YUK; Data Interpretation, ZD, YUK; Manuscript Preparation, ZD, YUK; LiteratureSearch, ZD. Thepublishedversion of themanuscript has been read and approved by all authors.

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RESEARCH ARTICLE

Effects of Different Aerobic Exercises in Overweight and Obese Women's Quality of Life and Obesity Levels

Yetkin Utku KAMUK[1*] and Zafer DOĞRU[2]

[1]Hitit University, Faculty of Sports Sciences, Department of Coaching Education, Corum / Turkey
[2]HititUniversity, Faculty of Sports Sciences, Department of Physical Education and Sports Teaching, Corum / Turkey
*Corresponding author: yetkinkamuk@hitit.edu.tr

Abstract
Obesity is a global epidemic that affects health. The aim of this study was to assess the effects of different aerobic exercises in overweight/obese women's quality of life (QOL) and body mass index (BMI) levels. Sixty-nine overweight/obese women (age: 35.9±8.9 years; BMI: 28.8±1.4 kg/m^2) were randomly assigned to either step-aerobics (SAG), Zumba (ZG), spinning (SG), or control group (CG). Experimental groups performed exercise sessions for three times per week for 45 minutes during 12 weeks but the control group did not have any intervention. World Health Organization QOL Questionnaire was applied to the subjects. Obesity levels were assessed by using BMI. Following the 12-week intervention, all groups were compared to each other and statistically significant differences ($p<.05$) were found on BMI levels of the subjects in each exercise category with different amount of decrements, 9.3%, 5.9%, and 9.2% for the SAG, ZG, and SP, respectively. It was also found that exercises had significant effects on physical QOL levels but Zumba was the only exercise that changed the psychological QOL level significantly. No differences in environmental or social relationships QOL levels was observed. All aerobic exercise types found to have positive effects on physical QOL. If psychological enhancement is desired Zumba exercises can be preferred because it is the most effective exercise for the psychological QOL. Although all exercise types were seen to be effective, spinning and step-aerobics exercises are found to be better than Zumba in decreasing BMI.

Keywords
Obesity, Body Mass Index, Energy Expenditure, Physical Activity, Fitness

INTRODUCTION

As a global epidemic in today's world, obesity is well-known for its association with cardiovascular diseases, different types of cancers, metabolic syndrome, type 2 diabetes mellitus, and decreased quality of life (Carbone et al. 2019; Hidayat et al. 2016; Al-Goblan et al. 2014; Puhl and Heuer, 2009). Even a moderate rise in fat mass results in substantial effects, such as the increased risk of mortality and comorbidity (Abdelaal et al. 2017; Santanasto et al. 2017). Body mass index (BMI) is used worldwide to assess obesity and has been accepted as a useful tool in categorizing people into mainly one of these categories: healthy, overweight, and obese (Nuttall, 2015). Because of its simplicity and being neither expensive nor invasive, BMI has been widely used to determine obesity (Akindele et al. 2016).

Being physically active and increasing energy expenditure are general recommendations to control body weight and these are the most effective non-medical ways against obesity (Donnelly et al. 2009). When compared, aerobic exercises were shown to have better effects on the level of obesity than anaerobic exercises (Klijn et al. 2007; Saif and Alsenany, 2015), but the National Health Interview Survey revealed that just about 20% of women reach to the recommended moderate intensity activity level of 150 mins per

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[1]**ORC**ID: 0000-0001-5976-7503 , [2]**ORC**ID: 0000-0001-8902-0301

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week (Clarke et al. 2017). It was previously reported that attending to aerobic exercises such as step-aerobics, Zumba and spinning had positive effects on the obese females' body compositions (Arslan, 2011; Krishnan et al. 2015; Yoon et al. 2017).

Some studies were conducted to reveal the effects of different types of aerobic exercises but there was no agreement on which type of aerobic exercise was the best (Gorostegi-Anduaga et al. 2018; Maldonado-Martin et al. 2016). To our current knowledge, any research on the effects of three different types of aerobic exercises has not been conducted before. Consequently, which one of these three aerobic exercises, step-aerobics, Zumba, and spinning, will be more effective in obese women's body composition is skeptical.

Along with the other aspects of health, quality of life (QOL) is also an important component in human health. Although QOL has a wide range of measurement scales, it generally focuses on physical and mental health (Wong et al. 2018). Studies on QOL revealed that physical activity can contribute to improve QOL in the physical domain (Carta et al. 2012) especially in women (Pucci et al.2012).

The objectives of this paper were to assess the effects of different aerobic exercises on obesity, and to examine the effects of aerobic exercises on QOL levels in obese women.

MATERIALS AND METHODS

Participants

The study was carried out by recruiting obese women meeting the following criteria: aged between 18 and 52, BMI>25 kg/m^2, with no known metabolic or physical disorders, been sedentary at least 1 year, and not on regular medication. Volunteers were chosen among the new subscribers to a gym for either a Zumba, spinning, or step-aerobics class. Eighty-five women meeting the criteria were invited to take part in the study as a subject in one of the three experimental groups but thirty-four of them rejected the invitation. The aim of the study was explained to the subjects and then three groups were formed as Zumba (ZG, n=17), step-aerobics (SAG, n=18), and spinning (SG, n=16). A control group (CG) was also formed by recruiting 18 overwight women. Each group, except the CG, had their exercises 3 times per week and 45 mins per session.

Ethics committee approval was obtained from the Hitit University Non-Interventional Researches Ethics Committee (Approval No: 2019-237) and all participants gave their written consent prior to the study. The research was conducted by strictly following the standards stated in Helsinki Declaration.

Study Design

Participants followed their exercise programs for 12 weeks. Each exercise session was planned to have an intensity between 55-75%. During the exercises, participants were asked to wear wireless heart rate monitors, and each participant's exercise intensity was projected on a screen. If the intensity was below or over the predetermined limits, the participant was asked to keep up with the pace or slow down where appropriate. Anthropometric measurements and BMI calculations were performed as pre- and post-tests. BMI was done by dividing body mass in kg to squared height in meters. World Health Organization Quality of Life Short Form (WHOQOL-BREF) was also applied to the subjects to assess their quality of life levels. WHOQOL-BREF has four dimensions as physical, psychological, social relationships, and environmental. All these scores were calculated as described in the Field Trial Version by the World Health Organization (1996).

Exercise Programs

Each group attended to their exercises for 45 minutes on Mondays, Wednesdays, and Fridays. Qualified trainers, each one is a physical education professional and certified trainer of the relevant exercise, led the training sessions. Before each session, the participants were instructed to have warm-up and stretching exercises to get their bodies ready for the exercises. After the sessions, cool-down exercises were applied. Participants were asked not to attend to another planned physical activity or change daily habits and dietary routines during the 12-week period. No caloric restrictions were made or extra energy intake was recommended.

Data Analysis

Descriptive statistics, mean and standard deviation, were calculated and expressed as mean±SD where appropriate. Normal distribution of the data was tested by Shapiro-Wilk and *Q-Q* Plot test. It was seen that data were normally distributed. Homogeneity of variance was tested by using Levene's test and one-way ANOVA was used to compare baseline differences. Paired samples

t-test was used for pre-post test comparisons. *Z*-scores for the differences were calculated and analyzed.

RESULTS

General characteristics of the subjects were presented in Table 1. There were no statistically significant differences among the groups by the variables at the pre-test ($p>.05$). Table 1 revealed that the subjects in different groups were not different from each other. When the post-test values in Table 2 were compared to the pre-test values in Table 1, it was seen that attending to exercises had statistically significant effects with large effect sizes on weight, BMI, and physical QOL values of the subjects ($p<.05$). Along with these, Zumba exercises were found to affect the psychological QOL of the subjects significantly ($p<.05$). No differences were observed in social relationships and environmental domains of QOL ($p>.05$). Figure 1 depicts the changes in the *Z*-scores from pre- to post-tests. All groups but the CG, presented desired and significant changes in BMI *Z*-scores (SAG=-0.59±0.39 kg/m^2; ZG=-0.02±0.44 kg/m^2; SG= -0.65±1.20 kg/m^2; CG=1.20±0.23 kg/m^2). The control group's *Z*-scores revealed a deterioration in BMI and the differences between the exercise groups and the CG were statistically significant ($p<.05$).

Table 1. General characteristics of the subjects prior to the exercise sessions. Data are presented as mean±standard deviation.

Variables	SAG (*n*=18)	ZG (*n*=17)	SG (*n*=16)	CG (*n*=18)	*p*
Age (year)	35.3±8.9	34.6±6.9	36.4±10.3	35.3±9.8	.95
Height (cm)	166.3±5.6	163.4±5.0	164.6±6.2	164.1±5.7	.46
Weight (kg)	79.9±6.8	76.7±6.2	79.1±5.7	77.1±6.3	.37
Body Mass Index (kg/m^2)	28.9±1.5	28.7±1.3	29.2±1.5	28.6±1.3	.64
Physical QOL	57.1±14.7	61.9±14.8	58.4±18.7	61.1±18.5	.81
Psychological QOL	63.8±16.3	68.2±16.3	59.0±17.2	60.1±17.5	.38
Social Relationships QOL	56.8±19.8	70.5±15.8	64.6±16.2	67.2±16.7	.12
Environmental QOL	57.2±18.4	61.8±18.6	65.3±16.4	64.2±16.3	.53

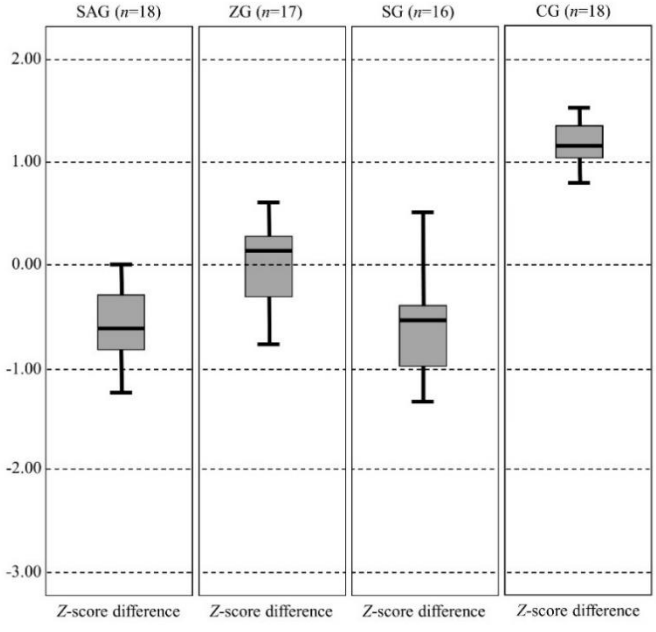

Figure 1. BMI *Z*-score changes from pre- to post-training of overweight and obese women in groups.

Table 2. Weight, BMI, and QOL scores of the groups at post-training. One-way ANOVA test results.

Variables	SAG (*n*=18)		ZG (*n*=17)		SG (*n*=16)		CG (*n*=18)		*p*
	Post	*ES*	Post	*ES*	Post	*ES*	Post	*ES*	
Weight (kg)	72.6±6.4*	1.11	72.2±6.3*	0.72	71.8±5.4*	1.31	78.5±6.3	-0.22	.02
BMI (kg/m^2)	26.2±1.4*	1.86	27.0±1.5*	1.21	26.5±1.4*	1.86	29.1±1.2	-0.40	.00
Physical QOL	65.3±10.2*	-0.65	69.8±12.2*	-0.58	70.9±13.8*	-0.76	50.8±16.3*	0.59	.00
Psychological QOL	67.7±16.4	-0.24	81.2±13.7**	-0.86	62.3±17.4	-0.19	59.1±16.7	0.06	.00
Social Relations QOL	60.7±19.6	-0.20	74.2±16.2	-0.23	68.3±15.9	-0.23	65.4±16.5	0.11	.14
Environmental QOL	60.7±18.8	-0.19	65.5±19.4	-0.20	68.7±15.7	-0.21	62.6±16.4	0.10	.58

* p<.05 vs. control. ** p<.05 vs. control. *ES*=Effect size.

The amounts of decrements in BMI values were found to be 9.3%, 5.9%, and 9.2% for the SAG, ZG, and SP, respectively. The CG's BMI value changed from 28.6±1.3 to 29.1±1.2, resulting in an increase of about 1.7%.

DISCUSSION

The main finding of this study is that attending to aerobic exercises regularly will cause a decrease in BMI and step-aerobics and spinning exercises are superior to Zumba to lose weight. It was also found that aerobic exercises positively contributed to the subjects' physical QOL. Although Zumba had a less powerful effect on decreasing BMI, in the current study it was the only aerobic exercise that contributed significantly to the subjects' psychological QOL. Social relationships or environmental QOL levels did not differ by attending to exercises.

As it is well-known, weight loss is possible by creating a negative energy balance, which is either by restriction in energy intake or promoting energy expenditure (Donnelly et al. 2009). As the caloric restriction has its own physiological limitations, the experts advise the latter. In this study, neither a caloric restriction was applied nor the caloric intake was controlled. The focus of this study was on the effects of different types of aerobic exercises on BMI and QOL levels in overweight and obese women. To our current knowledge, no similar study was conducted before. Thus, that makes it impossible to compare the results of this study directly with previously published studies.

Some studies investigated the effects of exercise on three groups but the groups differed only either by the intensity or frequency, but not by type (Cavalcante et al. 2018; Nunes et al. 2016). It was previously shown that applying resistance training in different volumes did not make any significant differences in overweight and obese women's BMI levels and it was hypothesized that the stimuli were not enough (Heden et al. 2011; Mookerjee et al. 2016). Although anaerobic exercises can contribute to decreasing BMI, aerobic exercises were more effective in reducing BMI when compared to anaerobic ones. Effects of attending 12-week exercise sessions on BMI were analyzed by Saif and Alsenany (2015) and it was found that aerobic exercises contributed to reduce BMI levels by 17.6% but anaerobic exercises reduced BMI by only 6.7%. When combined together, aerobic exercises and anaerobic exercises can enhance BMI better. Aerobic exercises, combined with body weight-bearing resistance exercises, for 12 weeks decreased obese women's BMI by 7.9% (Kang et al. 2018).

There are many studies that examined the effects of Zumba, step-aerobics and spinning exercises on BMI, separately. Numerous studies have shown the positive effects of step-aerobics exercises in obese women but the results from the interventions varied. In a study conducted by Arslan (2011), it was reported that attending to 8-week step-aerobics exercises caused a decrease of about 3.2% in obese women's BMI values. Melam et al. (2016) found that obese women lost nearly 5% of their BMI values after 10-week aerobic exercises. In the current study, it was found that attending to step-aerobics exercises for 12 weeks caused a significant reduction in overweight and obese women's BMI levels. The percentage in the decrease was found to be as high as 9.3%. As these studies have shown earlier, step-aerobics exercises contribute to decreasing BMI in women and as the period of attendance extends, the amount of this contribution gets larger. The results of those studies support the results of the current study.

Spinning is another aerobic exercise type that is commonly preferred by women because of being safe and its effectiveness on the energy expenditure, thus benefits on reducing BMI. Yoon et al. (2017) studied the effects of spinning and regular bicycle exercises and found that spinning exercises reduced women's BMI but not a regular bicycle. The reason for this was reported that spinning exercises cost more energy expenditure than regular cycling at the same intensity (Yoon et al. 2017). Kaya et al. (2018) reported that 6-week spinning exercises for three days per week caused a significant reduction in BMI by 4.6%. Amano et al. (2001) found that spinning exercises lowered BMI in overweight women as much as 5.1% in 12 weeks. Current study reveled that spinning exercises had significant effects on overweight and obese women's BMI levels. A decrease of about 9.2% in BMI was observed in the spinning group. The results are in line with the other studies in the literature.

As a relatively new aerobic exercise, Zumba has gained popularity among women because of its free form. Zumba exercises are less formal than in many aerobic exercises and it has fun and party-like dancing choreography. Because of that, Zumba is known as an enjoyable and entertaining exercise, as its motto says: "Ditch the workout, join the party!" (Luetgen et al. 2012). There are many studies showing that Zumba was effective in decreasing BMI levels in women (Ljubojevic et al.2016; Araneta and Tanori, 2015; Barene et al. 2014). Krishnan et al. (2015) evaluated the effects of 16-week Zumba exercises in severely obese (BMI: 37.3±1.5 kg/m^2) women with type-2 diabetes mellitus and concluded that Zumba intervention improved obesity tendency and reduced BMI values by about 3.5%. According to the results of the current study, it was revealed that Zumba could contribute to enhancing the BMI levels of overweight and obese women by 5.9%.

The results of the current study proved that regular attendance to aerobic exercises, regardless of the type of the exercise. Each type of exercise contributed to physical QOL levels of the subjects. However, it was also found that spinning and step-aerobics exercises contributed to BMI more than Zumba exercises. The reason to that was thought to be the informal structure of the Zumba exercises. The other exercises might have pushed the attendees to keep up with the group's performance because not being able to keep it up can be seen clearly but Zumba had an advantage over them by its free-form dancing. It was found that Zumba was superior to the other exercises in terms of psychological QOL. Previous studies shown that Zumba was effective in contributing to women's psychological QOL (Donath et al. 2014; Rossmeissl et al. 2016). In the current study, step-aerobics and spinning exercises did not affect the psychological QOL levels of the subjects. Being able to continue exercising freely, without being noticed when the performance is not good enough to keep pace with the group, might have been contributed to the attendants' psychological QOL levels.

It was previously shown that BMI had a disruptive effect on women's QOL (Pazzianotto-Forti et al. 2019; Slagter et al. 2015), and it was a predictor for the physical QOL score having a negative correlation (Hahn et al. 2005). In a study conducted in Italian obese adults, it was shown that QOL levels of the subjects reduced as their BMI levels increased (Sirtori et al. 2012). However, according to a study conducted on 968 Brazilian adult women, aerobic exercises were found to have positive correlations with physical and psychological QOL levels (Pucci et al. 2012). It is known that women are less satisfied with their body image when compared to men and obese women have lower health-related QOL than obese men (Friedman and Brownell, 1995). Obese people were previously shown to have poorer psychological profiles compared to their non-obese counterparts (Sarlio-Lahteenkorva et al. 1995). Obese individuals were shown to be subject to considerable stigma which the individuals might internalize and experience as embarrassment, depression, and nervousness (Kirk et al. 2014). The degree to which the obese individuals feel stressed, concerned, and unhappy because of their body shape and excess weight was studied before and it was found that obese individuals were more prone to feel depressed and losing weight was a successful way to maximize the psychological QOL of obese individuals (Vallis, 2016). In the current study no significant effects on the environmental and social QOL levels in the overweight and obese women were observed.

In this study, it was found that, when compared to each other, step-aerobics and spinning exercises are superior to Zumba to lose weight and to decrease BMI. Physical QOL was positively affected by all of the aerobic exercises examined.

Although the results supported that changes in the physical and psychological QOL levels were in the desired direction, no significant differences were found in the social relationships or environmental QOLs. The reason to this might be due to the social and cultural characteristics of the study group.

Additionally, spare-time activities and social behaviours of the subjects were not controlled or assessed and the extent of the effects of these factors are not clear. Even though these factors were not controlled, the subjects were instructed not to make any major changes in their calorie intake habits or lifestyles during the study. As a conclusion, it can be said that all aerobic exercises found to have effect on physical QOL. If psychological enhancement is desired Zumba exercises can be preferred because it is the most effective exercise for the psychological QOL. Although all exercise types were seen to be effective, spinning and step-aerobics exercises are found to be better than Zumba in decreasing BMI.

Conflict of Interest

The authors declare no conflict of interest. No financial support was received for the study.

Ethics Statement

The ethics permission was obtained prior to the study. The study was approved by the Hitit University Non-Interventional Researches Ethics Committee (Approval No: 2019-237).

Author Contributions

Study Design, YUK; Data Collection, YUK; Statistical Analysis, YUK and ZD; Data Interpretation, YUK and ZD; Manuscript Preparation, YUK and ZD; Literature Search, YUK and ZD. The authors have read and agreed to the published version of the manuscript.

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RESEARCH ARTICLE

Investigation of Difficulties to Sports Participation in Disabled Individuals in terms of Some Variables

Gülşah ÜNVER[1*] and Filiz Fatma ÇOLAKOĞLU[2]

[1]Osmaniye Korkut Ata University, Faculty of Health Sciences, Department of Physiotherapy and Rehabilitation, Osmaniye / Turkey
[2]Gazi University, Faculty of Sport Sciences, Department of Physical Education and Sport Teaching, Ankara / Turkey
*Corresponding author: gulsahunver@osmaniye.edu.tr

Abstract
Purpose: The purpose of the present study was to examine the difficulties to sports participation in disabled individuals in terms of some variables. **Method:** A total of 168 physically disabled individuals were included in the present study. Data collection tools were "Difficulties Sports Participation Scale for Persons with Disabilities" and an information form for the participants. Data were collected online. Data analysis was done with IBM SPSS program. **Result:** It was found that the awareness sub-dimension of the scale showed statistically significant difference in terms of marital status (p=0.035). It was determined that the overall scale and the environmental strain sub-dimension of the scale showed statistically significant difference in terms of disability rate categories (p=0.046 and p=0.035 respectively). **Conclusion:** It has been understood that there are differences for difficulties to sports participation according to marital status and disability rate in disabled individuals. It is thought that the findings of the present study can contribute to organization of suitable sports activities for disabled people and increase of sports participation in people with disabilities.

Keywords
Difficulties, Disabled Individuals, Participation, Sports

INTRODUCTION

Disability is the inability of a person to adapt to social life as a result of the restriction of physical, mental, spiritual, and sensory skills from congenital or later for any reason (Casebolt, 2021; Ünal and Altuğ, 2021). There are activities for disabled individuals to realize their potential, improve their skills, make their lives easier, reduce their addiction levels, and lead an active and healthy life. One of these activities is sport (Smith and Sparkes, 2019; Wilson and Clayton, 2010). Sports enable individuals with disabilities to develop physically, physiologically, psychologically, and cognitively. Sports facilitate integration into society of disabled individuals (Hutzter and Bar- Eli, 1993; Martin, 2013).

Sports for the disabled include all kinds of sportive activities, from recreational activities to competitive sports for the disabled people and people at risk of disability (Konar and Pepe, 2003). In the sports of the disabled, some factors are very important. These factors are the age of disabled, the gender of disabled, the motivation of disabled for games, sports, and competition, the type of disability, the ratio of disability, types of sports, and auxiliary equipment (Kiuppis, 2018; Martin and Whalen, 2014; van der Ploeg et al., 2004).

Disabled individuals expose various difficulties and restrictions in their life. These difficulties and restrictions are due to some personal and environmental reasons (Çoban and Özcebe, 2019; Tekin, 2019; Wilson and Khoo, 2013). Besides their own deficiencies, disabled

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[1]**ORCID:** 0000-0002-3031-8322 , [2]**ORCID:** 0000-0002-0635-7583

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individuals struggle other obstacles due to environmental inadequacies. Therefore, disabled individuals may encounter also various difficulties to participation in sports (Bodde and Seo, 2009; Ergin, 2021; Kirchner et al., 2008). It is thought that information about the difficulties to sports participation is needed for disabled individuals to benefit from certain sports adapted to their needs and situations, to develop sports activities specific to them, to increase in sports participation for them. The purpose of the present study was to examine the difficulties to sports participation in disabled individuals in terms of some variables.

MATERIALS AND METHODS

Research Group

For the present study, inclusion criteria were being a member of the Turkish Disabled Association, being between the ages of 20-60, having a physical disability from congenital or later, not doing or not being able to do sports, not having any operation in the last 6 months, and volunteering to participate in the study. The research group consisted of 168 physically disabled individuals who met the inclusion criteria. For the present study, ethics committee approval was received from the Social Sciences Scientific Research and Publication Ethics Committee of Osmaniye Korkut Ata University (Decision date: 30.05.2023, Decision number: 2023/6/13). In addition, permission for the study was obtained from the General Presidency of the Turkish Disabled Association. Before data collection, an online informed consent form was sent to individuals who would participate in the study. After their consent was obtained, they were included in the present study.

Data Collection

For the present study, data collection tools were the “Difficulties Sports Participation Scale for Persons with Disabilities” and an information form. The information form included some questions (such as age, gender, level of education, marital status, congenital or later disability, percentage of disability) about the participants. Data were collected between June 2023 and August 2023. Data were collected with the "Google Forms" application. The sections were created with the Google Forms application. The sections in the application included scale and questions in the information form. A connection link has also been created for the prepared form at the application. The connection link was delivered to the managers of the Turkish Disabled Association. They sent the connection link to individuals who met the inclusion criteria for the present study. The participants filled out the relevant sections via the Google Forms application.

In the present study, the difficulties to sports participation were evaluated with the “Difficulties Sports Participation Scale for Persons with Disabilities”. The validity and reliability study of the scale was conducted by Yılmaz et al. (2021). The scale consists of 14 items and 3 sub-dimensions (affective avoidance, awareness, and environmental strain). The scale is evaluated as a 5-point Likert type. There is no reverse coded item in the scale. The scale gives a total score. According to the scale, as the scores of the participants increase, the difficulties faced by the individuals increase, and as the scores decrease, these difficulties decrease.

Analysis of Data

Statistical evaluation of the data was made with the IBM SPSS (version 25, SPSS Inc., Chicago, IL, USA) program. The overall and sub-dimensions scores of the difficulties sports participation scale for persons with disabilities were calculated in accordance with the directive of the scale. The Kolmogorov-Smirnov test was applied to examine whether the data obtained were in accordance with the normal distribution. In addition, the assumption of normal distribution was examined with kurtosis-skewness values and histogram graphics. According to the assessments, it was understood that the data did not show normal distribution. Therefore, non-parametric test was applied for the comparisons. The Mann-Whitney U test was used to compare groups of two-category variables. Correlation analysis was performed to determine the relationship between the overall and sub-dimensions of scale. Since the data did not show normal distribution, Spearman correlation analysis was performed. The statistical significance level was accepted as $p<0.05$.

RESULTS

A total of 168 physically disabled individuals were included in the present study. The mean age of all participants was 39.73±13.11 years. Distribution of the participants according to education level, 112 (66.7%) people were at the high school or below, 54 (32.1%) people were at the undergraduate level, and 2 (1.2%) people were at the graduate level. The average of disability rates of all participants was 66.30±17.79. The mean score for overall scale of all participants was 33.65±11.48. The scores of the scale's sub-dimensions were calculated for all participants. The mean score of the affective avoidance was 8.22±4.23, the awareness was 11.51±4.51, the environmental strain was 13.88±6.78.

The comparisons of difficulties to sports participation in terms of gender and marital status are presented in Table 1. It was found that the overall and sub-dimensions of the scale did not differ statistically significantly in terms of gender (p=0.952, p=0.699, p=0.605, p=0.696, respectively). It was determined that the awareness sub-dimension of the scale showed a statistically significant difference in terms of marital status (p=0.035). For the awareness sub-dimension, the scores of single participants were higher than the scores of married participants. It was determined that the overall scale, the affective avoidance sub-dimension, and the environmental strain sub-dimension did not show a statistically significant difference in terms of marital status (p=0.445, p=0.392, p=0.412, respectively).

Table 1. The comparisons of difficulties to sports participation in terms of gender and marital status

	Variables	n	Mean Rank	p
Overall Scale	Female participants	40	84.90	0.952
	Male participants	128	84.38	
Affective Avoidance	Female participants	40	81.93	0.699
	Male participants	128	85.30	
Awareness	Female participants	40	87.96	0.605
	Male participants	128	83.42	
Environmental Strain	Female participants	40	81.89	0.696
	Male participants	128	85.32	
Overall Scale	Single participants	95	87.01	0.445
	Married participants	73	81.23	
Affective Avoidance	Single participants	95	87.30	0.392
	Married participants	73	80.86	
Awareness	Single participants	95	91.43	**0.035***
	Married participants	73	75.49	
Environmental Strain	Single participants	95	81.81	0.412
	Married participants	73	88.00	

p: statistical significance level, *p<0.05

The comparisons of difficulties to sports participation in terms of congenital or later disability and disability ratio categories are presented in Table 2. The participants were categorized according to their disability rate percentage as those with 60% or less and those with more than 60%. It was determined that the scale's overall and the scale's sub-dimensions did not show a statistically significant difference according to congenital or later disability (p=0.406, p=0.568, p=0.867, p=0.077, respectively). It was determined that the overall scale and the environmental strain sub-dimension of the scale showed statistically significant difference in terms of disability ratio categories (p=0.046 and p=0.035, respectively). The scores of overall scale and the environmental strain sub-dimension were found to be higher in those with a disability rate above 60% than in those with a disability rate of 60% or less. The affective avoidance and the awareness sub-dimensions of the scale did not show a statistically significant difference in terms of disability ratio categories (p=0.276 and p=0.857, respectively).

Table 2. The comparisons of difficulties to sports participation in terms of congenital or later disability and disability ratio categories

	Variables	n	Mean Rank	p
Overall Scale	Participants with congenital disability	64	80.52	0.406
	Participants with later disability	104	86.95	
Affective Avoidance	Participants with congenital disability	64	81.79	0.568
	Participants with later disability	104	86.17	
Awareness	Participants with congenital disability	64	83.70	0.867
	Participants with later disability	104	84.99	
Environmental Strain	Participants with congenital disability	64	76.05	0.077
	Participants with later disability	104	89.70	
Overall Scale	Participants with 60% or less disability	74	76.07	**0.046***
	Participants with more than 60% disability	94	91.14	
Affective Avoidance	Participants with 60% or less disability	74	79.93	0.276
	Participants with more than 60% disability	94	88.10	
Awareness	Participants with 60% or less disability	74	83.74	0.857
	Participants with more than 60% disability	94	85.10	
Environmental Strain	Participants with 60% or less disability	74	75.59	**0.035***
	Participants with more than 60% disability	94	91.51	

p: statistical significance level, *p<0.05

The evaluation of relationships between the overall and sub-dimensions of scale are shown in Table 3. According to the correlation analysis, it was determined that the overall scale had a positive relationship with the affective avoidance sub-dimension at the level of 61.3% (r=0.613, p<0.001). It was also determined that the overall scale had a positive relationship with the awareness sub-dimension at the level of 76.1%, and with the environmental strain at the level of 84.0% (r=0.761, p<0.001, and r=0.840, p<0.001, respectively). It was found that the affective avoidance sub-dimension had a positive relationship with the awareness sub-dimension at the level of 45.6%, and with the environmental strain sub-dimension at the level of 26.6% (r=0.456, p<0.001 and r=0.266, p<0.001, respectively). On the other hand, it was determined that there was a significant positive correlation at the level of 51.4% between the awareness and the environmental strain sub-dimensions (r=0.514, p<0.001).

Table 3. The evaluation of relationships between the overall and sub-dimensions of scale

		Overall Scale	Affective Avoidance	Awareness	Environmental Strain
Overall Scale	**r**	1.000	0.613**	0.761**	0.840**
	p	-	**<0.001**	**<0.001**	**<0.001**
	n	168	168	168	168
Affective Avoidance	**r**	0.613**	1.000	0.456**	0.266**
	p	**<0.001**	-	**<0.001**	**<0.001**
	n	168	168	168	168
Awareness	**r**	0.761**	0.456**	1.000	0.514**
	p	**<0.001**	**<0.001**	-	**<0.001**
	n	168	168	168	168
Environmental Strain	**r**	0.840**	0.266**	0.514**	1.000
	p	**<0.001**	**<0.001**	**<0.001**	-
	n	168	168	168	168

r: correlation coefficient; p: statistical significance level, *p<0.05, **p<0.01

DISCUSSION

In the present study, it was aimed to examine the difficulties to sports participation in physically disabled individuals according to variables such as gender, marital status, congenital or later disability, and disability rate. The results showed that there are differences in the difficulties to sports participation according to marital status and disability rate. Disabled individuals may encounter various obstacles for participation to sports activities. Ayan and Ergin (2017) grouped the barriers as personal, social, environmental, and other barriers in their study to examine the factors that prevent individuals with special needs from participating in physical activity programs. Older adults with intellectual disabilities participated in the study by van Schijndel-Speet et al. (2014). In their study, topics related to barriers to physical activity were identified as health and physiological factors, lack of self-confidence, lack of skills, lack of support, transportation problems, costs, and lack of suitable physical activity options and materials. Kang et al. (2007) reported that the most common obstacles faced by physically disabled individuals for physical activity and exercise are lack of time, pain or discomfort.

There may be differences in the difficulties to sports participation of disabled individuals in terms of some variables. In the present study, it was understood that the overall scale and sub-dimensions of the scale did not show a statistically significant difference according to gender. In other words, there was no statistically significant difference in the difficulties to sports participation between women and men. As a result of the study of Esatbeyoğlu and Karahan (2014), in which they identified the obstacles to the participation of disabled people in physical activity, two main themes emerged as environmental factors and individual factors. Under the main theme of environmental factors, sub-themes of social factors and physical factors, and under the main theme of individual factors, sub-themes of economic factors, disability situation, and psychological factors emerged. Within the scope of the social factors sub-theme, the social agents that affect participation are described as friends, families, gender, society, and companion. In the study of Esatbeyoğlu and Karahan (2014), gender was reported within the scope of social factors. In the study of Robertson and Emerson (2010) on mentally disabled individuals, participation in sports was associated with gender. In the present study, it was found that there was no difference in the difficulties of sports participation in terms of gender variable. The results of the present study about gender variable differed from the results of the studies in the literature. The total number of participants, the ratio of the number of female and male participants, and the type of disability may have been effective for this result. Because a total of 168 physically disabled individuals, 40 women and 128 men, participated in the present study.

In the present study, it was understood that the awareness sub-dimension of the scale showed a statistically significant difference in terms of marital status. But the overall scale, the affective avoidance sub-dimension, and the environmental strain sub-dimension did not show a statistically significant difference in terms of marital status. For the awareness sub-dimension, the scores of single participants were found to be higher than those of married participants. Therefore, it has been concluded that the difficulties for awareness domain are higher in single people than in married people. These results may be due to the fact that single people have more time than married people and single people want to take more time on social life than married people.

In the present study, it was understood that the overall scale and its sub-dimensions did not show a statistically significant difference in terms of congenital or later disability. There was no difference in the difficulties to participation in sports between those with congenital disabilities and those with later disabilities. This result made us think that the main factor for the difficulties to sports participation may not be the time of occurrence of the disability, but the existence of the disability. It was observed that the overall scale and the environmental strain sub-dimension differed statistically significantly according to disability percentage categories, while the affective avoidance and the awareness sub-dimensions did not differ statistically significantly according to disability percentage categories. The scores of overall scale and environmental strain sub-dimension were higher with a disability rate above 60% than those with a disability rate of 60% or less. Jaarsma et al. (2014) found that the most common personal obstacle for physically disabled athletes to do sports is being dependent on others for exercising. Argan et al. (2021) mentioned the

obstacles faced by physically disabled athletes in their sports experiences and reached the disability degree code of the individual within the scope of personal obstacles. Darcy and Dowse (2013) examined the experiences of people with intellectual disabilities in the context of sports. They reported that people who are independent or with a low to moderate need for support have a high level of involvement, while people with a high to very high need for support have significantly lower levels of involvement. The results of the studies in the literature, the degree of disability was emphasized. Thus, the studies in the literature support the result of the present study. In the present study, it was concluded that the difficulties encountered increase as the percentage of disability increases. Increasing the percentage of disability, increases the level of dependency in individuals and increases the need for other individuals or auxiliary equipment. Therefore, it can be considered as expected results that the difficulties encountered for participation to sports are higher in people with a higher percentage disability. In addition, the fact that the environmental strain was higher in the participants with a high disability rate than the participants with a low disability rate. This result showed that the individuals with a high disability rate have more environmental difficulties for participation to perform sports activities. This result may be due to the inadequacy of environmental adaptations and the fact that environmental regulations were not made appropriately for individuals with a high disability rate.

In the present study, according to the correlation analysis a positive and significant relationship was found between the overall and sub-dimensions of the difficulties sports participation scale for persons with disabilities. It has been understood that the overall scale has a higher level of relationship with the environmental strain sub-dimension than the other sub-dimensions. It was also understood that there is a higher level of relationship between the environmental strain and the awareness than the affective avoidance. According to these results, it can be interpreted that environmental strain is prominent in the difficulties of the participants and the environmental strain is more shaped by the awareness. When the education levels of the participants were examined in the present study, it was seen that the number of participants at high school and below education level was higher than the number of participants at the undergraduate and graduate education level. Increasing the level of education can increase the level of knowledge about the difficulties to participation in sports, especially about coping with environmental factors. Therefore, the education levels and knowledge levels of the participants may have been effective on the relationship results.

Conclusion

The difficulties to sports participation for disabled individuals may differ in terms of some variables. In the present study, there were differences in difficulties to sports participation for disabled individuals according to marital status and disability rate categories. It is an undeniable fact that sports have important effects on the physical, cognitive, social, and psychological development of disabled individuals. Sports branches and sports activities for the disabled should be developed and disseminated. It is very important to investigate the factors that make it difficult for individuals with disabilities to participate in sports and to examine them in terms of some variables, in order to prepare strategies that increase the level of participation in sports. It may be beneficial to conduct more research on individuals with different disability types and sociodemographic characteristics regarding the difficulties to sports participation for disabled people.

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Conflict of Interest

All authors declare no conflict of interest.

Ethics Statement

The approval of the Social Sciences Scientific Research and Publication Ethics Committee of Osmaniye Korkut Ata University (Decision date: 30.05.2023, Decision number: 2023/6/13) was obtained for the study.

Author Contributions

Study Design, GÜ; Data Collection, GÜ and FFÇ; Statistical Analysis, GÜ and FFÇ; Data Interpretation, GÜ; Manuscript Preparation, GÜ and FFÇ; Literature Search, GÜ. All authors have read and agreed to the published version of the manuscript.

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RESEARCH ARTICLE

The Effect of Role Uncertainty of Students in University Team Sports on Team Combination

Mustafa Barış SOMOĞLU[1*], Efecan TEZCAN[2], Ahmet Yılmaz ALBAYRAK[3] and Muhammet Uhud TÜRKMEN[4]

[1]Gümüşhane University, Physical Education and Sports College, Physical Education and Sports Teaching Department, Gümüşhane / Türkiye
[2]Gümüşhane University, Physical Education and Sports College, Sports Management Department, Gümüşhane / Türkiye
[3]Gümüşhane University, Physical Education and Sports College, Sports Management Department, Gümüşhane / Türkiye
[4]Gümüşhane University, Physical Education and Sports College, Sports Management Department, Gümüşhane / Türkiye
*Correspondingauthor: barissomoglu@gmail.com

Abstract
The primary objective of this research is to assess the level of team cohesiveness and role ambiguity among students who participate in university team sports, and examine them based on pre-determined variables. The selection of participants was conducted through a convenient sampling approach. The study employed the cross-sectional scanning method and comprised a sample of 238 participants, consisting of 88 females (37%) and 150 males (63%), who are engaged in team sports at Gümüşhane University during the 2022-2023 academic year. A Personal Information Form, Team Cohesion Scale and Role Ambiguity Scale were utilised to gather data in this study. Data was then analysed using T-tests, ANAVO and correlation tests. Analysis results indicate that university students who participate in team sports demonstrate above average team unity, whilst exhibiting below average role ambiguity. Men were found to have better scores in the team unity and group attractiveness task dimensions, based on gender. In contrast, students studying in departments other than physical education and sports schools reported higher role ambiguity. It has been noted that university students who have played on the same sports team for 1-5 years encounter greater role ambiguity compared to those who have had longer experience. Playing different sports and the number of years spent playing sports did not impact participants' team unity or role ambiguity. An additional noteworthy finding is the negative significant connection between role ambiguity and team commitment.

Keywords
Sport, Team, Togetherness, Uncertainty, Role

INTRODUCTION

Humanity has arisen various needs in order to survive and tried various strategies to meet these needs. Nature and living conditions have kept people together and this process has led people to become a nation. As Maslow stated in his theory, belonging is one of the greatest needs of human beings. Therefore, individuals often desire to be a member or join a community. It is stated that the main reasons for individuals to participate are belonging, partnership and realization (Hightower, 2000). According to Shaw (1971), the group; It is a gathering of people who are mutually influenced and interacting with each other. The uniting of individuals in groups for a goal reveals the concept of togetherness. If this unity occurs in the sports environment, the concept of team unity emerges. According to Carron, Widmeyer and Brawley (1998), team unity; It means that a group comes together to achieve goals, an effort to maintain

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[1]**ORCID:** 0000-0001-5811-384X , [2]**ORCID:** 0000-0003-3284-6361, [3]**ORCID:** 0000-0002-3345-6579 , [4]**ORCID:** 0000-0003-2067-7935

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unity and a dynamic process. The term "team cohesion", which is frequently encountered in the literature, is synonymous with concepts such as team cohesion, group unity, group solidarity, group cohesion.

Team unity provides the expression of being able to work in harmony, show solidarity and cooperate in order for a group of individuals to achieve common goals. This concept is considered the key to success in many areas from the business world to sports, from education to social projects. Positive harmony among team members and focusing on common goals increase the work of the team (Hackman and Wageman, 2005). Team cohesion is a fundamental phenomenon in which a group of people join forces and coordinate to achieve their common goals. The stability of this phenomenon is a critical factor for continued success.

Interaction within the team, shared goals and personal commitment to the team are expressed as determining factors in team unity (Eren, 2001). Team cohesion may occur due to factors such as individuals' dedication to the team and their desire to stay in the team. Team members with high team cohesion are generally willing to participate in the team's activities, attend meetings, and are happy with the team's success. On the contrary, members of teams with weak cohesion do not participate in the team's activities and are uninterested in the team. A strong unity within the group is considered a positive quality for teams (Eren, 2001).

One of the important group dynamics of the members of a team is considered to be the uncertainty perception of the roles of the athletes (Beauchamp and Bray, 2001; Beauchamp et al., 2002; Bosselut et al., 2010b; Eys et al., 2003a; Mellalieu and Juniper, 2006 Özkara 2019;). Role ambiguity is defined as a situation in which expectations are not clearly stated (Kahn et al., 1964). Role ambiguity is the lack of clear information about the details of individuals' powers and responsibilities (Baltaş and Baltaş, 2004). In situations where role ambiguity is experienced, people cannot fully perceive what is expected of them and exhibit behaviors that are not compatible with expected behaviors (Bernardin, 2010; Fisher, 2001). In addition, the person does not show the desired performance in the task when he lacks the necessary information about the task (Ceylan and Ulutürk, 2006).

The first studies related to this concept (role, role ambiguity, role conflict) were studied in the field of management and organization and are based on the role division model of Kahn et al. (1964). Based on this model, definitions of role ambiguity include two basic dimensions, namely task ambiguity and social-emotional states (Kahn et al., 1964; Ok, 2002; Özkalp and Özkalp, 2004). According to this approach, role ambiguity includes both details about the person's duties and how their performance is evaluated.

Task ambiguity refers to situations that are unclear about the tasks that a person should perform and includes three basic sub-dimensions. These sub-dimensions are: Uncertainties about the area of responsibility, uncertainties in what is expected to fulfill the required behavioral responsibilities, uncertainties about the hierarchical priority of each task. It is possible for the person to experience task ambiguity due to reasons such as not knowing what his/her powers include and not, not specifying the institutional goals clearly, clearly and regularly, not knowing the required standards, having insufficient experience in the profession, insufficient education and knowledge level, and unclear job descriptions (Ok, 2002).

Kahn et al., (1964) introduced the second main dimension as the Social-Emotional Role Ambiguity dimension. This dimension includes the uncertainty one feels about how one's achievements are perceived by others. The inability of the individual to clearly perceive the criteria by which his performance is evaluated or to receive constructive feedback from his environment causes a psychological process called social-emotional role ambiguity or a feeling of discomfort. When the existing literature on role ambiguity is examined, it is seen that most of the studies in this field are predominantly carried out in the context of business and industry, where productivity and performance are particularly important (Eys et al., 2003a).

Research focusing on role ambiguity has been conducted in the field of sports sciences since the 2000s. Studies on role ambiguity in sports have revealed its relationship to various factors. Increased cognitive and bodily anxiety has been associated with role ambiguity (Beauchamp et al., 2003). Decreased perceived competence and role performance showed links with role ambiguity (Beauchamp et al., 2002; Bray and Brawley, 2002; Eys and Carron, 2001; Özkara and Özbay, 2019).

Moreover, decreased sense of competence (Bray and Brawley, 2002; Eys and Carron, 2001) as well as decreased athletic pleasure (Eys and Carron, 2005; Eys et al., 2003b) have been associated with role ambiguity. . It has also been found to be associated with role conflict (Beauchamp and Bray, 2001) and social loafing (Høigaard et al., 2010).

Another factor associated with role ambiguity in sports is the athletes' perceptions of group integrity and team cohesion in their teams (Davarcı, 2008; Çepikkurt and Pehlevan, 2018). In order for a team to create an efficient structure, it is considered important to consider the necessity of members to have a clear role, to determine the distance between role ambiguity and group integrity, and to determine the communication and interaction between these two factors. Academic studies covering the dynamics of sports emphasized the importance of role ambiguity and group integrity, and the critical role of communication between these two variables in achieving successful performance and enjoying sports activities (Carron et al., 2007; Eys et al., 2006; Bosselut et al., 2012). The importance of unity in achieving the desired goals and keeping a group together is indisputable. On the other hand, individuals experiencing role ambiguity are naturally emotional and it has been emphasized that role ambiguity can lead to tension, decreased self-confidence and dissatisfaction. From this point of view, the aim of this research is; The aim of this study is to determine the role ambiguity perceptions of the athletes in the team and the level of team cohesion, to examine them in terms of the determined variables and to reveal the relationship between them.

MATERIALS AND METHODS

Model of the Research

This study was carried out with a quantitative research approach and a general evaluation was made about the whole or a part of the universe by using the cross-sectional survey method (Karasar, 2009). The cross-sectional survey model, which is carried out using the quantitative research method, involves the collection and analysis of data at a particular time or period. In this method, researchers try to understand the current situation by examining one or more variables at a given moment. In the cross-sectional survey model, a cross-sectional (instant) data is collected from the participants, that is, information is collected at a certain time using tools such as a questionnaire or observation. This type of research model is often used to understand the general state of the population or a particular trait or set of traits. The results of the analysis of the data can reflect their characteristics at a particular time. However, cross-sectional scanning models do not determine changes over time because the data represent only a particular moment.

Universe and Sample / Study Group

The sample of the study consists of a total of 238 (86 26% female/150 74% male) licensed athletes who are active in the province of Gümüşhane in the 2022-2023 academic year. The sample was selected with the “Easy Sampling Method”. With this method, time, easy accessibility and financial savings were achieved (Yıldırım and Şimşek, 2014).

Of the university students who participated in the research, 86.6% were PESC students and 13.4% were athletes from other departments. 18.9% of these students are in the 1st grade, 31.1% in the 2nd grade, 37.4% in the 3rd grade, and 12.6% in the 4th grade. Considering their distribution according to the variable of how many years they have played in the same team, 204 of them do sports in the same team for 1-5 years, while 34 of them play in the same team for 6 years or more. Of these students, 140 are interested in handball, 62 in volleyball, 36 in football. 30 of these athletes are between 0-2 years, 44 are between 3-5 years, 84 are between 6-8 years and 81 are doing sports for 8 years or more.

Ethics of Research; In order to start the data collection process of the research, an ethical approval report was obtained from the "Gümüşhane University Scientific Research and Publication Ethics Committee" (14.06.2023, article no: E-95674917-108.99-182130). Throughout the study, the “Higher Education Institutions Scientific Research and Publication Ethics Directive” was continued to be complied with. Before the study, the participants were informed and informed consent was obtained from the researchers.

Data Collection Tools

Personal Information Form

It consists of "gender, department, year of playing sports, year of playing in the same team and sports branch" created by the researcher. Athletes' Role Ambiguity Inventory (ARAI): The scale developed by Beauchamp and Bray (2001) was adapted into Turkish by Davarcı (2008) to evaluate the uncertainties about the roles of athletes. The inventory consists of two sub-dimensions, "Knowing What the Role Requires" and "Role Responsibility and Performance Criteria", and includes 7 items in total. The scale has a 7-point Likert style self-assessment format.

Group Environment Questionnaire (GEQ)

In the study, the team collaboration inventory, which was developed by Carron et al. (1985) to measure team cohesion and adapted into Turkish by Unutmaz, Kiremitçi, and Gençer (2014), was used. The inventory consists of 18 items divided into 4 sub-dimensions: "group integration-task, group integration-social, individual attractions to group-task, and individual attractions to group-social". The item distribution for each sub-dimension is as follows: 5 items (1, 3, 5, 7, 9) for Group Attractiveness-Social, 4 items for Group Attractiveness-Task (2, 4, 6, 8), Group Cohesion-Social (11, 13, 15, 17) and 5 items (10, 12, 14, 16, 18) for Group Integrity-Task. Each item in the inventory is measured on a 9-point Likert scale. Some items in the inventory are reverse scored (1, 2, 3, 4, 6, 7, 8, 11, 13, 14, 17,18).

Analysis of Data

First of all, the suitability of the data for the analysis of the data analyzed with SPSS 25.0 was tested. In this direction, Kolmogorov-Smirnov tests were applied, but the suitability of the data could not be tested. The values of kurtosis and skewness, which are another suitability parameter, were examined and it was decided that they were suitable for the analysis (between -1.5 and +1.5) (Büyüköztürk, 2010; Tabachnick and Fidell, 2013). As a result of the assumption of normality, other parametric tests (descriptive statistics, t-test, one-way analysis of variance) were applied.

RESULTS

In Table 1, Group Environment Questionnaire (GEQ) and its sub-factors group integration-task (GİT), group integration-social (GİS), individual attractions to group-task (IAGT), individual attractions to group-social (IAGS), and Athletes' Role Ambiguity Inventory Descriptive statistics results are given for (ARAI) and sub-factors Knowing What the Role Requires (KWRR), Role Responsibility and Performance Criteria (RRPC) scale scores. When Table 1 is examined, it has been determined that the scores obtained from the total and sub-dimensions of GEQ are above the average, and the scores from the ARAI and sub-dimensions are below the average. When the kurtosis and skewness scores were examined, it was assumed that they showed normal distribution by taking values between +1 and -1 in all scales and sub-dimensions.

Table 1. Descriptive Statistics on GEQ and ARAI Scores

GEQ	**n**	$\bar{X}$	**Ss**	**Skewness**	**Kurtosis**	**Min.**	**Mak.**
GİT	238	6,19	1,33	-0.700	-0,158	2,60	9
GİS	238	5,89	1.90	-0.012	-0.757	1,25	9
IAGT	238	5,78	1.27	-0.052	-0.341	3,00	9
IAGS	238	6,20	1.56	-0.034	-0.865	2,20	9
GEQ Total	238	6,04	1.09	0.384	-0.227	3,28	8,83
ARAI	**n**	$\bar{X}$	**Ss**	**Skewness**	**Kortosis**	**Min.**	**Mak.**
KWRR	238	2,20	1,14	0,939	0,017	1	5
RRPC	238	2,40	1,05	0,352	-0,158	1	5
ARAI Total	238	2,29	0,98	0,519	-0,347	1	5

Group Environment Questionnaire (GEQ), Group İntegration-Task (ARAI), Group İntegration-Social (GİS), İndividual Attractions to Group-Task (IAGT), İndividual Attractions to Group-Social (IAGS), Athletes' Role Ambiguity Inventory (ARAI) Knowing What the Role Requires (KWRR), Role Responsibility and Performance Criteria (RRPC).

The t-test findings according to the total and sub-dimension scores of GEQ and ARAI according to the "gender" variable of the participants are shown below (Table 2). As can be seen in the table below, the athletes' GEQ total [$t_{(236)}$=-0.878, p>0.05], GİT [$t_{(236)}$=-0.535, p>0.05], IAGT [$t_{(236)}$=-0.139, p>0.05], IAGS [$t_{(236)}$=-0.875, p>0.05] did not show a significant gender-related difference; A significant difference was found in favor of men in the dimension of GİS [$t_{(236)}$=-2.406, p<0.05]. ARAI levels were determined by gender in total [$t_{(236)}$=-0.666, p>0.05] and KWRR [$t_{(236)}$=0.026, p>0.05], RRPC [$t_{(236)}$=-1.493, p>0.05] dimensions. did not differ significantly.

Table 2. GEQ and ARAI Scores by Gender Variable t-test Results

GEQ	Gender	n	$\bar{x}$	Ss	sd	t	p
GİT	Female	88	6,12	1,30	236	-,535	,59
	Male	150	6,22	1,34			
GİS	Female	88	5,50	2,10	236	-2,406	,02*
	Male	150	6,11	1,73			
IAGT	Female	88	5,76	1,21	236	-,139	,89
	Male	150	5,78	1,29			
IAGS	Female	88	6,31	1,57	236	,875	,38
	Male	150	6,13	1,55			
GEQ Total	Female	88	5,96	1,12	236	-,878	,38
	Male	149	6,08	1,05			
ARAI	**Gender**	**n**	$\bar{x}$	**Ss**	**sd**	**t**	**p**
KWRR	Female	88	2,21	1,07	236	,026	,97
	Male	150	2,20	1,17			
RRPC	Female	88	2,27	0,96	236	-1,493	,13
	Male	150	2,48	1,08			
ARAI Total	Female	88	2,23	0,89	236	-,666	,50
	Male	150	2,32	1,02			

*p<0.05 , Group Environment Questionnaire (GEQ), Group İntegration-Task (ARAI), Group İntegration-Social (GİS), İndividual Attractions to Group-Task (IAGT), İndividual Attractions to Group-Social (IAGS), Athletes' Role Ambiguity Inventory (ARAI) Knowing What the Role Requires (KWRR), Role Responsibility and Performance Criteria (RRPC).

Table 3. GEQ and ARAI t-test Results by Reading Department Variable

GEQ	The Section You Read	n	$\bar{x}$	Ss	sd	t	p
GİT	PESC	206	6,14	1,34	236	-1,449	,14
	Other	32	6,50	1,22			
GİS	PESC	206	5,88	1,92	236	-,091	,92
	Other	32	5,91	1,72			
IAGT	PESC	206	5,80	1,26	236	,990	,32
	Other	32	5,57	1,27			
IAGS	PESC	206	6,22	1,56	236	,728	,46
	Other	32	6,01	1,59			
GEQ Total	PESC	205	6,04	1,08	236	,063	,95
	Other	32	6,02	1,09			
ARAI	**The Section You Read**	**n**	$\bar{x}$	**Ss**	**sd**	**t**	**p**
KWRR	PESC	206	2,14	1,10	236	-2,008	,04*
	Other	32	2,57	1,27			
RRPC	PESC	206	2,34	1,03	236	-2,140	,03*
	Other	32	2,77	1,09			
ARAI Total	PESC	206	2,23	0,95	236	-2,325	,02*
	Other	32	2,66	1,03			

*p<0.05, Group Environment Questionnaire (GEQ), Group İntegration-Task (ARAI), Group İntegration-Social (GİS), İndividual Attractions to Group-Task (IAGT), İndividual Attractions to Group-Social (IAGS), Athletes' Role Ambiguity Inventory (ARAI) Knowing What the Role Requires (KWRR), Role Responsibility and Performance Criteria (RRPC).

The t-test findings according to the GEQ total and sub-dimension scores of the participants according to the variable of "reading department" are shown below (Table 3). As can be seen in the table below, the athletes' total GEQ [$t_{(236)}$=0.063, p>0.05], GİT [$t_{(236)}$=-1.449, p>0.05], GİS [$t_{(236)}$=-0.091, p>0.05], IAGT [$t_{(236)}$=0.990, p>0.05] and IAGS [$t_{(236)}$=0.728, p>0.05] dimensions did not show a significant difference depending on the department they read; ARAI levels were in the total [$t_{(236)}$=-2.325, p<0.05] and KWRR [$t_{(236)}$=-2.008, p<0.05], RRPC [$t_{(236)}$=-2.140, p<0.05] dimensions. differed significantly depending on the variable. According to these findings, it was concluded that the students who do sports at the university have less role ambiguity than those who study in physical education and sports colleges (PESC) than those who study in other departments.

After the analysis, one-way ANOVA results show that the main effect of the variable of years of doing sports on the GEQ and ARAI total and sub-factor scores of the athletes did not differ (Table 4).

Table 4. ANOVA Results of GEQ and ARAI Scores by Years of Sport Variable

GEQ	Sports Year	n	$\bar{x}$	Ss	Sd	F	p	Difference
GİT	0-2	31	6,16	1,42	3-234	,755	,52	-
	3-5	44	6,23	1,27				-
	6-8	82	6,03	1,37				-
	8 +	81	6,33	1,28				-
GİS	0-2	31	5,94	1,73	3-234	,659	,57	-
	3-5	44	6,15	1,76				-
	6-8	82	5,67	1,86				-
	8 +	81	5,92	2,06				-
IAGT	0-2	31	5,85	1,08	3-234	,339	,79	-
	3-5	44	5,60	1,30				-
	6-8	82	5,78	1,27				-
	8 +	81	5,82	1,30				-
IAGS	0-2	31	6,24	1,71	3-234	,453	,71	-
	3-5	44	5,96	1,54				-
	6-8	82	6,21	1,56				-
	8 +	81	6,30	1,52				-
GEQ Total	0-2	31	6,06	1,13	3-234	,477	,69	-
	3-5	44	6,00	1,14				-
	6-8	82	5,94	1,05				-
	8 +	80	6,14	1,07				-
ARAI	**Sports Year**	**N**	$\bar{x}$	**Ss**	**Sd**	**F**	**p**	**Difference**
KWRR	0-2	31	2,05	0,97	3-234	,340	,79	-
	3-5	44	2,29	1,05				-
	6-8	82	2,16	1,01				-
	8 +	81	2,25	1,34				-
RRPC	0-2	31	2,58	0,99	3-234	1,490	,21	-
	3-5	44	2,63	1,00				-
	6-8	82	2,33	1,03				-
	8 +	81	2,28	1,08				-
ARAI Total	0-2	31	2,28	0,85	3-234	,443	,72	-
	3-5	44	2,44	0,90				-
	6-8	82	2,23	0,92				-
	8 +	81	2,26	1,11				-

Group Environment Questionnaire (GEQ), Group İntegration-Task (ARAI), Group İntegration-Social (GİS), İndividual Attractions to Group-Task (IAGT), İndividual Attractions to Group-Social (IAGS), Athletes' Role Ambiguity Inventory (ARAI) Knowing What the Role Requires (KWRR), Role Responsibility and Performance Criteria (RRPC).

The t-test findings according to the total and sub-dimension scores of the participants according to the "year of playing in the same team" variable is shown below (Table 5). As can be seen in the table below, the athletes' GEQ total [t(236)=0.108, p>0.05], GİT [t(236)=0.983, p>0.05], GİS [t(236)=-0.306, p>0.05], IAGT [t(236)=0.789, p>0.05] and IAGS [t(236)=-0.118, p>0.05] No significant difference was found in the dimensions of depending on the variable of playing for the same team. While ARAI levels differed significantly in total [t(236)=-1.986, p<0.05] and RRPC [t(236)=-1.999, p<0.05] dimensions depending on the variable of playing in the same team; No differentiation was found in KWRR [t(236)=-1.599, p>0.05] dimension. According to these findings, it was seen that students who do sports at the university have more role ambiguity than those who have fewer sports years (1-5 years) with the team than those who have longer sports years (6 years and above).

Table 5. GEQ and ARAI t-test Results by Years of Playing in the Same Team Variable

GEQ	Year of playing in the team	n	$\bar{x}$	Ss	sd	t	p
GİT	1-5	204	6,22	1,34	236	,983	,32
	6 and above	34	5,98	1,23			
GİS	1-5	204	5,87	1,89	236	-,306	,76
	6 and above	34	5,97	1,95			
IAGT	1-5	204	5,80	1,19	236	,789	,43
	6 and above	34	5,61	1,61			
IAGS	1-5	204	6,19	1,55	236	-,118	,90
	6 and above	34	6,22	1,66			
ARAI Total	1-5	204	6,04	1,05	236	,108	,91
	6 and above	33	6,02	1,28			
ARAI	**Year of playing in the team**	**n**	$\bar{x}$	**Ss**	**sd**	**t**	**p**
KWRR	1-5	204	2,49	1,10	236	-1,599	,11
	6 and above	34	2,15	1,31			
RRPC	1-5	204	2,73	1,02	236	-1,999	,04*
	6 and above	34	2,34	1,12			
ARAI Total	1-5	204	2,59	0,95	236	-1,986	,04*
	6 and above	34	2,23	1,08			

*p<0.05, Group Environment Questionnaire (GEQ), Group İntegration-Task (ARAI), Group İntegration-Social (GİS), İndividual Attractions to Group-Task (IAGT), İndividual Attractions to Group-Social (IAGS), Athletes' Role Ambiguity Inventory (ARAI) Knowing What the Role Requires (KWRR), Role Responsibility and Performance Criteria (RRPC).

After the analysis, one-way ANOVA results show that the main effect of the sport branch variable on the GEQ and ARAI total and sub-factor scores of the athletes did not differ (Table 6).

Table 6. GEQ and ARAI Scores ANOVA Results by Sports Branch Variable

GEQ	Branch	n	$\bar{x}$	Ss	Sd	F	p	Difference
GİT	Handball	140	6,08	1,39	3-235	1,922	,149	-
	Volleyball	63	6,46	1,15				-
	Football	36	6,09	1,28				-
GİS	Handball	140	5,73	1,99	3-235	1,318	,270	-
	Volleyball	63	6,18	1,55				-
	Football	36	5,98	2,07				-
IAGT	Handball	140	5,90	1,26	3-235	2,312	,101	-
	Volleyball	63	5,50	1,15				-
	Football	36	5,75	1,47				-
IAGS	Handball	140	6,27	1,53	3-235	,605	,547	-

	Volleyball	63	6,14	1,64				-
	Football	36	5,92	1,53				-
	Handball	140	6,01	1,10				-
GEQ Total	Volleyball	63	6,09	1,01	3-235	,129	,879	-
	Football	36	6,01	1,19				-
ARAI	**Branch**	**n**	**$\bar{X}$**	**Ss**	**Sd**	**F**	**p**	**Difference**
	Handball	140	2,13	1,11				-
KWRR	Volleyball	63	2,24	1,11	3-235	1,454	,236	-
	Football	36	2,54	1,29				-
	Handball	140	2,36	1,00				-
RRPC	Volleyball	63	2,52	1,11	3-235	,578	,562	-
	Football	36	2,33	1,13				-
	Handball	140	2,23	0,96				-
ARAI Total	Volleyball	63	2,36	0,95	3-235	,803	,449	-
	Football	36	2,45	1,13				-

Group Environment Questionnaire (GEQ), Group İntegration-Task (ARAI), Group İntegration-Social (GİS), İndividual Attractions to Group-Task (IAGT), İndividual Attractions to Group-Social (IAGS), Athletes' Role Ambiguity Inventory (ARAI) Knowing What the Role Requires (KWRR), Role Responsibility and Performance Criteria (RRPC).

Table 7 presents the results of the Pearson Correlation test performed to examine the relationship between GEQ and ARAI. As can be seen from Table 9, the correlation analysis between GEQ and ARAI reveals a significant, negative, moderate relationship between team cohesion and role ambiguity [r=-0.32, p=0.00].

Table 7. Correlation Results Between GEQ and ARAI

	GEQ		
	N	**r**	**p**
ARAI	238	-,319	0.00**

**p<0.01 [Group Environment Questionnaire (GEQ), Athletes' Role Ambiguity Inventory (ARAI)]

DISCUSSION

It was determined that university students' GEQ scores were above the average, and their ARAI scores were below the average. In other words, it can be said that the level of the team unity of the athletes is good, and the role ambiguities are low. In the study conducted by Çepikkurt and Pehlevan (2018) with female basketball players, it was stated that the basketball player participants perceived the social and task-oriented integrity of the team in a significantly positive way. In addition, it was stated that female basketball players have an opinion about the responsibilities of their own roles and the performance on which their performance is evaluated, but they have more limited information about the requirements of the role (Çepikkurt and Pehlevan, 2018). In the current study, it is considered as a natural result that the team unity scores above the average and the perceptions of role ambiguity are below the average. The participants showed that knowing the roles correctly in the teams had a positive effect on the team unity of the participants. These results can be interpreted as the participants who understand the responsibilities of the roles and performance evaluation have high perceptions of team cohesion, namely task integrity and social integrity.

It was determined that the group attractiveness-task scores of the gender-related men were higher than the women and differed significantly. It was concluded that GEQ and ARAI total and other factor scores were similar depending on gender. In other words, it can be said that being a woman or a man does not have an effect on GEQ and ARAI total and other factor scores. In the study of Aydın and Burmaoğlu (2018) with volleyball players between the ages of 15-18, it was stated that male participants experienced more role confusion in the same direction as the research findings. Çepikkurt and Pehlevan (2018), on the other hand, stated that female basketball players have problems in

knowing the requirements of the role in their study only with female basketball participants. In a different study, it is stated that gender does not have an effect on role ambiguity (Çankaya et al., 2021). When the studies on team collaboration are examined; Görgüt (2017) found a significant relationship in favor of female participants in all dimensions in his study with handball players. Soyer et al., (2010) similarly found significant differences in favor of women in their study. In the study of Molla, Öncen, Aydın (2019), a significant difference was found in favor of female participants in the Social Integrity of the Group sub-dimension, which defines the development and maintenance of social relations within the group, and no significant difference was found in other dimensions. It is predicted that the difference between the research findings and the literature may be due to different study groups and studies in different branches.

The department he studied did not have a main effect on the participants' GEQ and sub-factor scores; However, it was determined that those who read other departments on role ambiguity fell more into role ambiguity than those who read PESC. The reason for this situation may be that the athletes trained in the physical education and sports education program are more experienced and carry out their education in the field of sports. Similar to the research findings, Molla, Öncen, Aydın (2019) investigated the team unity of the athletes who go to sports schools and play in school teams, and concluded that the players who go to sports schools show higher team unity. No study evaluating this variable on this subject has been found in the literature. It is thought that by considering this variable, studies on these subjects will contribute to the literature.

When the findings were evaluated in terms of years of doing sports and sports branch, it was determined that the total and sub-factor scores of GEQ and ARAI were similar, in other words, the sports branch and the time spent with sports did not have an effect on team unity or role ambiguity in the team. Çankaya et al. (2021), in their study with athletes who play team sports, concluded that volleyball players experience more role ambiguity than soccer and handball players. In the literature on team cohesion, Dorak and Vurgun (2006) stated that in their study on team cohesion in team sports, participants with fewer years of playing sports showed higher team cohesion. In the study of Görgüt (2017) with handball players, it was stated that in the "Group Integrity Social" sub-factor, those who do sports for 4-7 years show higher team unity than those who do 11 or more. He attributed the result of this situation to age and stated that it may be due to the increase in the sense of independence as age progresses (Görgüt, 2017). The research conducted by Dorak and Vurgun (2006) showed that team unity varies according to different sports branches. It has been determined that volleyball players have higher team unity scores compared to handball players, football players compared to handball and basketball players. Similarly, in the study of Moralı (1994), it was stated that the ratio of football players to handball players had a higher level of team unity. It can be thought that the time spent with the same team rather than the year of doing sports may have an effect on the team unity, as the result of the current research is meaningless.

When considered in terms of the variable of years of playing in the same team, it was determined that those who played in the same team for 1-5 years in the ARAI total and RRPC sub-dimension experienced higher role ambiguity than those who played 6 or more in the same team. The year of playing in the same team did not affect the team unity. In the literature, Eys et al., (2003) investigated how group cohesion and role ambiguities changed throughout the season and whether they were related to experience; investigated their perceptions of role uncertainty during the season between experienced and inexperienced athletes. In their research, it was stated that experienced athletes exhibit a low level of role ambiguity perception compared to new players, as they have more experience in fulfilling their responsibilities regarding their duties during competitions and matches at the beginning of the season. However, it was emphasized that this difference decreased towards the end of the season and eventually disappeared. This finding, which emerged in the study of Eys et al., (2003), is important in terms of giving an idea that the perception of role ambiguity may change depending on the experience, the time worked with the team and the leader. This finding obtained in the study by Eys et al., (2003) provides important clues that the perception of role ambiguity may differ depending on experience and time spent with the team. If the effect of playing in the same team on team unity is interpreted, it can be said that

team unity may differ between seasons and years. In this sense, longitudinal studies may yield more effective results.

When the relationship between GEQ and ARAI was examined, a negative significant relationship was revealed between role ambiguity and team cohesion. In other words, as team cohesion increases, role ambiguity decreases, and as role ambiguity increases, team cohesion decreases. These results show that other studies revealing the balance between role ambiguity and group cohesion are largely in a similar line (Bosselut et al., 2010b; Bosselut et al., 2010a; Eys and Carron, 2001; Mellalieu and Juiper, 2006).

Eys and Carron (2001) in their study with university-educated basketball players stated that all sub-components of role ambiguity are basketball players' perceptions of task proficiency and negativity in task integrity. Bosselut et al., (2010b) and Bosselut et al., (2010a) examined the relationship between role ambiguity and group cohesion in their study on rugby players and football players, respectively, and emphasized that there was a negative relationship between role ambiguity and task integrity. These studies concluded that athletes who perceive low role ambiguity in teams perceive task integrity at a high level. Mellalieu and Juiper (2006) conducted a study using the method of interviewing football players. In their research, they emphasized that positive perceptions of role openness and role acceptance increase their perceptions of task competence and task integrity. Additionally, they stressed that such perceptions also contribute to reducing competitive anxiety, ultimately positively impacting both individual and group psychological well-being. These findings in the literature, besides supporting the current research results, are also considered important in terms of understanding role ambiguity and team cohesion. This finding emphasizes that reducing role ambiguity and strengthening team cohesion are increased for sports teams to be successful. Researchers such as Beauchamp and Bray (2001), Eys et al., (2003a), also emphasized the duration of the uncertainty of the role of athletes on team dynamics. This finding supported that especially the negative relationships between teams' unity and role ambiguities, it is important for the athletes to clarify their roles in the team and to understand the expectations from the perspective of team harmony and cooperation.

As a result, it was concluded that the class, the year of doing sports, and the sports branch did not affect the team unity of the athletes playing in the sports teams and the role uncertainties experienced in the team. It was concluded that male participants had higher group attractiveness-task perceptions. It has been observed that those who study PESC experience less role ambiguity than students who study in other departments. Another important result is that role ambiguities affect team cohesion, as team cohesion increases, role ambiguity decreases, and as role ambiguity increases, team cohesion decreases. In short, it shows that for sports teams to perform effectively and achieve success, it is necessary not only to work physically, but also to have a clear understanding of the roles and responsibilities of team members. In addition, considering the decrease in team unity when athletes experience the uncertainty of their roles, team managers need to communicate their role definitions clearly and clearly, ensure that the athletes understand their performance, and thus increase team collaboration.

Considering the research findings and theoretical explanations regarding role ambiguity, it can be suggested that clear and clear distribution of team roles, ensuring that performance criteria are well known and accepted by all players, and making role requirements transparent to players can contribute to development. This may allow positive perception of the task and social harmony within the team. The current research was carried out only with the students who took part in team sports at Gümüşhane University. Studies to be carried out by increasing the sample group can make important contributions to the literature. Considering the direction of the relationship between role ambiguity and team cohesion, future studies that will include different variables mediating this relationship can add a different dimension to research. Considering that team unity may change over time (during the season) and the roles of the undertaker may differ over time, it is anticipated that lonARAIudinal studies in this area are important.

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Conflict of Interest

No conflict of interest is declared by the authors. In addition, no financial support was received.

Ethics Committee

Ethics of Research; In order to start the data collection process of the research, an ethical approval report was obtained from the "Gümüşhane University Scientific Research and Publication Ethics Committee" (14.06.2023, article no: E-95674917-108.99-182130).

Author Contributions

Study Design, MBS; Data Collection, MBS, ET; Statistical Analysis, AYA, MUT; Data Interpretation, MBS, ET, AYA; Manuscript Preparation, AYA, MUT; Literature Search, MBS, AYA. The published version of the manuscript has been read and approved by all authors.

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RESEARCH ARTICLE

Investigation of the Effect of Playing Sports on Social Appearance Anxiety

Zeynep Senem SÖYLEYİCİ ÖCAL[1*] and Recep Fatih KAYHAN[2]

[1]Suleyman Demirel University, Faculty of Sports Sciences, Department of Coaching Education, Isparta / Turkey
[2]Marmara University, Faculty of Sports Sciences, Department of Coaching Education, İstanbul / Turkey
*Correspondingauthor: zeynepsoyleyici@sdu.edu.tr

Abstract
Social appearance anxiety plays a key role in the field of physical-sports and the mental image people have of themselves. In this respect, this study reflects the objectives of (a) determining the factors affecting social appearance anxiety and (b) testing whether physical activity is a significant determinant of social appearance anxiety. For this purpose, a quantitative study was conducted on a sample of 250 participants; %54 male and %46 female.The tool used is the Turkish version of the "Social Appearance Anxiety Scale". There was a significant difference between social appearance anxiety levels in terms of gender($p<0.05$). There was difference between social appearance anxiety levels in terms of doing sport and working status($p<0.05$). The results show that those who do sports, women, unemployed, dissatisfied with their height and weight have higher levels of appearance anxiety. In conclusion, body dissatisfaction and attitudes towards appearance are important determinants of appearance anxiety risk among both genders and whether or not they do sports.

Keywords
Anxiety, Social Cohesion, Body Image

INTRODUCTION

Social anxiety is a cognitive-emotional state that an individual experiences when he wants to make a certain impression on others but is not sure that he will succeed (Czekierda et al., 2017; Leary and Kowalski, 1995). Low levels of social anxiety may affect the exercise experience due to its negative impact on enjoyment or motivation, while higher levels may prevent people from exercising (Vani et al., 2021). Considering the possible negative effects of social anxiety in practice, it is important to investigate the factors that may affect these cognitive-emotional states. One of the factors shown to be associated with social anxiety is apparent anxiety (Dimmock et al., 2020)

Physical Activity/Sports

Exercising the importance of physical activity for a healthy, happy and productive life is undeniable. Physical activity affects physical, cognitive and mental health at every stage of our lives (Rebelo et al., 2018). In addition, one of the most effective methods to promote a healthy society and reduce the prevalence of chronic diseases is movement (Yıldırım et al., 2019). The American Sports Medicine Association and the American Heart Association define exercise as a drug used in the treatment and prevention of chronic diseases. It has been shown that regular physical activity reduces the incidence of many cancers, especially colon and breast cancer, by -50% (Booth, 2002; Newton, 2008). Physical activity in combination with pharmacotherapy has also been found to have many beneficial effects in relieving motor and non-motor symptoms in patients with Parkinson's disease. For example, recent research highlights that post-diagnosis exercise prescriptions can improve

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[1]**ORCID:** 0000-0002-9783-1665 , [2]**ORCID:** 0000-0002-1022-2892

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neurophysiological processes and slow the progression of symptoms (Ramaswamy, 2018). One of the health effects of exercise is that it improves mental health. The impact of physical activity on psychology has been examined by many researchers and exercise increases self-confidence, copes with stress, can express oneself comfortably in a new environment, improves self-confidence and emotional states, and increases vitality (Korkmaz and Uslu, 2020). Regular and moderate exercise neutralizes stress hormones and activates endorphins, known as the happiness hormone, which increases one's sense of happiness and energy. This shows us that sports and various activities relax individuals and provide them both happiness and vitality (Herring et al., 2021). Among all these psychological factors, the perception of social appearance is thought to be directly related to physical activity due to its effect on physical appearance. In the literature, it is stated that physical activity plays an important role in the formation of body image perception (González et al., 2017). Thus, it can be said that the physical and mental benefits obtained from sports activities are important in the formation of this perception and it enables individuals to be more at peace with themselves (Sabiston et al., 2019).

Social Appearance Anxiety

Social Appearance Anxiety The coping strategies that young people apply regarding their body image and social anxiety are among the main factors that directly affect both their identity development and their close relationships (Mooney et al., 2017; Traş et al., 2019). Social anxiety is mainly related to a lack of confidence in one's appearance and a desire to make a positive impression on others (Weinstein et al., 2015). Social appearance anxiety is a type of anxiety defined as the fear of being judged or rejected by others because of one's physical appearance (Claes et al., 2012; Sar, 2018). People with social appearance anxiety generally have a negative perception of their body and appearance (Aslan and Tolan, 2022; Fardouly and Vartanian, 2016) and often try to hide their unpleasant features or body parts (Fardouly and Vartanian, 2016). As well as, they prefer minimal physical contact and instead use online communication, which involves less exposure and also provides an easier way to manipulate their image and promotion (Weinstein et al., 2015). Anxiety about social appearance can lead to a strong desire to be invisible, and fear of being excluded due to appearance can exacerbate the feeling of loneliness (Park, 2007). People with severe social appearance anxiety seek socially revealing interactions to avoid this anxiety, which leads them to a sedentary lifestyle (Papapanou et al., 2023). As a result, it is seen that individuals' social appearance anxiety is directly related to their physical appearance (Cash and Fleming, 2002). In addition, individuals' beliefs and perceptions about the participation of others are also important in this evaluation (Leary and Kowalski, 1995).

Physical Activity and Social Appearance Anxiety: Related Factors

Physical activity and social aspect. Anxiety: Related factors Social appearance anxiety can be evaluated as a result of negative body image of the individual's body and appearance (Claes et al., 2012). According to researchers, social appearance anxiety occurs as a result of social and physical anxiety. Therefore, it manifests itself as a negative image of the person's body and appearance (Hart et al., 2008). Hart et al., (2008) state that the concept of social appearance anxiety has a significant relationship with factors such as skin color and face shape, as well as general physical appearance such as height, weight and muscle structure. In order to achieve a better appearance in society, an ideal "perfect" body is associated with success (Mooney et al., 2017). This preoccupation with physical appearance has led not only to the objectification of the human body, but also to the emergence of various appearance-related disorders. This is also confirmed by the increase in publications on body image and anxiety disorders over the past three decades (Al-Saaraf et al., 2018; Brennan et al., 2013; Buhlmann et al., 2010). This phenomenon has been associated with the idea of exercising to improve body image, rather than being motivated by increased desire for health and wellness. Although this phenomenon is not fully understood, preliminary evidence suggests that obsession with physical appearance may represent a continuum from healthy behaviors to psychopathological symptoms associated with various forms of anxiety (Al-Saaraf et al., 2018; Beucke et al., 2016; Murray et al., 2012; Sandgren and Lavallee, 2018). Although both men and women have similar perceptions of physical attractiveness as a function of appearance anxiety levels, this anxiety is important for women who experience appearance anxiety more frequently than men (Dakanalis et al., 2016). The ideal body

image of people who exercise for appearance should be muscular and "V" shaped for men and thin for women (Hall et al., 2016; Ricciardelli et al., 2010). Social appearance anxiety also plays a crucial role for young people who are typically interested in mentalizing their changing bodies, but particularly interested in online relationships where body image sharing is a priority (Boursier and Manna, 2019; Franchina et al. Lo Coco, 2018; Pelosi et al. ., 2014; Stefanone et al., 2011). Social appearance anxiety is a concept that researchers have recently explored regarding sports participation (Dumciene et al., 2015; Eriksson et al., 2008). Studies in exercise psychology clearly show the positive effects of participation in regular physical activity on physical and psychological health (Dishman and Jackson, 2000; Paluska and Schwenk, 2000). Studies focusing especially on the effects of physical exercise on a number of psychological variables such as anxiety, self-esteem, self-efficacy, body image and happiness have shown that participation in regular physical activity can have a direct positive effect on psychological variables (Emeljanovas and Hraski, 2014; Mikkelsen et al., 2010; Ströhle, 2009).

Based on the relationships described above, a model was constructed that could help explain the relationships between athletic status and various variables and social appearance anxiety.

• H1: Participation in sports affects social anxiety.

• H2: Social appearance anxiety differs according to gender.

• H3: Concerns about social appearance vary with height and weight.

• H4: Concern about social appearance varies by job type.

Present Study

The dissatisfaction with the physical appearance of the person stems from the difference between the required weight and the current weight. However, in addition to positive or negative thoughts about a person's physical appearance, his current weight is also an important factor in the emergence of dissatisfaction with his body (Potter et al., 2004). Social appearance anxiety refers to the state of anxiety that a person feels when judged by others (Çınar and Keskin, 2015). They are concerned with self-esteem as well as how others see them. While this importance is natural, social anxiety occurs when they prioritize, organize and worry about their lives. Since it provides physical change, it can be said that physical activity can effectively reduce the social aspect of people's anxiety. This has also been proven by the above studies. In addition, the same studies revealed that regular physical activity, which has positive effects on health, reduces the risk of anxiety disorders and depression in relation to mental health and social development. The fact that social appearance anxiety has a negative effect on people's health and determining the factors affecting social appearance anxiety is important for our research. Therefore, this study has a unique value in terms of elucidating the factors affecting social appearance anxiety and providing an up-to-date resource to the literature. In addition, a comprehensive determination of social appearance anxiety in a selected sample is important in terms of guiding educators in reducing serious mental and physical health problems. Based on the aforementioned literature, this study evaluated the predictive role of variables in social appearance anxiety and drew attention to possible differences between physical activity and gender. Therefore, this article has two purposes: (1) to determine the factors affecting social appearance anxiety and (2) to test whether physical activity is a significant predictor of social appearance anxiety.

MATERIALS AND METHODS

Research Model

Study design Quantitative descriptive method was used in the preparation of the research plan. It is research that presents facts and events in an observable, measurable and numerical way by objectifying them. The purpose of quantitative research is to objectively measure the social behaviors of individuals through observation, experiment and test and to explain them with numerical data (Kanatsız and Gökçe, 2020).

The study was approved by the Recep Tayyip Erdogan University Social and Human Sciences Ethics Committee (number: 2023/227, Date: 25/08/2023).

Research Group

Research group The number of samples included in the study was determined by G-Power analysis based on the study of Alemdağ and Öncü (2015), and it was found that minimum 170 participants were reliable. 250 volunteers, 125 women and 125 men, randomly participated in the study. 125 of the participants are active athletes

and 125 of them are non-athletes. Before filling out the questionnaire, all individuals were informed about the purpose and subject of the questionnaire and their consent was obtained.

Data Collection Tools

Personal Information Form

In the data form, questions were asked to obtain information about the individual's gender, employment status, sports status, how many times a week he did sports, and weight-height satisfaction.

Social Appearance Anxiety Scale

In the information questionnaire, information such as gender, job, sports, number of exercises, and satisfaction with weight and height were requested. Social Appearance Anxiety Scale (SSI): The Social Appearance Anxiety Scale (SSAS) was used to determine the social appearance anxiety level of individuals. Hart et al. (2008) and Doğan (2011) translated into Turkish, "Social Appearance Anxiety Scale (SSAS)" consists of 16 items and is scored on a 5-point Likert scale. The first item of the scale was reverse coded. As the average score obtained from the scale increases, the level of anxiety also increases. The Cronbach Alpha internal consistency coefficient of the scale, which was calculated based on the data collected within the scope of this study, is 0.85.

Analysis of Data

The obtained data were analyzed using SPSS 22 package program. As a result of the analysis, firstly percentage (%) and frequency (f) values were calculated. Normality tests of the Social Appearance Anxiety Level scale revealed that the distribution was not normal. For this reason, in the analysis of the scores obtained from the scales, Mann-Whitney U tests were used for demographic questions with two options and Kruskal Wallis tests were used for questions with more than two options. The post-toc test was used to understand the reason for the difference in the findings that showed a significant difference according to the Kruskal Wallis test results, and the averages were indicated by the star method.

RESULTS

References, tables, figures to be used must be prepared in accordance with APA 6. Articles that do not comply with the rules of writing and APA are eliminated in the first stage by the editor. You should review your references and check their compliance with APA 6. Tables must be cited in the text together with the table number as “Table 1”.

Table 1. Demographic distribution of the group participating in the study

Variables		n	%
Gender	Woman	115	46,00
	Male	135	54,00
Working Status	He/She is at work.	116	46,40
	He/She it is not working	134	53,60
Doing Sports Status	Yes I do	125	50,00
	I don't	125	50,00
Frequency of Doing Sports	I don't	125	50,00
	1-3 days	68	27,00
	4-6 days	57	23,00
Body Weight Satisfaction	I am very satisfied	30	12,00
	I am satisfied	97	38,80
	I am undecided	61	24,40
	I am not satisfied	47	18,80
	I am not satisfied at all	15	6,00
Height Satisfaction	I am very satisfied	36	14,40
	I am satisfied	116	46,40
	I am undecided	43	17,20
	I am not satisfied	46	18,40
	I am not satisfied at all	9	3,60

Table 2. Social appearance anxiety scores of the participants by gender

Gender	N	Min	Max	M ± SS	Rank M	U	Z	P
Woman	115	16	76	28,00±10,90	138,01	6323.5	-2.529	**.011***
Male	135	16	63	25,20±8,60	114,84			

***p<0.05, n:** Number of people, **Min:** Minimum, **Max:** Maximum, **M:** Mean, **SD:** Standard deviation

Table 3. Social appearance anxiety scores of the participants according to the factor of working status

Working Status	N	Min	Max	M ± SS	Rank M	U	Z	P
He/She is at work.	116	16	56	24,60±7,60	112,71	6285.5	-2.606	**.009***
He/She it is not working	134	16	76	28,30±11,20	136,54			

***p<0.05, n:** Number of people, **Min:** Minimum, **Max:** Maximum, **M:** Mean, **SD:** Standard deviation

Table 4. Social appearance anxiety scores of the participants according to the factor of doing sports

Doing Sports Status	N	Min	Max	M ± SS	Rank M	U	Z	P
Yes I do	125	16	76	28,80±9,30	124,76	7354	-.803	**.014***
I don't	125	16	54	26,40±8,20	115,25			

***p<0.05, n:** Number of people, **Min:** Minimum, **Max:** Maximum, **M:** Mean, **SD:** Standard deviation

Table 5. Social appearance anxiety scores according to the factor of the number of days the participants did sports

Frequency of Doing Sports	N	Min	Max	M ± SS	Rank M	P	Difference
(1) I don't	125	16	54	26,40±8,20	115,17		
(2) 1-3 days	68	16	63	27,80±9,60	120,27	**.027***	**3>1, 3>2, 2>1**
(3) 4-6 days	57	16	76	29,80±11,01	129,25		

***p<0.05, n:** Number of people, **Min:** Minimum, **Max:** Maximum, **M:** Mean, **SD:** Standard deviation

Table 6. Social appearance anxiety scores of participants according to body weight satisfaction factor

Body Weight Satisfaction	N	Min	Max	M ± SS	Rank M	P	Difference
(1) I am very satisfied	30	16	43	22,80±6,70	93,88	**.000***	5>1, 5>2, 5>3, 5>4 4>1, 4>2, 3>1, 3>2
(2) I am satisfied	97	16	56	24,20±7,40	109,18		
(3) I am undecided	61	16	48	26,90±8,80	131,08		
(4) I am not satisfied	47	17	64	28,80±9,00	149,48		
(5) I am not satisfied at all	15	18	76	42,00±17,50	196,43		

***p<0.05, n:** Number of people, **Min:** Minimum, **Max:** Maximum, **M:** Mean, **SD:** Standard deviation

Table 7. Social appearance anxiety scores of the participants according to the height satisfaction factor

Height Satisfaction	N	Min	Max	M ± SS	Rank M	P	Difference
(1) I am very satisfied	36	16	76	25,80±11,50	111,85	**.019***	5>1, 5>2, 5>3, 5>4 4>1, 4>2, 3>1, 3>2
(2) I am satisfied	116	16	65	25,10±8,90	115,00		
(3) I am undecided	43	16	51	27,40±8,90	135,99		
(4) I am not satisfied	46	16	47	27,90±8,20	142,85		
(5) I am not satisfied at all	9	19	63	38,30±17,10	176,72		

***p<0.05, n:** Number of people, **Min:** Minimum, **Max:** Maximum, **M:** Mean, **SD:** Standard deviation

DISCUSSION

This study examines the relationship between sports participation and social appearance anxiety and provides evidence that body dissatisfaction and appearance attitudes are risk factors for men and women. It was determined that the social appearance anxiety levels of the participants differed according to gender, and the social appearance anxiety of women was higher than that of men. Although there are mixed results on this subject in the literature, the general opinion is that women are more obsessed with their appearance than men (Martins et al., 2007). Many studies show that body dissatisfaction symptoms vary according to gender (Beren et al., 1996; Martins et al., 2007) and acknowledge that gender is an important factor in body dissatisfaction in men and women (Mccabe and Ricciardelli, 2004). A significant number of these studies (Dakanalis et al., 2016; Fairburn et al., 2003; Jones et al., 2004) argue that women value body image more than men and that women are more dissatisfied with their bodies than men. Therefore, although both men and women have similar perceptions of physical attractiveness as a function of their level of appearance anxiety, this anxiety is an important problem for women who experience appearance anxiety more frequently than men (Dakanalis et al., 2016; Martins et al., 2007). Although the effects of body image satisfaction/dissatisfaction are similar in men and women, there are significant differences between the two genders in terms of body image ideals. For example, it is important for women to have positive feelings about weakness (Ahern et al., 2008; Fairburn et al., 2003; Thompson et al., 2004). For men, muscular strength is the biggest concern regarding body image (Edwards and Laudner, 2000; Mayville et al., 2002). Therefore, when women try to slim their appearance, men tend to increase their fat mass (Harvey and Robinson, 2003).

There are other studies with mixed results suggesting that gender differences are much more complex than previous studies suggest (McCabe and Ricciardelli, 2004; Myers et al., 2012). Although it has been reported that men have less fear and related negative affect, men may have a desire to be heavier and more masculine as well as a desire to be weaker and weaker (Leeper Piquero et al., 2010; Parent et al., 2013; Turel et al., 2018). However, the creation of the ideal muscular and fit body image for men has also changed the way men think about their bodies. This increased the incidence of male appearance dissatisfaction in studies (Fernandez-Aranda et al., 2009; Gadalla, 2009; O'dea and Abraham, 2002; Woodside et al., 2001). Therefore, we can conclude that although it is more common in women, social appearance anxiety, which is frequently seen in men and women, arises because people compare themselves with other men and women presented as cultural ideals. It was determined that the social appearance anxiety in the study group differed according to the profession, and the social appearance anxiety of the non-working participants was higher. In a study, it was found that the non-working group had lower body esteem and social appearance anxiety than the working group (Cengiz, 2022; Gümüş, 2022). It can be said that this may be due to the fact that people who do not have sufficient financial resources cannot make the desired investment in their external appearance and therefore experience anxiety when they evaluate their bodies negatively (Cengiz, 2022).

It was revealed that the social appearance anxiety of the group participating in the study differed according to the status of the athletes and the frequency of doing sports, and the appearance anxiety was higher in the athletes. This situation has been handled differently in the literature and the appearance anxiety of people who do not do sports has emerged as a phenomenon that needs to be discussed (Özpolat, 2020; Yaşartürk and Pekin, 2023). In fact, it is widely believed that most social people have marked anxiety. This creates a perception of appearance anxiety, as it encourages some people to exercise and transform their appearance into an ideal body image (Alemdağ and Öncü, 2015; Gadalla, 2009; Kalkavan et al., 2021). In our study, results supporting this view were also obtained. However, it has been found that creating an ideal body image increases exercise participation and appearance perception in athletes (Gadalla, 2009; O'dea and Abraham, 2002; Woodside et al., 2001). The perception that women's bodies are not weak and men's belief that their bodies are not sufficiently muscular or weak causes them to experience appearance problems, which causes them to participate more in sports (Olivardia, 2001; Olivardia et al., 2000; Pope et al., 2000). In addition, compensatory behaviors such as exercise are often characterized by distorted self-

image diagnosed in women (Pope et al., 2000; Olivardia, 2001).

It was determined that the social appearance concerns of the participants differed according to their satisfaction with their body weight, and those who were not satisfied with their body weight had high social appearance concerns. It was determined that as the satisfaction level of the study group with their body weight decreased, their social appearance anxiety increased. Accordingly, it has been found in the literature that people who are afraid of weight experience more social appearance anxiety (Cox, 2011). Deteriorated body image, unhealthy weight loss methods, mental health problems such as depression and anxiety are associated with body dissatisfaction (Bundros et al., 2016). And half of these individuals meet the criteria for anxiety disorder (Levinson and Rodebaugh, 2012). People who are dissatisfied with their appearance are more likely to experience social anxiety (Brosof and Levinson, 2017). Weight is seen as an external factor that can be compared with people in the social environment (Kayhan et al., 2021; Titchener and Wong, 2015). For example, it has been reported that women with high BMI are more likely to experience social appearance anxiety (Titchener and Wong, 2015). In addition, studies show that social appearance anxiety is a problem related to all body features (weight, hair, eyes, skin color, body type, etc.) (Amil and Bozgeyikli, 2015; White and Warren, 2014).

Similarly, body weight is accepted as the most important risk factor in increasing social appearance anxiety (Andreea-Elena, 2015; Bailey and Ricciardelli, 2010; Mastro et al., 2016; Titchener and Wong, 2015). In this context, weight-related prejudice and discrimination and social pressure to lose weight may explain the relationship with social appearance anxiety, since body weight is a feature that can be observed by others. It was determined that the social appearance anxiety of the study group differed according to their satisfaction with their height, and those who were not satisfied with their height had higher social appearance concerns. It was determined that as the height satisfaction rate of the study group decreased, social appearance concerns increased. Physical appearance is the first thing people notice and has a significant impact on social interactions. Being physically attractive and attached to high personal elements has become a cultural condition not only in Western culture but throughout the world. In a similar study, it was found that as people's height satisfaction increased, social appearance anxiety decreased (Cristiana, 2016). In this context, Hart et al. (2008) defined social appearance anxiety as focusing on one's appearance and fearing situations where others might negatively evaluate his or her appearance (body and face shape, height and weight). It has also been found that most of the women are not satisfied with their appearance because they have a negative attitude towards their weight and body shape (Rodin et al., 1984; Tantleff-Dunn et al., 2011). Other studies have revealed that men's desire to be tall and muscular leads to body dissatisfaction (Comte et al., 2015; Fernandez-Aranda et al., 2009; Leeper Piquero et al., 2010). Fear of social body image is considered within the framework of fear of social appearance, which is the fear of negative evaluation by others depending on the general appearance of the person (Hart et al., 2008). Social appearance anxiety encompasses a broader concept of physical appearance, ranging from general physical characteristics such as height, weight and muscle structure to personal characteristics such as skin color and face shape (Argon, 2014). Studies confirm that social appearance anxiety is a problem related to all body characteristics (weight, height, etc.) (Amil and Bozgeyikli, 2015; White and Warren, 2014). In this context, since the height of individuals is a comparable feature in the social environment, prejudice and discrimination due to social pressure may explain the relationship with fear of social appearance.

Lımıtatıons

More research is needed to understand the pressure men and women face to achieve their ideal body image to avoid apparent anxiety. Future research will benefit from using factors such as body composition to provide a more comprehensive understanding of body image issues. It may also be helpful to use scales that evaluate aspects of anxiety-provoking situations. Considering the presence of social appearance anxiety in our research group, other psychological factors such as internet addiction, social media, career stress, and job burnout that may affect the level of social anxiety in sedentary and active participants can also be investigated. Similar studies can be conducted with different sample groups (children, young people, etc.) in order to

examine the effects of developmental periods on social appearance anxiety levels.

Conclusion

This study contributes to a better understanding of the risk of appearance anxiety in sedentary and athletic individuals and its relationship to appearance concerns such as gender, employment status, height and weight. Although both men and women have body dissatisfaction and attitudes about appearance, it was determined that the risk of performance anxiety was higher in women. The comparison between men and women broadens our view that appearance anxiety is not just a female issue, but can also affect a significant number of men. Concerns about social appearance were a risk factor for those who did not work. It can be argued that this situation stems from the effect of economic opportunities on the external image. Our research shows that appearance anxiety is effective in a group of athletes. As athletes are subject to specifically defined standards of physical condition and performance, this population is expected to be concerned about their appearance. In addition, it was determined that dissatisfaction with appearance occurred in groups who were not satisfied with their weight and height. Since these two factors are used to describe and compare individuals in the society, dissatisfaction may arise when people are not at peace with themselves. In summary, body dissatisfaction and perceived attitudes were significant predictors of appearance anxiety and whether or not they were involved in sports in both genders.

Conflict of Interest

No conflict of interest is declared by the authors. In addition, no financial support was received.

Ethics Committee

The study was approved by the Recep Tayyip Erdogan University Social and Human Sciences Ethics Committee (number: 2023/227, Date: 25/08/2023).

Author Contributions

Study Design, ZSSÖ; Data Collection, ZSSÖ, RFK; Statistical Analysis, ZSSÖ, RFK; Data Interpretation, ZSSÖ, RFK; Manuscript Preparation, ZSSÖ; Literature Search, RFK. The published version of the manuscript has been read and approved by all authors.

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RESEARCH ARTICLE

Investigation of Basic Psychological Needs in Physically Disabled Athletes

Fatih AĞDUMAN[1*] and Sonay Serpil DAŞKESEN[2]

[1]Ataturk University, Faculty of Sports Sciences, Recreation Department, Erzurum / Turkiye
[2]Ataturk University, Kâzim Karabekir Faculty of Education, Department of Physical Education and Sports, Erzurum /Turkiye
*Corresponding author: f.agduman@atauni.edu.tr

Abstract
Basic psychological needs are fundamental elements that influence individuals' motivation, performance, and overall well-being. These needs reside at the core of human behavior and constitute factors that determine individuals' psychological health and satisfaction. The purpose of this study is to examine the satisfaction and frustration of basic psychological needs among physically disabled athletes across various variables. A total of 128 athletes, including 68 males and 60 females in sitting volleyball and wheelchair basketball participated in the research. In the current study, to assess the satisfaction and frustration of basic psychological needs, the 'Psychological Need States in Sports Scale' was employed. Data collected via Google Forms were converted into the appropriate file format by the researchers and relevant hypothesis tests were applied using the JASP 0.15.0.0 statistical analysis software. In the autonomy satisfaction subscale, it was determined that male athletes (5.25 ± 2.26) obtained higher scores compared to female athletes (4.42 ± 1.99) ($p<.05$). In the competence frustration and relatedness frustration subscales, there is a statistically significant difference in favor of male athletes ($p<.05$). In the competence satisfaction and relatedness satisfaction subscales, the mean scores of first division athletes are significantly higher than those of the other group ($p<.05$). Moreover, in the competence frustration and relatedness frustration subscales, the scores of second division athletes are statistically significantly higher than those of the other group ($p<.05$). As conclusion, it can be stated that male and first – division physically disabled athletes have a higher level of satisfaction with their basic psychological needs.

Keywords
Self – Determination Theory, Well Being, Performance, Handiccaped

INTRODUCTION

Self-Determination Theory is a frequently referenced framework in the field of psychology, offering crucial insights into the understanding of athletes' motivation, performance, and well-being. Positioned at the heart of human motivation and behavior, the theory identifies psychological needs, focusing on three concepts: autonomy, competence, and relatedness (Deci & Ryan, 2000). Autonomy refers to the sense of individuals owning their behaviors, choices, and decisions (Chirkov et al., 2003). An autonomy-supportive environment assists athletes in enhancing their intrinsic motivation, leading to increased participation in activities, exerting more effort, and maintaining a longer-term interest in sports (Deci & Ryan, 1987). When athletes feel autonomous, they experience a higher level of psychological well-being (Adie et al., 2008). Furthermore, athletes' self-control and self-direction abilities assist in delivering more effective performance during training and competitions (Reinboth et al., 2004). Competence, considered as a fundamental component of an individual's intrinsic motivation, well-being, and overall life satisfaction, represents a belief or feeling that one can effectively utilize their abilities and skills while interacting with their environment (Deci et al., 1991). Athletes who feel competent and effective possess a higher intrinsic

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[1]**ORC**ID: 0000-0002-5744-7191 , [2]**ORC**ID: 0000-0002-8227-6590

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motivation (Deci et al., 1991). In athletes, the belief in their own abilities enhances learning processes and boosts athletic performance (Harter, 2015). Thanks to the belief in their abilities, athletes experience positive mood states and a higher level of life satisfaction (Quested & Duda, 2010). Relatedness, grounded in an evolutionary basis (Baumeister & Leary, 2017) refers to people's mankind's need to connect with their social environment, to be accepted, and to feel valued (McMillan & Chavis, 1986). The sense of relatedness helps athletes to be more eager and determined (Ryan & Deci, 2000). A strong sense of relatedness among athletes leads to more harmonious and effective teamwork (Bruner et al., 2014), enhancing athletes' ability to cope with challenges (Rees & Hardy, 2000). Sports affects all individuals in different ways (Ilhan, 2008). It is possible to observe a much greater positive effect on individuals with special needs than it does on individuals with normal development (Demir et al., 2017). Psychological factors come first among these positive effects (Ilhan, 2010; Yarimkaya et al., 2016).

Sport, by providing an environment that supports basic psychological needs, enhances athletes' motivation, performance, and overall well-being through athletic activities. In particular, for physically disabled athletes with a high potential for social isolation and exclusion (Shapiro & Martin, 2010), the satisfaction of basic psychological needs emerges as a significant problem that needs to be addressed.

Disabled athletes may face different challenges compared to non-disabled athletes. Foremost among these challenges is the feeling of being different or excluded by those around them (Martin, 2013). The mobility or physical abilities of disabled athletes lead to specific challenges in sports (Van de Vliet et al., 2008). Disabled athletes also require specialized equipment and practices in terms of equipment, facilities, or training methods (DePauw & Gavron, 2005). Non-disabled athletes, on the other hand, have to cope with challenges such as high-performance pressure (Hanton et al., 2005), fear of injury (Walker, Thatcher, & Lavallee, 2007), and negative body image (De Bruin et al., 2007). The reasons for the low participation rates of physically disabled individuals in sports can be listed as architectural barriers, inability to access appropriate sports wheelchairs, institutional policy and practice deficiencies, discrimination, and societal attitudes (Rimmer et al., 2005).

Research on basic psychological needs is frequently conducted in the fields of education (Niemiec & Ryan, 2009), work life (Gagné & Deci, 2005), health (Williams et al., 1998), interpersonal relationships (La Guardia et al., 2000), clinical psychology (Ryan et al., 2011) and sports (Adie et al., 2008). In the field of sports, the focus is primarily on performance (Deci & Ryan, 2000; Reinboth & Duda, 2006), psychological well-being (Deci & Ryan, 2008), and the coach-athlete relationship (Amorose & Anderson-Butcher, 2007). Therefore, the number of studies related to individuals with disabilities is limited. The aim of this research is to examine the satisfaction and frustration of basic psychological needs in physically disabled athletes in terms of various variables.

MATERIALS AND METHODS

Research Model

In the study, a quantitative research method was employed. The research was designed in a survey model. In quantitative research, the survey model is a commonly used method where the skill or attitude levels of individuals included in the study concerning a subject or event are determined (Büyüköztürk et al., 2008).

Participants

In the study, a total of 128 disabled athletes, comprising 68 males and 60 females, who have been licensed for at least 2 years in sitting volleyball and wheelchair basketball and are actively participating in sports, voluntarily took part. The age of the athletes ranges between 18 – 48, with an average age of 30.96 ± 11.77.

For this research, ethical approval was obtained from Atatürk University Faculty of Sport Sciences Ethics Committee on 24.04.2023 with reference number 72. Study was conducted in accordance with Helsinki Declaration.

Data Collection Tools

In the study, a personal information form created by the researchers was used to collect demographic data of the participants. Additionally, to assess the satisfaction and frustration of basic psychological needs, the 'Psychological Need States in Sports Scale (PNSSS)', developed by Bhavsar and colleagues (Bhavsar et al., 2020) in

2020, and translated into Turkish by Sarı and colleagues (Sari et al., 2022) in 2022, was utilized.

To measure the satisfaction and frustration of athletes' basic psychological needs, the PNSSS, applied in a seven-point Likert format (1 = Strongly Disagree, 7 = Strongly Agree), consists of 29 items. The scale comprises six sub-dimensions: autonomy satisfaction (5 items - e.g., "I feel freedom in making decisions about training"), autonomy frustration (5 items - e.g., "I feel excessive pressure"), competence satisfaction (5 items - e.g., "I can overcome challenges"), competence frustration (4 items - e.g., "I feel inept"), relatedness satisfaction (5 items - e.g., "I feel valued"), and relatedness frustration (5 items - e.g., "I feel ignored"). In the adaptation of the scale into Turkish, a study with 589 athletes revealed that the Cronbach α values for the sub-dimensions were higher than .70, thereby affirming the scale as a reliable measuring tool.

Data Collection

The participant information form and the Psychological Need States in Sports Scale were prepared online by researchers using Google Forms and were administered online between May and August 2023. In the initial part of the online form application, detailed explanations about the scale were provided, and participants' voluntary consents were obtained online in the same manner.

Statistical Analysis

Data collected via Google Forms were converted into the appropriate file format by the researchers and relevant hypothesis tests were applied using the JASP 0.15.0.0 statistical analysis software. A normal distribution test was conducted to determine the type of hypothesis test (parametric / non-parametric) to be applied in data analysis. Decisions on whether the data were normally distributed were made by examining the Skewness, Kurtosis, Shapiro Wilk, Kolmogorov – Smirnov, and Q – Q plots values. Since the obtained data showed a normal distribution, parametric tests, namely the independent samples t-test and ANOVA hypothesis tests, were used.

RESULTS

Table 1. Comparison of Subscale Average Scores of Female and Male Athletes using Independent Sample T-Test

Subscale	Gender	n	M	s.d.	t	p
Autonomy Satisfaction	Male	68	5,25	2,26	2,195	**0,030***
	Female	60	4,42	1,99		
Autonomy Frustration	Male	68	2,29	0,87	-2,447	**0,016***
	Female	60	2,73	1,20		
Competence Satisfaction	Male	68	6,05	1,67	1,543	0,125
	Female	60	5,52	2,20		
Competence Frustration	Male	68	1,21	0,42	-3,390	**0,001****
	Female	60	1,64	0,95		
Relatedness Satisfaction	Male	68	5,62	1,80	0,798	0,426
	Female	60	5,34	2,22		
Relatedness Frustration	Male	68	1,29	0,52	-4,976	**0,001****
	Female	60	2,00	1,04		

* p<.05, ** p<.01

The findings related to the Psychological Need States in Sports Scale for male and female athletes are shown in Table 1. When examining the autonomy satisfaction subscale of the Psychological Need States in Sports Scale, the average scores of male athletes (5.25 ± 2.26) were found to be higher than those of females (4.42 ± 1.99) (p<.05). In the autonomy frustration subscale, it was determined that the values belonging to men (2.29 ± 0.87) were lower than those of women (2.73 ± 1.20) (p<.05). Although the average scores belonging to men in the competence satisfaction and relatedness satisfaction subscales were higher than those of women, it was observed that there was no statistically significant difference between genders (p>.05). Statistically significant differences were found in favor of men in the competence frustration and relatedness frustration subscales (p<.05).

Table 2. Comparison of Subscale Average Scores of Athletes Competing in Upper and Lower Divisions Using the Independent Samples T-Test

Subscale	Division	n	M	s.d.	t	p
Autonomy Satisfaction	First Division	71	6,31	1,11	12,698	**0,001****
	Second Division	57	3,06	1,77		
Autonomy Frustration	First Division	71	2,45	0,90	-0,533	0,595
	Second Division	57	2,55	1,22		
Competence Satisfaction	First Division	71	6,78	0,65	7,579	**0,001****
	Second Division	57	4,59	2,32		
Competence Frustration	First Division	71	1,27	0,67	-2,423	**0,017***
	Second Division	57	1,59	0,81		
Relatedness Satisfaction	First Division	71	6,54	0,98	8,114	**0,001****
	Second Division	57	4,19	2,19		
Relatedness Frustration	First Division	71	1,39	0,86	-3,534	**0,001****
	Second Division	57	1,92	0,81		

* p<.05, ** p<.01

Findings related to the Psychological Need States in Sports Scale for athletes competing in first and second divisions are shown in Table 2. When examining the autonomy satisfaction subscale of the Psychological Need States in Sports Scale, athletes competing in the first division scored 6.31 ± 3.06, while those in the second division scored 3.06 ± 1.77, showing lower values than the other athletes (p<.05). Although the scores obtained by athletes competing in the second division for the autonomy frustration dimension were higher, no statistically significant difference was observed between the groups (p>.05). For competence satisfaction and relatedness satisfaction subscales, the average scores of the first division athletes were significantly higher than the other group (p<.05). For the competence frustration and relatedness frustration subscales, it was found that scores of the second division athletes were statistically significantly higher compared to the other group (p<.05).

Findings related to the Psychological Need States in Sports Scale based on participants' athletic experience are shown in Table 3. In the autonomy satisfaction subscale of the Psychological Need States in Sports Scale, scores for athletes with more than ten years of experience are 5.50 ± 1.73, those with 5-10 years of experience are 5.02 ± 2.24, and for athletes with less than five years of experience, the scores are 4.18 ± 2.29. In the autonomy satisfaction subscale, the average score of athletes with more than ten years of experience significantly differs from those with less than five years of experience (p<.05).

In competence satisfaction and relatedness satisfaction subscales, despite the highest scores being in athletes with more than ten years of experience, no statistically significant difference was observed between the groups (p>.05). In the autonomy, competence, and relatedness frustration subscales, no statistically significant difference was found between the groups (p>.05).

Table 3. Comparison of Subscale Average Scores in Terms of Participants' Athletic Experience Using the ANOVA Test

Subscale	Experience	n	M	s.d.	F	p	Post Hoc
Autonomy Satisfaction	A) 0 - 5 Years	48	4,18	2,29	4,483	**0,013***	C > A
	B) 6 - 10 Years	39	5,02	2,24			
	C) 10+ Years	41	5,50	1,73			
Autonomy Frustration	A) 0 - 5 Years	48	2,29	1,08	2,237	0,111	
	B) 6 - 10 Years	39	2,48	1,18			
	C) 10+ Years	41	2,76	0,84			
Competence Satisfaction	A) 0 - 5 Years	48	5,55	2,36	0,703	0,497	
	B) 6 - 10 Years	39	5,89	1,97			
	C) 10+ Years	41	6,02	1,30			
Competence Frustration	A) 0 - 5 Years	48	1,40	0,64	1,539	0,219	
	B) 6 - 10 Years	39	1,27	0,55			
	C) 10+ Years	41	1,56	0,98			
Relatedness Satisfaction	A) 0 - 5 Years	48	5,38	2,39	1,338	0,266	
	B) 6 - 10 Years	39	5,20	1,96			
	C) 10+ Years	41	5,90	1,46			
Relatedness Frustration	A) 0 - 5 Years	48	1,83	1,00	2,108	0,126	
	B) 6 - 10 Years	39	1,46	0,68			
	C) 10+ Years	41	1,55	0,86			

* p<.05

DISCUSSION

This study aims to examine the satisfaction and frustration of basic psychological needs in physically disabled athletes. The findings indicate that male disabled athletes experience higher satisfaction in terms of basic psychological needs compared to females (p<.05). These results underscore the influence of gender on the satisfaction of basic psychological needs. The higher scores achieved by male athletes, particularly in autonomy satisfaction, may be attributed to factors such as the unique nature of sports or societal expectations. Greater autonomy satisfaction can lead male athletes to participate more actively in sports, exert more effort, and engage in sports activities for longer durations. This can contribute to enhancing their intrinsic motivation for sports activities (Deci & Ryan, 1987). In the study conducted by Harvey and Retter (2002), it was reported that there was no significant difference in the satisfaction of the autonomy need in terms of gender (Harvey & Retter, 2002).

Furthermore, statistically significant differences favoring male athletes were found in the dimensions of competence frustration and relatedness frustration (p<.05). These results demonstrate that male athletes experience less frustration in these needs, resulting in a more positive sports experience. Lower levels of frustration can help athletes feel more competent

and effective, thus enhancing their intrinsic motivation (Deci et al., 1991). Contrary to these findings, in the research conducted by Demir and İlhan (2019), there was no significant difference in terms of gender in the intrinsic motivation sub-dimension.

These findings indicate that elite-level physically disabled athletes experience a higher level of satisfaction in their basic psychological needs compared to their counterparts in lower-level leagues ($p<.05$). This heightened level of satisfaction may contribute to enhanced psychological well-being among elite athletes and a more positive approach to their sports. These results shed light on how the league level in which physically disabled athletes compete can impact their basic psychological needs. The reasons behind the higher satisfaction level among elite athletes may be attributed to factors such as increased support, resources, or accumulated experience. However, for a more comprehensive understanding of these findings, future research should delve deeper into this subject. Furthermore, the lower scores in the frustration of basic psychological needs among elite athletes in the upper league suggest that these athletes experience fewer impediments to their basic needs ($p<.05$). Reduced levels of frustration can potentially boost athletes' self-confidence in their abilities and enhance their internal motivation (Deci et al., 1991).

The obtained results indicate that physically disabled athletes with more experience in terms of duration have a higher level of autonomy satisfaction ($p<.05$). These findings support the idea that sports experience can enhance the sense of autonomy and lead athletes to feel more in control of their own behavior (Quested & Duda, 2010). Furthermore, the positive effects of long-term sports experience on autonomy satisfaction appear to be consistent with previous research in the literature. For instance, Vallerand et al. (1992) found that long-term participation in sports increased intrinsic motivation and supported a sense of autonomy among athletes (Vallerand et al., 1992). In this context, it can be stated that long-term experience in sports may enhance autonomy satisfaction among athletes, consequently making them more motivated and committed. For a better understanding and generalization of these results, future research is needed. Furthermore, considering the limitations of this study, more comprehensive research examining the satisfaction and frustration of basic psychological needs is required. In this way, more effective strategies can be developed to better address the psychological needs of physically disabled athletes.

Conflict of Interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Ethics Committee Permission

For this research, ethical approval was obtained from Atatürk University Faculty of Sport Sciences Ethics Committee on 24.04.2023 with reference number 72.

Researchers' Contribution

Study Design, SSD; Data Collection, FA and SSD; Statistical Analysis, FA; Data Interpretation, FA and SSD; Manuscript Preparation, FA and SSD; Literature Search, FA and SSD.

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RESEARCH ARTICLE

Functional Movement Analysis in 11-13 Age Group Football Players: Total Score, Asymmetries, and Technical Skill Tests

Enes GÜNGÖR[1*] and Barış BAYDEMİR[2]

[1]Aşağı Çekirgemiddle school, Ceylanpınar, Şanlıurfa / Turkiye
[2]Çanakkale 18 Mart University, Faculty of Sports Sciences, Department of Coaching Education, Çanakkale / Türkiye
*Correspondingauthor: barisbaydemir@hotmail.com

Abstract
This study was conducted with the aim of determining the relationship between Functional Movement Scores (FMS) and technical skills in 11-13-year-old football players undergoing basic training in football schools and various youth academies, as well as identifying any asymmetries. A total of 180 football players aged between 11 and 13 participated in the research. The participants were subjected to measurements including height, weight, Body Mass Index (BMI), FMS, Yeagley Soccer Test, and Short Dribbling Test. The data obtained were analyzed using a statistical software package. Descriptive statistics were calculated for the football players. Spearman Rank Differences correlation analysis was performed to determine the relationship between functional movement analysis results and technical skills according to age groups. The Wilcoxon Signed-Rank test was conducted to identify asymmetries in football players. The significance level was set at 0.05. The results of the study indicate that athletes with higher FMS scores also performed better in football skills tests. Furthermore, it was found that there were asymmetries in the movement patterns of 11 and 13-year-old football players, except for Rotatory Stability scores, with left asymmetry scores being lower than right asymmetry scores.

Keywords
FMS, Exercise, Technical skills, Short Dribbling Test, Yeagley Soccer Test

INTRODUCTION

Football is a popular branch that has been played for many years and has been dragging the masses after it. It is a game in which two teams of eleven players compete and aim to score goals in the opposing goalpost. Like every game, it has its own rules and players must fulfill certain skills. Since soccer can be played easily in many areas and conditions, it is preferred at a young age. Athletes need to be physically and cognitively well-developed in order to successfully fulfill these skills (Ali, 2011; Babkes & Weiss, 1999).

Football is a sport that requires a high level of agility, speed, endurance, and physical effort, and it is played at a basic level with small age groups. To be successful, players need to repeatedly demonstrate high intensity performances, including running at high speeds, sprinting, changing direction, passing, ball control, and scoring goals, all of which are specific football skills. Recognizing the skill element required to play football is crucial. Indeed, it has been determined that the most important activities affecting the outcome of a match include one-on-one battles in offense and defense, accurate passing, corner kicks, and free kicks (Datson et al., 2017).

According to official FIFA data, 265 million players and 5 million referees and officials are active in the game of football worldwide. Identifying and nurturing talented players at an early age leads to sporting and financial success.

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[1]**ORC**ID: 0000-0002-3145-9004 , [2]**ORC**ID: 0000-0002-8653-0664

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For this reason, national federations and many football clubs devote significant resources to the identification and development of young and talented players (Fuller et al., 2012).

Football is a game where physical performance, technical skills, and cognitive processes are the most intense. The game structure of soccer has become a more dynamic and faster game in terms of technical aspects in recent years. For this reason, there is a need for talented soccer players who have technical characteristics such as speed, strength, endurance, etc., as well as good cognitive processes and the ability to make fast and accurate decisions.

Bringing technical skills to football players at a young age in parallel with cognitive processes is a successful strategic step in raising a talented population. While transferring cognitive decision-making mechanisms to football players who are at the age of development in physical and physiological aspects, gaining technical skills will enable them to be more successful (Paśko et al., 2021). For this reason, a high level of education is needed in order to play and train football correctly. On the other hand, these processes are supported by studies carried out under talent screening (Bojkowski et al., 2022).

Researchers have stated that since soccer is a multifactorial sport, talent identification methods should focus more on selecting skills that match technical skills in a game, such as passing and dribbling, and the validity of test batteries should be evaluated longitudinally (Rowat et al., 2016). Many test protocols are used to identify talented athletes. FMS is among these test protocols. FMS, which includes the selection and analysis of movements suitable for the sports branch, provides information about the individual movement patterns of the athlete. It is also used to determine the effect of these selected movement patterns on performance. FMS assesses functional movement deficiencies based on proprioception, mobility, and stability and is utilized to predict weaknesses in the body by identifying asymmetry and weak links in fundamental functional movement patterns. The presence of movement asymmetry and functional disorders can increase an athlete's risk of injury and lead to the development of movement patterns that emphasize and correct faulty movements.

In today's world, having knowledge of athletes' physical characteristics and technical skills has become a necessity to achieve success on the international stage. Possessing this information about athletes facilitates the selection of young talents for coaches and clubs. On the other hand, knowing the physical attributes makes it easier to create individualized training programs. Additionally, screening fundamental movement patterns in athletes plays a crucial role in determining whether they have a solid foundation before moving on to more challenging activities. Therefore, the relationship between functional movement analysis and technical skills among soccer players of a certain age group was investigated.

MATERIALS AND METHODS

Research Design

The research was designed as an experimental study. The Exploratory Model, one of the Relational Screening Models, was used as the research model due to the examination of the relationship between two or more variables. The study was approved by Çanakkale 18 Mart University Clinical Research Ethics Committee (Approval Number: 2019/20). The study was conducted in accordance with the Declaration of Helsinki.

Research Group

The population of the study consisted of soccer players and the sample consisted of soccer players residing in Çanakkale. A total of 180 soccer players playing soccer in Çanakkale province and participants between the ages of 11 and 13 were included in the study.

Data Collection Tools

Height, weight, Body Mass Index (BMI), FMS test, Yeagley Soccer Test, and Short Dribbling Test were performed on the soccer players participating in the study.

Weight Measurement: SECA (Germany) brand electronic scale was used for body weight measurement of soccer players.

BMI calculation: Body Mass Index (BMI) = Body Weight / Height^2 (Anonymous, 1980).

Functional Movement Analysis (FMS): The FMS test was performed on the parquet floor of the gymnasium. After a standard warm-up protocol, a test protocol consisting of seven movements was applied. Each movement was evaluated between 0-3 points and the FMS score was calculated by summing the scores obtained from the movements between 0-21 points. Right-left asymmetries were also calculated (Cook et al., 2006).

Yeagley Football Test: The test protocol used to measure the technical skills of soccer players was applied on synthetic turf. Footballers started bouncing the ball with the start command. After 30 seconds of bouncing the ball in the designated area (4x4m), soccer players were given 2 attempts, and the maximum number of bounces was recorded (Yeagley, 1972).

Short Dribbling Test: The test protocol used to measure the specific changing direction and dribbling skills of soccer players was applied on synthetic turf. Footballers dribbled the ball in the fastest way between the funnels and the test was terminated in the square area at the end of the track. Photocells were placed at the start and end of the track. After 2 trials, the best score was recorded (Bangsbo & Mohr, 2013).

Data Analysis

A statistical package program was used for statistical analysis, calculations, and graphics. Descriptive statistics values of the variables of the athletes participating in the study were calculated. Whether the measurement values of the athletes showed normal distribution characteristics was analyzed according to the Kolmogorov-Smirnov statistics. The Spearman Rank Difference Correlation Analysis, which is a nonparametric test, was performed for the correlation between FMS scores and technical skill tests. In order to determine the FMS asymmetries in soccer players, the Wilcoxon Signed Ranks Test, one of the non-parametric tests, was performed since multiple (right-left) observations were made on the same group of soccer players (Atan & Ünver, 2019; Bayraktar, 2008; Hamarat, 2017). The significance level was accepted as $p<0.05$ and $p<0.01$.

RESULTS

Table 1. Descriptive Statistics on Physical Characteristics and Technical Skill Tests of the Athletes Participating in the Study

	Group	N	Min	Max	Mean	SD
Height (cm)	11	90	134	162	143.99	8.00
	13	90	150	162	155.86	3.90
Body Weight (kg)	11	90	30	54	37.54	8.94
	13	90	33	61	50.19	8.04
Body Mass Index	11	90	14.10	28.70	17.97	3.31
(kg/m^2)	13	90	14.40	24.20	20.61	2.63
Short Dribbling Test	11	90	12.80	16.64	14.39	0.98
(sec)	13	90	12.05	15.99	13.82	1.26
Yeagley Football Test	11	90	20	35	26.58	2.71
(again)	13	90	26	43	33.34	3.68

Descriptive statistics of the height, body weight, BMI and the results of the Short Dribbling Test and Yeagley Football Test, which are among the technical skill tests, of the athletes participating in the study were evaluated and the relevant data are given in Table 1.

Table 2. Descriptive Statistics of FMS Scores of the Athletes Participating in the Study

		Group	N	Min	Max	Mean	SD
Deep Squat	Total	11	90	1	3	1.88	0.47
		13	90	2	3	2.40	0.49
Hurdle Step	Right	11	90	2	3	2.12	0.32
		13	90	2	3	2.38	0.48
	Left	11	90	1	2	1.80	0.40
		13	90	1	2	1.90	0.30
	Total	11	90	1	2	1.80	0.40
		13	90	1	2	1.90	0.30
In-line Lunge	Right	11	90	2	3	2.12	0.32
		13	90	2	3	2.61	2.61
	Left	11	90	1	2	1.68	0.47
		13	90	1	2	1.89	0.31
	Total	11	90	1	2	1.68	0.47
		13	90	1	2	1.89	0.31
Shoulder Mobility	Right	11	90	1	3	2.67	0.49
		13	90	2	3	2.89	0.31
	Left	11	90	1	3	2.10	0.39
		13	90	2	3	2.13	0.34
	Total	11	90	1	3	2.10	0.39
		13	90	2	3	2.13	0.34
Active Straight Leg Raise	Right	11	90	1	3	2.27	0.46
		13	90	2	3	2.91	0.28
	Left	11	90	1	3	1.99	0.18
		13	90	1	3	2.04	0.33
	Total	11	90	1	3	1.99	0.18
		13	90	1	3	1.86	0.33
Trunk Stability	Total	11	90	1	3	1.86	0.48
		13	90	1	3	2.00	0.21
Rotatory Stability	Right	11	90	1	3	1.91	0.38
		13	90	1	2	1.82	0.38
	Left	11	90	1	3	1.61	0.55
		13	90	1	2	1.82	0.38
	Total	11	90	1	3	1.61	0.55
		13	90	1	2	1.82	0.38
Total FMS Score	Total	11	90	11	15	12.91	1.05
		13	90	12	16	14.19	0.82

FMS scores of the athletes participating in the study and descriptive statistics of the values obtained were evaluated and the relevant data are given in Table 2.

Table 3. FMS Asymmetries of 11-year-old Athletes Participating in the Study

Variables	Rows	N	Row Mean	Row Total	z	p
Hurdle Step Right-Left	Negative Queues	26	13.50	351.00		
	Positive Rows	0	.00	.00	-4.874	.000
	No Difference	60				
In-line Lunge Right-Left	Negative Queues	37	19.00	703.00		
	Positive Rows	0	.00	.00	-5.879	.000
	No Difference	53				
Shoulder Mobility Right-Left	Negative Queues	50	25.50	1.275.00		
	Positive Rows	0	.00	.00	-7.005	.000
	No Difference	40				
Active Straight Leg Raise Right-Left	Negative Queues	26	14.00	364.00		
	Positive Rows	1	14.00	14.00	-4.811	.000
	No Difference	63				
Rotatory Stability Right-Left	Negative Queues	27	14.00	378.00		
	Positive Rows	0	.00	.00	-5.196	.000
	No Difference	63				

The 11-year-old athletes' Hurdle Step scores (z=-4.874, p<0. 05), In-line Lunge scores (z=-5.879, p<0.05), Shoulder Mobility scores (z=-7.005, p<0.05), Active Straight Leg Raise scores (z=-4.811, p<0.05), Rotatory Stability scores (z=-5.196, p<0.05) were evaluated. The fact that the differences between the scores were in favor of the negative ranks shows that the athletes' asymmetry-determining left-side scores from the FMS movements were less than the right-side scores. The data obtained are given in Table 3.

Table 4. FMS Asymmetries of 13-year-old Athletes Participating in the Study

Variables	Rows	N	Row Mean	Row Total	z	p
Hurdle Step Right-Left	Negative Queues	42	21.50	903.00		
	Positive Rows	0	.00	.00	-6.874	.000
	No Difference	48				
In-line Lunge Right-Left	Negative Queues	58	29.50	1.711.00		
	Positive Rows	0	.00	.00	-7.296	.000
	No Difference	32				
Shoulder Mobility Right-Left	Negative Queues	67	34.00	2.278.00		
	Positive Rows	0	.00	.00	-8.185	.000
	No Difference	23				
Active Straight Leg Raise Right-Left	Negative Queues	74	37.50	2.775		
	Positive Rows	0	.00	.00	-8.444	.000
	No Difference	16				
Rotatory Stability Right-Left	Negative Queues	6	7.50	45.00		
	Positive Rows	8	7.50	60.00	-535	.593
	No Difference	76				

According to the results of the Wilcoxon Signed Ranks Test, which was conducted to find out whether there was a difference between the right and left FMS scores of the 13-year-old athletes and to determine their asymmetry, statistically significant differences were detected between the athletes' Hurdle Step scores (z=-6.874, p<0.05), In-line Lunge scores (z=-7.296, p<0.05), Shoulder Mobility scores (z=-8.185, p<0.05), and Active Straight Leg Raise scores (z=-8.444, p<0.05). however, there were no statistically significant differences between Rotatory Stability scores (z= -535, p<0.05). The fact that the difference scores were in favor of negative ranks showed that the left-side scores, which determined the asymmetry, were lower than the right-side scores, except for the Rotatory Stability scores from the FMS movements of the athletes. The data obtained are given in Table 4.

Table 5. Correlation Between FMS Scores and Technical Skill Tests of 11 Year Old Athletes Participating in the Study

Variables	Values	FMS Total Score	Short Dribbling Test	Yeagley Football Test
FMS Total Score (points)	R	1	-.962**	.976**
	P	.	.000	.000
	N	90	90	90
Short Dribbling Test (sec)	R	-.962**	1	-.983**
	P	.000	.	.000
	N	90	90	90
Yeagley Football Test (again)	R	.976**	-.983**	1
	P	.000	.000	.
	N	90	90	90

**p<0.001

Spearman Rank Difference Correlation Analysis was performed to determine the correlation between the FMS total scores of 11-year-old athletes and their technical skill test results. As a result of the analysis, a statistically significant and negative correlation was found between the FMS total scores of 11-year-old athletes and the Short Dribbling Test results (r=-.962; p=0.000). It has been determined that as the total FMS score increases in football players, the duration of the Short Dribbling Test decreases. Additionally, a statistically significant and positive relationship was found between FMS total scores and the Yeagley Football Test (r=-.976; p=0.000). It was observed that as the FMS total score increased, the Yeagley Football Test score also increased. In addition, a statistically significant and negative relationship was detected between the Short Dribbling Test and the Yeagley Football Test. A statistically significant and negative relationship was detected between the Short Dribbling Test and the Yeagley Football Test, which are among the technical skill tests of football players (r=-.983; r=0.000). The data obtained are given in Table 5.

Table 6. Correlation Between FMS Scores and Technical Skill Tests of 13-Year-Old Athletes Participating in the Study

Variables	Values	FMS Total Score	Short Dribbling Test	Yeagley Football Test
FMS Total Score	R	1	-.860**	.907**
(points)	P	.	.000	.000
	N	90	90	90
Short Dribbling Test	R	-.860**	1	-.954**
(sec)	P	.000	.	.000
	N	90	90	90
Yeagley Football Test	R	.907**	-.954**	1
(again)	P	.000	.000	.
	N	90	90	90

**p<0.001.

Spearman Rank Differences Correlation Analysis was performed to determine the correlation between FMS total scores and Technical skill tests of 13-year-old athletes participating in the study. As a result of the analysis, a statistically negative and significant correlation was found between the FMS total scores of 13-year-old athletes and the Short

Dribbling Test results (r=-.860; p=0.000). It was determined that as the total score of the FMS score increased, the duration of the Short Dribbling Test decreased. A statistically positive and significant correlation was found between FMS total scores and Yeagley Football Test results (r=-.907; p=0.000). In addition, it was also determined that as the total score of the FMS increased, the Yeagley Football Test repetition also increased. A statistically negative and significant relationship was found between the Short Dribbling Test, which is one of the technical skill tests for football players, and the Yeagley Football Test (r=-.954; r=0.000). The obtained data are given in Table 6.

DISCUSSION

The present study was conducted to determine the relationship and asymmetries between FMS scores and technical skills of 11-13-year-old soccer players who were raised in football schools or in the substructures of various clubs and who were subjected to technical training during the basic training period. In the literature, it has been determined that there are few studies on the relationship between technical skill and FMS. In addition, it was seen that there are studies on technical skill and athletic performance (Da Costa et al., 2023; Sun et al., 2022) or injury prediction of FMS (Łyp et al., 2022; Moore et al., 2023). There were also studies on the validity of technical skill tests in soccer (Dardouri et al., 2014).

In their study, Dardouri et al. (2014) examined soccer-specific tests and their discriminative features and the reliability of these tests. A total of 92 soccer players aged 14 years participated in the study and 3 soccer-specific tests including dribbling between slalom, sprint, and agility test were examined. As a result of the study, it was reported that all three tests were reliable, that dribbling and agility tests could distinguish ability between slalom, and that these tests could be applied in football-specific skill assessments. Kelly et al. (2020) examined the relationship between technical skills obtained from match analysis and technical tests in their study. In their study in which 40 football players aged 9-11 and 58 football players aged 12-16 participated, they stated that there was a significant relationship between technical skills such as ball possession, passing, dribbling obtained from match analysis and technical skill tests in which football players participated.

The FMS test does not determine how a person will perform under load or during competition. The purpose of the FMS is not to measure sports performance. Therefore, studies that try to see if it is related to sports performance have difficulty in achieving the goal. However, FMS scores help coaches to see the predisposition of soccer players to selected soccer skills and to predict the athlete's results from the tests, as can be seen from the results obtained in our study.

McCall et al. (2015) reported in their study that most researchers recognized FMS as an injury risk assessment tool and that 66% of researchers working in elite men's football clubs used FMS often as an injury risk screening assessment tool. Vandendriessche et al. (2012) emphasized that motor coordination is an important determinant of talent in young football players. However, they also reported that studies focusing on football-specific motor skills, FMS scores, and performance have begun to be conducted more frequently in recent years. Kokstejn et al. (2019) stated that FMS is effective in testing basic motor skills and techniques in their study. For this reason, the researchers who stated that they designed this study investigated FMS, physical fitness, and soccer-specific motor skills (fast dribbling). As a result of the study, they stated that there is a relationship between the FMS test and skill (fast dribbling) in soccer players and that FMS plays an important role in the process of acquiring motor skills in pre-adolescent soccer players.

Duncan et al. (2022) examined the importance of FMS and technical skills in soccer players. In their study in which 60 male soccer players aged 8-12 years participated, the relationships were investigated using FMS, dribbling, passing, and shooting tests for the evaluation of technical skills, 15m sprint speed, long jump, and ball throwing tests for physical fitness. As a result of their study, they reported that young football players had the perception of being competent in FMS in addition to their age. Portas et al. (2016) examined the factors affecting FMS scores in soccer players in their study. In the study in which 1163 male soccer players between the ages of 8-18 participated, they determined in which movements there were differences in FMS scores. As a result of their study, they stated that there is a relationship between age and FMS and

that FMS results may be invalid in younger athletes.

Zalai (2015) stated in his study that there were right-left asymmetries and functional deficiencies in trunk stability and deep squatting from FMS movements in elite athletes aged 14-20 years. Coaches, conditioners, athletic performance specialists, physiotherapists, and other football-related researchers have emphasized that young athletes have more functional deficits than adults, which may lead to reduced technical capacity and increased risk of injury. Hujigen (2010) investigated dribbling skills in soccer players aged 12-19 years. The researcher found a relationship between speed and dribbling and reported that there was a relationship between slalom and dribbling test. He also stated that the tests measured different characteristics. Wright et al. (2015) investigated the importance of corrective exercises in FMS scores in children. Twenty-two children aged 13 years participated in the study. Children were grouped according to the FMS total score. FMS exercises were applied to the experimental group for 4 weeks. As a result of the study, they emphasized that there were no differences between the groups, well-prepared exercises may be more ideal, and emphasized the importance of future studies.

Marques et al. (2017) emphasized in their study that soccer players at different levels may still have soccer-specific movement deficiencies, even if determined by FMS. In the study conducted for this purpose, FMS scores of 103 soccer players between the ages of 14-20 were evaluated and asymmetries were determined. As a result of the research, they stated that asymmetries and functional decreases were observed in young soccer players.

As a result of the study, asymmetries were determined in 11 and 13 age group soccer players. It was also found that soccer players with high FMS scores performed better in skill tests. Based on these results, it is thought that FMS can provide coaches with preliminary information about soccer players' predisposition to dribbling and bouncing skills in skill selection. In addition, FMS, which contains patterns suitable for the movement patterns of football players, can provide coaches, trainers, and conditioners with preliminary information about the movements that are likely to be performed in the game and how they will perform in some skills (dribbling, ball bouncing, shooting, etc.) that include these movements.

Conflict of Interest

This study is based on a master's thesis prepared by the first author under the supervision of the corresponding author and the second author. There is no conflict of interest. There is no financial support provider.

Ethics Committee

Approval was obtained from Çanakkale 18 Mart University Clinical Research Ethics Committee (Approval Nummer: 11.12.2019 dated 20-02).

Author Contributions

The version published by the authors has been read and accepted. Each stage of the study was planned equally by the authors.

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RESEARCH ARTICLE

The Effect of Different Physical Education Class Hours Applied in Secondary Education on Certain Physiological and Physical Parameters

Mehmet Onur SEVER[1*], Mehmet SÖYLER[2], Yunus Emre ÇİNGÖZ[3] and Emrah BARKIN[4]

[1]Gumushane University, School of Physical Education and Sport, Gümüşhane / Turkey
[2]Çankırı Karatekin University, Social Sciences Vocational High School, Çankırı / Turkey
[3]Bayburt University, Faculty of Sport Sciences, Bayburt, Turkey
[4]Ağrı İbrahim Çeçen University, Institute of Health Sciences, PhD, Ağrı / Turkey
*Corresponding author: m.onursever@gmail.com

Abstract
This study investigates the effects of different physical education lesson hours applied to secondary school students on some physical and physiological parameters. A total of 36 secondary school students voluntarily participated in the study: respectively, 18 from Group 1 and 18 from Group 2 (age: 14.94±0.41 / 14±0.34 years; height: 175.22±7.62 / 169.33±6.95 cm; weight: 61.95±9.07 / 56.83±6.33 kg). While Group 1 students received 8 hours of physical education lessons per week, Group 2 students were given 2 hours of physical education lessons according to the Ministry of National Education curriculum. Body weight (kg) and body fat percentage (%) were determined using the Inbody 270 professional body analysis device. A portable dynamic balance device was used to determine the students' balance. The test results were analyzed using the SPSS Statistics software. Non-parametric tests were employed since the data did not show a normal distribution. The Mann-Whitney U test was used to test the significance of the difference in balance and body fat percentage (BFP) level averages between the two independent groups. Upon evaluating our data, it was statistically ascertained that the dynamic balance (Balance) values of Group 1 secondary school students were significantly higher when compared to Group 2 students. However, no statistically significant difference was found in body fat percentage (BFP) values between Group 1 and Group 2. As a result, it is seen that increasing physical education lesson hours in secondary education contributes to some physical development of young individuals.

Keywords
Balance, Exercise, Secondary Education

INTRODUCTION

Childhood is a pivotal phase during which an individual undergoes rapid and influential development that has lasting implications for their future. Providing fundamental sports training and fostering the necessary interest in sports from childhood and sustaining it through physical activities are of great importance, leaving lasting impacts on individuals' lives with their gains (Sever, 2018). Physical activity during this stage is instrumental for dynamic engagement within the social milieu, fostering socialization (Sever and Barkan, 2022, Akçakoyun et al., 2016 & Gökşen, 2014). Education, defined as the formal and informal transmission of knowledge and insights from preceding generations, shapes desired behaviors in individuals (Ercan, 1998 &Aydınlı, 2016). The primary objectives of education are to orient and cultivate individuals towards specific

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[1]**ORCID:** 0000-0001-6422-9144 , [2]**ORCID:** 0000-0002-6912-4218 , [3]**ORCID:** 0000-0002-5702-3997 , [4]**ORCID:** 0000-0003-1519-9254

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goals and to establish a contemporary, healthy paradigm congruent with the existing world (Ergün & Ersoy, 2014). Thus, by imparting quality education to younger generations, society benefits substantially (Aktug et al., 2017).

In this context, physical education and sports activities emerge as vital facets of individual and societal development. Such activities hold prominence throughout one's educational journey (Yavuz et al., 2019). A structured integration of movement and physical education within the broader educational curriculum significantly enables students to hone movement skills, sustain physical fitness, attain health awareness, develop essential life skills, and nurture social competencies (Pangrazi, 2001 & Aynacıyan and Özer, 2020).

Physical education is an indispensable avenue for individuals to engage in physical activity (Özcan and Üstündag, 2017). Tailored to individual needs, it stands as a cornerstone of holistic education. In childhood, physical education facilitates self-expression, creativity, mind-body harmony, growth, development, and emotional regulation (Bucher, 1987 & Demirel, 2010). The curriculum that children are exposed to in their early educational years is predominantly game-centric (Temel & Avşar, 2009). The underlying objective of this game-focused approach is to nurture movement skills. Such foundational skills pave the way for healthier and more fulfilling lives (Temel & Avşar, 2009& Silverman and Scrabis, 2004).

Contrary to the misconception of training students in specific sports, the primary goals of physical education are to offer a respite from rigorous classroom settings, transition students from sedentary to active lifestyles, enhance health factors, foster a problem-solving ethos, and build resilience against prospective challenges. This groundwork is also crucial in preparing the subsequent generations to become adept educators (Özşaker & Orkun, 2005). The present study seeks to discern the disparities between middle school students undergoing two hours of physical education weekly and those engaged for eight hours, explicitly focusing on balance and body mass index.

For this purpose, the hypothesis of our study is that the dynamic balance parameters of sports high school students will be better than regular high school students.

MATERIALS AND METHODS

Research model

In this investigation, aligned with the curriculum set forth by the ministry of national education, initial assessments were conducted to gauge participants' dynamic balance, height, weight, and body fat percentage. Following an 8-week physical education intervention, these metrics were reassessed. Students from sports-centric high schools engaged in physical education for 8 hours weekly, unlike their counterparts in conventional high schools, who participated for 2 hours weekly. The ministry of national education's curriculum encompasses domains such as movement skills, movement concepts, associated life skills and principles, strategies and tactics related to movement, habitual physical activity, fundamental principles of physical activity and related life skills, cultural heritage and values, and the understanding and organization of sports.

Research group

The study cohort comprised thirty-six volunteer students, indiscriminately chosen from both Ali Fuat Kadirbeyoğlu Anatolian High School and Gümüşhane sports high school in Gümüşhane, Turkiye. These students exhibited no known health concerns. Based on their instructional schedules, they were categorized into two distinct groups. The first group was subjected to 8 hours of physical education weekly, whereas the second group participated for 2 hours. All physical education sessions were orchestrated in compliance with the curriculum delineated by the ministry of national education.

Ethical approval was obtained for this study and the study was conducted in accordance with the principles of the Declaration of Helsinki. Written informed consent explaining the study steps and objectives was signed by all participants.

Table 1. Demographic variables for participants

	Grup	N	Min.	Max.	Mean	Sd
Age (years)	1	18	14	16	1.94	±0.41
	2	18	13	15	14	±0.34
Height (cm)	1	18	160	189	175.22	±7.62
	2	18	157	181	169.33	±6.95
Weight (kg)	1	18	48	75	61.95	±9.07
	2	18	45	69	56.83	±6.33

Data collection tools

Anthropometric measurements

Participant Height: Participants' heights were measured in centimeters using a wall-mounted stadiometer by Holstein Ltd, England. Measurements were taken with the participant in an anatomical position: barefoot, heels together, holding their breath, and their head aligned in the frontal plane, ensuring the vertex touched the measuring board (Söyler, 2022 & Mor et al., 2022).

Body Composition Analysis: To determine the body weights (in kg) of the athletes participating in the study, we used an Inbody 270 brand body analysis device from Japan (Sassi et al., 2011).

Data analysis

The statistical analysis of the data was conducted using the SPSS 16.0 software package. To evaluate the normality of the data, the Shapiro-Wilk test was employed. As the data did not show a normal distribution, non-parametric tests were used. In the study, the Mann Whitney U test was utilized to test the significance of differences in average balance and BFP levels between two independent groups; a p-value greater than 0.05 was considered non-significant.

RESULTS

When Table 2 was examined, the average balance values for Groups 1 and 2 were determined to be 2.98±0.87. When the balance values of Groups 1 and 2 were compared, it was determined that the balance value was statistically higher. When Body Fat Percentage was examined, the average Body Fat Percentage for Groups 1 and 2 was 11.31±2.70. When the Body Fat Percentage values of Groups 1 and 2 were compared, no statistically significant difference was observed (p>0.05)

Table 2. Analysis results of the comparison between groups regarding dynamic balance (TOGU) and body fat percentage values

Variable	Group	n	X	Sd	Min	Max	Rank. Avg.	U	P
Balance	1	36	2.98	±0.87	1.35	4.75	23.44	73.00	0.04
	2						13.56		
Body Fat Percentage (%)	1	36	11.31	±2.70	5.70	16.30	17.36	141.50	0.52
	2						19.64		

DISCUSSION

In the investigation, the experimental group consisted of eleven female and nine male athletes, whereas the control group comprised eleven female and eight male athletes. Athletes from the experimental cohort had an average height of 130.75±4.84 cm, while those from the control cohort registered an average of 127.84±4.54 cm. The findings indicated a notable increment in body weight for both the experimental and control cohorts between the preliminary and concluding tests (p<0.05). Nonetheless, when comparing the initial and final tests, no statistically significant variance was identified in body weight between the athletes of both cohorts (p>0.05). Study of Başal & Yüksel (2021) with 12-13-year-old students mirrored these findings, indicating no significant disparities in body weight metrics. Similarly, study of Yüksek (2020) by involving female participants undergoing basketball training did not unveil any body weight variances after 12 weeks. Such observations align seamlessly with our research outcomes. The discerned statistical significance between the cohorts' initial and final test results can arguably be attributed to the natural progression during the research duration.

Contrastingly, study of Anamurluoğlu (2020) which scrutinized the impact of foundational classical ballet training supplemented with pedagogical games on 3-5-year-old children, identified significant variances in body weight metrics (p<0.05). It's postulated that discrepancies between Anamuroğlu's investigation and the present study might stem from differences in age brackets and game methodologies.

Upon assessing Table 2, it becomes evident that the Body Fat Percentage metrics of the experimental cohort athletes remained consistent between the initial and final tests (p>0.05). On the other hand, the control group showcased a marked rise in Body Fat Percentage metrics between these

tests ($p<0.05$). Both cohorts, however, did not display significant disparities in Body Fat Percentage metrics for the initial and final tests ($p>0.05$). A literature review emphasizes that most studies predominantly focus on BFP (Promsri et al., 2020) as a crucial parameter. Table 2's analysis revealed a stable trend in power metrics between the preliminary and concluding tests for the control group ($p>0.05$), in stark contrast to the experimental group, which displayed a considerable upsurge ($p<0.05$). Furthermore, no significant variances in power metrics were identified between the two groups during these tests ($p>0.05$).

In a 2018 study with 12-14-year-olds, Balcıoğlu pinpointed substantial differences in BMI and anaerobic power levels. Likewise, Kırıştı (2019) investigation involving 12-14-year-old females, unveiled notable group differences. Cirav's (2018) research, which evaluated the repercussions of pedagogical games on 9-10-year-old children, discerned significant variations in the vertical jumps of the control group ($p<0.05$). In a study exploring the ramifications of pedagogic game-based training on the motor skill evolution of judo starters, salient differences were observed in the vertical jump metrics of the experimental cohort when juxtaposed against the control group (Steidl-Müller et al., 2019).

Erturk et al. (2021) compared some parameters on the shooting performance of air rifle athletes according to gender and competition categories, and found that 20 air rifle athletes had negative and high scores between male participants' serial shooting scores and right foot dynamic balance (r-.790; $p<0.05$) measurements. They determined that there was a statistically significant relationship at the level. Scrutiny of Table 2 deduced that both cohorts of athletes did not exhibit substantial shifts in flexibility metrics between the preliminary and concluding tests ($p>0.05$). Moreover, no significant disparities were observed between the two groups for these tests ($p>0.05$). Past research involving 7-8-year-olds undergoing pedagogical games found consistent results in the sit-reach test comparisons (Bilgiç et al., 2016 & Kusan et al., 2018). Study of Urlu (2014) 10-12-year-olds also reinforced these findings, indicating no notable class-based differences. Bayrakdaroğlu et al. (2021) in their study examining the performance responses to 8-week terabant exercises applied to football players, they could not detect the effect of terabant exercises on the balance parameters of 14-year-old children.

Conclusion

We believe that this study on different physical education class hours will contribute to the literature, and the findings will pave the way for similar studies in the future.

Conflict of Interest

This study there is no conflict of interest. There is no financial support provider.

Ethics Committee

This study is approved by Bayburt University, Ethical Committee approved the study protocole (2023/decision 269-14/E-15604681-100-150129), and the study is conducted in accordance with the principles of the Declaration of Helsinki II. Written informed consent that explains the study steps and aims were signed by all participants. All authors have read and agreed to the published version of the manuscript.

Author Contributions

Study Design, MOS; **Data Collection,** MOS, MS, YEC, EB; **Statistical Analysis,** YEC, MS, EB; **Data Interpretation,** YEC, MS, EB; **Manuscript Preparation,** MOS, MS, YEC, EB**; Literature Search,** MOS, MS, YEC, EB. All authors have read and agreed to the published version of the manuscript.

Data Availability Statement

The data presented in this study are available on request from the corresponding author. The data are not publicly available due to legal restrictions.

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RESEARCH ARTICLE

Determination of the Relationship Between Personality Traits and Burnout Levels of Athletes from Different Branches

Cüneyt SEYDİOGLU[1], Ihsan YAGCİ[2*], Kubilay ÇİMEN[3] and Ünsal TAZEGÜL [4]

[1]Istanbul TopkapiUnivrsity, Faculty of Sport Sciences, Recreation, Istanbul / Turkey
[2]Ministry of Education, Afyonkarahisar / Turkey
[3]Istanbul GelisimUnivrsity, School of Physical Education and Sports, Sport Management, Istanbul / Turkey
[4]Iğdır University, Faculty of Sport Sciences, Department, Igdir / Turkey
*Correspondingauthor: cuneytseydioglu@topkapi.edu.tr

Abstract
This study aimed to reveal the relationship between the personality traits and burnout levels of athletes from different branches. The study was conducted with the relational research model among the quantitative research methods. The study group included 305 athletes consisting of 46 wrestlers, 91 boxers, 25 runners, 89 weightlifters, and 54 football players. The data were analyzed through SPSS 20 package software. The data analysis used descriptive statistical analysis and Pearson correlation analysis to determine the direction and severity of the relationship between the variables. As a result of the descriptive statistical analysis, it was determined that the boxers scored higher in the reduced sense of accomplishment, emotional and physical exhaustion, and depersonalization dimensions. It was concluded that athletes in the athletics branch had higher scores in the extrovert and neuroticism dimensions, and athletes in the weightlifting branch had higher scores in the psychoticism dimensions. According to the correlation analysis, it was found that there was no statistically significant relationship between the personality traits and burnout levels of athletes.

Keywords
Burnout, Personality, Athlete

INTRODUCTION

Personality has been examined and researched by many scientists since it is an essential factor indicating the place of human beings in society. Different theories have been introduced about personality as a result of these examinations. One of these theories is the “Theory of Structural Personality.” This trend examines personality in terms of structure. It focuses on the development of consciousness, which constitutes the highest level of personality, and elements such as perception, thought, and will. Tichener is the leading defender of this personality movement (Koknel, 1984). Another theory about personality is the "Theory of Social Learning Personality". A. Bandura, J. Rotter, and W. Mischel are the prominent representatives of this theory. This movement argues that human learning occurs in a social environment and that the most important learning of children occurs by observing the behaviors of others (Cuceloglu, 2002). This theory suggests that if personality is formed by learning, then it can also be changed through learning (Senerler, 1993). The common point of these definitions and theories is that personality involves everything that concerns a person, and that personality is a long and uninterrupted process that

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[1]**ORCID:** 0000-0002-3637-8585 , [2]**ORCID:** 0000-0002-4595-0574 , [3]**ORCID:** 0000-0003-1427-120X , [4]**ORCID:** 0000-0001-9772-9305

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begins in the human uterus and continues until the end of life (Tazegul, 2012 and Cuceloglu, 2002). Eysenck, who conducts comprehensive studies on personality, evaluates personality structure through two independent two-pronged horizontal and vertical dimensions. One end of the horizontal dimension involves introversion, and the other involves extroversion. In the vertical dimension, there are neurotic types at the upper end and main types at the lower end. The personality structures of all people are located somewhere between these two dimensions. This location can be determined by observation, graded scales, and tests. The elements that compose the personality are located on four separate levels that are separate from each other, with a connection between them (Goodworth, 1988). Studies on sports and personality have generally determined that sports contribute positively to individuals' personality development. Hills and Argyle (1998) examined the positive emotional states developed by leisure time activities and their effects on personality. They found that all kinds of leisure time activities were the sources of positive emotional states. In addition, each of these activities was found to be associated with extrovert personality traits. The relationship between sports and extrovert personality traits has manifested itself especially in team sports (Pehlivan and Ada, 2011). According to the general profile of athletes, low neuroticism, high extroversion, and responsible personality traits are observed in athletes (Acar and Karavelioglu, 2022).

Many mental factors negatively affect the performance of athletes. Anxiety, stress, and burnout are among the factors that negatively affect the performance of athletes (Tazegul, 2013; Tazegul, 2012). Negative mental factors such as anxiety and stress affect the burnout levels of athletes.

The concept of "burnout", introduced by Freudenberger (1974) in the 1970s, emerged due to the changes in an individual and others caused by the intensive work pace. Freudenberger (1974) considered burnout as a psycho-social structure and explained it as a process that affected the productivity of an individual. In the following years, the concept of burnout, which was defined by Maslach and Jackson (1981) as a physical and mental dimensional syndrome that included the negative attitudes of the individual towards work, life, and other people, along with the feelings of physical exhaustion, prolonged fatigue, helplessness, and hopelessness in humans, was started to be studied by Raedeke and Smith (2001) in the field of sports psychology after the 2000s.

Burnout is a prolonged physical, mental, and behavioral dysfunction that develops as a result of working under constant stress in individuals working in highly demanding jobs (Budak, 2003). In terms of sports, burnout has been defined as physical, emotional, and social withdrawal from previously enjoyed sports activities (Gould and Whitley, 2009). This withdrawal can be classified as emotional and physical exhaustion, reduced sense of accomplishment, and devaluation of sports. According to another definition, burnout is a condition that occurs as a result of chronic stress, motivational orientations, and changes in the athlete caused by perceived or fundamental imbalances between what is expected of the athlete physically, psychologically, and socially and the reaction capacity of the athlete (Gould and Weinberg, 2015). In many studies on burnout, burnout has attracted more attention than overtraining or exhaustion (Hanrahan and Andersen, 2010). The main characteristics of burnout are physical and emotional weakness, poor personal achievement, low self-esteem, and loss of personality (Raedeke and Smith, 2001). In sports, burnout is used differently from quitting sports because burnout includes psychological and emotional weakness, reacting negatively to others, poor self-esteem, and depression (Williams, 2006). Overtraining, which refers to short cycle training (lasting a few days or weeks) in which athletes expose themselves to excessive training loads at maximum or almost maximum capacity, is one of the sub-causes of burnout. On the other hand, excessive training also contributes to positive performance when exercised by the right athletes at the right time (Gould and Weinberg, 2015).

The main aim of this study was to reveal the relationship between the personality traits and burnout levels of athletes from different branches.

MATERIALS AND METHODS

The study was conducted with the relational research model among the quantitative research methods. This study was conducted with ethical and informed consent in accordance with the rules stated in the Declaration of Helsinki

Study Group

The study group included 305 athletes consisting of 46 wrestlers, 91 boxers, 25 runners, 89 weightlifters, and 54 football players.

Data Collection Tools

Revised Eysenck Personality Questionnaire - Short Form (EPT-RS)

Francis et al. (1992) developed the EPT-RS by reviewing the Eysenck Personality Questionnaire (Eysenck, Eysenck 1975) and the short form of the same questionnaire (48 items) (Eysenck, Eysenck, Barrett 1985). The validity and reliability studies of the scale were conducted by Karanci et al. (2007). The internal consistency of the scale for the sub-scales was 0.78 for Extroversion, 0.65 for Neuroticism, and 0.42 for Psychoticism, respectively. The test-retest consistency was 0.84 for Extroversion, 0.82 for Neuroticism, and 0.69 for Psychoticism. In this questionnaire, each factor is evaluated with 6 items, and the participants are expected to respond to 24 questions as Yes (1) or No (0). The score that can be obtained for each personality trait varies between 0 and 6. The fact that the test used simple language increased the usage value of the test (Aydemir and Koroglu, 2009). The sub-scales of the Eysenck Personality Questionnaire and the description of these scales are as follows (Yildiz et al., 2008).

Psychoticism

A troublesome, disturbing personality that causes trouble for others. Extroversion: A sociable and cheerful personality.

Neuroticism

An anxious, grumpy, and resentful personality (Karanci et al., 2007).

Athlete Burnout Questionnaire

The Athlete Burnout Questionnaire, which was developed by Raedeke and Smith (2001), is a 5-point Likert-type questionnaire consisting of 3 sub-dimensions and 15 items. The scale was adapted to Turkish by Kelecek, Kara, Kazak, Cetinkalp, and Asci (2016). Two items were removed due to low factor load; therefore, the scale was evaluated over 13 items. Emotional and physical exhaustion sub-dimension consists of 5 items, and the sub-dimensions of reduced sense of accomplishment and depersonalization consist of 4 items. The internal consistency coefficient of the reduced sense of accomplishment was calculated as 0.75, the internal consistency coefficient of emotional physical exhaustion was calculated as 0.87, and the internal consistency coefficient of depersonalization was calculated as 0.83. Within the scope of this study, Cronbach's Alpha values were 0.76 for the reduced sense of accomplishment, 0.79 for emotional physical exhaustion, and 0.60 for depersonalization.

Data Analysis

The data were analyzed through SPSS 20 package software. One-sample "Kolmogorov-Smirnov" test was administered to find out whether the data had a normal distribution, and the "ANOVA - Homogeneity of Variance" was applied to evaluate whether the data were homogeneous. In this first examination, it was determined that the data were distributed homogeneously and normally. In the analysis of the data, descriptive statistical analysis and Pearson correlation analysis were used to determine the direction and severity of the relationship between the variables.

RESULTS

This part of the study included the findings obtained regarding the personality traits and burnout levels of athletes from different branches.

Table 1 showed that the scores of the boxers were $\bar{X}$= 10.65 ± 2.30 in the reduced sense of accomplishment, $\bar{X}$= 12.27 ± 4.28 in emotional and physical exhaustion, and $\bar{X}$=8.71 ± 3.37 in depersonalization, and they were higher compared to the other branches. It was determined that the scores of the athletes in the athletics branch were $\bar{X}$= 3.24 ± 1.96 in the extrovert and $\bar{X}$= 3.56 ± 1.58 in neuroticism, and the scores of the athletes in the weightlifting branch were $\bar{X}$= 2.61 ± 1.16 in psychoticism; they were higher compared to the other branches.

Table 1. Descriptive statistics findings

The scales	Branch	N	$\bar{X}$ ± S.D.
Reduced Sense of Accomplishment	Wrestling	46	10.52 ± 2.13
	Boxing	91	10.65 ± 2.30
	Athletics	25	10.20 ± 2.51
	Weight Lifting	89	10.49 ± 2.49
	Football	54	10.68 ± 2.40
Emotional Physical Exhaustion	Wrestling	46	11.54 ± 4.52
	Boxing	91	12.27 ± 4.28
	Athletics	25	11.12 ± 3.68
	Weight Lifting	89	10.47 ± 4.46
	Football	54	11.66 ± 4.29
Depersonalization	Wrestling	46	8.39 ± 3.66
	Boxing	91	8.71 ± 3.37
	Athletics	25	7.64 ± 3.38
	Weight Lifting	89	7.44 ± 3.56
	Football	54	8.05 ± 3.52
Extrovert	Wrestling	46	3.28 ± 1.32
	Boxing	91	3.19 ± 1.10
	Athletics	25	3.24 ± 1.96
	Weight Lifting	89	3.12 ± 1.17
	Football	54	3.38 ± 1.45
Neuroticism	Wrestling	46	3.15 ± 1.39
	Boxing	91	3.13 ± 1.51
	Athletics	25	3.56 ± 1.58
	Weight Lifting	89	3.28 ± 1.43
	Football	54	3.29 ± 1.73
Psychoticism	Wrestling	46	2.45 ± 0.93
	Boxing	91	2.51 ± 1.12
	Athletics	25	2.24 ± 0.72
	Weight Lifting	89	2.61 ± 1.16
	Football	54	2.48 ± 1.09

Table 2. Correlation analysis showing the relationship between personality dimensions and burnout dimensions

The scales		Extrovert	Neuroticism	Psychoticism
Reduced Sense of Accomplishment	PearsonCorrelation	0.047	0.033	0.049
	Sig. (2-tailed)	0.347	0.512	0.327
EmotionalPhysicalExhaustion	PearsonCorrelation	0.042	0.067	0.014
	Sig. (2-tailed)	0.400	0.183	0.787
Depersonalization	PearsonCorrelation	0.061	0.014	0.004
	Sig. (2-tailed)	0.228	0.785	0.941

According to Table 2, no statistically significant relationship was determined between the personality traits and burnout levels of the athletes as a result of the correlation analysis ($p>0.05$).

DISCUSSION

As a result of the descriptive statistical analysis, it was determined that the scores of the boxers were higher in the dimensions of reduced sense of accomplishment, emotional and physical exhaustion, and depersonalization. It was found that the athletes had high scores in the athletics branch in the extrovert and neuroticism dimension, and that the athletes in the weightlifting branch had high scores in the psychoticism dimension. According to these data, it can be argued that the boxers in the sample were more physically and emotionally exhausted and more prone to stress. One of the greatest factors in the physical and mental exhaustion of boxers is thought to be the fact that boxing is a difficult sport. Boxers may become physically and mentally exhausted more quickly as they constantly punch each other in training. In addition, it can be argued that athletes in the athletics branch in the sample were generally cheerful and sociable people. This is because people who develop extroverted personality traits are the types of people who like to communicate and are cheerful. Eysenck defined extroverts as follows: Typical extroversion refers to people who enjoy social entertainment and gatherings, act according to their motives at the time, like to make hurtful jokes, and are carefree, lymphatic, and self-indulgent (Koc, 1994). In addition to these characteristics of the athletes in the field of athletics, it can be argued that they were more fragile, resentful, and moody individuals since their neuroticism personality traits were more developed. The biggest reasons for the further development of the extroverted personality traits of athletes in the athletics branch included the fact that their economic status was good and they had achieved great success. This is because as the economic and sporting success of an athlete increases, the level of human relations and socialization also increases.

In a study conducted on 188 young athletes in Taiwan to examine the effect of the adaptive and maladaptive two-dimensional perfectionism model on the burnout levels of athletes, it was concluded that adaptive and maladaptive perfectionism did not have a significant effect on burnout (Chen, Kee, Tsai, 2009). In a study conducted with 202 professional and semi-professional rugby players, who continued their sports lives in the UK, a relationship was found between perfectionism and burnout (Hill and Appleton, 2011). Kelecek and Gokturk conducted a study in 2017 and found the emotional/physical exhaustion scores of female football players as 1.55, their reduced sense of accomplishment scores as 2.08, and their depersonalization scores as 1.34. In their study conducted in 2020, Sari and Koleli reported the emotional physical exhaustion score of the athletes as 1.65, the reduced sense of accomplishment score as 2.08, and the depersonalization score as 1.48. Ozcosan conducted a study in 2018 and found that the burnout levels of female athletes were higher compared to the male participants. In their study conducted in 2016, Kang et al. stated that professional athletes experienced more burnout compared to non-professional athletes. Molinero et al. conducted a study in 2012 and determined that excessive training affected the burnout levels of athletes negatively. In a study by Berengui Gil et al., which was conducted in 2015, they found that female athletes had high levels of burnout. Lu et al. conducted a study in 2016 and reported that coach support positively affected the burnout levels of the athletes. A study on the effect of motivational climate and flexibility on burnout levels of young athletes, which was conducted with 87 young volleyball and basketball players aged between 15 and 18, concluded that task-oriented motivational climate and flexibility were positively related to competence and negatively related to the three dimensions of burnout. The performance-oriented motivational climate was found to be positively related to all three dimensions of burnout. Another result was that the task-oriented motivational environment significantly affected the decline and poor accomplishment dimensions of burnout in sports (Vitali, Bortoli, Bertinato, Robazza, and Schena, 2015).

In conclusion, it was determined that the athletes in the sample were more extroverted and sociable individuals. It was found that athletes in the boxing branch experienced more burnout. No statistically significant relationship was determined between the personality traits and burnout levels of the athletes in the sample. At the end of this section, emphasizing the limitations of the research and making suggestions for future research will improve the quality of the study.

Conflict of Interests Statement

There are no conflicts of interest for the contributing author.

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Ethics Statement

During the current research, "Higher Education Institutions Scientific Research and Publication Ethics Directive" and the relevant research was conducted at Istanbul Topkapı University, Academic Research and Publication Ethics Commission, E-49846378-050.01.04-2300010581
approved by the board decision.

Author Contributions

Study Design, IY; Data Collection, CS and Statistical Analysis, UT; Data Interpretation, IY and FK; Manuscript Preparation, CS; Literature Search, IY and UT. All authors have read and agreed to the published version of the manuscript.

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RESEARCH ARTICLE

The Effect of Diaphragm Awareness Exercise on Flow Experience and 1-min Paced Deep Breathing Assessment

Esin KAPLAN[1]

[1]Burdur Mehmet Akif ErsoyUniversity, Faculty of Sport Science, Department of Sports Management, Burdur / Turkey
*Corresponding author: ekaplan@mehmetakif.edu.tr

Abstract
This study aimed to examine the effect of diaphragm awareness exercise on flow experience and 1-minute paced deep breathing assessment. A total of 17 university students, seven males and ten females, aged 20.64±1.5 years, participated in the study voluntarily. The convenience sampling method was used in the study. The study is a single group, Pre-Post test design. Personal information form, 1-min Paced Deep Breathing measurement, and " Flow State Questionnaire " to determine flow experiences were used as data collection tools in the pre-test. Diaphragm awareness exercise were performed ones a week for eight weeks. In the post-test, the procedure applied in the pre-test was applied. According to the findings, significant differences were observed in SDNN (p= .035), Balance (p= .013), Concentration (p= .023), and flow (p= .009) of the study group after the diaphragm awareness exercise (p<0.05). However, no significant difference was observed in MHRR, RMSSD, and Coherence parameters (p>0.05). In conclusion, Diaphragm awareness exercises increases heart rate variability. It also positively affects the flow experience by increasing balance and concentration on work.

Keywords
Diaphragm awareness, Heart rate variability, Flow

INTRODUCTION

The foundations of breath psychology, celebrated for thousands of years in various wisdom and spiritual traditions, are studied in connection with many themes (like consciousness, embodiment, spirituality, and healing). Breath psychology practices are also considered in the context of health, sport, and skills training (Edwards, 2008).

Respiratory activity significantly alters the membrane potentials of preganglionic vagal and sympathetic neurons. The most prominent of these "respiratory pathways" is respiratory sinus arrhythmia, the rhythmic fluctuations of electrocardiographic R-R intervals observed in healthy people (Eckberg, 2003). Respiratory Sinus Arrhythmia (RSA) reflects the increase and decrease in cardiac sinus rhythm corresponding to inhalation and exhalation. Sympathetically mediated breathing (inhalation) is associated with increases in heart rate, while parasympathetically mediated exhalation is reflected by decreases in heart rate. It is a function of the processes that control respiration and thus gas exchange (Schwartz and Andrasik, 2017).

All people breathe differently depending on the mental and physical conditions they are in. In the event of a strain, when a person perceives the situation as a threat, the activity of the sympathetic nervous system increases. This leads to some physiological and mental symptoms. One of these symptoms is increased respiratory frequency. Breathing becomes frequent, superficial, and chest-related. The air goes to the upper part of the lungs. In normal breathing, however, air goes to

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[1]**ORCID:** 0000-0002-8417-1266

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the whole lungs and is related to the abdomen. This is called diaphragmatic breathing (Doğan, 2005, p.120-121). Many muscles are involved in breathing, the most important of which are the diaphragm, abdominal muscles, and inter-rib muscles (Pehlivan, 2015). Therefore, it is recommended to perform breathing exercises together with diaphragmatic breathing 2-3 times a day for 5-10 minutes (Doğan, 2005, p. 121; Tiryaki, 2000, p. 39).

Heart rate refers to the number of heartbeats in one minute (Ergen et al., 2011, p. 70). Heart rate variability refers to the detectable change in R-R intervals reflecting the autonomic balance between the sympathetic nervous system (SNS) and parasympathetic nervous system (PNS) acting on the sinoatrial node (Freeman et al. 2006). HRV is therefore considered a neuro-cardiac measure reflecting heart-brain interactions and autonomic nervous system dynamics (McCraty et al., 2009).

A number of strategies are helpful when a person wants to control heart rate variability. Diaphragmatic breathing, relaxation meditation, and cultivating positive emotion are tools to change heart rate variability (Moss, 2004). Diaphragmatic breathing is a critical tool for increasing heart rate variability and establishing a consistent heart rhythm. In diaphragmatic breathing, the individual breathes deeply, smoothly, and fully using the diaphragm muscles at the bottom of the lungs. With each breath, the individual fills the lungs completely but effortlessly and then empties the lungs completely and smoothly. Breathing continues evenly and smoothly at about six breaths per minute (Moss, 2004).

Flow theory is a theory proposed by Mihaly Csikszentmihalyi in 1975 (Orhun & Gülcan, 2022). According to the flow model, an individual's perceived level of difficulty and personal skills lead to their level of optimal experience (Csikszentmihalyi & Larson, 2014, p. 81).

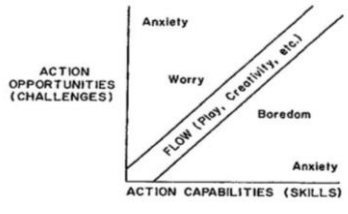

Figure 1. Model of The Flow State (Csikszentmihalyi & Larson, 2014, p. 147)

According to the model, the points that the individual should avoid in order to be in the flow channel are anxiety and worry. When action opportunities are perceived by the individual as exceeding their abilities, the resulting stress is experienced as anxiety. When action opportunities are in balance with the individual's skills, the state of flow is felt. If the skills exceed the difficulties, boredom and tiredness are experienced (Csikszentmihalyi & Larson, 2014, p. 147).

However, Csikszentmihalyi and Larson (2014) also state that whether or not a person is in flow does not entirely depend on the objective nature of the challenges available or the objective skill level. In fact, whether or not one is in flow depends entirely on one's perception of what challenges and skills are. According to Csikszentmihalyi and Larson, with the same objective level of action opportunities, a person can feel anxious one moment, bored the next, and in a state of flow immediately afterward. Therefore, it is impossible to say with certainty whether a person will be bored or anxious in a given situation.

Csikszentmihalyi (2022) states that every flow activity, including competition, chance, and any other dimension of experience, has a kind of exploration and features that take the person to a new reality. These activities push the person to a higher level of performance, which leads to a level of consciousness that was previously unimaginable. In other words, it transforms the essence, making it more complex. The development of this essence is the key point of flow activities (p.116-117).

Furthermore, Collingwood (1938) states that consciousness is autonomous, and only its decision determines whether to pay attention to a particular sensation or emotion. He states that a conscious being is not free to decide which emotion to have, but it is free to decide which emotion to place at the center of its consciousness. So in order to be conscious of pleasurable experiences, it is necessary to narrow the focus of attention to only the relevant stimuli. What we usually call "concentration" is intensely focused attention on a narrow range of stimuli (Csikszentmihalyi, 2022, p. 3-7).

Breathing training aims to restore a person's ability to maintain proper respiratory chemistry regardless of emotional state, activity, or respiratory rate. While some breathing practices

may involve relaxation, the goal is breath training (Khazan, 2013).

In the literature, 1-minute paced deep breathing measurement has been used with parameters such as determining worker health (Six Dijkstra et al. 2019), differences between short- and long-term HRV measurements (McCraty et al. 2021), and perceived stress (Tripska et al. 2022). Studies also examine the effect of diaphragm awareness exercises on HRV using different protocols (Edwards, 2005; Rocha et al. 2020). There are studies on flow experience in the literature. However, from a different perspective, there is no study examining the effect of diaphragm awareness exercises on flow experience. Studies on flow experience have been evaluated by considering different parameters such as athletic mental energy and mindfulness (Öner, 2022), motivation regulation, and the role of personality (Turgut and Ümmet, 2021).

In this context, it is conceivable that the focus on breath and diaphragm movement in diaphragm mindfulness practices may affect balance, concentration on the task, and therefore the overall flow state with these. It may also cause some changes in heart rate variability parameters. In this context, this study aims to examine the effect of diaphragm awareness exercises on flow experience and 1-minute paced deep breathing assessment.

MATERIALS AND METHODS

Participants

A total of 17 university students, seven males, and ten females, voluntarily participated in the study. The convenience sampling method was used in the study. The study included individuals between the ages of 18-25 who were sedentary, did not have a systematic disorder, and did not regularly use medication. The study is a single group, Pre-Post test design.

This study used the G Power 3.1.9.7 software package to calculate the number of participants, setting $\alpha = .05$, power = 0.8, and effect size = 0.8. The calculated number of participants was 15. Considering an attrition rate 17 participants were recruited for this study.

Ethics Committee Approval of the study was taken from the Ethics Committee of Burdur Mehmet Akif Ersoy University before starting the research (Decision No: GO 2023/279) and, written informed consent was obtained from the participants before starting the study.

Table 1. Descriptive statistics

	N	$\bar{X}$	Sd
Age	17	20.64	1.5

Data Collection Tools

Personal Information Form

It was created by the researchers in order to determine the age, gender, exercise status, and disease-medication status of the individuals.

Diaphragm Awareness Study

In the diaphragm awareness study, one of the exercise that increase diaphragm awareness in Önder (2019)'s 365 Gün Nefes (365 Days of Breathing) book were used. The exercise that increase diaphragm awareness was performed by the participants while sitting on a chair. The application format of the exercises is as follows;

Exercise: In a seated position, participants breathed in and out with the left hand on the navel (solar plexus) and the right hand on the chest. They were asked to notice that either one or both hands rose as they inhaled and vice versa as they exhaled. Participants were only asked to experience the current situation.

1-min Paced Deep Breathing Measurement

HRV was assessed with a 1-minute paced deep-breathing protocol. The 1-minute paced deep-breathing measurement was performed using the HeartMath brand emWave Pro+ device. The blood volume measurement sensor in the emWave Pro+ device was placed on the participant's earlobe and measured for 1 min, and MHRR, SDNN, RMSSD, and Coherence values were obtained.

Flow State Questionnaire

This scale was developed by Magyarodi, Nagy, Soltesz, Mozes, and Olah (2013) and adapted into Turkish by Uz-Baş (2019) in order to examine the flow experience of individuals and their basic characteristics within the flow experience. It is a 5-point Likert-type scale consisting of "Strongly Disagree", "Disagree", "Undecided", "Agree" and "Strongly Agree" statements and a total of 12 items. The scale has two sub-dimensions: balance and concentration on work. A minimum score of 12 and a maximum score of 60 can be obtained from the scale. A high score on the scale indicates that the individual has

a high level of flow experience. Cronbach Alpha internal consistency reliability coefficients of the dimension, .83 for the work concentration sub-dimension, and .91 for the total score.

Procedure

In the first session (pre-test), the personal information of the participants was collected. After the participants rested in a sitting position for 5 minutes, a 1-minute Paced Deep Breathing measurement was performed using the heart math emWave pro+ device. Immediately after the measurement, the participants were asked to fill in the Flow State Questionnaire to determine their flow experience. Then, diaphragm awareness exercise was practiced for ones a week for 8th weeks and the post-test was performed in the 9th week. In this study, diaphragm awareness exercises were performed in the subjects' breathing cycles in a sitting position for 10 minutes.

Participants were asked not to consume stimulants such as coffee 12 hours before the measurement. Measurements were collected between 11.00-14.00 hours. Diaphragm awareness exercise were conducted by a breathing instructor.

*PIF Personal information form, *DAEDiaphragm awareness exercise

Figure 2. Procedure

Statistical Analysis

SPSS statistics program was used in the analiysis of the data. Z scores were examined to determine the extreme values of the data. Values above -2.50 +2.5 were excluded from the Z scores data. Then, for the values of EM score p> 0.05, loss data assignment was made according to the average of the series. Normality test was performed using Shapiro Wilks test. HRV parameters and flow experience were considered dependent variables, and diaphragm awareness studies were considered independent variables. The effect of the application in the groups was evaluated by paired sample t-test. The significance of the difference between the averages was taken as α=0.05.

RESULTS

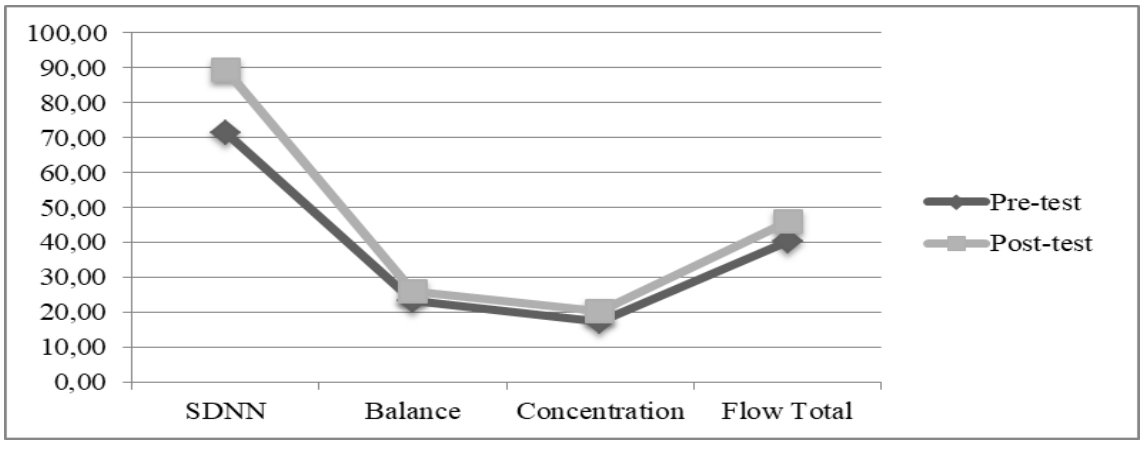

Figure 2. SDNN, Balance, Concentration and Flow total Chart before and after diaphragm awareness exercise

When Table 2 is examined, a significant difference was observed in SDNN (p= .035), Balance (p= .013), Concentration (p= .023), and Flow (p= .009) in the study group (p<0.05). However, no significant difference was observed in MHRR, RMSSD, and Coherence parameters (p>0.05).

Table 2. HRV parameters and flow experience before and after diaphragm awareness exercise

	Pre-test n=17				Post-test n=17	
	x̄	Sd			x̄	Sd
MHRR	29,18	9,17	t= -1.252	p=.229	32,22	11,92
SDNN	71,43	25,58	t= -2.302	p=.035*	89,32	33,86
RMSSD	47,86	11,93	t= -1.133	p= .274	52,18	18,36
C1	70,07	20,79	t= -2.024	p= .060	76,34	13,60
B	23,18	4,11	t= -2.803	p=.013*	25,88	2,14
C2	17,24	4,78	t= -2.512	p=.023*	20,18	2,98
FT	40,41	7,73	t= -2.960	p=.009*	46,06	4,24

*p<0.05 *$C1_{Coherence}$, $B_{Balance}$, $C2_{Concentration}$, $FT_{Flow\ Total}$

DISCUSSION

For this study, HRV was measured with various parameters, including SDNN, RMSSD, MHRR, and coherence. Results show that the diaphragm awareness exercises applied in the current study affected the SDNN parameter. Time domain indices of heart rate variability measure the amount of HRV observed during monitoring periods ranging from <1 minute to >24 hours. SDNN is one of these parameters. SDNN is the standard deviation of NN intervals (Shaffer and Ginsberg, 2017) and is a reliable and descriptive measure for the assessment of HRV (Schipke et al., 1999).

When the literature is examined, it is possible to find studies in which diaphragm applications positively affect heart rate variability. The study results of Subbalakshmi et al. (2014) show that diaphragmatic breathing causes more cardiac autonomic modulation in healthy subjects. According to the results of Hunt et al. (2021), diaphragmatic breathing caused significant increases in HRV. According to Moss (2004), a number of strategies help when a person wants to control heart rate variability. First, diaphragmatic breathing is a critical tool to increase heart rate variability and establish a consistent heart rhythm. In addition to diaphragmatic breathing, cognitive relaxation, and positive emotion help to achieve optimal increases in HRV. According to MacLean and Psych (2004), two aspects of breathing are crucial for achieving 'consistency' or optimal heart rate variability. One is respiratory mechanics, which emphasizes diaphragmatic breathing rather than thoracic or chest breathing. But more importantly, breathing frequency plays a critical role in bringing the heart and other physiological systems to a state of coherence or optimal functioning. When the literature was examined, it

was observed that studies related to the diaphragm and HRV were also conducted on patient groups.

In addition, the diaphragm technique can reduce the mean resting heart rate. Immediately after diaphragm training, it can increase heart rate variability (Rocha et al. 2020). Recent evidence recognizes breathing skills as the original method of energy control, disease prevention, health promotion and quality of life improvement (Edwards, 2005). Results show that the literature supports the findings of the current study. According to the results of the study, diaphragm awareness exercises increase HRV.

In the present study, RMSSD and MHRR parameters are not significantly different. RMSSD is the root mean square of consecutive RR interval differences between normal heartbeats and provides an estimate of parasympathetic system of the heart (Shaffer and Ginsberg, 2017).Schipke et al. (1999) recommend SDNN as a reliable, easily accessible, and descriptive measure for the assessment of HRV due to the wide distribution of RMSSD and pNN50.

MHRR is the mean heart rate interval. MHRR is expressed as a time domain variable that indicates the magnitude of the acceleration-deceleration amplitudes of the heart. It is also a helpful parameter in the assessment of autonomic nervous system health (Six Dijkstra et al., 2019). The MHRR method is typically measured from a series of consecutive deep breaths, usually at least six breaths at a rate of five or six breaths per minute (Shields, 2009). In the current study, MHRR values did not differ significantly. However, when the pre-test and post-test averages were analyzed, it was observed that there was an increase. A lower MHRR indicates a higher health risk (Six Dijkstra et al., 2019).

There are studies on flow experience in the literature. However, from a different perspective, there is no study examining the effect of diaphragm awareness exercises on flow experience. Magyarodi and Olah (2015) found that the most typical solo flow activities are work, sports, creative activities, and reading. The most common social activities that trigger flow are work and sports. The choice of the most frequent flow-inducing activities in both solitary and interpersonal situations depends on the gender of the respondent, and various demographic factors may influence the frequency of flow experiences in different contexts. Öner (2022) study results showed that athletes' mindfulness, awareness, and refocus were significantly related to on-task flow, balance, and self-giving, and a non-judgmental attitude was only positively related to balance. Turgut and Ümmet (2021) study results show that when adults can motivate themselves in their lives, it will be easier for them to focus on any activity they perform (academic, housework, hobby, daily work, etc.) when their willpower to regulate their motivation is high, and it will be easier for them to fully concentrate and experience flow in the activity. As a result of Eryılmaz's (2018) study, it was seen that the balance between the challenges and skills dimension of the flow experience (balance between challenges and skills; activity adoption), which was examined through two structures, had an effect on self-efficacy. Wessling's (2022) study results show that there is a relationship between flow and well-being. As a result of Eryılmaz's (2018) study examining the flow experiences of individuals participating in recreational activities, it was found that the flow experience did not differ for the individual who performed the activity indoors and outdoors. In the current study, diaphragm awareness exercises and flow experience on breathing were performed indoors. When the literature is examined, it shows that the studies are mostly on the effect of recreational activities on flow experience. The results of the current study show that diaphragm exercises increase the balance and concentration skills of individuals by staying in the flow. Therefore, being in the flow in activities on breathing is realized after repetitions. Thus, repeating the diaphragm awareness exercises leads to an improvement in the flow experience.

In conclusion, Diaphragm awareness exercises increase heart rate variability. It also positively affects the flow experience by increasing balance and concentration on work. In future studies, it is recommended to increase the application time of diaphragm awareness studies and to apply them to a larger sample group by adding a control group. In addition, supporting diaphragm awareness studies with different breathing techniques on athletes will contribute to the literature.

Research Publishing Ethics

Ethics Committee Approval of the study was taken from the Ethics Committee of Burdur Mehmet Akif Ersoy University before starting the

research (Decision No: GO 2023/279) and, written informed consent was obtained from the participants before starting the study.

Conflict of Interest

This study there is no conflict of interest. There is no financial support provider.

Author Contributions

Planned by the author: Study Design, Data Collection, Statistical Analysis, Data Interpretation, Manuscript Preparation, Literature Search. Author have read and agreed to the published version of the manuscript.

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RESEARCH ARTICLE

Evaluation of The Relationship Between Internet and Smartphone Addiction and Loneliness Among University Students

Yasemin SARICI[1*] and İlknur SAYAN[2]

[1]İstanbul Esenyurt University, Vocational School, Department of Management and Organization, İstanbul / Turkey
[2]Istanbul Kent University, Vocational School of Health Services, Department of Medical Services and Techniques, İstanbul / Turkey
*Corresponding author: yaseminsarici@esenyurt.edu.tr

Abstract
The present study investigated the relationships between Internet addiction, smartphone use, and loneliness among university students, and compared these variables according to demographic characteristics. A total of 384 university students participated in this study, which employed a cross-sectional design. Data were collected using the Internet Addiction Test, Smartphone Addiction Scale, and UCLA Loneliness Scale. Descriptive statistics, correlation analyses, and multiple comparison tests were used for data analysis. The results revealed significant positive correlations between internet addiction, smartphone use, and loneliness, highlighting the interrelated nature of these constructs. Sociodemographic factors such as age, department, leisure activities, and family relationships were significantly associated with the study variables. Specifically, younger age groups and students from Health Sciences and Business and Management departments reported higher scores for Internet addiction and smartphone use. Moreover, engaging in sports or reading during leisure time was associated with lower scores in these areas. To conclude, findings emphasize the importance of considering sociodemographic factors and promoting alternative leisure activities when designing interventions to mitigate the negative effects of excessive technology use. Further research is needed to explore the underlying mechanisms and potential strategies for addressing internet addiction, smartphone use, and loneliness among university students.

Keywords
Internet, Smartphone Addiction, Loneliness, Sociodemographic Factors

INTRODUCTION

In recent years, the pervasive use of smartphones and the Internet has become an integral part of daily life, particularly among Generation Z university students. The history of Internet addiction research dates back to the mid-1990s, when Dr. Kimberly Young presented her initial findings at the American Psychological Association's annual conference (Young, 1998). Digital devices have transformed how people communicate, access information, and engage in various forms of entertainment. However, excessive use of smartphones and the Internet has raised concerns about addiction and its potential consequences on mental health, social well-being, and academic performance.

Smartphone addiction, defined as the excessive and uncontrollable use of smartphones that interferes with an individual's daily life, has emerged as a significant issue among university students. Numerous studies have investigated the prevalence of smartphone addiction and its various risk factors, including personality traits, sociodemographic

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[1]**ORCID:** 0000-0002-3026-5398 , [2]**ORCID:** 0000-0002-7133-5858

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factors, and mental health conditions (Gökçearslan et al., 2018; Noyan et al., 2015). Research has indicated that excessive smartphone use can lead to various negative consequences, including sleep disturbances, anxiety, depression, and reduced academic performance (Demirci et al., 2014; Ozcan and Acimis, 2021; Öztürk et al., 2023).

Loneliness is a complex emotional state characterized by a subjective feeling of social isolation and dissatisfaction with one's social relationships. It is not merely the absence of social interaction but rather the perception of being disconnected from others and lacking meaningful connections. Loneliness has been associated with a range of negative physical and mental health outcomes including increased stress, depression, anxiety, and reduced cognitive function (Hawkley and Cacioppo, 2010; Peplau, 1982; Perlman, 1982).

Research has identified loneliness as both a risk factor and consequence of smartphone and Internet addiction (Aktaş and Yılmaz, 2017; Aslan, 2023; Yalçin et al., 2020). Early studies on Internet addiction, such as those conducted by Young (Young, 1998), suggested that excessive Internet use might lead to social withdrawal and increased feelings of loneliness, as individuals substitute online interactions for face-to-face connections. In a similar manner, Shapira et al. (Kwon et al., 2013; Noyan et al., 2015) explored the association between problematic internet use and loneliness and found a significant positive correlation between the two constructs.

With the rise of smartphones, researchers have extended these findings to examine the relationship between smartphone addiction and loneliness. A recent study by Chóliz (Chóliz, 2010) found that heavy smartphone users were more likely to report higher levels of loneliness than moderate users, indicating that excessive smartphone use may contribute to social disconnection and feelings of isolation. A study by Sahin et al. (2013) observed a positive correlation between smartphone addiction and loneliness in university students, highlighting the potential consequences of excessive smartphone use on social well-being.

This study aimed to comprehensively understand the relationship between Internet and smartphone addiction and loneliness among university students. By examining risk factors, consequences, and potential interventions, this research seeks to contribute to the ongoing academic discourse on digital addiction and its impact on university students' mental health and well-being.

MATERIALS AND METHODS

This study was conducted with voluntary university students aged 18 and 35 who participated from June 1, 2021, to July 10, 2022. Informed consent was obtained from all the participants using voluntary information. This research was conducted with undergraduate, graduate, and postgraduate students attending Istanbul Esenyurt University and Istanbul Kent University. This study was conducted in accordance with ethical principles and guidelines for research involving human subjects. The research protocol was approved by the Institutional Review Board (IRB) of Istanbul Esenyurt University and Istanbul Kent University. The IRB approved the study before data collection commenced. Date and numbered: 01.10.2021/E-12483425-299-8712.

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All participants were informed of the study's purpose and procedures, and voluntary participation was ensured. Informed consent was obtained from each participant by using voluntary information. Participants were assured of their right to withdraw from the study at any time, without any consequences. Confidence and anonymity of the participants' data were maintained throughout the study and used solely for research purposes. Also Declaration of Helsinki rules have been followed. . Also Declaration of Helsinki rules have been followed.

In total, 450 online surveys were conducted. Convenience sampling and survey techniques were employed to collect the data. The sample size was calculated using a formula for quantitative research with variable features.

Study used validated scales to measure Internet addiction, smartphone addiction, and loneliness. Internet addiction was assessed using a scale developed by Gönül (Murat and Günüç, 2009). Smartphone addiction was measured using the Smartphone Addiction Scale (SAS] developed by Kwon et al. (2013) and its short version for adolescents by Noyan et al. (2015) and Demirci et al. (2014) validated the Turkish version of the SAS.

Internet Addiction Scale

Young developed the Internet Addiction Scale, which consists of 20 items rated on a 5-point Likert scale (1 = never, 5 = very often] (de Jong Gierveld, Psychology at Ege University examined the scale translated from English to Turkish. The standardized alpha reliability of the translated test was 0.91, and the Spearman-Brown value was 0.87, suggesting that the test was reliable.

Smartphone Addiction Scale

Kwon developed the initial Smartphone Addiction Scale based on Young's Internet addiction items and the future of smartphones (Young, 1998). The Turkish version of the scale was developed by Kwon et al. (2013) was developed by Demirci et al. (2014). The Cronbach's Alpha value for the original scale was 0.98, while it was 0.93 for the adaptation study. The Likert-type Smartphone Addiction Scale consisted of 33 items with a single-factor structure. Responses were evaluated on a scale of 1 to 6. The minimum and maximum response scores were 33 and 198, respectively. Those with higher scores were considered at-risk smartphone users, indicating an addiction.

UCLA Loneliness Scale (ULS-8)

Russell et al. developed the UCLA Loneliness Scale (Pretorius, 1993). The scale's reliability was examined, and the internal consistency coefficient was found to be 0.94. The test-retest reliability was found to be significant (r = 0.73). The scale consists of 20 items, with 10 coded positively and 10 coded negatively. The negatively coded items are as follows: 1, 4, 5, 6, 9, 10, 15, 16, 19, 20. Demir and Fişiloğlu (1999) and Demir (1989) examined the validity and reliability of a one-dimensional UCLA Loneliness Scale in Turkey. Yıldız and Duy (2014) adapted the short form of the scale. The factor analysis revealed a single factor. The factor loadings of the items range from 0.31 and 0.71. All fit indices for the ULS-8 indicated a good fit.

RESULTS

A total of 175 survey responses were collected online. However, it was observed that eight participants answered only the demographic questions and not the scale questions; thus, they were removed from the dataset. Consequently, the 1998; Young, 1998). The scale was evaluated on the basis of a single-dimension total score. The internal consistency reliability coefficient of the scale is 0.85. Five faculty members from the Department of analyses were conducted using responses from 167 participants.

Among the participants, 76.1% were female, and 23.9% were male. The age groups of the participants were as follows:25.8% in the 18-20 age group, 44.2% in the 21-23 age group, 13.5% in the 24-26 age group, and 16.6% in the ≥ 27 age group. The majority of the participants were studying in the field of Health Sciences (50.3%), followed by Vocational Schools (17.8%), Graduate Programs (14.4%), and Business and Management Sciences (6.7%). Regarding academic achievement, 14.7% of the participants described themselves as very good, 53.4% as good, 30.1% as average, and 1.8% as poor.

It was observed that 76.1% of the participants were from nuclear families, whereas 23.9% were from extended families. The number of individuals in the family was found to be–1-3 in 17.8%, 4-5 in 54.0%, 6-7 in 21.5%, and 8 or more in 6.7% of cases. The family status of the participants was as follows:89.6% lived with both parents, 1.2% had a deceased mother, 4.9% had a deceased father, and 4.3% had divorced or separated parents. The relationships among family members were described as very supportive in 32.5%, supportive in 36.2%, normal in 23.9%, conflicting in 5.5%, and highly conflicting in 1.8% of cases. The participants reported living with their families in 77.3% cases, with relatives in 3.1%, dormitories in 8.0%, and roommates in 6.7%. Table 1 presents the participants' demographic and family informations (Table 1).

Among them, 1.2% evaluated their economic status as very good, 33.1% as good, 57.7% as normal, 6.7% as poor, and 1.2% as very poor. Most participants (68.7%) reported spending a significant portion of their lives in metropolitan areas. Additionally, 16.6% of the participants lived in cities, 10.4% in towns, and 3.7% in villages. It was found that participants spent their leisure time as follows:27.6% on the Internet, 25.8% on their mobile phones, 19.0% listening to music, 12.3% reading books, and 10.4% engaging in sports activities. Table 2 presents socioeconomic information of the survey participants (Table 2).

Table1. Demographic characteristics of the participants

		N	%
Your gender	Female	124	76.1%
	Male	39	23.9%
Your age	18-20	42	25.8%
	21-23	72	44.2%
	24-26	22	13.5%
	27+	27	16.6%
Your department	Business and Management sciences	11	6.7%
	High School of Physical Education and Sports	7	4.3%
	School of Applied Sciences	3	1.8%
	Faculty of Engineering and Architecture	6	3.7%
	Faculty of Health Sciences	82	50.3%
	Vocational School	29	17.8%
	Faculty of Humanities and Social Sciences	2	0.6%
	Graduate	23	14.1%
How successful do you think you are in school?	Very good	24	14.7%
	Good	87	53.4%
	Middle	49	30.1%
	Bad	3	1.8%
Family structure:	Nuclear family	124	76.1%
	Extended family	39	23.9%
Number of members in your family (including you)	2-3	29	17.8%
	4-5	88	54.0%
	6-7	35	21.5%
	8+	11	6.7%
Your family	Living together	146	89.6%
	Mother passed away	2	1.2%
	Father passed away	8	4.9%
	Divorced/separate	7	4.3%
How do you evaluate your relationship with your family members?	Very supportive	53	32.5%
	Supportive	59	36.2%
	Normal	39	23.9%
	Conflicted	9	5.5%
	Very conflicted	3	1.8%
Who do you live with?	With my family	126	77.3%
	With my relative	5	3.1%
	In the dormitory	13	8.0%
	Roommate	11	6.7%
	Other	8	4.9%

Table 2. Evaluation of the participants' economic situation, place of residence and leisure time

		N	%
How would you describe your overall economic situation?	Very good	2	1.2%
	Good	54	33.1%
	Middle	94	57.7%
	Bad	11	6.7%
	Too bad	2	1.2%
Where have you lived the longest in your life?	Big city	112	68.7%
	City	27	16.6%
	District	17	10.4%
	Bay	6	3.7%
	Other	1	0.6%
Which of the following hobbies do you do most often in your spare time?	Reading books	20	12.3%
	To do sport	17	10.4%
	Cinema theater	3	1.8%
	Listen to music	31	19.0%
	Spending time on the internet	45	27.6%
	Spending time with cell phone	42	25.8%
	To watch TV	5	3.1%
	Other	0	0.0%

Exploratory Factor Analysis and Reliability of the Scales Used in the Study

Before conducting the analysis, the factor structure and reliability of the scales used in this study were examined. Exploratory factor analysis was performed on each scale to ensure that the underlying factor structure was consistent with the original studies. Additionally, reliability analysis was conducted to assess the internal consistency of the scales, and Cronbach's alpha coefficients were calculated for each scale. The results of the factor and reliability analyses of the Internet Addiction Scale, Smartphone Addiction Scale, and UCLA Loneliness Scale are presented in this section.

Exploratory Factor Analysis of the Internet Addiction Scale

In the exploratory factor analysis of the Internet Addiction Scale, three items were excluded from the analysis because they had standard factor-loading values below 0.50. These items were: "How often do you form new relationships with fellow online users?", "How often do you check your email before starting an assignment?" and "How often does your school performance suffer from Internet use?". A factor analysis was conducted using the remaining 17 items. performance suffer from Internet use?". r analysis was conducted using the remaining 17 items. performance suffer from Internet use?". A factor analysis was conducted using the remaining 17 items. items were: "How often do you form new relationships with fellow online users?", "How often do you check your email before starting an assignment?" and "How often does your school performance suffer from Internet use?". A factor analysis was conducted using the remaining 17 items.

Exploratory Factor Analysis of the Smartphone Usage Scale (SUS)

In the Smartphone Usage Scale (SUS) exploratory factor analysis, all items had standard factor loading values above 0.50, resulting in no items being excluded from the analysis. The Bartlett's test of sphericity was significant ($p < 0.05$), indicating that the dataset was suitable for factor analysis. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was 0.889, suggesting excellent suitability for factor analysis. Principal Component Analysis (PCA) was chosen as the extraction method for analysis.

Consistent with the literature, the SUS was found to have a single-factor structure in the present study sample. The explained variance is 51.37%. Standard factor loadings ranged from 0.552 to 0.814.

In the exploratory factor analysis of the ULS, two items with standard factor loading values below 0.50 were excluded from the analysis. These items were "I don't feel lonely" and "My social relationships are superficial." The Bartlett's test of sphericity was significant ($p < 0.05$), indicating that the dataset was suitable for factor analysis. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was 0.877, suggesting excellent suitability for factor analysis. Principal Component Analysis (PCA) was chosen as the extraction method for analysis. Consistent with the literature, the ULS was found to have a single-factor structure in the present study sample. The explained variance is 45.11%. Standard factor loadings ranged from 0.508 to 0.788.

Reliability and Internal Consistency of the Scales in the Study

The reliability and internal consistency measures for the scales used in the study were calculated and are presented in the table, along with the number of items. Accordingly, the Cronbach's alpha value for the Internet Addiction (IA) scale, which was analyzed with 17 items in the exploratory factor analysis, was 0.909. The Cronbach's alpha value for the Smartphone Use (SU) scale, which consists of 10 items, was 0.982, and for the UCLA Loneliness (UL) scale, which was analyzed with 18 items, the Cronbach's alpha value was 0.895. All three scales were found to have a "high reliability" level, with alpha values above the threshold of 0.80.

Correlational Analyses

To investigate the relationships between the dimensions of the scales used in this study, correlational analyses were conducted. Pearson correlation coefficients were calculated to determine the strength and direction of the relationships between the Internet Addiction (IA), Smartphone Use (SU), and UCLA Loneliness (UL) scales. The results of correlational analyses provide insights into the associations between these variables and contribute to a better understanding of how they might influence each other. For a more comprehensive interpretation of the results, it was essential to consider the effect sizes of the correlations.

Generally, correlations above 0.10 are considered small, above 0.30 are considered medium, and above 0.50 are considered large effect sizes. Considering these effect sizes, the findings can be interpreted more accurately, and the scale dimensions' potential relationships can be better understood.

Correlational Analyses Between Scale Dimensions

In the correlational analyses conducted between the scales used in the study, significant positive relationships were found between the loneliness variable and Internet Addiction ($r=0.329$; $p<0.05$) and between the loneliness variable and Smartphone Use ($r=0.342$; $p<0.05$). Additionally, a significant positive relationship was found between Smartphone Use and Loneliness ($r=0.790$; $p<0.05$). Table 3 presents the correlational analyses of the scale dimensions.

Table 3. Correlation analysis between scale dimensions

Scales	One	2	3
1 Internet Addiction	One		
2 Smartphone Usage	,790 **	One	
3 UCLA Loneliness	,329 **	,342 **	One

**p<0.01 *p<0.05

These findings suggest that as the level of Internet Addiction or Smartphone Use increased, so did the level of loneliness among participants. It is essential to consider these relationships when developing interventions or policies to address Internet and smartphone addiction issues and their potential impact on mental health and well-being.

Regression Analysis: Explaining Internet Addiction by Smartphone Use

The regression coefficient ($\beta=0.790$; $p<0.05$) was found to be significant in the regression model explaining the Internet Addiction variable by Smartphone Use variable. According to this finding, an increase in mean Smartphone Use also increases Internet Addiction. Regarding the Internet Addiction variable, 62.5% of the variation can be attributed to Smartphone Use. Table 4 presents the regression analysis results, which indicate that Smartphone Use is a significant predictor of Internet Addiction.

Table 4: Prediction of Internet addiction variable by smartphone use variable

Model	Coefficient		Standard coefficient	T	P	R2 -
	B	SE	B			
Smartphone Usage	,532	,033	,790	15,908	,000**	,625

**p<0.01 *p<0.05

These results highlight the potential influence of Smartphone Use on Internet Addiction among participants. Interventions or policies designed to address Internet and smartphone addiction should consider the strong association between these two factors.

Regression Analysis: Explaining Loneliness by Smartphone Usage and Internet Addiction

In the regression model, explaining the loneliness variable by both Smartphone Usage and Internet Addiction variables, the regression coefficient for Internet Addiction ($\beta=0.165$; $p<0.05$) was positive and significant, and the regression coefficient for Smartphone Usage ($\beta=0.214$; $p<0.05$) was positive and significant. According to these findings, an increase in Internet Addiction and Smartphone Usage positively affects the mean loneliness variable. In the Loneliness variable, 14.3% of the variation could be explained by both Internet Addiction and Smartphone Usage. Table 5 presents the regression analysis results, indicating that both Internet Addiction and Smartphone Usage were significant predictors of loneliness.

Table 5. Prediction of Loneliness by Internet Addiction and smartphone use variables

	Coefficient		Standard coefficient	T	P	R2 –
	B	SE	B			
Internet addiction	,126	,099	,165	3,273	,015*	,143
Smartphone Usage	,110	,067	,214	3,650	,010*	

**p<0.01 *p<0.05

These findings suggest that both Internet addiction and smartphone use are important factors in understanding and addressing loneliness among participants. Policies or interventions aimed at mitigating loneliness should consider significant associations between these factors.

Comparison of Scale Scores According to Demographic Characteristics

To investigate the relationships between scale scores (Internet Addiction, Smartphone Usage, and Loneliness) and the demographic characteristics of the participants, statistical analyses such as t-tests, ANOVAs, or non-parametric tests (e.g., Mann-Whitney U, Kruskal-Wallis) can be used, depending on the distribution of the data and the type of variables. These analyses can help determine whether there are significant differences in scale scores among different demographic groups.

For example, scale scores can be compared across categories, such as

1. Gender: The scale scores of males and females to investigate potential gender differences in Internet Addiction, Smartphone Usage, and Loneliness.

2. Age: Scale scores across different age groups were compared to explore whether Internet Addiction, Smartphone Usage, and Loneliness vary by age.

3. Education level: Investigating whether there are differences in scale scores among participants with different levels of education, such as high school, undergraduate, and postgraduate.

4. Socioeconomic status: Scale scores across participants with different socioeconomic backgrounds were compared to examine whether socioeconomic factors influence Internet Addiction, Smartphone Usage, and Loneliness.

5. Urban/rural residence: Investigating potential differences in scale scores between urban, suburban, and rural participants.

The results of these comparisons can provide insights into the prevalence and patterns of Internet Addiction, Smartphone Usage, and Loneliness among various demographic groups. This information can be valuable in designing targeted interventions or policies to address these issues and promote overall well-being.

This study found significant differences in smartphone use and loneliness scale scores based on gender (p<0.05). • The average score for women in smartphone use (2.14) was higher than that for men (1.389). • The average loneliness score for women (1.84) was higher than that of men (1.792). Table 6 presents a detailed comparison of scale dimensions by gender.

Table 6. Comparison of scale dimensions by gender

	Gender	N		SD	T	P
Internet addiction	Woman	121	1,386	,7053	1,962	,052
	Male	39	1,133	,6874		
Smartphone Usage	Woman	120	2,140	1.0010	3,957	,000**
	Male	37	1,389	1.0346		
Loneliness	Woman	112	1,814	,5756	,208	,835
	Male	35	1,792	,4914		

***p<0.01 *p<0.05 AM: Arithmetic mean SD: standard deviation t: independent sample table value*

Significant differences were found in the scores on the Internet addiction, smartphone use, and loneliness scales based on age groups (p<0.05). The sources of differences in the multiple comparison tests were identified as follows. In Internet Addiction, the average scores for the 24-26 age group (1.546) and the 18-20 age group (1.459) were found to be higher than those of the other groups. • In smartphone use, the average scores for the 24-26 age group (2.215) and the 18-20 age group (2.220) were found to be higher than those of the other groups. • In the Loneliness variable, the average score for the 24-26 age group (2.168) and the 18-20 age

group (2.220) were found to be higher than those of the other groups. Table 7 presents a detailed comparison of the scale dimensions by age group.

Table 7. Comparison of scale sizes by age groups

		N	AM	SD	F	P
Internet addiction	18-20	42	1,459	,6216	2,865	,039*
	21-23	70	1,288	,6424		
	24-26	21	1,546	,8753		
	27+	27	1,035	,7784		
	Total	160	1,324	,7073		
Smartphone Usage	18-20	40	2,220	1,0204	4,181	,007**
	21-23	70	1,970	.9989		
	24-26	20	2,215	1,0703		
	27+	27	1,378	1.0624		
	Total	157	1,963	1.0553		
Loneliness	18-20	35	1,862	,5162	4,592	,004**
	21-23	64	1,677	,4853		
	24-26	21	2,168	,6393		
	27+	27	1,771	,5874		
	Total	147	1,809	,5551		

***p<0.01 *p<0.05 AM: Arithmetic mean SD: standard deviation F: ANOVA table value*

Significant differences were found only in the scores of smartphone use based on the department in which education was received (p<0.05). The sources of differences in the multiple comparison tests were identified as follows.

In Smart Phone Use, the average scores for students in the Faculty of Health Sciences (2.265) and those studying Business and Management Sciences (2.020) were found to be higher than those of the other groups. Table 8 presents a detailed comparison of the scale dimensions by department.

Table 8. Comparison of scale sizes by division

		N	AM	SD	F	P
Internet addiction	Business and Management sciences	10	1,118	,6063	1,768	,138
	Faculty of Health Sciences	80	1,457	,7302		
	Vocational School	29	1,282	,5658		
	Graduate	23	1,072	,8662		
	Other	18	1,242	,5518		
	Total	160	1,324	,7073		
Smartphone Usage	Business and Management sciences	11th	2,027	,8684	4,733	,001**
	Faculty of Health Sciences	77	2,265	1.0495		
	Vocational School	29	1,831	,8418		
	Graduate	22	1,282	1.1742		
	Other	18	1,678	,9214		
	Total	157	1,963	1.0553		
Loneliness	Business and Management sciences	10	1,865	.5980	,207	,934
	Faculty of Health Sciences	74	1,820	,5825		
	Vocational School	24	1,784	,4765		
	Graduate	22	1,727	,5062		
	Other	17	1,869	,6196		
	Total	147	1,809	,5551		

***p<0.01 *p<0.05 AM: Arithmetic mean SD: standard deviation F: ANOVA table value*

These findings suggest that the field of study may play a role in determining the extent of smartphone use among students. Students in the Health Sciences and Business and Management Sciences may be more prone to excessive smartphone use, which could potentially impact their academic performance and overall well-being. Educators and administrators should be aware of these differences and consider implementing targeted interventions and support for students in these departments.

No significant differences were found in the scores for Internet addiction, smartphone use, and loneliness based on academic achievement ($p>0.05$). The scale scores did not vary according to academic success. This finding suggests that there may not be a direct relationship between Internet addiction, smartphone use, and loneliness and academic achievement among students. However, it is crucial to note that these results do not rule out the potential indirect effects of these variables on academic performance or overall well-being. No significant differences were found in the scores for Internet addiction, smartphone use, and loneliness based on family structure ($p>0.05$). The scale scores did not show variations based on family structure. These findings imply that family structure may not directly affect Internet addiction, smartphone use, and loneliness among students. However, it is important to note that these results do not dismiss the potential indirect effects of family structure on these variables.

Significant differences were found in the Internet Addiction scores based on the department in which education was received ($p<0.05$). Multiple comparison tests identified the sources of the differences as follows: In smartphone use, the average scores for students in the Faculty of Health Sciences (2.265) and Business and Management Sciences (2.020) were higher than those of other groups. Results indicate that there are differences in Internet addiction levels depending on the department in which students are enrolled. Students from the Faculty of Health Sciences and those from Business and Management Sciences seem to have higher Internet addiction levels than their peers from other departments.

No significant differences in Internet addiction, smartphone use, and loneliness scores based on family structure ($p > 0.05$) were found. The scale scores did not show any variation according to family structure. Findings suggest that family structure does not significantly influence internet addiction, smartphone use, or loneliness. It is essential to consider that other factors, such as individual differences, coping mechanisms, and social support systems, may play a more significant role in explaining variations in these variables.

No significant differences in Internet addiction, smartphone use, and loneliness scores based on the living environment ($p > 0.05$) were found. The scale scores did not vary according to living environment. Findings suggest that living environment does not significantly influence the study's Internet addiction, smartphone use, and loneliness levels. It is important to consider that other factors, such as individual differences, coping mechanisms, and social support systems, may play a more significant role in explaining variations in these variables.

No significant differences in Internet addiction, smartphone use, and loneliness scores based on economic status ($p > 0.05$) were found. The scale scores did not show any variation according to economic status. Results indicate that participants' economic status did not significantly affect their Internet addiction, smartphone use, or loneliness levels. It is crucial to acknowledge that other factors such as individual personality traits, coping strategies, and social support may play a more significant role in explaining variations in these variables.

No significant differences in Internet addiction, smartphone use, and loneliness scores based on the longest-lived location ($p > 0.05$) were found. The scale scores did not vary according to the location of residence. Findings indicate that in this study, Internet addiction, smartphone use, and loneliness levels were not significantly affected by the longest-lived location of the participants. It is essential to recognize that other factors, such as individual personality traits, coping strategies, and social support, may play a more significant role in explaining the variations in these variables.

A significant difference was found in the smartphone use scores based on relationships with family members ($p<0.05$). The sources of the differences in the multiple comparison tests were determined as follows: The average smartphone use score of those with very supportive families (1.539) was higher than those of other family relationship types. Table 9 compares the scale dimensions based on relationships with family members.

Table 9. Comparison of scale dimensions according to the relationship with family members

		N	AM	SD	F	P
Internet addiction	Very supportive	53	1,168	,7024	1,372	,246
	Supportive	58	1,410	,6514		
	Normal	38	1,407	.7964		
	Conflicted/very conflicted	11th	1,310	,4567		
	Total	160	1,324	,7073		
Smartphone Usage	Very supportive	49	1,539	1.1189	3,516	,09**
	Supportive	59	2,188	,9967		
	Normal	38	2,092	,9545		
	Conflicted/very conflicted	11th	2,438	,6610		
	Total	157	1,963	1.0553		
Loneliness	Very supportive	46	1,684	,5365	1,308	,270
	Supportive	54	1,893	,5261		
	Normal	38	1,845	.5940		
	Conflicted/very conflicted	9	1,941	,6900		
	Total	147	1,809	,5551		

***p<0.01 *p<0.05 AM: Arithmetic mean SD: standard deviation F: ANOVA table value*

These findings suggest that relationships with family members play a role in smartphone use, with individuals experiencing more supportive family relationships and showing higher levels of smartphone use. It is crucial to consider the possible reasons behind this relationship and investigate whether supportive families facilitate healthier smartphone use or whether there is a potential downside to increased smartphone use within this context. A significant difference was found in Internet addiction and smartphone use scores based on how the participants spent their leisure time ($p<0.05$). The sources of the differences in the multiple comparison tests were determined as follows:The average Internet addiction scores for those who engaged in sports during their free time (0.799) and those who read books (0.919) were considerably lower compared to other leisure time methods. The average smartphone use scores for those who engaged in sports during their free time (1.18) and those who read books (1.365) were considerably lower compared to other leisure time methods. Table 10 presents a comparison of scale dimensions based on how participants spent their leisure time.

Table 10. Comparison of scale dimensions according to the way they spend their free time

		N	AM	SD	F	P
Internet addiction	Reading books	19	,919	,3836	7,508	,000**
	To do sport	17	,799	,4348		
	Cinema theater/music	34	1,452	,7022		
	Spending time on the internet	44	1,311	,6353		
	Spending time with cell phone	41	1,683	,7202		
	To watch TV	5	1,012	,3179		
	Total	160	1,324	,7073		
Smartphone Usage	Reading books	20	1,365	,9522	5,053	,000**
	To do sport	18	1,188	1.0019		
	Cinema theater/music	29	2,207	,9419		
	Spending time on the internet	45	1,907	,9642		
	Spending time with cell phone	40	2,463	1.0521		
	To watch TV	5	1,760	,7635		
	Total	157	1,963	1.0553		
Loneliness	Reading books	19	1,619	,5035	2,064	,061
	To do sport	14	1,811	,4511		
	Cinema theater/music	29	1,747	,5551		
	Spending time on the internet	43	1,715	,4644		
	Spending time with cell phone	38	1,989	,6571		
	To watch TV	4	2,044	,6006		
	Total	147	1,809	,5551		

***p<0.01 *p<0.05 AM: Arithmetic mean SD: standard deviation F: ANOVA table value*

These findings indicate that engaging in activities such as sports or reading during leisure time is associated with lower levels of internet addiction and smartphone use. This suggests that promoting healthier leisure activities might be useful for reducing excessive technology use and its potential negative effects.

DISCUSSION

Sociodemographic Characteristics of Participants

The participants' sociodemographic characteristics revealed significant differences in internet addiction, smartphone use, and loneliness scores based on age group. In particular, younger age groups (18-20 and 24-26) displayed higher scores in these areas, suggesting that they are at a higher risk of experiencing adverse effects related to technology use. This finding is consistent with previous studies that reported increased technology use and associated risks among younger individuals (Kuss et al., 2014; Odacı and Çıkrıkçı, 2014). Possible reasons for this finding may include increased exposure to digital technology and social media in these age groups, which may exacerbate feelings of loneliness and contribute to addiction (Bozoglan and Demirer, 2015). Consequently, interventions targeting younger age groups may be crucial in preventing further complications such as mental health issues, social isolation, and reduced academic performance.

Exploratory Factor Analysis and Reliability of the Scales Used in the Study

Factor analysis and reliability assessment of the scales in this study provided robust evidence for the validity and reliability of the measures. This strengthens the results and allows for meaningful interpretations and comparisons with the existing literature. Previous studies using similar scales, such as Young's Internet Addiction Test (Young, 1998) and the UCLA Loneliness Scale (Pretorius, 1993), have also demonstrated satisfactory psychometric properties, indicating their applicability in various populations and contexts (Andreassen et al., 2016; Pretorius, 1993). These scales can be utilized in future research to examine Internet addiction, smartphone use, and loneliness in various populations and contexts.

Correlational Analyses Between Scale Dimensions

This study found significant positive correlations between Internet addiction, smartphone use, and loneliness, indicating that these constructs are interrelated. This finding aligns with existing research, such as studies by Wang et al. (2011) and Tokunaga (2015), which suggest that excessive use of digital technology may contribute to feelings of loneliness, which in turn may perpetuate addiction. To address this issue, interventions can promote healthy technology use, foster social connections, and provide support for individuals experiencing loneliness, as suggested by Cacioppo and Cacioppo (2018) and Van Rooij et al. (Carras et al., 2017).

Comparison of Scale Scores According to Demographic Characteristics

Comparisons based on demographic characteristics revealed significant differences in scale scores. For instance, Health Sciences and Business and Management department students reported higher smartphone use scores. This finding suggests that the nature of these fields or the academic demands placed on students may contribute to increased technology use. Lepp et al. (2015) and Alt (2018) also found similar results, pointing to the role of academic factors in shaping technology use patterns. Therefore, it is essential to consider these factors when developing targeted interventions for specific populations.

Moreover, the study found that students who engaged in sports or reading during their leisure time had lower Internet addiction and smartphone use scores. This finding highlights the importance of promoting alternative leisure activities that foster well-being and reduce the risk of technology-related complications. Previous research by Zhang et al. (2022) and Weinstein et al. (2015) supports the idea that encouraging participation in sports, reading, or other activities that build social connections and contribute to mental health could be an effective strategy to mitigate the negative effects of excessive technology use. This study’s findings have several practical implications for policymakers, educators, and mental health professionals. First, the results highlight the need for early intervention programs targeting younger age groups, given their higher risks of Internet addiction, smartphone use, and loneliness. Implementing school-based prevention and awareness programs could help promote healthy technology use and prevent the negative consequences associated with excessive use (28). Second, the significant differences in technology use based on department and leisure activities suggest the importance of tailoring interventions for specific populations. For instance, Health Sciences and Business and Management department educators

could incorporate discussions about responsible technology use within their curricula. Universities can offer workshops and support services to help students balance technology use with other aspects of their lives (Alan, 29-30). Furthermore, this study highlights the potential benefits of promoting alternative leisure activities like sports and reading to reduce technology-related problems. In addition to;

- Mental Health and Well-being Services: Enhance mental health and well-being services available to students, including counseling, support groups, and workshops on stress management, time management, and mindfulness.
- Promote Alternative Leisure Activities: Encourage students to engage in alternative leisure activities, such as sports, reading, and arts, to foster social connections, improve mental health, and reduce reliance on digital technology.
- Parental and Community Involvement: Involve parents and the community in efforts to promote healthier technology use and address loneliness among university students. Collaborate with local organizations and community groups to create supportive environments encouraging social connections and well-being.
- Tailored Interventions: Develop targeted interventions for specific at-risk groups, such as younger individuals and students in certain fields of study. These interventions may include mentorship programs, peer support networks, or specialized workshops that address the unique challenges faced by these groups.

Limitations and Future Research

While this study provides valuable insights into the relationship between Internet addiction, smartphone use, and loneliness, it also has some limitations. First, the cross-sectional design precludes the establishment of causal relationships between variables. Future research employing longitudinal or experimental designs could provide more robust evidence regarding the causal relationships among technology use, loneliness, and addiction. Second, the study relied on self-report measures, which may have been subject to social desirability bias or inaccurate recall. Future research could employ more objective measures, such as tracking technology use, to corroborate self-report.

Finally, the study focused on a specific population of university students, which may have limited the generalizability of the findings. Future research should examine the relationships between Internet addiction, smartphone use, and loneliness in other populations, such as adolescents, working adults, and older adults, to comprehensively understand these issues across different age groups and contexts.

Future Research Directions

Based on the findings and limitations of this study, several future research directions can be suggested to explore further the relationships between internet addiction, smartphone use, and loneliness.

1. Longitudinal Studies: Conduct longitudinal research to establish causal relationships and better understand the temporal dynamics of Internet addiction, smartphone use, and loneliness.

2. Mediating and Moderating Factors: Investigate potential mediating and moderating factors such as personality traits, coping strategies, and social support to better understand the mechanisms underlying the relationships between these variables.

3. Diverse samples: The study was replicated with more diverse samples, including different age groups, educational backgrounds, and cultural contexts, to enhance the generalizability of the findings.

4. Objective Measures: Incorporate objective measures of technology use, such as digital usage tracking, to complement self-reported data and provide a more comprehensive assessment of the phenomena under investigation.

5. Intervention Studies: Design and evaluate interventions to reduce Internet addiction, smartphone use, and loneliness among university students, focusing on the effectiveness and sustainability of the implemented strategies.

Conflict of interest

Theauthorsdeclarenoconflicts of interest. No financialsupport has beenreceived.

Ethics Committee

The study was confirmed by Istanbul Esenyurt University Ethics Committee which is a recognized review board or ethics committee on 01.10.2021 (Approval no: E-12483425-299-8712).

Author Contributions

Study Design, YS; Data Collection, İS; Statistical Analysis, İS; DataInterpretation, YS; Manuscript Preparation, YS,İS; Literature Search, YS, İS. The published version of the manuscript has been read and approved by all authors.

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RESEARCH ARTICLE

The Effect of Quality of Life on Job Performance and Job Satisfaction of Sports Club Employees: Evidence from Ankara Province

Güven DERE[1*]

[1]Istanbul Rumeli University, Faculty of Sports Sciences, Department of Sports Management, İstanbul / Turkey
*Corresponding author: guven.dere@rumeli.edu.tr

Abstract
Human, the most valuable capital of organizations, is the most effective success factor in achieving the set goals. The fact that the general quality of life is positive for the individual is a critical factor that is stated to have a relationship with the organizational variables that affect the productivity of the employee. In this study, the compatibility of quality of life with job satisfaction and job performance, which are thought to be related to this phenomenon (by creating a study model), was tested with the data obtained from sports center employees. The population of the research is the individuals working in sports clubs in Ankara province. The data were collected by online survey method and 423 employees participated in the survey. The collected data were analyzed in the SPSS 27.0 statistical program. Frequency, percentage, mean, and standard deviation values were used to make descriptive statistics of demographic factors and scale scores. Skewness and kurtosis values were analyzed to determine the normality distribution of the scales. Pearson correlation analysis and multiple linear regression analysis were used to test the hypotheses. A moderate, positive linear relationship between quality of life and job performance level (r=.436, p=.000) and a moderate, positive linear relationship between quality of life and job satisfaction (r=.344, p=.000) were found. As a result of the research, the two hypotheses were found to be compatible with the literature and it was stated that the model was compatible with the data.

Keywords
Quality of Life, Job Satisfaction, Job Performance, Sports Club Employees

INTRODUCTION

The concept of sport, which is seen as an important component of everyday life, has made a difference due to its support for mental and physical health, its contribution to the self-confidence and socialization of the individual, and its effects on solidarity in society. For this reason, it has been deemed worthy of research by academics. In the research conducted in this field, findings on the positive effects of sport on mental health as well as its contribution to physical health have continued. One of the remarkable ones of these studies is the studies on "subjective well-being", which has an important place in general quality of life. Subjective well-being is an individual's being positive and happy in his/her own world.

The fact that development is continuous and that its multifaceted characteristics occur in a dynamic process makes it difficult to define the concept of quality of life. It is stated that the concept of quality of life, which has a general definition as the "well-being of the individual", is open to psychological, sociological, cultural, and economic effects. Quality of life, which can be completed as happiness and satisfaction with life, can also be expressed as understanding the individual's own situation in line with the dominant values and culture of the society (Ulukan & Esenkaya, 2020: 186). Quality of life is defined

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[1]**ORCID:** 0000-0002-6506-7674

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as the way people perceive their situation within the whole of the culture and value judgments they live in, in connection with their goals, expectations, standards, and interests (WHOQOL Group, 1995: 1403 as cited in Vapur and Yavuz, 2022). The individual's awareness and subjective evaluation of his/her health in the environment in which he/she lives (Zorba, 2008; Zorba & Saygın, 2009) is another expression regarding the definition of quality of life. According to the World Health Organization, "Quality of Life" is the individual's perception of his/her life position in terms of the culture and values of the society in which he/she lives, depending on the goals, hopes, standards, interests and lines he/she wants to realize (WHO, 1996-3). In other words, this concept is defined as the subjective perception of the health status of the individual in the environment in which he/she lives and communicates. Rather than being a concept that can be quantitatively measured by various methods, it is a phenomenon that is subjectively evaluated and not directly linked to expensive tastes. The main purpose is to determine the satisfaction of individuals with their physical, social, and psychological functions and the extent to which the presence or absence of the features they need in this regard disturbs them (Zorba and Yermakhanov, 2022: 446).

According to Aristotle, the most desirable life is a good life. In other words, it is the discovery of a good life, for example, the best (not necessarily the morally best) or the most most valuable. This most desirable and most valuable life includes concepts such as good, happy, virtuous, satisfying, prosperous, social and political structure and their integrations (Osterfeld, 1994:19). Sports were also included in the study due to their positive effects on subjective well-being and thus quality of life.

The job that an individual has in order to meet his/her needs and to continue his/her life as he/she desires creates economic, psychological, and social opportunities and has an important place in the lives of individuals in this context (Dere, 2022:44). The effort and cognitive efforts of the individual in order to continue his/her life by increasing his/her opportunities are social and economic activities aimed at increasing his/her welfare. When the subject is considered from this aspect, it is possible to see the social and psychological aspects of Job life. While the obligation to be in a relationship with others in the social environment of the ongoing work or the desire for this relationship is evaluated in the social sense, respecting other employees in the same environment and being satisfied with the work of the individual tells the psychological aspect of the issue. In addition to the material gains that will meet the needs of the job, there are also psychological gains such as being satisfied by being happy with the work done, feeling the pleasure of achievement, and being appreciated by others (Köroğlu, 2011). Work has an important place in an individual's life. The level of job satisfaction is also considered to have an important effect on the individual.

According to the Turkish Language Institution, "to be satisfied" means "to be gratified, to be relieved, to be satiated by achieving something desired" (TDK, 2023). Satisfaction is felt when the goal and target are achieved. Satisfaction is the feeling of happiness as a result of obtaining needs (Halsey, 1988: 884). As can be understood from the definition, satisfaction is completely subjective and related to the individual's perception. Job satisfaction is defined as the satisfaction that occurs when an individual meets the characteristics that he/she expects from a job and has the qualities that he/she attaches importance to (Fisher, 2001). In simple terms, it is the happiness that an individual feels from his/her job (Vieira, 2005). In general terms, job satisfaction can be defined as the state of being satisfied with factors such as wages, conditions, promotion and advancement opportunities, and human relations. As can be understood from the definition, individual and organizational factors affect job satisfaction.

The perceived quality of working life is a concept that reflects how individuals feel in their working environment and is a subject that is frequently addressed today and attracts the attention of researchers. On the basis of this idea, it is seen that it is aimed to consider the organization as a whole during the design of the job, to consider the tasks by taking into account the human and technological elements, and to increase the quality of work life in the organization with the organizational climate change to be established (Özyurda, 1994). All expectations related to increasing the quality of life in the working environment are considered within the scope of quality of work life (Turunç et al., 2010:80). When

employees perceive the quality of work life as high, their motivation may increase and in parallel, job satisfaction may increase (Lawler, 1975). In this context, it is stated that increasing the quality of work life plays an important role in attracting and retaining qualified labor (May, Lau, & Johnson, 1999). According to Davies, Levine, and Taylor (1984), quality of work life encompasses all expectations to improve the quality of life of organizational members in the work environment (Turunç et al., 2010:80). Therefore, it is seen that practices aimed at increasing the quality of work life in organizations have an important place in attracting and retaining qualified workforce (May, Lau, & Johnson, 1999). In the studies conducted on the subject, it is evaluated that there is a positive effect between quality of work life and job satisfaction.

Job satisfaction is seen as an individual's subjective evaluation of job conditions, wages, and job security (Çekmecelioğlu, 2005). In the research, the relationship between job satisfaction and different organizational variables has been determined. In a study on the subject, the factors affecting job satisfaction were categorized under six main headings: the job itself, the salary received, opportunities for advancement, management style, workgroup, and working conditions (Arnold & Feldman, 1986). In a study in which 224 faculty members working at a university participated and the relationship between quality of work life and organizational variables was investigated; it was stated that quality of work life positively and significantly affected the job satisfaction of the employees, and this result was parallel to the results of Fields and Thacker (1992) and Kawai and Wyatt (2007) (Turunç et al., 2010). The results obtained supported that the quality of work life has a positive and significant effect on employees' job satisfaction and revealed that results parallel to the results of Fields and Thacker (1992) and Kawai and Wyatt (2007) studies were obtained (Turunç et al., 2010:90).

"Performance, whose dictionary meaning is 'achievement'" (TDK, 2023), refers to the value that an individual provides to an organization within a certain period of time (Motowidlo et al., 2003). It can also be associated with the concept of productivity, which is associated with input and output processes (Williams, 2002:93). Inputs such as intelligence and education of the individual should be considered as the elements that constitute the outputs of the individual's performance. It can also be defined as the level of doing the job or the behavior of the employee in accordance with predetermined conditions (Bingöl, 2003:273). Increasing the productivity of employees by organizing their work environment is important in terms of increasing their performance levels. In addition, an individual's feeling of burnout due to tension and stress can have a diminishing effect on performance and productivity. Therefore, it is necessary to prevent excessive workload and psychological negativities (Dilekçi & Bişgin, 2022:194).

The effort that employees have to show in return for the wages they receive is referred to as job performance (Rousseau & Mc Lean, 1993). In another study on the subject, job performance is defined as "the level of efficiency related to the results of the employee's behaviors related to his/her job compared to his/her peers" (Begenirbaş & Çalışkan, 2014).

Individuals' subjective well-being is in interaction with their environment. An important part of this environment is work life and its conditions, which constitute a large part of daily life. Therefore, quality of work life is an important factor affecting overall quality of life. The effect of quality of work life on the job performance of employees has been extensively studied by researchers. In one study, the relationship between quality of work life and other work-related variables was examined and it was found that there was a significant relationship between organizational commitment, motivation, attitude towards work and mental health and job performance (Aketch, Odera, Chepkuto, & Okaka, 2012). In another study, it was stated that quality of work life positively affects job performance and the satisfaction of employees with high quality of work life is effective on customer loyalty and commitment (Lau, 2000).

In the field of organizational psychology, studies examining the relationship between job satisfaction and job performance have been considered particularly valuable and have been called the "Holy Grail" by industrial psychologists (Landy, 1989). Although most of the researchers interested in this field thought that the studies were qualitatively and quantitatively inadequate, Judge and his team stated that there have been recent developments that will revitalize the discussions

on this issue and that they find it important to examine these studies (Judge et al., 2001).

Hawthorne studies constitute the beginning of workplace behavior and productivity research (Luthans, 2011: 6). In the study conducted by Brayfield and Crockett, the relationship between job satisfaction and job performance was examined together with other behavioral inputs (absenteeism, turnover, and accidents, etc.) and as a result, although no relationship between job performance and job satisfaction was found (Brayfield and Crockett, 1955), the publication based on a small number of studies was reported to be one of the most cited articles in this field until 1985 (Judge et al., 2001).

In a study examining 5 studies on the relationship between job satisfaction and job performance (Bagozzi, 1980; Siegel & Bowen, 1971; Sheridan & Slocum, 1975; Wannous, 1974; Prestwich, 1981), 4 studies concluded that job performance is effective on job satisfaction and 2 studies concluded that job satisfaction affects job performance (Judge et al., 2001). In another study on the interaction between job satisfaction and job performance of salespeople in the financial services sector, a positive relationship between job performance and job satisfaction was found (Oh, Rutherford, Park, 2014:113). Based on these results, it is possible to say that there is a positive relationship between job performance and job satisfaction.

In another study conducted in order to obtain a clear and holistic result for the relationship between job satisfaction and job performance, 113 articles were selected and analyzed with 123 independent data from 913 articles from four databases in English and Persian languages, and analyzed by applying the random-effects model based on the results, and as a result, a moderate, positive and significant relationship between job satisfaction and job performance was found (Katebi, HajiZadeh, Bordbar, Amir and Salehi, 2022). In the studies of Bozer and Yanık (2020), Akkoç et al. (2012), and Akburak et al. (2020), the same relationship was found to be positive and moderate. In light of these studies, it is possible to state that there is a positive relationship between job satisfaction and job performance.

A model was created within the framework of the research purpose. The relational survey method, which is among quantitative research methods, was used in the model study. The model is shown in Figure 1.

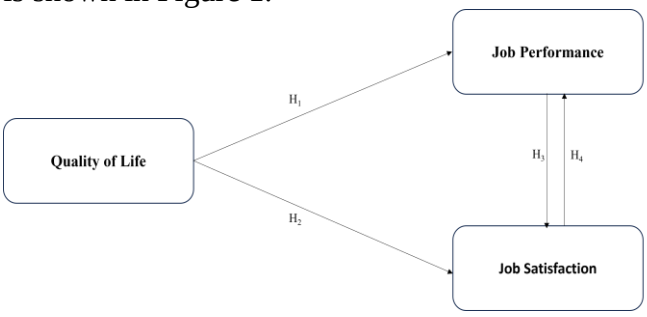

Figure 1. Research Model

H_1: Quality of life levels of sport center employees have a significant and positive effect on job performance.

H_2: Quality of life levels of sports center employees have a significant and positive effect on job satisfaction.

H_3: Job performance levels of sports center employees have a significant and positive effect on job satisfaction.

H_4: Job satisfaction levels of sports center employees have a significant and positive effect on job performance.

MATERIALS AND METHODS

Participants

The population of the study consists of individuals working in private sports centers in Ankara. As of 2022, there are 1466 sports clubs in Ankara (Ankara GSB, 2023). However, there is no exact number of employees working in private sports centers in the province. Therefore, in order to provide flexibility to the researchers, the level of "α=0.05" was determined for sampling errors, and the required sample sizes were calculated for different population sizes. As a result, the sample size was determined as "n=384" (Çokluk, Şekercioğlu & Büyüköztürk, 2012: 130). In the sampling of the study, the convenience sampling method, one of the random sampling methods, was preferred. All participants gave their written informed consent and this study was conducted in accordance with the Declaration of Helsinki. Ethics approval permission was obtained.

Study Design and Data Collection

Data were collected using the questionnaire technique, which is among the quantitative data collection methods. Data were collected from 423 employees through an online survey form. Three of these data were excluded from the data set due to incomplete completion of the questionnaires.

The questionnaire consists of four parts: personal information form, individual quality of life scale, job performance scale, and job satisfaction scale. Personal Information Form was used in this study. In accordance with the purpose of the study, demographic information such as age, marital status, educational status, income, years of seniority, and working position were collected.

Individual Quality of Life Scale was used in this study which was developed by the International Wellbeing Group (2006) based on Gullone & Cummins' (1999) Comprehensive Quality of Life Scale, this 8-item scale focuses on different life areas with a 0-10 scale. The validity and reliability of the Turkish version were established by Şimşek (2011) with a 0.87 reliability coefficient. For the current study, the total internal reliability coefficient was 0.88, within the quite reliable Cronbach's alpha range per Altunışık et al. (2010). Job Performance Scale was used in this study which was developed by Kirkman and Rosen (1999) and adapted into Turkish by Çöl (2008). During the adaptation study, it was reported that the factor loadings of the 4 items ranged between 0.85 and 0.78. In addition, the Cronbach's alpha value of the Turkish version of the scale was calculated as 0.83. The items are organized as a 5-point Likert type (1= Strongly Agree, 5= Strongly Disagree). The total internal reliability coefficient of the data obtained in this study was found to be 0.92. Job Satisfaction Scale was used in this study which was developed by Brayfield and Rothe (1951) and shortened by Judge, Locke, Durham, and Kluger (1998). The validity and reliability study of the Turkish version of the scale was conducted by Başol and Çömlekçi (2020). The scale has a structure consisting of 5 items and a single sub-dimension. The internal consistency of the scale was calculated as 0.929. The items are organized as a 5-point Likert type (1= Strongly Agree, 5= Strongly Disagree). The total internal reliability coefficient of the data obtained for this study was calculated as 0.89.

Statistical analyses

The collected data were analyzed using the SPSS 27.0 statistical program. Frequency, percentage, mean, and standard deviation values were used to make descriptive statistics of demographic factors and scale scores. Skewness and kurtosis values were analyzed to determine the normality distribution of the scales. Pearson correlation analysis and multiple linear regression analysis were used to test the hypotheses.

RESULTS

Table 1. Participant Profile

Variables		N	%
Gender	Male	220	52.4
	Woman	200	47.6
Age	18-23	24	5.7
	24-29	245	58.3
	30-35	84	20.0
	36 and above	67	16.0
Marital Status	Married	194	46.2
	Single	226	53.8
Education Status	Associate degree	36	8.6
	License	232	55.2
	Postgraduate	152	36.2
Income Status	0-11.500 TL	191	45.5
	11.501-23.000 TL	123	29.3
	23.001-34.500 TL	69	16.4
	34.501 TL and above	37	8.8
Seniority Year	0-2	67	16.0
	3-4	193	46.0
	5-6	47	11.2
	7-8	24	5.7
	9 and above	89	21.2
Working Position	Employee	272	64.8
	Al Level Manager	32	7.6
	Mid-Level Manager	84	20.0
	Senior Manager	10	7.6

Of the employees participating in the study, 52.4% were male and 47.6% were female. When the age distribution is analyzed, it is seen that 5.7% are between the ages of 18-23, 58.3% are between the ages of 24-29, 20.0% are between the ages of 30-35 and 16.0% are 36 years and above. Regarding the marital status of the employees, 46.2% are married and 53.8% are single. In terms of education level, 8.6% have associate's degrees, 55.2% have bachelor's degrees and 36.2% have postgraduate degrees. In terms of the income distribution, 45.5% of the employees earn 0-11,500 TL, 29.3% earn 11,500-23,000 TL, 16.4% earn 23,001-34,500 TL and 8.8% earn 34,501 TL and above. When the seniority of the employees is analyzed, it is seen that 16.0% of them have 0-2, 46.0% 3-4, 11.2% 5-6, 5.7% 7-8 and 21.2% 9 years or more. Regarding their working positions, 64.8% are employees, 7.6% are lower-level managers, 20.0% are middle-level managers and 7.6% are upper-level managers.

Table 2. Mean, Standard Deviation, and Normality Analyses of Quality of Life, Job Satisfaction, and Job Performance

Variables	N	x̄	Ss	Skewness	kurtosis
Quality of Life	420	6.324	1.644	-0.571	-0.579
Job Satisfaction	420	3.581	0.815	-0.462	-0.020
Job Performance	420	4.154	0.570	-0.427	-0.407

The mean quality of life, job satisfaction, and job performance of the sports center employees were calculated as 6.324, 3.581, and 4.154, respectively. Skewness and kurtosis values are between ± 1.5. According to Tabachnick and Fidell (2013), skewness and kurtosis values between -1.5 and +1.5 indicate a largely normal distribution.

Table 3. Results of Pearson Correlation Analysis

Variables	N	R	P
Quality of Life **Job Performance**	420	0.436	.000
Quality of Life **Job Satisfaction**	420	0.344	.000
Job Performance **Job Satisfaction**	420	0.282	.000
Job Satisfaction **Job Performance**	420	0.297	.000

According to the results of the Pearson correlation test conducted to determine the relationship between quality of life and job performance levels of sports center employees, there is a moderate, positive linear relationship between quality of life and job performance level (r=.436, p=.000). In addition, according to the results of the Pearson correlation test conducted to determine the relationship between quality of life and job satisfaction, there is a moderate, positive linear relationship between quality of life and job satisfaction (r=.344, p=.000).

According to the results of the Pearson correlation test conducted to determine the relationship between job performance and job satisfaction levels, there is a moderate, positive linear relationship between job performance and job satisfaction levels (r=.282, p=.000).

According to the results of the Pearson correlation test conducted to determine the relationship between job satisfaction and job performance levels, there is a moderate, positive linear relationship between job satisfaction and job performance level (r=.297, p=.000).

According to Pearson correlation analysis; 0-0.29 is a weak relationship, 0.30-0.64 is a moderate relationship, 0.65-0.84 is a strong relationship, and 0.85-1 is a very strong relationship (Ural & Kılıç, 2018).

Table 4: Results of Simple Linear Regression Analyses

Independent Variable	Dependent Variables	R	R^2	F	p	β	t	p
Quality of Life	**Job Performance**	.436	.190	98.174	.000	.436	9.908	.000
	Job Satisfaction	.344	.188	56.097	.000	.344	7.490	.000
Job Performance	**Job Satisfaction**	.282	.188	40.422	.000	.297	6.358	.000
Job Satisfaction	**Job Performance**	.297	.088	40.422	.000	.280	6.358	.000

Simple linear regression analysis was performed to predict job performance according to quality of life. Quality of life level was a predictor of job performance (F (1, 418) =98.174, p<.001). Quality of life predicts 19 percent of the variance in job performance. When the quality of life of sports center employees increases by one unit, their job performance will increase by .436 units. According to this result, hypothesis H1 is accepted.

Simple linear regression analysis was performed to predict job satisfaction according to quality of life. Quality of life level is a predictor of job satisfaction (F (1, 418) =56.097, p<.001). Quality of life predicts 19 percent of the variance in job satisfaction. When the quality of life of sports center employees increases by one unit, their job satisfaction will increase by .344 units. According to this result, hypothesis H2 is accepted.

Simple linear regression analysis was performed to predict job satisfaction according to job performance. Job performance is a predictor of job satisfaction (F (1, 418) =40.422, p<.001). Job performance predicts 19 percent of the variance in job satisfaction. When the job performance of sports center employees increases by one unit, their job satisfaction will increase by .297 units. According to this result, hypothesis H3 is accepted.

Simple linear regression analysis was performed to predict job performance according to job satisfaction. Job satisfaction is a predictor of job performance (F (1, 418) =40.422, p<.001). Job satisfaction predicts 9 percent of the variance in job performance. When job satisfaction of sports center employees increases by one unit, their job performance will increase by .280 units. According to this result, the H4 hypothesis is accepted.

DISCUSSION

Increasing organizational productivity is an issue that is frequently thought and researched. The content and number of research and studies on the human element, which is stated to be an important factor in increasing productivity, attracts attention. The effects of the quality of life of the human element, which is an effective factor in Jobs, on job satisfaction and performance, constitute the main subject of this study. While it is seen that the relationship between quality of work life and other organizational variables is included in the literature, studies on determining the relationship between general quality of life and organizational variables are mostly not found. Therefore, in this study, the relationship between quality of work life and other organizational variables was examined. In this framework, a model and hypotheses were created to test the relationship between individuals' quality of life and job satisfaction and performance and then tested with Pearson correlation analysis and simple linear regression analysis.

According to the results of the research, it was determined that there is a moderate and positive linear relationship between quality of life and job performance level (r = 0.436, p = 0.000). This indicates that the hypothesis "Quality of life levels of sports center employees have a significant and positive effect on job performance" is accepted. This result is in line with the findings of previous studies by Aketch, Odera, Chepkuto, and Okaka (2012) and Lau (2000). There was a moderate and positive linear relationship between quality of life and job satisfaction (r = 0.344, p = 0.000). This indicates that the hypothesis "Quality of life levels of sports center employees have a significant and positive effect on job satisfaction" is accepted. This result is consistent with the findings of Turunç et al. (2010), Fields and Thacker (1992), and Kawai and Wyatt (2007).

According to the results of the Pearson correlation test conducted to determine the relationship between job performance and job satisfaction levels, there is a moderate, positive linear relationship between job performance and job satisfaction level (r=.282, p=.000). This result, shows that the hypothesis "Job performance levels of sport center employees have a significant and positive effect on job satisfaction" is accepted, is in line with the findings of the studies conducted by Bagozzi, (1980), Siegel and Bowen, (1971), Sheridan and Slocum, (1975), Wanous, 1974), Oh, Rutherford and Park, (2014), which concluded that job performance is effective on job satisfaction. According to the result of the Pearson correlation test conducted to determine the relationship between job satisfaction and job performance levels, there is a moderate, positive linear relationship between job satisfaction and job performance level (r=.297, p=.000). "Job satisfaction levels of sports center employees have a significant and positive effect on job performance." This result, which means that the hypothesis is accepted, is consistent with the results obtained in the studies conducted by Katebi, HajiZadeh, Bordbar, Amir, and Salehi, (2022), Bozer and Yanık (2020), Akkoç et al. (2012) and Akburak et al. (2020).

Although the results have been obtained, this study has limitations. The most important limitation is that the sample group consists only of employees of sports centers in Istanbul. Therefore, it is thought that it may be useful to conduct similar studies with different sample groups and different organizational variables in order to generalize the findings obtained.

Conflict of interest

No conflict of interest is declared by the authors. In addition, no financial support was received.

Ethics Committee

Istanbul Rumeli University Ethics Commission approved that the research was ethically appropriate with the decision taken at the meeting dated 23.08.2023 and numbered 2023/08.

Author Contributions

Planned by the author: Study Design, Data, Collection, Statistical Analysis, Data Interpretation, Manuscript Preparation, Literature Search. The author has read and agreed to the published version of the manuscript.

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RESEARCH ARTICLE

Nationwide Study of Basic and Instrumental Activities of Daily Living in Individuals Aged 65+ Living at Home

Nadire Gülçin YILDIZ[1*], Halide Z. AYDIN[2] and Kemal AYDIN[3]

[1]Faculty of Education, Department of Guidance and Counseling, Istanbul Medipol University, Istanbul / Türkiye
[2]Arnold School of Public Health, University of South Carolina, Columbia, SC / United States
[3]Merzifon Faculty of Economics and Administrative Sciences, Amasya University, Merzifon / Türkiye

Abstract
The limitations encountered by aging individuals 65+ in Turkey in their basic and instrumental activities of daily living were examined according to gender and age i.e., specifically for 65-74 and 75+ age groups. Microdata from the Turkey Health Survey implemented by the Turkish Statistical Institute (TurkStat) in 2019 were used in the analyses. According to the findings of this country-wide research, the results indicated that of the 2457 people aged 65+ living in their own homes, 11.2% were limited in activities of daily living (ADL), and 45.8% were limited in their instrumental activities of daily living (IADL). The ADL and IADL limitations also increased significantly according to age and gender. The prevalence of ADL limitations across Turkey was 4.5%, 1.9% in men aged 65-74, and 7.2% in women aged 65-74. In elderly individuals aged 75+, the prevalence of ADL limitations was found to be 13.7% in men and 21.7% in women. Based on the results of the Instrumental Activities of Daily Living module (IADL) results, 46.9% of men between the ages of 65-74 were limited in IADL, while this rate was found to be 72% for women. In both activities, the prevalence of limitations in women was more than twice as high as in men. The prevalence of ADL and IADL limitations differed significantly by gender and age groups ($p<0.05$).

Keywords
Activities of Daily Living, Geriatrics, Sociodemographic Factors, Mental Health, Public Health, Quality of Life

INTRODUCTION

As a result of the demographic changes, the proportion of the population made up of elderly individuals is increasing. According to the population projections of the Turkish Statistical Institute, the rate of the elderly population aged 65+ is expected to reach 11% in 2025, 12.9% in 2030, and 16.3% in 2040 (TurkStat, 2021). Although elderly individuals' aging experience may vary, diseases increase with age while physical and cognitive performances decrease continuously (Demir Akça, 2014; Diker et al., 2002; Vaughan 2016). The number of people reporting limitations in daily living activities also increases with age.

Limitations in daily living activities restrict the elderly populations' participation in daily life and independent living experiences, making them dependent on assistance. Many countries have been experiencing unprecedentedly rapid demographic changes since the second half of the 20th century, which is characteristic of the demographic transition caused by the growth rates -i.e., being accelerated to exceptional levels in history (Bongaarts, 2009, p. 2985). The number of elderly individuals affected by this situation during the demographic transformation process will continue to increase in the future (Aydiner Boylu and

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[1]**ORCID:** 0000-0002-5852-9658 , [2]**ORCID:** 0000-0001-7017-6149, [3]**ORCID:** 0000-0002-2013-7085

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Günay, 2017; Diker et al., 2001; Kesioğlu et al., 2003; Tel and Tel, 2006).

Healthy aging is associated with the ability to perform Activities of Daily Living (ADL) and Instrumental Activities of Daily Living (IADL). Therefore, improving ADL and IADL is considered to help prevent dependence in the elderly population. Determining the prevalence of ADL and IADL in the elderly population and determining their causes may guide social policymakers, healthcare, and mental health providers (WHO, 2001; WHO, 2015).

ADL encompasses essential skills necessary for self-care including bathing, feeding, dressing, toileting, and mobility. The inability to perform ADL can lead to dependence, impacting an individual's quality of life (Edemekong et al, 2023). Although many studies have been conducted in Turkey on the ADL of patients in hospitals and in various local regions, such as elderly individuals living in nursing homes and neighborhood health centers, there is no research covering the elderly population as a whole (Demir Akça et al., 2014; Demir Erbil and Hazer, 2021; Ince Parpucu et al., 2023; Kitiş et al., 2012; Molaoğlu and Yanmış, 2018; Çam and Salık Asar, 2019). However, the nationwide prevalence of elderly individuals aged 65+ living at home experiencing limitations in their ADL and IADL is not known.

The TurkStat periodically conducts a survey called the Turkey Health Survey (THS) covering the whole country. By analyzing the ADL and IADL modules in these surveys, it is possible to examine the limitations faced by elderly individuals and the factors affecting them. This study aims to analyze the data of the THS conducted by the TurkStat in 2019 and examine the limitations faced by people aged 65+ in Turkey in their ADL and IADL.

METHODS

Research Model

This is a descriptive and cross-sectional study. In this form of research, the researcher aims to examine and then discuss the results of the population at a particular point in time. Describing what already exists in the population without any control or changes allows the researcher to document issues (Heppner et al., 2008). As a tool, descriptive research design is a powerful method to gather information about a particular group, which offers the ability to outline facts and features of a particular population of interest. his study was performed in line with the principles and guidelines of the Declaration of Helsinki. The study protocol for the THS was approved by the chairperson of the Turkish Statistical Institute. "Regulation on Procedures and Principles Regarding Confidential Data Privacy and Data Security in the Official Statistics" was used to ensure the privacy and confidentiality of the data from the study. All participants provided informed consent before enrollment in the survey. These guidelines were officially published, and a gazette was assented to on 20/06/2006-No.26204.

Data Collection

The data from the Turkey Health Survey (THS), which was implemented cross-sectionally by the Turkish Statistical Institute (TurkStat) in 2019, was analyzed in this study. THS was cross-sectional research conducted with a multi-stage sampling design in provinces, districts, and towns covering 12 regions. This survey, the last of which was conducted in 2019, covers households in all settlements within the borders of Turkey. The population described as institutional (e.g., military soldiers, dormitory residents, prisoners, those who stay in the hospitals for a long term, elderly individuals residing in nursing homes) was not included in the research. Detailed information about sample selection, method, definitions, and classifications of socio-economic variables were included in the TurkStat 2016, 2019, and 2022.

Variables and measurements

To evaluate the prevalence of limitations in daily activities in the general population, the Turkey Health Survey (THS) includes variables belonging to the five-item Katz's Basic Activities of Daily Living Index (ADL) and seven-item Lawton and Brody's Instrumental Activities of Daily Living Index (IADL) (Lawton & Brody, 1969; Katz et al. 1963; Katz et al., 1970; Katz, 1983). The survey has the following questions: "1. Do you usually have difficulty on feeding yourself without help? 2. Do you usually have difficulty on getting in and out of a bed or chair without help? 3. Do you usually have difficulty on dressing and undressing without help? 4. Do you usually have difficulty on using toilets without help? 5. Do you usually have difficulty on bathing or showering?"
In the 5-item ADL module, the answers were as follows: a. No difficulty; b. Some difficulty; c. A

lot of difficulty; and d. I can't achieve it by myself. In this study, the options "No difficulty" and "Some difficulty" were combined; and ADL limitations categories were created by combining the "No ADL difficulty." As a result of the calculations, participants with ADL scores of 1-5 were defined as having "No ADL Limitations" or limitations, and those with 6+ points were defined as having difficulties or limitations with their ADL or referred to as "ADL Limitations."

In the IADL module, which had a total of seven items, participants are asked:

1. Do you usually have difficulty on preparing meals without help? 2. Do you usually have difficulty on using the telephone without help? 3. Do you usually have difficulty on shopping without help? 4. Do you usually have difficulty on managing medication without help? 5. Do you usually have difficulty on doing light housework without help? 6. Do you usually have difficulty on doing occasional heavy housework without help? 7. Do you usually have difficulty on taking care of finances and everyday administrative tasks without help? The responses included: a. No difficulty, b. Some difficulty, c. A lot of difficulty, d. I can't achieve it by myself, e. Never tried it or do not need to do it.

In the 7-item IADL module, "No difficulty," "Some difficulty," and "Never tried it or do not need to do it" responses were combined and created the "No IADL limitations" category. "A lot of difficulty" and "I can't achieve it by myself" were combined and created the "IADL limitations" category. An IADL score between 1-7 was defined as having No IADL limitations, and an IADL score of 8+ points was defined as having IADL limitations.

Having at least one item marked "A lot of difficulty" on the ADL and IADL modules defined ADL and IADL limitations. In this study, elderly individuals aged 65+ were included in the analysis, with age categories of 65-74 and 75+. In THS, the dependence levels of a total of 2458 people, including 1589 people in the 65-74 age group and 869 people aged 75+, were examined in their daily life activities.

RESULTS

In Table 1, the prevalence of ADL limitations was found to be significant between gender and age groups ($p<0.05$). According to the five-item ADL results, 96% of men aged 65-74 did not have any difficulty feeding themselves, while this rate was 90% for women. In addition, in this age group, 3.4% of men were partially challenged. Also, 7.8% of women stated that they experienced difficulties feeding themselves partially and 2.5% stated that they could not feed themselves. Among those age groups aged 75+, the frequency of eating independently without any help was 82% for men and 75% for women.

Although 88% of the participants in the 65-74 age group had no difficulty in getting into/out of bed without assistance or sitting down to/ getting up from a chair, it was revealed that 9.3% of those had some difficulty and 3.1% reported that they needed support. While 93% of men had no difficulty, this rate dropped to 82% for women.

Furthermore, 88% of participants aged 65-74 reported having no difficulty in dressing and undressing without help, as 69% of those aged 75+ reported having no difficulty in dressing and undressing without help. Also, 8.7% of people aged 65-74 said they were partially struggling, whereas 3% stated they needed help. Among elderly individuals aged 75+, 18% stated they had some difficulty, 9% had a lot of difficulty, and 3.3% could not do it at all.

Among elderly individuals aged 65-74, 93% of men and 85% of women declared that they had no difficulty using the toilet, 93% of men and 84% of women reported that they had no difficulty bathing/showering with a similar frequency. Among individuals aged 75+, the rate of having no difficulty in using the toilet was 78% for men and 65.3% for women. The rate of taking a bath/shower without any assistance was 74% for men and 58% for women aged 75+.

In summary, 88% to 93% of people between the ages of 65-74 did not have any difficulty in ADL activities, 7% to 9% had some difficulty and 3.3% could not engage in any ADL at all. For people aged 75+, this distribution dropped to 78% in feeding, 69% in going to bed, dressing up, and using the toilet, and 65% in showering. 18-20% of people aged 75+ reported having some difficulty, and another 12-15% reported not being able to do it at all. In both age groups, the limitations of ADL were twice as common in women as in men.

Table 1. The prevalence of ADL limitations by age and gender

Age	Gender	No difficulty	Some difficulty	A lot of difficulty	I can't achieve it by myself	Total
1. Do you usually have difficulty on feeding yourself without help?						
	Men	699-95,9	25-3,4	5-0,7	0-0,0	729
	Women	771-89,7	67-7,8	20-2,3	2-0,2	860
65-74	Total	1470-92,8	92-5,6	25-1,5	2-0,2	1589
	Men	303-81,7	49-13,2	14-3,8	5-1,3	371
	Women	375-75,3	88-17,7	26-5,2	9-1,8	498
75 +	Total	678-78,5	137-15,5	40-4,5	14-1,6	869
2. Do you usually have difficulty on getting in and out of a bed or chair without help?						
	Men	678-93,0	42-5,8	9-1,2	0-0,0	729
	Women	708-82,3	110-12,8	40-4,7	2-0,2	860
65-74	Total	1386-87,7	152-9,3	49-2,9	2-0,2	1589
	Men	277-74,7	62-16,7	22-5,9	10-2,7	371
	Women	310-62,2	125-25,1	46-9,2	17-3,4	498
75 +	Total	587-68,5	187-20,9	68-7,6	27-3,1	869
3. Do you usually have difficulty on dressing and undressing without help?						
65-74	Men	677-92,9	41-5,6	10-1,4	1-0,1	729
	Women	726-84,4	98-11,4	32-3,7	4-0,5	860
	Total	1403-88,3	139-8,7	42-2,6	5-0,3	1589
75 +	Men	281-75,7	52-14,0	29-7,8	9-2,4	371
	Women	321-64,5	108-21,7	49-9,8	20-4,0	498
	Total	602-69,3	160-18,4	78-9,0	29-3,3	869
4. Do you usually have difficulty on using toilets without help?						
65-74	Men	681-93,4	38-5,2	10-1,4	0-0,0	729
	Women	735-85,5	87-10,1	34-4,0	4-0,5	860
	Total	1416-89,1	125-7,9	44-2,8	4-0,3	1589
75 +	Men	289-77,9	44-11,9	29-7,8	9-2,4	371
	Women	325-65,3	101-20,3	55-11,0	17-3,4	498
	Total	614-70,7	145-16,7	84-9,7	26-3,0	869
5. Do you usually have difficulty on bathing or showering?						
65-74	Men	674-92,5	43-5,9	10-1,4	2-0,3	729
	Women	719-83,6	101-11,7	37-4,3	3-0,3	860
	Total	1393-87,7	144-9,1	47-3,0	5-0,3	1589
75 +	Men	276-74,4	51-13,7	32-8,6	12-3,2	371
	Women	291-58,4	109-21,9	65-13,1	33-6,6	498
	Total	567-65,2	160-18,4	97-11,2	45-5,2	869

TURKSTAT, Turkey Health Survey, 2019

The prevalence of IADL limitations by age and gender

Table 2 includes the seven-item variables related to Lawton and Brody's Instrumental Activities of Daily Living. These variables consist of a total of seven questions that make inquiries about the ability to prepare meals, use the phone, shopping, manage medication, do light housework and occasional heavy housework and take care of finances and everyday administrative tasks without help, which are necessary to live independently in society. In the analyses, it was determined that ADL limitations differed statistically according to gender and age groups ($p<0.05$).

Table 2. The prevalence of IADL limitations

Age	Gender	No difficulty	Some difficulty	A lot of difficulty	I can't achieve it by myself	Never tried it or do not need to do it	Total
1. Do you usually have difficulty on preparing meals without help?							
65-74	Men	621-85,2	28-3,8	10-1,4	15-2,1	55-7,5	729
	Women	694-80,7	102-11,9	38-4,4	22-2,6	4-0,5	860
	Total	1315-82,8	130-8,2	48-3,0	37-2,3	59-3,7	1589
75 +	Men	216-58,2	43-11,6	22-5,9	40-10,8	50-13,5	371
	Women	273-54,8	83-16,7	51-10,2	72-14,5	19-3,8	498
	Total	489-56,3	126-14,5	73-8,4	112-12,9	69-7,9	869
2. Do you usually have difficulty on using the telephone without help?							
65-74	Men	661-90,7	40-5,5	7-1,0	8-1,1	13-1,8	729
	Women	659-76,6	85-9,9	36-4,2	26-3,0	54-6,3	860
	Total	1320-83,1	125-7,9	43-2,7	34-2,1	67-4,2	1589
75 +	Men	236-63,6	44-11,9	25-6,7	32-8,6	34-9,2	371
	Women	239-48,0	74-14,9	44-8,8	77-15,5	64-12,9	498
	Total	475-54,7	118-13,6	69-7,9	109-12,5	98-11,3	869
3. Do you usually have difficulty on shopping without help?							
65-74	Men	647-88,8	40-5,5	24-3,3	13-1,8	5-0,7	729
	Women	584-67,9	110-12,8	66-7,7	64-7,4	36-4,2	860
	Total	1231-77,5	150-9,4	90-5,7	77-4,8	41-2,6	1589
75 +	Men	215-58,0	52-14,0	32-8,6	51-13,7	21-5,7	371
	Women	169-33,9	77-15,5	71-14,3	141-28,3	40-8,0	498
	Total	384-44,2	129-14,8	103-11,9	192-22,1	61-7,0	869
4. Do you usually have difficulty on managing medication without help?							
65-74	Men	685-94,0	25-3,4	8-1,1	7-1,0	4-0,5	729
	Women	763-88,7	73-8,5	13-1,5	7-0,8	4-0,5	860
	Total	1448-91,1	98-6,2	21-1,3	14-0,9	8-0,5	1589
75 +	Men	287-77,4	47-12,7	22-5,9	10-2,7	5-1,3	371
	Women	339-68,1	90-18,1	38-7,6	28-5,6	3-0,6	498
	Total	626-72,0	137-15,8	60-6,9	38-4,4	8-0,9	869
5. Do you usually have difficulty on doing light housework without help?							
65-74	Men	556-76,3	46-6,3	11-1,5	27-3,7	89-12,2	729
	Women	567-65,9	163-19,0	80-9,3	40-4,7	10-1,2	860
	Total	1123-70,7	209-13,2	91-5,7	67-4,2	99-6,2	1589
75 +	Men	177-47,7	49-13,2	31-8,4	52-14,0	62-16,7	371
	Women	197-39,6	99-19,9	65-13,1	113-22,7	24-4,8	498
	Total	374-43,0	148-17,0	96-11,0	165-19,0	86-9,9	869
6. Do you usually have difficulty on doing occasional heavy housework without help?							
65-74	Men	391-53,6	98-13,4	44-6,0	52-7,1	144-19,8	729
	Women	255-29,7	185-21,5	248-28,8	149-17,3	23-2,7	860
	Total	646-40,7	283-17,8	292-18,4	201-12,6	167-10,5	1589
75 Age +	Men	92-24,8	49-13,2	54-14,6	93-25,1	83-22,4	371
	Women	67-13,5	64-12,9	122-24,5	211-42,4	34-6,8	498

	Total	159-18,3	113-13,0	176-20,3	304-35,0	117-13,5	869
7. Do you usually have difficulty on taking care of finances and everyday administrative tasks without help?							
65-74	Men	630-86,4	54-7,4	19-2,6	10-1,4	16-2,2	729
	Women	534-62,1	129-15,0	40-4,7	59-6,9	98-11,4	860
	Total	1164-73,3	183-11,5	59-3,7	69-4,3	114-7,2	1589
75 Age +	Men	222-59,8	63-17,0	28-7,5	38-10,2	20-5,4	371
	Women	188-37,8	72-14,5	54-10,8	104-20,9	80-16,1	498
	Total	410-47,2	135-15,5	82-9,4	142-16,3	100-11,5	869

TURKSTAT, Turkey Health Survey, 2019

Of a total of 1589 people between the ages of 65-74 in preparing meals without help 82.8% stated they had "No difficulty," 8.2% said they had "Some difficulty," 3.0% said they had "A lot of difficulty," 2.3% said "I can't achieve it by myself," and another 3.7% said they had "Never tried it or do not need to do it." For people aged 75+, this distribution in sequence was 56.3%, 14.5%, 8.4%, 12.9% and 7.9%, respectively.

With regards to using the phone, 83.1% of those between the ages 65-74 said they had "No difficulty," 7.9% said they had "Some difficulty," 2.9% said they had "A lot of difficulty," 2.1% said "I can't achieve it by myself", and 4.2% said "Never tried it or do not need to do it." those using the phone without assistance dropped to 54.7% of for elderly who were aged 75+. 13.6% of the participants in this age range stated that they had "Some difficulty," 7.9% stated that they had "A lot of difficulty," 12.5% stated that "I can't achieve it by myself," and another 11.3% stated that they had "Never tried it or do not need to do it." 91.1% of those aged 65-74 and 72% of those aged 75+ had stated that they had "No difficulty" in managing their medication. While 70.7% of people aged 65-74 reported that they had "No difficulty" doing light housework.

As 43% of people aged 75+ reported that they had "No difficulty" doing light housework without help."

40.7% of those aged 65-74 reported that they had "No difficulty" doing heavy housework without help."

18.3% of those aged 75+ reported that they had "No difficulty" doing heavy housework without help.

13.5% of those aged 75+ reported that they "Never tried it or do not need to do it."

In summary, women reported having more than twice as much difficulty as men on the seven-item IADL variables. The most difficult activity reported was heavy housework.

Basic and Instrumental Activities of Daily Living among elderly individuals

As explained in the variables and measurement section, the ADL and IADL index were calculated, and the results were presented in Table 3. Findings indicated that ADL and IADL limitations experienced by elderly individuals increased according to age and gender ($p<0.05$). The average prevalence of ADL limitations was 4.5%, including 1.90% of men and 7.20% of women aged 65-74. It was found that 13.7% of men in the age group of 75+ had ADL limitations, and 21.7% of women had ADL limitations. In other words, the results indicated that 11.2% of the elderly individuals aged 65+ (4.5+17.7/2= 11.2) were limited in ADL. According to the results of the IADL module, 16.5% of men and 47.5% of women between the ages of 65-74 were limited in IADL, a total of 32.0%. While 49.6% of men aged 75+ were dependent on IADL, this rate reached 72.0% in women, and total of 59.4%. In summary, the results showed that a total of 45.8% of elderly individuals who were 65+ needed assistance with their IADL.

Tablo 3. ADL and IADL limitations for elderly individuals in Turkey

Age	Gender	No ADL Limitations	ADL Limitations	Total	No IADL Limitations	IADL Limitations	Total
		N-%	N-%	N	N-%	N-%	N
65-74	Men	715-98,1	14-1,90	729	609-83,5	120-16,5	729
	Women	798-92,8	62-7,20	860	451-52,5	409-47,5	860
	Total	1513-95,5	76-4,50	1589	1060-67,8	529-32,0	1589
75 and	Men	320-86,3	51-13,7	371	197-53,1	174-46,9	371
	Women	389-78,3	108-21,7	497	140-28,0	358-72,0	498
	Total	709- 82,3	159-17,7	868	336-40,5	532-59,4	869
65-75 plus	**Total**	**2223- 88,8**	**234-11,2**	**2457**	**1396-54,2**	**1061-45,8**	**2457**

TURKSTAT, Turkey Health Survey, 2019

DISCUSSION

In summary, of a total of 2457 people aged 65+ representing the entire country who were currently residing in their own homes, it was found that 11.2% were limited in ADL and 45.8% were limited in IADL. In this study, when the limitations in ADL were evaluated in terms of gender according to preparing meals, getting in/out of bed, dressing/undressing, toilet, and bathing, approximately 5% of men between the ages of 65-74 said they had some difficulty, 1.9% said they had a lot of difficulties or could not do it at all. Women, on the other hand, stated that they had some difficulty with a prevalence of approximately 10%, and another 7.2% stated that they had a lot of difficulty or could not do it at all. Likewise, about 14% of men aged 75+ stated that they had "Some difficulty" with ADL, and 13.7% had "A lot of difficulty" or "I can't achieve it by myself." In women aged 75+, results showed that 21% of women had "Some difficulty," and 21.7% needed help. The results demonstrated that elderly individuals aged 65+ experienced the most limitations on bathing or showering and using toilets without help.

Results showed that IADL limitations increased when preparing meals, using the phone, managing medication, doing light and heavy housework, and taking care of financial issues. Approximately 7% of men between the ages of 65-74 reported experiencing some limitations, and 46.9% were completely limited. Results showed that nearly 7% of men aged 75+ were somewhat limited (Table 1 – Table 2) and 47% were limited in their IADL, while 15% of women were slightly limited and 72% were limited. The main problem with the most limitations in IADL was doing heavy housework. While only 30% of elderly individuals 65+ reported that they could do heavy housework themselves, 15% reported that they had "Some difficulty" and 55% reported that they had "A lot of difficulty" or "could not do it at all." This study provides information about ADL and IADL limitations of elderly individuals in Turkey. IADL limitations were 32% of the 65-74 age group and 59% of individuals aged 75+. ADL and IADL limitations were high among those aged 65+, and almost half of them appeared limited in their IADL. Also, both ADL and IADL limitations among women were more than twice as high compared to men. Such limitations result in adverse conditions among elderly individuals, affecting their quality of life.

The proportion of those who experience limitations in daily functioning increases with age which directly affects the quality of life. It is important to reduce these limitations that elderly individuals encounter in their daily lives. Subsequently, when these activities are impaired, assistance is required. While many studies have been conducted at the local level on basic and instrumental daily living activities, studies representing the elderly population of Turkey on a national level are none. In this respect, this study fills an important gap and aims to provide vital information to policymakers, caregivers, healthcare providers, and mental health services. However, this study is limited to the elderly living at home and does not include those persons living in nursing homes and hospital settings.

Across the world average life expectancy is increasing which is bringing the issue of improving the quality of life for aging populations.

Two main points emerged in the literature to ensure the welfare of the elderly: maintaining daily functioning and independence. Physical limitations and functional problems affect the quality of life causing long-term care. As a result of aging these emerging deficiencies can be assessed by looking at the individual's level of ability to perform daily living activities independently or with assistance.

This study helped describe how ADL and IADL impact elderly individuals' functioning. Gender and age-related causes of limitations in activities of daily living are summarized. Having the ability to live independently in engaging daily routines impacts the elderly to have a positive perception of themselves and their health (Demir Erbil and Hazer, 2021; Kitiş et al., 2012; Wolff et al., 2016). Therefore, they must be supported in this aspect as much as possible. As a result, in this study, it was found that elderly individuals experienced inadequacy in ADL. Women expressed needing twice as much help in IADLs. Additionally, it has been determined that as age and the number of chronic diseases increase, elderly individuals become more dependent on ADL (Güdük, 2023; Saul & Kosinsky; 2021).

Like previous studies, it is shown that as the age of elderly individuals increases, IADL and quality of life decrease (Tel et al., 2011; Güdük, 2023). Individuals with a decline in their physical health and limited self-sufficiency face challenges in their ADLs. In addition, ADL moderated the correlation between life satisfaction and quality (Aydiner Boylu and Günay, 2017). It is recommended to provide elderly persons to help facilitate IADL by making necessary arrangements that foster their independence. Also providing support in daily functioning to help maintain their quality of life is suggested. The social networks (i.e., family and friends) and support in IADL of elderly individuals significantly affect mental health and the aging process (Bozo et al., 2009; Demir Erbil and Hazer, 2021; Lyu & Wolinsky, 2017). This issue of limitations faced by the elderly has other important mental health consequences. For example, Bozo et al. (2009) examined the effects of ADL and perceived social support on the depression level of Turkish adults 60+. The ADL and perceived social support significantly predicted depression and higher ADL functioning and higher perceived social support predicted a lower level of depression.

In line with these results, community-based health service provision for elderly individuals is recommended (Tel et al., 2006). Assessing their ADL in their natural environment, supporting their independence (i.e., by providing the necessary care), and making arrangements that facilitate ADL will maintain engagement in ADL and enhance life quality (Diker et al., 2001; Özbek Yazıcı & Kalaycı, 2015). Aging is inevitable. However, it is possible to lower the dependency level of elderly individuals to maintain their quality of life. Today, policies and programs regarding aging focus on improving the quality of life and general health that aim for productive, successful, and independent aging (Tel et al., 2011).

A person's functional status is determined by the degree of his or her engagement in ADL. The inability to perform ADLs results in dependence on others which may lead to unsafe conditions and poorer quality of life. Assessment of a person's ADL may predict their need for paid home care and or other assisted living conditions, admission to nursing homes, alternative living arrangements, hospitalization, and use of paid home care. The outcome of a treatment program can also be assessed by reviewing patients' ADLs (Costenoble et al., 2021; Cagle et al., 2020). For example, The United States National Health Interview Survey of 2011 indicates that 20.7% of adults aged 85 or older required assistance with ADLs (Adams et al., 2011). There are extensive mental health consequences (e.g., suicide, addiction, depression) of the elderly population as the world is aging, which demand further attention (Albanese, 2020; Bozo et al., 2009; Kondo, 2008; Tel et al., 2011). Güdük (2023) conducted a national study with the Turkish population that compared the limitations of elderly individuals. The results indicated that age and sociodemographic and health characteristics influenced disability (e.g., there was a meaningful relationship between depression and disability).

Before, the nationwide prevalence of elderly individuals aged 65+ living at home experiencing limitations was not known. The results of this study helped determine the prevalence of elderly individuals aged 65+ living at home and experiencing limitations in their ADL and IADL in Turkey. Actions must be taken to facilitate ADL so that elderly individuals can live independently (Wolff et al., 2016). Thus, an elderly person's

quality of life can be enhanced (Diker et al., 2001; Kitiş et al., 2012). For this purpose, necessary provisions should be developed in areas focusing on assisted living and nursing homes (Özbek Yazıcı & Kalaycı, 2015). Further, policies related to elderly individuals' welfare, healthcare status, and mental health conditions should be in place (Bozo et al., 2009). Since it helps evaluate one's general health condition, related plan, and treatment procedure, and healthcare, assessment of ADL is clinically important topic (Costenoble et al., 2021). Similarly, it is important to acknowledge the role of diminishing one's ADL on the individual is highly encouraged and advocated in American society, and many elderly individuals fear losing their independence (Vaughan et al., 2016; Warmoth et al., 2018).

Conclusion

Results may provide dependable information on the health status of the elderly population in Turkey. In addition to being a study that reflects the country in general, the research is also important in that it sheds light on national needs and enables international comparisons, especially with countries in the European Union.

Ethical approval

The Turkish Statistical Institute provides anonymized data after signing an agreement regarding the security and accessibility of the data. Ethical approval is not required for this study because the data are publicly available, which also does not involve direct human contact.

Conflict of interest

There is no personal or financial conflict of interest within the scope of the study.

Author contribution

Conceptualization of the study conducted by NGY. The method was designed by NGY, HZA, and KA. KA performed statistical analyses.

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RESEARCH ARTICLE

The E-Learning Attitude of Talented Pre-service Teachers in the Online Learning Model Following the Kahramanmaraş and Hatay Earthquakes

Üstün TÜRKER[1*], Mustafa Barış SOMOĞLU[2], Efecan TEZCAN[3] and Mine KOÇ[4]

[1]Gümüşhane University, School of Physical Education and Sport, Department of Physical Education and Sport, Gümüşhane / Türkiye
[2]Gümüşhane University, School of Physical Education and Sport, Department of Physical Education and Sport, Gümüşhane / Türkiye
[3]Gümüşhane University, School of Physical Education and Sport, Department of Sport Management, Gümüşhane / Türkiye
[4]Gümüşhane University, School of Physical Education and Sport, Department of Coaching, Gümüşhane / Türkiye
*Correspondingauthor: ustunturker@outlook.com

Abstract
This study, which aims to determine the e-learning attitudes of talented teacher candidates following the earthquakes in Kahramanmaraş and Hatay and to compare them according to some variables, was designed with a cross-sectional-survey model, one of the quantitative research methods. The research sample was comprised of 826 pre-service teachers from the fields of Physical Education and Sports, Music Education, and Visual Arts during the spring semester of 2022-2023. Data for the study were collected using the Test of E-Learning Related Attitudes Scale, with data collection conducted through Google Forms. Data analysis was used to SPSS program. In terms of the academic department variable, it was concluded that pre-service teachers specializing in Physical Education and Sports, Music Education, and Visual Arts demonstrated similar levels of E-learning attitudes, and no statistically significant differences were observed among them ($p<0.05$). Furthermore, in the context of education and instructional activities being carried out through online learning methods, it was determined that the choice of and utilization of computers and mobile devices as learning tools resulted in similar overall E-learning attitudes ($p<0.05$). Nevertheless, those who favored mobile devices demonstrated a statistically higher level of inclination toward technology use and perceived usefulness, while those who used computers reported statistically higher levels of satisfaction and motivation in their E-learning attitudes ($p<0.05$). According to the research results, it was observed that the E-learning attitudes of pre-service teachers following the Kahramanmaraş and Hatay earthquakes were at a moderate level, with satisfaction in online learning registering as the least favorable aspect of E-learning attitude.

Keywords
E-learning, Online learning, Earthquake, Teacher

INTRODUCTION

It is well known that Turkey is a country frequently exposed to natural disasters, particularly those caused by earthquakes (Solmaz and Ozel, 2012). Between 1900 and 2023, Turkey experienced a total of 269 earthquakes resulting in casualties and significant material damage. Among these earthquakes, the most severe in terms of loss of life and extensive damage, spanning over a century, were the 2023 Kahramanmaraş and Hatay earthquakes, followed by the 1939 Erzincan and 1999 Gölcük earthquakes. The most recent earthquakes, with a magnitude of 7.7 (Mw) occurring on February 6, 2023, at 04:17 (Turkey local time) with its epicenter in Kahramanmaraş, and another with a magnitude of 6.4 (Mw) on February 20, 2023, at 20:04 (Turkey local time)

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[1]**ORCID:** 0000-0003-0604-8577 , [2]**ORCID:** 0000-0001-5811-384X , [3]**ORCID:** 0000-0003-3284-6361, [4]**ORCID:** 0000-0001-5858-5361

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with its epicenter in Hatay, resulted in the declaration of a total of 11 cities in the region as disaster zones. In these earthquakes, more than 48,000 citizens lost their lives, and over half a million buildings were recorded as damaged, resulting in significant material losses in various sectors, including communication and energy infrastructure (SBB, 2023).

It is undeniable that the earthquakes that have occurred in our country, referred to as the 'disaster of the century,' will have consequences that extend beyond the impact on communication and energy infrastructure. Earthquakes or natural disasters that disrupt the normal social life of individuals and communities have also affected the sustainability of education, among various other aspects (Telli Yamamoto and Altun, 2023). Considering the severity of the earthquakes centered in Kahramanmaraş and Hatay, the geographical area covering 11 cities and their populations, the number of universities and students in the region, and the fact that the spring semester was approaching in the academic calendar of all universities nationwide, the Council of Higher Education (YOK) decided, due to all these factors, to transition to online learning (E-learning) methods in higher education and suspend face-to-face education in order to ensure the continuity of education. In this context, as a result of the earthquakes centered in Kahramanmaraş and Hatay, the Council of Higher Education (YOK) announced that in the spring semester of the 2022-2023 academic year, all universities in the country would conduct and complete their educational activities through remote teaching methods (E-learning) (YOK, 2023). The concept of E-learning, achieved by the integration of digital and internet technologies and platforms, allows individuals to access information, resources, and solutions through various methods regardless of place and time. It is in harmony with open and flexible learning models, providing individuals with diverse learning experiences, diversifying the climate of learning, offering various alternatives based on the pace of individual learning, placing the learner at the center, and providing rich learning opportunities. It is a contemporary, innovative learning approach compatible with today's technology (Khan, 2005; Rosenberg, 2006). However, it should be noted that in the use of E-learning systems and methods, in addition to these advantages, certain disadvantages can also be observed from financial, psychological, academic, or technical perspectives.

In February 2023, following the earthquakes centered in Kahramanmaraş and Hatay, in accordance with the decision made by the Council of Higher Education (YOK), there was a rapid transition back to E-learning methods that had been used extensively during the COVID-19 pandemic in educational activities. While there have been numerous studies on the psychological, sociological, and economic effects of the earthquake on individuals and society (Yıldız and Akkoyun, 2023; Cengiz and Peker, 2023; Genc et al., 2023; Ozdemir, 2023), there has been only one research study found in the literature related to E-learning titled 'The Inevitability of Online Learning in Turkey After an Earthquake' (Telli Yamamoto and Altun, 2023). Furthermore, no study has been identified in the literature investigating the effects of the earthquake and E-learning on university students. Within the context of the information available in the literature, the objective of this study is to determine the E-learning attitudes of talented pre-service teachers in the fields of physical education and sports, music education, and visual arts, who primarily complete a significant portion of their higher education studies through applied courses and examinations related to their curricula, and to compare these attitudes based on certain variables. This investigation aims to shed light on the learning experiences of these pre-service teachers who have been using distance education methods in the aftermath of the Kahramanmaraş and Hatay earthquakes in 2023.

MATERIALS AND METHODS

Research Problem

The primary research problem of this study is, "In the aftermath of the earthquakes centered in Kahramanmaraş and Hatay in February 2023, and due to the suspension of face-to-face education and the adoption of online learning methods in higher education in Turkey, what are the general attitudes of our talented pre-service teachers toward e-learning, their inclination to use technology, motivation, and their levels of usefulness and satisfaction toward e-learning systems? " In line with this main research problem, the following sub-problems were addressed in the study.

1. What is the level of general attitudes toward e-learning among pre-service teachers in the fields of physical education and sports, music education, and arts and crafts education?
2. What are the levels of inclination to use technology, motivation, usability, and satisfaction attitudes among talented pre-service teachers?
3. Is there a significant difference in the inclination to use technology, motivation, usability, satisfaction, and general attitudes toward e-learning among talented pre-service teachers based on the gender variable?
4. Is there a significant difference in the inclination to use technology, motivation, usability, satisfaction, and general attitudes toward e-learning among talented pre-service teachers based on the academic department variable?
5. Is there a significant difference in the inclination to use technology, motivation, usability, satisfaction, and general attitudes toward e-learning among talented pre-service teachers based on the device preference variable in online learning?

Model of the Research

This research was designed using a quantitative research method, specifically the cross-sectional survey model, to address both the main and sub-problems of the study. The survey model is a scientific research approach aimed at describing an existing phenomenon in its current state, whether in the past or the present (Karasar, 2002; Karasar, 2008). In this regard, our study was designed as a descriptive study.

Universe and Sample / Study Group

The population of this study, designed with a descriptive approach to determine the attitudes of talented pre-service teachers toward e-learning in online learning environments, consists of pre-service teachers currently enrolled in undergraduate programs at seven different state universities *(Anadolu, Atatürk, Çukurova, Ege, İnönü, Marmara, Ondokuz Mayıs)* in our country. The sample of the study consisted of 826 pre-service teachers who were continuing their education in the fields of physical education and sports, music, and fine arts during the spring semester of the 2022-2023 academic year and were voluntarily included in the research through random sampling. The sample size of the study was determined through power analysis using G*Power, based on an effect size of 0.53 calculated with a 5% Type-I error level and 95% power, which resulted in a minimum of 673 participants. Considering the possibility of incorrect or erroneous responses during the data collection process, the sample size was increased to 850 pre-service teachers. In the course of the study, it was determined that 24 individuals had incorrect or erroneous codings in their responses to the E-learning attitude scale. Consequently, the responses of these individuals were not included in the analyses, and the final analyses for the research objectives were conducted using the responses of a total of 826 pre-service teachers. Among the 826 talented pre-service teachers who participated in the study, 47.1% were male, and 52.9% were female. Regarding age distribution, 26.4% were in the 18-19 age range, 33.4% were in the 20-21 age range, and 40.2% were 22 years or older. In terms of academic units where they were enrolled in higher education, 36.7% were in the field of physical education and sports, 31.7% were in music education, and 31.6% were in the visual arts field. Additionally, concerning the device preference variable in online learning environments, it was observed that the majority of respondents (68.9%) preferred mobile devices, while computer preference was 31.1% (Table 1).

Implementation Process and Ethics

Following the determination of the research objectives, permissions were obtained for the use of the TELRA for this study, which was designed after the interruption of face-to-face education in higher education due to the Kahramanmaraş and Hatay earthquakes and the transition to online learning methods in February 2023. In addition, the ethical approval of this research was granted by the Bayburt University Ethics Committee on 29.12.2020 with decision number 26654. Once the necessary permission procedures for the research were completed, data collection tools were transferred to a digital platform using Google Forms. The pre-service teachers in the sample group were then contacted at the universities they attended and asked to respond to the questions voluntarily.

Table 1. Descriptive Information on Pre-service Teachers' Demographic Characteristics

Variables	Groups	*n*	%
Gender	Male	389	47.1
	Female	487	52.9
Age	18 – 19	218	26.4
	20 – 21	276	33.4
	22 years and older	332	40.2
Department	Physical education and sports	303	36.7
	Music	262	31.7
	Arts and Crafts	261	31.6
Electronic device	Computer	257	31.1
	Mobile devices	569	68.9
Total		826	100

Data Collection Tools

In this study, the Personal Information Form, consisting of questions determined by the researchers, and the Test of E-Learning Related Attitudes Scale (TELRA) were used as data collection tools to achieve the objectives of the research. The TELRA was utilized to determine the attitudes of pre-service teachers toward e-learning.

Test of E-Learning Related Attitudes Scale

This inventory, developed by Kisanga and Ireson (2016) to determine the attitudes of university students in higher education toward e-learning, was adapted to Turkish through the work completed by Biçer (2019) (Determinants of Teachers' Attitudes E-Learning in Higher Learning Institutions). The adapted scale consists of 23 items and uses a 4-point Likert scale. Bicer (2019) designed the items of the scale under four different factors: Tendency to Use Technology, Satisfaction, Motivation, and Usefulness. Scores that can be obtained based on the responses to TELRA range from a minimum of 23 to a maximum of 92. Any increase or decrease in the total score obtained from the TELRA by the participants is considered as an increase or decrease in their attitudes toward e-learning. In this study, the reliability coefficients analyzed for TELRA, along with the values from Bicer's (2019) adaptation study, are shown in Table 2 below.

Table 2. Reliability Coefficients of the Test of E-Learning Related Attitudes Scale

E-learning Attitudes	**Number of items**	**Kisanga (2016)**	**Biçer (2019)**	**Türker et al. (2023)**
Tendency to use technology	6	α=,680	α=,729	α=.79
Satisfaction	5	α=,788	α=,757	α=.823
Motivation	6	α=,651	α=,717	α=.811
Usefulness	6	α=,731	α=,689	α=.787
TELRA	23	α=,888	α=,789	α=.836

TELRA : Test of E-Learning Related Attitudes Scale

Analysis of Data

Following the completion of the data collection process, research data were analyzed using the statistical software package SPSS (Version 26.0) in accordance with the research questions. Frequency analysis was conducted for percentage distributions, and reliability analysis was performed for scoring. The normality distribution and skewness-kurtosis values of the research data were assessed. Based on the criterion that these values should fall within the range of +1.5 and -1.5 (Tabachnick & Fidell, 2013), it was determined that the responses exhibited a statistically normal distribution. Consequently, independent sample t-tests were employed for pairwise comparisons of variable groups, while one-way analysis of variance (ANOVA) with the Tukey method was applied for comparisons involving more than two variable groups.

RESULTS

This chapter presents the results obtained from assessing the attitude levels of talented pre-service teachers who are continuing their higher education in relation to e-learning. Additionally, it includes comparisons based on gender, the academic units they are enrolled in, and the choice of electronic devices in online learning environments, in alignment with the research objectives. Examining the attitudes of teacher candidates admitted to higher education through special talent exams and continuing their education at the undergraduate level toward e-learning in the aftermath of the Kahramanmaraş and Hatay earthquakes in online learning environments, it was determined that the attitude of usefulness had the highest value, while the attitude of satisfaction had the lowest value regarding e-learning. Furthermore, it was observed that the general attitude toward e-learning had a mean score of 56.55 ± 7.27 and a skewness-kurtosis value ranging from -.235 to .157 (Table 3).

Table 3. Descriptive Statistics of Attitudes toward E-Learning

E-learning Attitudes		Skewness	Kurtosis	Min.	Max.	$\bar{X}$±Ss
Talented Pre-service Teacher (*N*=826)	Tendency to use technology	-.018	.162	6	24	13.52±3.3
	Satisfaction	.936	.170	5	44	13.09±3.2
	Motivation	.165	.427	6	34	15.07±3.9
	Usefulness	-.140	.210	6	24	15.11±3.7
	TELRA	-.235	.157	23	92	56.55±7.27

TELRA : Test of E-Learning Related Attitudes Scale

Upon reviewing Table 4, while no statistically significant differences were found in terms of satisfaction and motivation attitudes toward online learning activities based on gender (p >.05), it was observed that female pre-service teachers had a statistically significant difference in terms of their inclination to use technology and their perception of the usefulness of e-learning tools during the earthquake period. Furthermore, in the general TELRA score, female pre-service teachers (57.05 ± 6.61) created a statistically significant difference compared to male pre-service teachers (55.97 ± 7.91) (p <.05)

Table 4. Comparison of Attitudes toward E-Learning by Gender

E-learning Attitudes		Male (*n*=389)	Female (*n*=437)	t	p
		$\bar{X}$±Ss			
Talented Pre-service Teacher (*N*=826)	Tendency to use technology	12.83±3.44	13.63±3.14	-3.473	.001
	Satisfaction	13.21±3.57	12.99±2.84	.996	.320
	Motivation	15.30±4.23	14.86±3.71	1.575	.116
	Usefulness	14.61±3.82	15.56±3.71	-3.587	.000
	TELRA	55.97±7.91	57.05±6.61	-2.113	.035

TELRA : Test of E-Learning Related Attitudes Scale

In the aftermath of the Kahramanmaraş and Hatay earthquakes that occurred in Turkey in February 2023, during the period when education activities were conducted through E-learning methods in online environments, it was observed that there were no statistically significant differences in the technology usage tendency, satisfaction factors, and the general attitudes toward E-learning among talented pre-service teachers based on the variable of their academic department, which includes physical education and sports, music, and visual arts.

The average scores were found to be very close to each other, and there were no statistically significant differences in the technology usage tendency and satisfaction factors as well as the general E-learning attitudes of pre-service teachers studying in these academic units (p > 05).
However, it was observed that pre-service teachers in the field of visual arts created a notable difference with an average score of 15.52±3.98 compared to pre-service teachers in the physical education and sports department, and in terms of usefulness attitude, pre-service teachers in the physical education and sports department, with an average score of 15.53±3.80, significantly differed from those in the visual arts department (Table 5).

Table 5. Comparison of Attitudes toward E-Learning by Academic Department

E-learning Attitudes		Physical Education and Sport (*n*=303)	Music (*n*=262)	Arts and Crafts (*n*=261)	F	p
		$\bar{X}$±Ss				
Talented Pre-service Teacher (*N*=826)	Tendency to use technology	13.51±3.41	13.01±3.01	13.21±3.46	1.667	.190
	Satisfaction	12.97±3.50	12.99±3.11	13.35±2.90	1.194	.304
	Motivation	14.57±3.96 [b]	15.20±3.91 [ab]	15.52±3.98 [a]	4.195	.015
	Usefulness	15.53±3.80 [a]	15.03±3.74 [ab]	14.71±3.79 [b]	3.367	.034
	TELRA	56.60±6.93	56.24±7.77	56.80±7.15	.393	.675

TELRA : Test of E-Learning Related Attitudes Scale

Examining Table 6, it can be observed that there is no significant difference in the attitudes of talented pre-service teachers toward E-learning in online learning activities based on the variable of the preferred and utilized electronic device. Those who favor computers and those who favor mobile devices exhibit quite similar scores on TELRA (p > .05). However, when it comes to satisfaction and motivation regarding E-learning, there are significant differences in favor of those participating in online learning with computers. Conversely, in terms of usefulness and the inclination to use technology, significant differences were noted in favor of pre-service teachers who participate in online learning through mobile devices (p < .05).

Table 6. Comparison of Attitudes toward E-learning Based on the Preferred Electronic Device for Online Learning

E-learning Attitudes		Computer (*n*=257)	Mobile Devices (*n*=569)	t	p
		$\bar{X}$±Ss			
Talented Pre-service Teacher (*N*=826)	Tendency to use technology	12.69±3.42	13.51±3.22	-3.251	.001
	Satisfaction	13.52±3.52	12.90±3.03	2.458	.014
	Motivation	15.49±3.97	14.88±3.95	2.065	.039
	Usefulness	14.77±3.71	15.27±3.82	-1.774	.002
	TELRA	56.49±8.01	56.57±6.92	-.142	.887

TELRA : Test of E-Learning Related Attitudes Scale

DISCUSSION

In this chapter of the study, the findings regarding the average scores of talented pre-service teachers in their attitudes toward E-learning after the Kahramanmaraş and Hatay earthquakes (2023), as well as the findings obtained from analyses applied to gender, the academic unit of study, and the choice of electronic devices for online learning are compared and discussed in the context of similar or related research in the literature. Considering that the learning skills of the pre-service teachers included in the research are primarily associated with motor skills and the absence of any prior studies in the literature related to attitudes toward E-learning following the

Kahramanmara and Hatay-centered (2023) earthquakes, it is anticipated that this study could bring original contributions to the E-learning literature.

After the Kahramanmaraş and Hatay earthquakes, it was observed that the talented pre-service teachers had an average score of 56.55±7.27 in their attitudes toward E-learning in the education activities conducted through the online learning model (Table 3). Examining similar or related studies in the literature, it can be seen that Turker's (2021) study conducted with sports science students during the COVID-19 pandemic reported attitudes toward E-learning with an average score of 55.37±6.98, which is similar to the current study. Additionally, Ozdemir and Sonmez's (2021) study on health science students in Turkey during the COVID-19 pandemic indicated that students had a tendency toward moderate levels of avoidance of E-learning. These results may be interpreted as the curriculum of higher education, which primarily consists of practical courses, negatively affecting the attitudes toward E-learning in students/pre-service teachers. Hasan and Bao (2020) have stated that difficulties in E-learning and low attitudes can be attributed to factors such as academic year loss, decreased academic performance, and the impact of psychological symptoms such as anxiety. Furthermore, considering that individual differences and learning styles are effective not only in traditional learning environments but also in E-learning, the results reported in Turker and Bostancı's (2023) study on learning styles, where pre-service teachers predominantly reported that they learn best with the kinesthetic learning style and the multiple learning model, support these findings.

In the comparisons of E-learning attitudes among special education pre-service teachers based on the gender variable, it was observed that female pre-service teachers had a higher tendency to use technology better in online learning, found it more useful, and had a higher general E-learning attitude compared to males. Despite male pre-service teachers had higher levels of satisfaction and motivation attitudes, no statistically significant difference was found (Table 4). Similar to the findings of the present study, Saddik et al.'s (2020) study also revealed a significant difference in favor of women. It is worth noting that there are studies in the literature that have reached different results. Acar and Egilmez's study (2023) on pre-service music teachers found that male pre-service teachers had a higher E-learning attitude, yet no statistically significant difference was observed. Konakcı's study (2010) on students in the fine arts department also did not find a significant difference in terms of the gender variable. Similarly, studies conducted on pre-service teachers from different branches and university students have reported that gender is not a significant variable affecting E-learning attitudes (Ates and Altun, 2008; Demirtas, 2021; Kısla, 2005; Malkawi et al., 2021). Most studies in the literature did not reveal a significant difference in E-learning attitudes based on gender, which aligns with Deniz's (2021) findings that support a positive relationship between the perception of technological competence and attitudes toward remote education. However, the fact that the entire sample group in the present study consists of pre-service teachers whose curriculum is predominantly composed of practical courses and psychological effects related to the earthquake may be considered as factors that could differentiate E-learning attitudes based on gender.

While there was no statistically significant difference in the general attitude toward E-learning among all talented pre-service teachers based on the academic unit variable, it was observed that in terms of motivation, visual arts students had a significant difference compared to physical education and sports pre-service teachers. Additionally, in terms of the usefulness attitude, physical education pre-service teachers differed significantly from visual arts pre-service teachers (Table 5). Similarly, Turker's (2021) study in the field of sports sciences at the undergraduate level, including coaching, physical education and sports teaching, and recreation and sports management departments, did not reveal a significant difference in general attitudes toward E-learning among different departments. Considering that there are no previous studies in the literature that compare E-learning attitudes among talented pre-service teachers based on their department of study, this study is believed to contribute significantly to the literature by providing original insights in this regard. Furthermore, the fact that the curricula in all three different fields in the sample group primarily consist of practical courses throughout their undergraduate education can be interpreted as a reason for both the similarity in E-learning

attitudes and the lack of significant differences in general attitudes.

Among all the talented pre-service teachers included in the study who used mobile phones, tablets, or iPads to engage in online learning following the Kahramanmaraş and Hatay earthquakes in 2023, it was observed that they had a more positive attitude toward technology usage and found E-learning more useful compared to those who used computers for online learning. However, in terms of satisfaction and motivation attitudes, pre-service teachers who preferred using computers achieved significantly higher scores. Additionally, it was found that the preferred device did not significantly affect the general attitude toward E-learning (Table 6). Reviewing the literature, it can be observed that Acar and Egilmez's (2023) study on pre-service music teachers also reported a lack of significant differences based on the preferred/used device variable in E-learning environments. The similarity in the levels of general attitudes toward E-learning and the absence of significant differences can be associated with the fact that in today's technology landscape, mobile phones and computers do not exhibit significant differences in terms of hardware or it can be linked to the similarity in the E-learning systems preferred/developed by universities. Besides, the high levels of digital literacy scores among university students in the study conducted by Kayalı and colleagues (2021) also support these findings.

In conclusion, pre-service teachers admitted to higher education through special talent exams and continuing their education have moderate attitudes toward E-learning in the aftermath of the Kahramanmaraş and Hatay earthquakes in 2023. Among their attitudes toward online learning, satisfaction is the lowest level of E-learning attitude. Talented pre-service teachers in physical education and sports, music education, and visual arts fields have similar attitudes toward E-learning regardless of their academic units, and there is no statistically significant difference between them. Nevertheless, female pre-service teachers have a higher inclination to use technology, find it more useful, and have a more positive general attitude toward E-learning in online learning environments compared to male pre-service teachers. Moreover, during this period, when educational activities are conducted through online teaching methods, the computer and mobile devices preferred and used by pre-service teachers as learning tools have similar levels of general attitude toward E-learning. Furthermore, those who prefer mobile devices have a statistically higher level of E-learning attitude in terms of technology usage tendency and usefulness attitude, while those who use computers have higher levels of satisfaction and motivation.

Ethical approval

The ethical approval of this research was granted by the Bayburt University Ethics Committee on 29.12.2020 with decision number 26654. Voluntary participation consent was obtained from the participants.

Conflict of interest

There is no personal or financial conflict of interest within the scope of the study.

Author contribution

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RESEARCH ARTICLE

Exploring Attitudes Towards Healthy Nutrition Among Athletes In Diverse Disciplines

Gamze MURATHAN[1*]

[1]Adiyaman University, Faculty of Sports Sciences, Coaching Education, Adiyaman, Turkey
*Corresponding author: gmurathan@adiyaman.edu.tr

Abstract
Nutritional awareness and healthy eating are vital aspects for the well-being of society, quality of life, and disease prevention. This study assessed the attitudes of athletes towards healthy nutrition and explored the impact of various factors, such as age, gender, and sports discipline, on such attitudes. A quantitative research approach and descriptive survey method were used. A total of 492 athletes participated in the study, including 287 males and 203 females. The athletes were licensed to participate in different sports disciplines in the Adıyaman province during the 2022-2023 season. The Attitude Scale for Healthy Nutrition (ASHN) was used to collect data. The scale's validity and reliability were established by Tekkurşun-Demir et al. (2019). It was complemented by a personal information questionnaire detailing the athletes' sociodemographic characteristics. The results showed that the athletes had a moderate level of attitude towards healthy nutrition, with an average score of 62.95. A positive correlation was detected between the athletes' age and their healthy nutrition attitude scores, with a moderate correlation coefficient of r = 0.533, p=0,221. The study underscores the significance of regular physical activity in enhancing athletes' healthy nutrition attitudes. The research also highlights that skipping meals has a detrimental effect on healthy nutrition attitudes among athletes, emphasizing the importance of regular and balanced meal consumption to maintain a positive attitude towards healthy nutrition.

Keywords
Athlete, Healthy Nutrition, Attitude

INTRODUCTION

Nutrition involves the consumption of essential nutrients and bioactive components vital for sustaining life, supporting growth and development, enhancing health, improving the quality of life, and promoting productivity (Tüber, 2015). Inadequate and imbalanced nutrition can result in adverse health outcomes, diminished work efficiency, and delayed recovery from illnesses (Baysal, 2018). Malnutrition is classified as one of the four primary behavioral risk factors, alongside inadequate physical activity, tobacco use, and alcohol consumption, contributing to noncommunicable diseases, as emphasized by the World Health Organization (WHO) in 2021. Such diseases are responsible for causing approximately 15 million deaths annually among individuals aged 30 to 70. A significant portion of the morbidity and premature mortality attributed to noncommunicable diseases can be mitigated through interventions aimed at reducing the impact of these four major risk factors (WHO, 2019).

Athletes are a group that can be considered at risk in terms of nutrition, given its significant impact on their performance. This risk is not solely related to the potential for obesity, unhealthy lifestyles, and an increased susceptibility to chronic disease but also revolves around a critical juncture in an athlete's exercise and training

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[1]**ORCID:** 0000-0003-3325-0252

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journey when they establish enduring patterns of healthy behavior (Nelson et al., 2008). It is essential to recognize that mere consumption in response to hunger doesn't encompass proper nutrition. Optimal and healthy nutrition necessitates that a diet primarily provides sufficient energy and essential nutrients to meet metabolic requirements essential for the body's proper functioning (Yücecan, 2008). In essence, for human organisms to thrive, it is imperative not only to consume food but to maintain a nourishing diet that aligns with the needs of bodily systems and supports holistic physical and psychological development, a perspective illuminated by Braun and Brown in 2011.

Health policies worldwide are oriented towards the pursuit of a robust and thriving society of individuals in good health. While the provision of health services is undeniably vital, it alone does not suffice to cultivate a healthy society; the individuals themselves must lead lives dedicated to well-being (Demir & Cicioğlu, 2019). To realize a state of collective health, attain a desired quality of life, and stave off the onset of diseases, it becomes imperative to enhance the nutritional consciousness of every constituent of society and transmute healthy nutrition into an ingrained way of life. In this overarching framework, safeguarding, enhancing, and nurturing the lifelong health of every individual, augmenting their quality of life, and fostering the embrace of a health-oriented lifestyle – characterized by healthy dietary choices, sufficient physical activity, and the prevention of alcohol and tobacco consumption – are paramount goals (Tüber, 2015).

Nutrition and health surveys have furnished compelling evidence of the numerous nutritional and health challenges afflicting our nation. These challenges encompass acute and/or chronic nutritional deficits, including issues such as underweight and stunted growth, as well as deficiencies in essential vitamins and minerals, such as iodine, iron, calcium, zinc, folate, vitamin D, and vitamin B12, among others. Additionally, there is a concerning prevalence of obesity and nutrition-related noncommunicable chronic diseases, such as cardiovascular disease and certain types of cancer (Tüber, 2015).

In recent years, the growing concerns about nutrition and unhealthy eating habits have been amplified by factors such as industrialization, urbanization, changing lifestyles, food safety concerns, and major changes in eating patterns. Such factors have contributed to the rise in the marketing and consumption of products replete with high levels of saturated fats, carbohydrates, and salt, while being deficient in essential vitamins and minerals. Thus, it becomes an imperative task to disseminate awareness and impart education on healthy nutrition to the public. Concurrently, the implementation of stringent regulations on food, especially processed foods, and the formulation of health and agricultural policies emerge as indispensable measures (Yücecan, 2008).

In a general context, attitude can be defined as an individual's predisposition or orientation towards themselves or any object, phenomenon, or social issue within their environment. Essentially, it represents the expected behavioral response of an individual when confronted with a situation, event, or phenomenon. This concept was articulated by Katz, who described attitude as "an individual's inclination to assess a symbol, an object, or an event in either a positive or negative manner" (İnceoğlu, 2010). Attitude encompasses three fundamental components: cognitive (pertaining to an individual's knowledge about the phenomenon, case, or situation), affective (referring to their emotional stance, which can be positive, negative, or neutral in relation to the situation), and behavioral (relating to the actions and behaviors they exhibit concerning the subject) (Demir & Cicioğlu, 2019).

In light of this theoretical foundation, the primary objective of this study was to investigate the attitudes of athletes participating in various sports disciplines towards the concept of healthy nutrition. Furthermore, the research aimed to scrutinize the influence of diverse variables on these attitudes.

MATERIALS AND METHODS

This quantitative research employed the descriptive survey method, a research approach that seeks to examine and define a particular event, individual, or object within its natural context, without any attempts to manipulate or alter the existing conditions (Karasar, 2012). To conduct this study, ethical clearance was obtained from the Adıyaman University Social and Human Sciences Ethics Committee, which granted permission on the 1st of November 2022, under the decision number 123. All participants volunteered to take

part in the study. Prior to their involvement, a comprehensive explanation on the purpose and scope of the research was provided to the athletes. It was clearly communicated that the data collected during the research would be employed solely for scientific purposes. Participants were also informed that they could withdraw from the study at any time, regardless of the stage of the study.

The study's target population comprised athletes ranging from 17 to 35 years of age who were actively participating in sports competitions within Adıyaman province and held sports licenses in various sports disciplines. The research did not intend to estimate specific event percentages or calculate averages for particular variables with a predefined level of precision, especially when the population size was known. Consequently, sampling calculations were based on methods that considered the entire population when determining the required sample size. In accordance with this approach, the research sample included a total of 490 athletes, comprising 287 males and 203 females, all of whom held sports licenses in various sports branches for the 2022-2023 season. Careful attention was given to ensure that the chosen sample size met the minimum requirements necessary for appropriate statistical analyses.

In this study, data collection was facilitated through the utilization of the Attitude Scale for Healthy Nutrition (ASHN), complemented by a personal information form designed to gather demographic characteristics of the participating athletes. The ASHN, a comprehensive tool for assessing attitudes towards healthy nutrition, was developed by Tekkurşun-Demir et al. in 2019, following rigorous procedures to establish its validity and reliability. This scale adopts a 5-point Likert-type format and comprises a total of 21 items organized into four distinct subdimensions: Knowledge on Nutrition (KN), questions 1 through 5; Emotion towards Nutrition (EN), questions 6 through 11; Positive Nutrition (PN), questions 12 through 16; Malnutrition (MN), questions 17 through 21.

The ASHN generates scores that can range from a minimum of 21 to a maximum of 105. Interpretation of these scores is as follows: a score of 21 is considered very low, 23-42 reflects low attitudes towards healthy nutrition, 43-63 indicates a moderate attitude, 64-84 signifies a high attitude, and 85-110 suggests an ideally high attitude towards healthy nutrition.

The scale's internal consistency coefficients, as determined by Demir & Cicioğlu in 2019, are as follows: 0.90 for the BHB factor, 0.84 for BHB, 0.75 for OB, and 0.83 for the CR factor. These coefficients demonstrate the scale's reliability in assessing the various facets of healthy nutrition attitudes among the study participants.

The statistical analysis of the data in this study was carried out using the IBM SPSS Statistics 25.0 software package (IBM Corp., Armonk, NY). Continuous variables were summarized using descriptive statistics such as mean ± standard deviation, median, minimum-maximum values, while categorical variables were presented as numbers and percentages. To assess the normality of the data distribution, both the Kolmogorov-Smirnov and Shapiro-Wilk tests were employed. When the assumptions for parametric tests were met, Independent Samples T-test and One-Way ANOVA (followed by post hoc Tukey tests) were utilized to investigate differences between groups. Conversely, when the parametric test assumptions were not met, the Mann-Whitney U test and Kruskal-Wallis Analysis of Variance were employed, with post hoc testing using the Mann-Whitney U test and Bonferroni correction. Furthermore, Spearman correlation analysis was employed to explore relationships between continuous variables. The significance level for all statistical analyses was set at $p<0.05$.

RESULTS

Table 1 provides an overview of the personal characteristics of the athletes who participated in the study. A total of 287 athletes (57.57%) were male, while 203 athletes (41.42%) were female. Regarding the age classification, the largest proportion of athletes, comprising 187 individuals (38.16%), fell within the 19-23 age category. Conversely, the smallest group was represented by athletes aged 34 and above, consisting of 32 individuals (6.55%). The table also reveals that 62.24% of the participating athletes (305) were engaged in team sports disciplines, while 37.75% (185) were involved in individual sports disciplines. Additionally, athletes were asked to assess their overall health status, with 51.64% (253) of them rating their general health as "excellent."

Table 1. Sociodemographic Characteristics of Athletes

	Characteristics of Athletes	f	(%)
Gender	Male	287	58.57
	Female	203	41.42
Age	18 years or younger	104	21.22
	19 – 23 years	187	38.16
	24 – 28 years	93	18.97
	29 – 33 years	74	15.10
	34 years or older	32	6.55
Sport Age	3 Years or less	86	17.55
	4 – 7 years	212	43.27
	8 – 11 years	109	22.24
	12 years or more	83	16.93
Branch	Team Sports	305	62.24
	Individual Sports	185	37.75
Status	Amateur	408	83.26
	Professional	82	16.73
Self-Assessment of Overall Health	Excellent	253	51.64
	Good	178	36.32
	Not Bad	33	6.73
	Bad	26	5.30

Table 2 provides insights into the eating habits of the athletes in the study. Notably, a significant portion, specifically 58% (288 athletes), admitted to skipping at least one meal per day. Among these instances of meal skipping, the highest occurrence, at 55.55% (160 athletes), was related to the morning meal. Examining the reasons behind athletes skipping meals, it was found that the most prevalent factor was a lack of economic resources, cited by 30.20% (87 athletes).

Table 2. Nutritional Habits of Athletes

	Characteristics of Athletes	f	(%)
Skipping Meals	Yes	288	58.77
	No	202	41.22
Most Frequently Skipped Meal (n=288)	Breakfast	160	55.55
	Lunch	103	35.76
	Dinner	25	8.68
Reasons for Skipping Meals (n=288)	Lack of appetite	34	11.80
	Problem waking up in the morning	81	28.12
	Lack of time	14	4.86
	Dieting	18	6.25
	Inadequate economic resources	87	30.20
	Other	54	18.75

Table 3 presents the mean scores of the athletes on the Attitude Scale for Healthy Nutrition (ASHN) and its subdimensions. The data reveals that the athletes had an average total score on the ASHN of 62.95. In terms of the scale's grading, this score falls within the "moderate" category, indicating that the athletes' attitudes towards healthy nutrition were 1.05 points below the threshold for a "high" level of healthy nutrition attitude.

Table 3. Distribution of Scores for the Total and Subdimensions of ASHN

Scale	Lowest	Highest	Mean	SD
ASHN Total Score	21	105	62.95	10.86
Knowledge on Nutrition	5	25	14.78	4.28
Emotion towards Nutrition	6	30	17.63	5.06
Positive Nutrition	5	25	16.60	3.99
Malnutrition	5	25	13.94	4.01

*p<0.05

Table 4 presents the results of the statistical analysis concerning the influence of the athletes' gender on their scores from the ASHN and its subdimensions. The findings indicate that there was a significant difference in the total ASHN score (t=-3.648, p=0.000), as well as in the subdimensions of Knowledge on Nutrition (t=2.028, p=0.001) and Emotion towards Nutrition (t=3.227, p=0.000) based on the gender of the participating athletes. Female athletes obtained higher mean ASHN scores as compared to their male counterparts. However, in the subdimensions of Positive Nutrition (t=-1.068, p=0.126) and Malnutrition (t=-2.640, p=0.218), no statistically significant differences were observed between male and female athletes.

Table 4. Gender-Based Differences in Scores for Total and Subdimensions of ASHN: T-Test Results

Scale	Gender	n	Mean	SD	t	Sd	p
ASHN Total Score	Female	203	63.35	10.34	3.648	488	**0.000***
	Male	287	62.58	11.28			
Knowledge on Nutrition	Female	203	15.93	4.32	2.028	488	**0.001**
	Male	287	14.41	4.41			
Emotion towards Nutrition	Female	203	19.02	4.92	3.227	488	**0.000**
	Male	287	16.84	4.88			
Positive Nutrition	Female	203	16.88	3.61	-1.068	488	0.126
	Male	287	16.42	3.89			
Malnutrition	Female	203	14.32	4.21	-2.640	488	0.218
	Male	287	13.81	4.08			

Table 5 provides insights into the correlations between various independent variables of the research group and the total scores and subdimensions of the Attitude Scale for Healthy Nutrition (ASHN). The following key observations can be made based on the data: There was a positive correlation between the age of the athletes and their ASHN scores. As athletes' age increases, their ASHN scores also tend to increase. This correlation is moderate in strength (r=0.533). A negative correlation was found between the frequency of meal skipping among athletes and their total ASHN scores. In other words, as athletes skipped meals more frequently, their overall attitudes towards healthy nutrition, as measured by the ASHN, tended to be lower. This correlation was relatively strong (r=-0.621). A positive correlation exists between the total scores on the ASHN and the athletes' self-assessed health status. Athletes who rated their health more positively tended to have higher ASHN scores. This correlation is of moderate strength (r=0.374). These correlations shed light on the interplay between various factors, such as age, meal habits, and self-perceived health, and athletes' attitudes towards healthy nutrition, as reflected in their ASHN scores.

Table 5. Results of Correlation Analysis Between Independent Variables and Scores for Total and Subdimensions of ASHN

		Age	Sport Age	Health Assessment	Skipping Meals
ASHN Total Score	**r**	.533	.605	.374	-.621
	p	.221	.068	.077	.003
Knowledge on Nutrition	**r**	.674	.781	.068	-.437
	p	.002	.086	.215	-.391
Emotion towards Nutrition	**r**	.334	.261	.328	-.189
	p	.320	.050	.067	.105
Positive Nutrition	**r**	.599	.804	.309	-.721
	p	.004	.024	.066	.003
Malnutrition	**r**	-.318	-.228	-.114	.494
	p	0.002	.161	.610	.005

p<0.01**

DISCUSSION

In the current study, the mean ASHN score among athletes pertaining to their attitudes towards healthy nutrition stood at 62.95±10.86, signifying a generally favorable disposition toward healthy dietary practices. This aligns with findings from prior research. Specifically, a study among medical faculty students by Güleş (2021) reported that 76.4% of participants exhibited a notably elevated level of positive attitudes towards healthy nutrition. Similarly, a study involving students from a sports sciences faculty by Göral and Yıldırım (2022) revealed a mean ASHN score of 74.67±12.50, suggesting a robust inclination toward healthy eating behaviors. Furthermore, research involving nutrition and dietetics, as well as nursing students within a university context unveiled an ASHN score of 76.17±9.13, affirming a noteworthy commitment to sound nutritional principles within this cohort (Sönmez, 2022). Additionally, Çelik and Duran (2022) conducted a study involving medical faculty students, distinguishing between genders, with female students scoring an ASHN average of 73.3±10.72 and male students scoring 71.2±10.32. These findings collectively underscore the prevalence of positive attitudes towards healthy nutrition in various academic populations, potentially attributed to the provision of health education in diverse settings as noted in the relevant literature.

Our study found that female athletes had higher attitude scores regarding healthy nutrition than male athletes. This is contrary to the general observation that men have better healthy nutrition behaviors, as women tend to have more irregular eating behaviors to lose weight due to aesthetic concerns, eating disorders are more common in women, and eating behaviors are more affected by emotional factors such as sadness (Vançelik et al., 2007; Wah, 2016). Supporting this pattern, Öztürk (2021) found that men tend to have a higher healthy nutrition attitude compared to women, speculating that this outcome could be linked to men's potentially superior psychological coping mechanisms. In a related study conducted by Göral and Yıldırım (2022) among sports sciences faculty students, it was observed that male students exhibited more favorable attitudes towards healthy nutrition than their female counterparts.

Expanding beyond the athletic context, research involving university students by Vançelik et al. (2007) indicated higher nutritional habit scores among males. Similarly, a study involving 7,669 adolescents in Tehran revealed that, despite girls having greater nutritional knowledge, their dietary habits lagged behind those of boys (Mirmiran et al., 2007). These findings collectively underscore the multifaceted nature of gender-related distinctions in healthy nutrition attitudes and behaviors.

While some research, as previously mentioned, indicates that men tend to exhibit more favorable dietary behaviors and attitudes, there are also studies that yield contrasting results. For instance, Sönmez (2022) conducted a study where women's attitudes toward healthy nutrition were found to be higher than those of

men. In a study involving 316 athletes, including 142 females aged between 17-25 years, Demir et al. (2021) did not find statistically significant differences in healthy nutrition attitudes based on gender. Similarly, in investigations carried out among university students, researchers such as Güleş (2021) and Alamehmet (2021) found no significant gender-based disparities in healthy nutrition attitudes. This variability in research outcomes underscores the intricate interplay of factors influencing individuals' attitudes toward healthy nutrition, suggesting that the relationship between gender and dietary preferences is not uniform and may be influenced by contextual, cultural, and individual factors that vary across different study populations. Thus, it is essential to consider the diversity of findings in the literature when examining gender-related trends in healthy nutrition attitudes.

Educational interventions aimed at promoting healthy eating have demonstrated a beneficial impact on the adoption of healthy nutrition behaviors. For instance, Kastorini et al. (2016) conducted research on school-based nutrition programs and identified significant improvements in the dietary habits of adolescents from low socioeconomic backgrounds as a result of these interventions. In a comparative study involving university students from both Turkey and the USA, Özgen (2016) observed that students who received nutrition education exhibited notably higher levels of nutrition knowledge and more favorable nutrition attitude scores. Likewise, A study involving second-year students in a faculty of health sciences, where nutrition education was introduced for the first time (Yardımcı & Özçelik, 2015), found that such education had a positive impact on students' nutritional knowledge levels. Furthermore, within the context of athletic literature, studies have highlighted the positive influence of nutrition education on athletes' nutrition attitudes. Notable examples include the

The combination of dieting alongside exercise and training is identified as a factor that can improve an athlete's nutritional status. This implies that a holistic approach, integrating both dietary and physical activity components, can be beneficial for athletes' nutritional well-being. The research also highlights that skipping meals has a detrimental effect on healthy nutrition attitudes among athletes, emphasizing the importance of regular and balanced meal consumption to research conducted by Richards et al. (2006) and Ha & Caine (2011), both of which underscore the potential for nutrition education to enhance athletes' dietary perspectives and choices.

Previous research in the relevant literature has consistently pointed out the positive impact of increased physical activity on individuals' nutritional habits (Koca & Arkan, 2021). For instance, Vançelik et al. (2007) discovered that university students who engaged in regular sports activities exhibited higher scores in healthy nutrition attitudes compared to their non-active peers. This trend was also observed in various studies involving university students, demonstrating that those who partook in regular physical activity generally displayed more favorable attitudes towards healthy nutrition (Arı & Çakır, 2021). Moreover, Yılmaz et al. (2022) conducted a study focusing on healthy nutrition attitudes among university students and found a significant difference based on the frequency of physical activity. Students who exercised daily exhibited more positive attitudes towards healthy nutrition. Our research aligns with these findings, as we observed that athletes who maintained a consistent exercise regimen displayed above-average healthy nutrition attitudes. This indicates that an increase in daily exercise time could potentially lead to a further enhancement of these attitudes.

Athletes who receive nutrition education or information tend to exhibit more positive attitudes towards healthy nutrition. This suggests that incorporating nutritional guidance into athletes' routines can be a valuable strategy for fostering healthier eating habits. The study underscores the significance of regular physical activity in enhancing athletes' healthy nutrition attitudes. Engaging in exercise and training on a consistent basis appears to contribute positively to their overall dietary choices. maintain a positive attitude towards healthy nutrition.

Based on these findings, it is recommended that comprehensive programs be devised to promote the physical and mental health of athletes, incorporating both exercise and nutritional education. Economic measures should also be implemented to enable athletes to meet their daily energy requirements effectively. These combined efforts can contribute to the overall well-being and performance of athletes.

Declaration of Conflicting Interests

All authors declare no conflicts of interest.

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Ethics Statement

The study protocol was approved by Adıyaman University Social and Human Sciences Ethics Committee, which granted permission on the 1st of November 2022, under the decision number 123. All participants volunteered to take part in the study.

Author Contributions

Planned by the author: Study Design, Data Collection, Statistical Analysis, Data Interpretation, Manuscript Preparation, Literature Search. Author have read and agreed to thepublished version of the manuscript.

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RESEARCH ARTICLE

The Psychology of Paralympic Athletes: A Bibliometric Analysis

Çiğdem ÖNER[1*]

[1] Istanbul Rumeli University, Faculty of Sports Sciences, İstanbul / Turkey
*Corresponding author: cigdem.oner.phd@gmail.com

Abstract
Comprehending the paralympic athletes' psychology is paramount due to their distinctive challenges. Sports can be a facilitator, strengthening emotional well-being, coping mechanisms, and self-confidence and fostering resilience, yet internal stressors can undermine their mental health. It is crucial to elucidate the publications' fundamental components displaying a growing trend within this framework. Hence, this study aims to explore a comprehensive bibliometric analysis of paralympic athletes' psychology. The Web of Science database was analyzed for publications from 1992 to Sept. 1, 2023, across Social Sciences Citation, Science Citation Index Expanded, Emerging Sources Citation, and Arts & Humanities Citation indexes. Among these, 263 articles were integrated, encompassing 13 categories of sports, psychology, and sociology. This study utilized VOSviewer 1.6.19 to investigate citation and bibliometric coupling analysis and provided keywords, occurrence, and co-citation analysis. The findings indicate that 2022 witnessed the most cited publications, comprising 34 articles. Further findings revealed that David L. Mann is the top-cited author, the British Journal of Sports Medicine is the top-cited journal. Bibliometric coupling results underlined Psychology of Sport and Exercise, Loughborough University, and England, with the highest total link strength, respectively, as journal, institution, and country. Regarding study results, the most notable keyword clusters are sports, paralympic games, paralympic, paralympics, disability, and paralympic athletes. Finally, the top terms featured in abstracts were game, impairment, person, difference, program, and participation. Consequently, distinguished writers, organizations, and nations not only engage in vigorous interactions within their respective domains but also maintain robust and meaningful connections with one another.

Keywords
Para Athletes, Paralympians, Paralympic Sports, Disability, Athletes With Special Needs

INTRODUCTION

Extensive research has unequivocally established the transformative power of sports for individuals with disabilities, enabling them to surmount physical limitations and overcome social isolation and economic obstacles. Studies have specifically emphasized the pivotal role of disabled sports in not just promoting rehabilitation but also facilitating social participation (Tow et al. 2019; Yardımcı and Anaforoğlu Külünkoğlu, 2022). Furthermore, Swartz et al. (2019) posited that engaging in paralympic sports can serve as a protective buffer against the psychological and social challenges often accompanying disabilities.

The Stoke Mandeville Games, created by Sir Ludwig Guttmann in 1948, is credited as the foundation of modern disability sports (Brittain, 2016). Initially intended for rehabilitating injured military veterans, Sir Guttmann's vision evolved into the contemporary Paralympic Games.

As Legg (2018) reported, the word Paralympic, derived from the Greek words 'para' (beside) and Olympic, reflects that the Paralympic games were created as parallel games of the Olympics. The Paralympic games are exclusively for elite athletes with exceptional training and

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[1]**ORCID:** 0000-0002-1939-0526

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expertise, called Paralympians, as emphasized by Dieffenbach and Statler (2012). Paralympians require special training, dedication, and resources to pursue their Olympic dream like the Olympians.

The Paralympic Movement's vision is to inspire and excite the world by enabling Paralympic Athletes to achieve sporting excellence (IPC, 2010). To ensure this vision is realized, unique classification systems are used in Paralympic sports, serving two crucial functions. Firstly, these systems define who is eligible to compete in Paralympic sports and thus have the opportunity to achieve their goal of becoming a Paralympic Athlete. Secondly, they assist athletes in minimizing the impact of their disabilities and categorizing them into sports classes to ensure that sporting excellence is determined by which athlete or team achieves victory.

Like the Olympic Games, the Paralympic Games serve as a global platform for elite athletes to compete in various summer and winter team and individual sports (Dieffenbach and Statler, 2012). These games are characterized by intense competition, with paralympic athletes being classified into six distinct categories, namely amputees, cerebral palsy, individuals with intellectual disabilities, "Les Autres" (others), visually impaired, and wheelchair categories. Athletes are classified based on specific activity areas to ensure a level playing field. The classification system fosters an environment where athletes can compete against players of comparable standing (Özdemir and Ilkım, 2019).

A paralympic athlete also encounters challenging situations in many aspects, such as putting forth the best in the competitive culture, surpassing himself, preparing before the competition, and coping with many structures, such as excitement, fear, anxiety, and stress during the competition. Additionally, considering that the preparation for the competition is not a purely technical tactical training process, paralympic athletes have the exact basic needs as Olympic athletes in terms of psychological preparation for the competition and strengthening existing psychological skills.

Some researchers (Asken, 1991; Bawden, 2006) assert that coaching and sports psychology for Paralympic athletes is comparable to that of Olympic athletes. The commonality between the two groups lies in their shared identity as athletes, which facilitates fulfilling their fundamental psychological needs. Furthermore, this shared experience has the power to counteract any obstacles that may impede the satisfaction of these needs.

This research aims to explore the bibliometrics of Paralympic athletes' psychology thoroughly. The remarkable absence of any national or international publication that utilizes the visual mapping technique in the literature review to analyze these athletes' psychology brings to light this study's exceptional nature. By addressing this significant gap, the research will provide a reliable reference for scientists, psychological performance counselors, coaches, athletes, sports administrators, and new researchers keen on studying Paralympic athletes.

A rigorous examination of the following inquiries was undertaken to advance the research objectives.

- How do citation analyses of the examined research articles distribute across documents, journals, and authors?
- How do bibliometric coupling analyses of the examined research articles vary across journals, institutions, and countries?
- What is the keyword distribution in the research articles analyzed, based on frequency of use and total link strength?
- How are frequently used terms in the abstracts distributed based on frequency of use and relevance?
- What is the co-citation analysis distribution observed in reference, journal, and author criteria?

MATERIALS AND METHODS

This section covers the research model, universe and sample, data collection platform, data analysis, and ethical considerations.

Research model

This study employs a bibliometric analysis technique involving visual mapping. Bibliometrics applies mathematical and statistical methods to analyze books and other forms of communication. It is a commonly used method for evaluating scientific research based on research publications (Pritchard, 1969; Rehn and Kronman, 2008). Vosviewer, a cluster analysis-based tool, is used for this study. Bibliometric analysis is an indispensable tool for assessing research performance across different levels, from a broader

perspective to a more detailed one. While conducting country or discipline-level analysis provides a general outlook, meso-level analysis of institutions and micro-level analysis of individual authors can produce more refined insights. With the help of bibliometric techniques, researchers can access high-quality, dependable, and informative data to effectively assess publication performance, author and institution rankings and generate comprehensive maps of research activities (Laengle et al. 2017; Özsoy and Demir, 2018; Yalçın and Öztürk, 2017).

Universe and Sample

The universe of this bibliometric research on the psychology of Paralympic athletes consists of publications related to the subject in the Web of Science database. On September 1, 2023, a query was made to clarify the population and sample framework for research using Web of Science's advanced search engine. The selected keywords are formalized and written in the specified string, respectively: (ALL=("para athlete*" OR "paralymp*" OR "para race*" OR "para sport*")) AND (ALL=("psycho*" OR "sport psycho*")). With the selected keywords, 418 publications were reached in the Web of Science database. Upon examination, it was discovered that the earliest publication related to the subject was from 1992. Of the 418 publications accessed, a majority of 320 were research articles (76.6%), followed by 34 reviews (8.1%), 45 abstracts (10.8%), and 8 full-text papers (%1.9) presented at conferences, 2 book chapters (0.5%) and 9 editorial material (2.2%).

This study primarily chose the research articles covering 76.6% of the relevant literature as the unit of analysis. The publications classified in the categories of review, abstract, and full-text papers presented at conferences, book chapters, and editorial materials are omitted. Subsequently, the 323 articles selected as the analysis unit were scrutinized according to their indexation status in the SSCI, SCI-E, ESCI, and AHCI databases within the Web of Science Core Collection scope. Eventually, 321 articles were found to be matched. Afterward, all 321 articles were classified according to the Web of Science categories. Among these, a sum of 263 articles, respectively classified under 13 categories titled "hospitality leisure sport tourism", "psychiatry", "psychology", "psychology applied", "psychology clinical", "psychology developmental", "psychology experimental", "psychology multidisciplinary", "psychology social", "rehabilitation", "social sciences interdisciplinary", "sociology", and "sport sciences" were selected and incorporated into the study.

Based on the evaluations conducted, it has been conclusively determined that the first study in 1992 was a research article. Accordingly, the review interval of this study's publications is between 1992 and September 1, 2023.

Data collection platform

Web of Science (WoS) is a digital platform that serves as a repository for comprehensive citation data across various academic fields. It offered subscription-based access to multiple databases and was initially developed by the Institute for Scientific Information 'ISI' (Birkle et al. 2020). Today, WoS is managed by Clarivate Analytics.

The Web of Science Core Collection is comprised of six comprehensive online databases. These databases include (1) The Science Citation Index Expanded (SCIE), which meticulously scans over 8,500 peer-reviewed journals across 150 disciplines since 1900, (2) The Social Sciences Citation Index (SSCI), which focuses on over 3,000 journals that pertain to social sciences since 1900, (3) The Arts & Humanities Citation Index (AHCI), which has attentionally scanned over 1,700 journals that encompass science, social sciences, and arts since 1975, (4) The Emerging Sources Citation Index (ESCI), which focuses on over 5,000 journals that pertain to science and social sciences, (5) The Book Citation Index (BCI), which thoroughly scans over 60,000 printed books since 2005, and finally (6) The Conference Proceedings Citation Index (CPCI) which has carefully scanned over 160,000 scientific conference titles since 1990 (Birkle et al. 2020; Öner, 2022).

This comprehensive study examines research articles in SCIE, SSCI, AHCI, and ESCI databases.

Data analysis

The research employed the VOSviewer 1.6.19 software to generate a detailed network diagram of the psychology of paralympic athletes and to provide a clear visualization of the corresponding literature.

VOSviewer is a powerful software for visualizing literature units that excel in the advanced 'Visualization of Similarities (VOS)'

technology. This technology is particularly adept at displaying mapping information areas, focusing primarily on clustering (Van Eck and Waltman, 2010). According to Sinkovics (2016), VOSviewer is the most popular method used in bibliometric mapping. The related literature claims that VOSviewer is suitable for analyzing large-scale data and creating complex networks (Zou et al. 2018) and is specially designed for mapping and visualization (Cobo et al. 2011). It provides bibliometric tools facilitating citations, authors, geographic distribution, and word frequency analyses (Niñerola et al. 2019).

VOSviewer boasts a unique clustering technique, which is a standout feature. The circles within the set highlight the position of each item under review, with their size reflecting the number of co-occurrences. The larger the circle, the more significant the element and its impact. Colors are assigned to items based on their respective sets to distinguish clusters. Additionally, the distance between the items within the examination unit offers valuable insights into their relationships (Khalil and Crawford, 2015; Van Eck and Waltman, 2010). The proximity of the examined elements indicates a strong relationship, while a significant distance implies insufficient similarity and a weak correlation in mapping. Finally, the absence of a connection reveals the lack of a relationship.

Through an extensive review of relevant literature, this study has identified the optimal keywords to select appropriate data for the planned content analysis. The chosen keywords, based on the literature review, include "para athlete", "paralympian", "paralympic", "para race", "para sport", "psychology", and "sport psychology". Then, it was evaluated from which database the publications that overlapped with the purpose of the review should be accessed. The Web of Science (WoS) database served by Clarivate Analytics was chosen because it is a platform that attracts excellent attention regarding publication quality. The selected keywords were placed in the "query" line in the "Documents" subsection in the advanced search feature offered by Web of Science (WoS), considering the different extension possibilities of the selected keywords written with the string (ALL=("para athlete*" OR "paralymp*" OR "para race*" OR "para sport*") AND (ALL=("psycho*" OR "sport psycho*")). With the selected keywords, 418 publications were accessed in the Web of Science database between 1992 and September 1, 2023. The study meticulously assessed research articles published in SSCI, SCI-E, ESCI, and AHCI databases that were classified in WoS categories closely related to the subject matter. Ultimately, only 263 articles that met the strict criteria were included as the analysis unit, whereas 155 publications that failed to fulfill the relevant requirements were excluded.

The selected articles, which serve as the foundation for the analysis, have been transferred to the VOSviewer 1.6.19 program for visual mapping and data analysis.

The study analyzed the distribution of documents based on their publication years. The citation analyses regarding documents, journals, and authors were detailed and strengthened through bibliometric publication images and density maps. The program's bibliographic coupling analysis highlighted the connections among the journals, institutions, and countries referenced in the relevant publications for the research topic. Furthermore, keywords were analyzed to identify the frequently used words. Besides these, the study also revealed the most used terms in the abstracts. In these analyses, bibliometric images and density maps explained the results. Additionally, detailed information is provided on reference, journal, and author characteristics that emerged in the co-citation network analysis.

Ethical considerations

This study was carried out following the unanimous decision of the Istanbul Rumeli University Ethics Committee dated 21/12/2022 and numbered 2022/11-08.

RESULTS

This section highlights research findings that align with the general purpose and sub-objectives.

Analysis of Publications by Years

The accompanying visual, Figure 1, illustrates the timeline of research articles about Paralympic athletes' psychological aspects.

Figure 1 indicates a fluctuating trend in the research publication on paralympic athletes' psychology between 1992 and 2014. Interestingly, the number of publications remained constant at 12 articles in 2015 and 2016 and did not decrease in subsequent years. Notably, the number of

publications from 1992-2014 amounted to 57, while between 2015 and September 1, 2023, saw a substantial increase to 206 publications. The year 2022 saw the highest number of publications, comprising 34 releases.

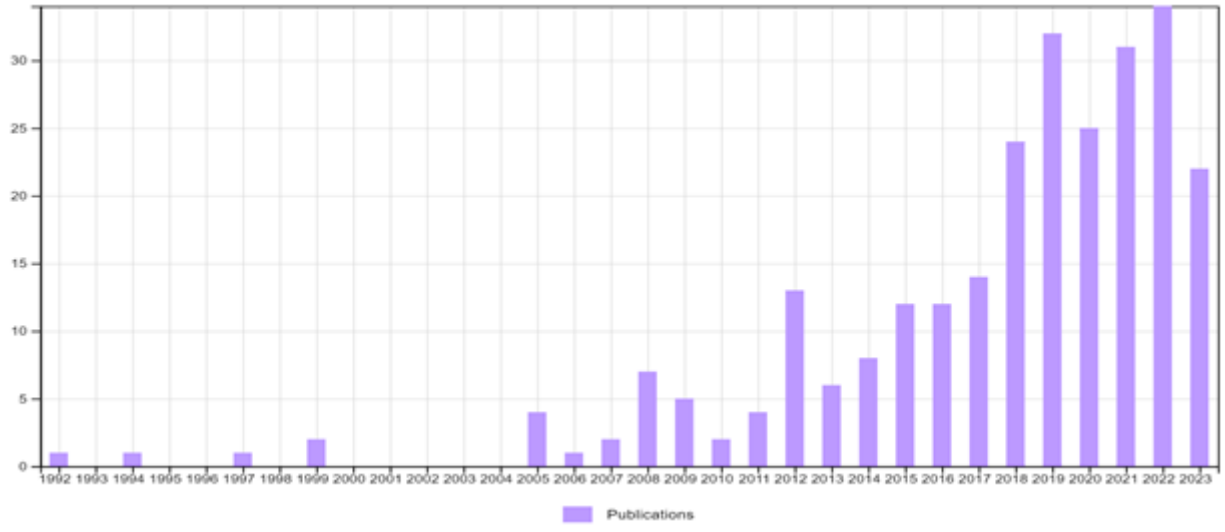

Figure 1. Chronological distribution of articles

Citation analyses

Citations analyses regarding documents

The research delved into which publications are cited the most, yielding valuable insights. A minimum citation count of 2 was set for each publication analyzed, and 178 out of 263 publications surpassed this threshold. Table 1 provides a detailed breakdown of the top 16 studies with the highest citation counts.

Table 1. Most cited publications

Article Title	Authors	Citations Count
Consensus statement on concussion in sport-the 5th international conference on concussion in sport held in Berlin, October 2016	McCrory, P. et al. 2017	2126
How much is too much? (Part 2) International Olympic Committee consensus statement on load in sport and risk of illness	Schwellnus, M. et al. 2016	253
The Sport Concussion Assessment Tool 5th Edition (SCAT5): Background and rationale	Echemendia, R.J. et al. 2017	239
Spontaneous facial expressions of emotion of congenitally and noncongenitally blind individuals	Matsumoto, D. and Willinghan B., 2009	147
Changing negative attitudes towards persons with physical disabilities: An experimental intervention	Krahé, B. and Altwasser, C., 2006	116
Research on physical activity and health among people with disabilities: A consensus statement	Cooper, R.A. et al. 2001	109
Paralympic classification: Conceptual basis, current methods, and research update	Tweedy, S.M. et al. 2014	102
Disability sport and activist identities: A qualitative study of narratives of activism among elite athletes' with impairment	Smith, B. et al. 2016	91
Coach autonomy support, basic need satisfaction, and intrinsic motivation of paralympic athletes	Banack, H.R. et al. 2011	73
Giving and receiving autonomy support in a high-stakes sport context: A field-based experiment during the 2012 London Paralympic Games	Cheon, S.H. et al. 2015	71
International Olympic Committee (IOC) Sport Mental Health Assessment Tool 1 (SMHAT-1) and Sport Mental Health Recognition Tool 1 (SMHRT-1): towards better support of athletes' mental health	Gouttebarg, E.V. et al. 2021	70

Table 1. Continue

Article Title	Authors	Citations Count
Modulators of the personal and professional threat perception of olympic athletes in the actual COVID-19 Crisis	Clemente-Suarez, V.J. et al. 2020	69
The dynamics of expertise acquisition in sport: The role of affective learning design	Headrick, J. et al. 2015	68
Sleep quality evaluation, chronotype, sleepiness and anxiety of paralympic Brazilian athletes: Beijing 2008 Paralympic Games	Silva, A. et al. 2015	64
Motivational factors and coping strategies of Norwegian paralympic and olympic winter sport athletes	Pensgaard, A.M. et al. 1999	48
Athlete mental health in the olympic/paralympic quadrennium: A multi-societal consensus statement	Henriksen, K. et al. 2020	47

Regarding Table 1, the research article with the highest number of citations, with 2126, belongs to McCrory et al. (2017). While Schwellnus et al.'s (2016) studies ranked second with 253 citations, and Echemendia et al.'s (2017) studies were the third most cited publication with 239 citations. Figure 2 shows the connections between the documents, while Figure 3 illustrates their density.

After analyzing the citations, 12 distinct clusters within the publications were identified. The two most significant red and green clusters ranked the first two rows with 11 and 10 documents, respectively. The blue cluster follows them with nine documents, while the light blue has only two publications, making it the smallest cluster. Figure 3 highlights Schwellnuss et al. (2016), Krahé and Altwasser (2006), Tweedy et al. (2014), Banack et al. (2011), Smith et al. (2016), Pensgaard et al. (1999) and Silva et al. (2012) as the forerunners regarding documents' citation density.

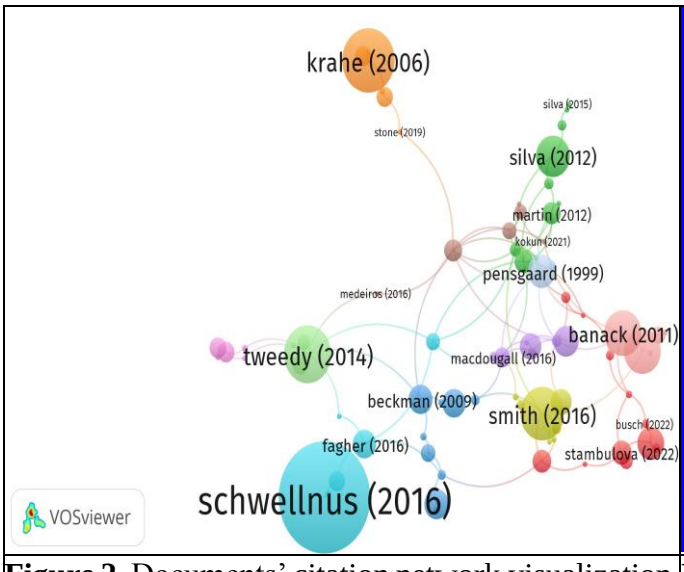

Figure 2. Documents' citation network visualization

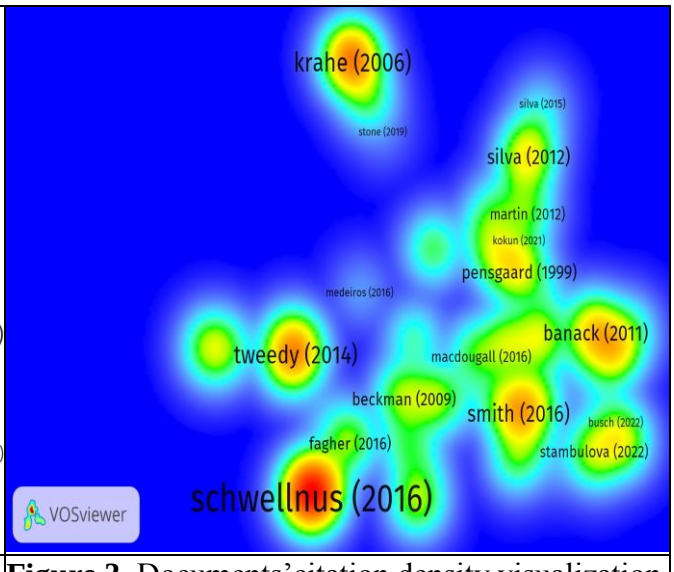

Figure 3. Documents'citation density visualization

Citation Analyses Regarding Journals

As part of the research, the distribution of the journals where the documents were published was analyzed. A minimum of four documents published in a journal was selected as the default threshold value, and it was discovered that 15 out of the 103 journals exceeded this threshold. Table 2 provides further details on the identified journals.

Table 2. Most cited journals

Journal	Citations Count	Publications	
		Count	Percentage
British Journal of Sports Medicine	2861	14	5.32%
Psychology of Sport and Exercise	390	18	6.84%
Frontiers in Psychology	247	22	8.37%
Adapted Physical Activity Quarterly	128	11	4.18%
International Journal of Sport and Exercise Psychology	90	6	2.28%
Journal of Sport Psychology in Action	67	7	2.66%
Journal of Applied Sport Psychology	61	4	1.52%
Journal of Sports Sciences	46	9	3.42%
Frontiers in Sports and Active Living	32	7	2.66%
Psychology Society & Education	20	4	1.52%
Revista Brasileira De Medicina Do Esporte	19	4	1.52%
International Journal of Sports Science & Coaching	16	4	1.52%
Journal Of Human Kinetics	14	5	1.90%
Retos Nuevas Tendencias En Educacion Fisica Deporte Y Recreacion	7	4	1.52%
Pedagogics Psychology Medical-Biological Problems of Physical Training	3	22	8.37%

The British Journal of Sports Medicine, with 14 publications and 2861 citations, and the Psychology of Sport and Exercise, with 18 publications and 390 citations, shared the first two stages among the most cited journals. Frontiers in Psychology ranked third row with 22 publications and 247 citations. In comparison, Adapted Physical Activity Quarterly, with 11 publications and 128 citations, the International Journal of Sport and Exercise Psychology 6 publications and 90 citations ranked fourth and fifth. Figure 4 displays the relationships between journals with four or more publications from Table 2, while Figure 5 shows the density map.

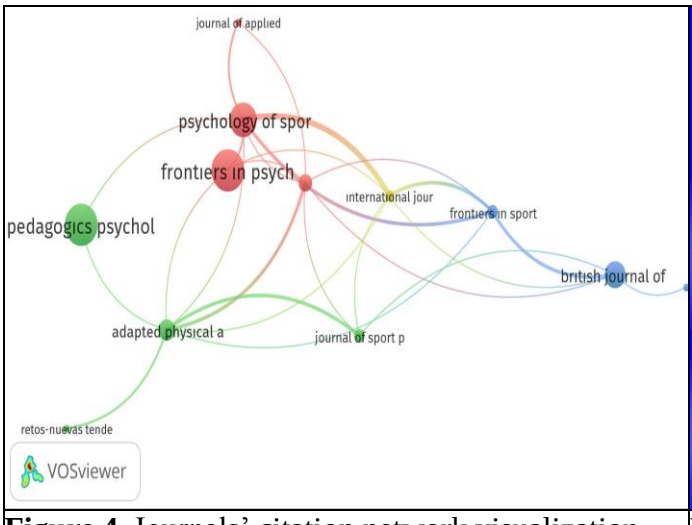

Figure 4. Journals' citation network visualization

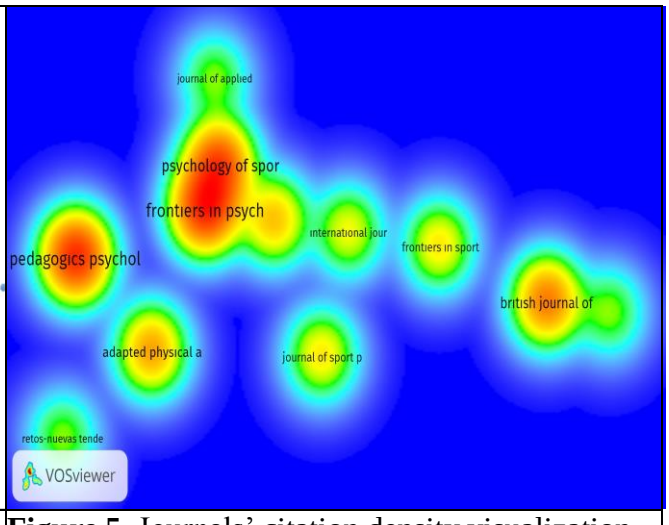

Figure 5. Journals' citation density visualization

Figure 4 and Figure 5 reveal that the most cited journals with four or more articles are grouped into four primary clusters.

The initial cluster, identified in red, includes

Frontiers in Psychology, Journal of Applied Psychology, Journal of Sport Sciences, and Psychology of Sport and Exercise.

In the second cluster, colored green, Adapted Physical Activity Quarterly, Journal of Sport Psychology in Action, Pedagogics Psychology Medical-Biologicals Problems of Physical Training, and Retos Nuevas Tendencias En Educacion Fisica Deporte Y Recreacion stand out.

The third and blue cluster covers the British Journal of Sports Medicine, Frontiers in Sports And Active Living, and Revista Brasileira De Medicina Do Esporte.

Finally, the International Journal of Sport and Exercise Psychology became evident in the yellow cluster.

Citation Analyses Regarding Authors

As a means of assessing citations, the distribution of highly cited authors was analyzed. Authors with at least four documents were listed as the default threshold value, resulting in 20 individuals surpassing this threshold out of 955 authors. Table 3 illustrates the 16 most frequently cited authors from this group.

Within this particular context, David L. Mann has been cited the most frequently with ten documents (146 citations), followed by Sergio Tufik with nine documents (126 citations) and Marco Túlio de Mello with eight documents (122 citations). Additionally, these authors had the highest number of publications compared to those in Table 3.

Table 3. Most cited authors

Author	Citations Count	Publications Count	Total Link Strenght
David L. Mann	146	10	4
Sergio Tufik	126	9	25
Marco Túlio de Mello	122	8	25
Brett Smith	118	5	0
Rosemary Purcell	113	4	2
Andressa Silva	95	5	21
Ciro Winkler	91	6	20
Roberto Vital	89	6	17
Rianne H. J. C. Ravensbergen	76	5	2
Cheri Blauwet	71	4	0
Jan Lexell	64	4	0
Peter M. Allen	54	7	2
Leslie Schwartz	48	5	2
Jan Burns	46	5	1
Keziah Latham	46	4	0
Joy Myint	46	4	0

Figure 6 depicts a bibliometric visualization showcasing the connections between the most cited authors, while Figure 7 displays a density map.

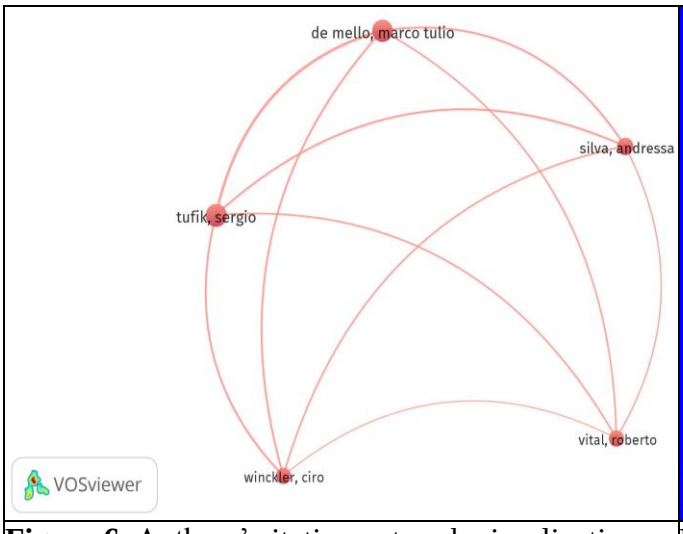

Figure 6. Authors' citation network visualization

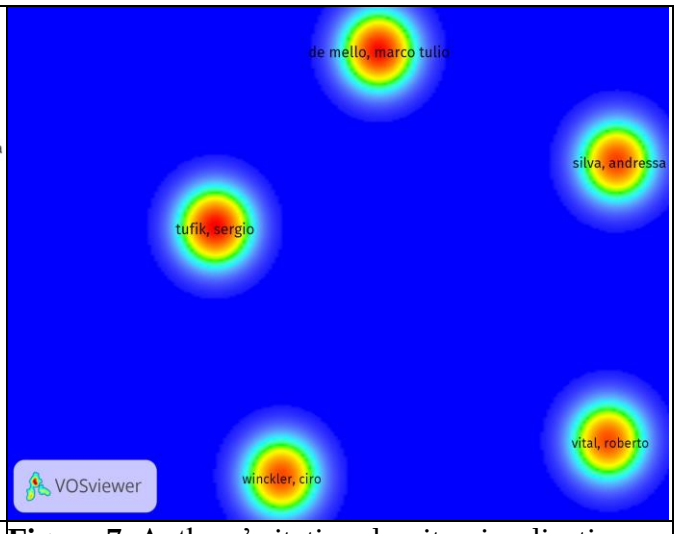

Figure 7. Authors' citation density visualization

A single cluster surfaced in the highly cited authors' network following the mapping process. This cluster comprises individuals with solid connections, namely Marco Tulio De Mello, Andressa Silva, Sergio Tufik, Roberto Vital, and Ciro Winckler.

Bibliographic Coupling Analyses

Bibliographic Coupling Analyses of Journals

Throughout the bibliometric coupling analysis, meticulous attention was given to pinpointing the journals in which the examined documents were featured. A standard threshold of at least four publications was applied, which resulted in 15 out of the 103 journals surpassing this benchmark. Table 4 enumerates the journals with the most published documents to offer a more transparent representation.

Table 4. Bibliographic coupling between journals

Journal	Total Link Strenght	Publications		Citations Count
		Count	Percentage	
Psychology of Sport and Exercise	541	18	6.84%	390
Frontiers in Psychology	514	22	8.37%	247
Frontiers in Sports and Active Living	338	7	2.66%	32
Journal of Sports Sciences	273	9	3.42%	46
International Journal of Sport and Exercise Psychology	234	6	2.28%	90
Adapted Physical Activity Quarterly	199	11	4.18%	128
British Journal of Sports Medicine	115	14	5.32%	2861
Journal of Sport Psychology in Action	113	7	2.66%	67
Journal of Applied Sport Psychology	111	4	1.52%	60
International Journal of Sports Science Coaching	101	4	1.52%	16
Retos Nuevas Tendencias En Educacion Fisica Deporte Y Recreacion	87	4	1.52%	6
Psychology Society & Education	60	4	1.52%	19
Journal of Human Kinetics	54	5	1.90%	14
Revista Brasileira De Medicina Do Esporte	32	4	1.52%	19
Pedagogics Psychology Medical Biological Problems of Physical Training and Sports	30	22	8.37%	3

Based on the data presented in Table 4, Psychology of Sport and Exercise, Frontiers in Psychology, and Frontiers in Sports and Active Living are the top three journals with the highest total link strength. Interestingly, the British Journal of Sports Medicine, which has the highest degree in citation analysis, ranked 7th among all journals regarding total link strength. Following the British Journal of Sports Medicine, Psychology of Sport and Exercise reached the second degree with 390 citations, and Frontiers in Psychology the third degree with 247 citations.

Figure 8 displays the bibliometric coupling network visualization presenting the connections between journals, while Figure 9 reveals its density visualization.

Figure 8 and Figure 9 remark that the journals with the most total link strength are distinct into four prominent clusters.

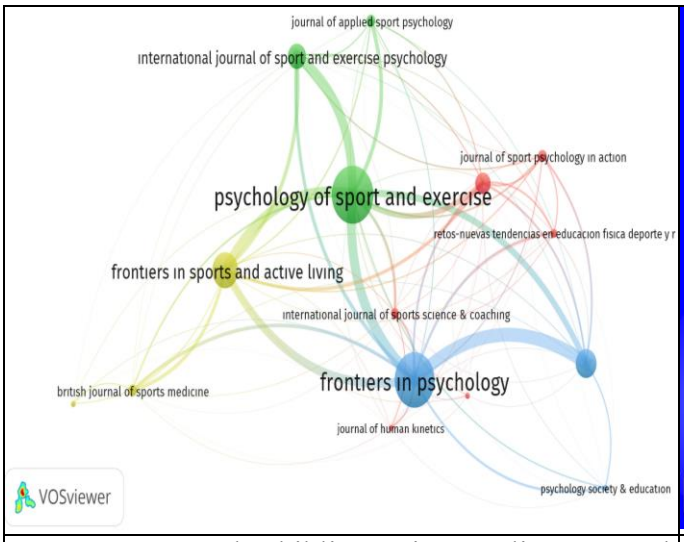

Figure 8. Journals' bibliometric coupling network visualization

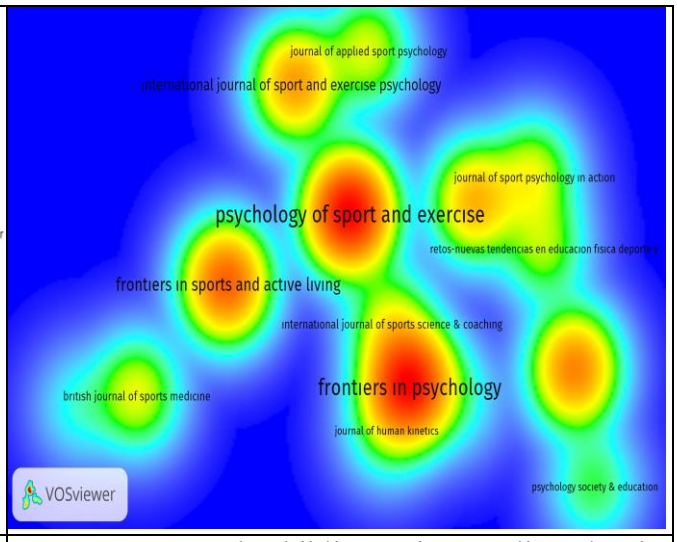

Figure 9. Journals' bibliometric coupling density visualization

The cluster colored red, with 6 journals, is led by Adapted Physical Activity Quarterly. Among the other three clusters, each formed by three different journals, Psychology of Sport and Exercise stands out in the green cluster, Frontiers in Psychology in the blue cluster, and Frontiers in Sports and Active Living in the yellow cluster.

Bibliographic Coupling Analyses of Institutions

The bibliometric coupling analysis scrutinized the distribution of the institutions that published the examined documents. The default threshold value was set at five documents, and 19 out of the 497 institutions surpassed this.

Table 5 presents a comprehensive list of these institutions. Within this particular context, it is noteworthy to highlight the institutions that possess the highest total link strength, respectively: Loughborough University (11 documents and 99 citations), Lund University (6 documents and 111 citations), Vrije Universiteit Amsterdam (11 documents and 164 citations), Anglia Ruskin University (7 documents and 55 citations), and Norwegian School of Sport Sciences (9 documents and 317 citations).

Table 5. Bibliographic coupling between institutions

Institution	Total Link Strength	Publication		Citations Count
		Count	Percentage	
Loughborough University	837	11	4,18%	99
Lund University	732	6	2,28%	111
Vrije Universiteit Amsterdam	665	11	4,18%	164
Anglia Ruskin University	653	7	2,66%	55
Norwegian School of Sport Sciences	617	9	3,42%	317
University of Ottowa	495	5	1,90%	55
Universidade Federal De Minas Gerais	484	8	3,04%	58

University of British Columbia	475	7	2,66%	59
University of Birmingham	457	5	1,90%	134
Universidade Federal De Sao Paulo Unifesp	454	9	3,42%	126
Linkoping University	448	5	1,90%	329
Stellenbosch University	387	6	2,28%	29
University of Queensland	381	7	2,66%	425
Brazilian Paralympic Committee	359	5	1,90%	22
McGill University	200	5	1,90%	103
Katholieke University Leuven	104	5	1,90%	39
Canterbury Christ Church University	70	5	1,90%	47
Universidad Miguel Hernandez De Elche	30	5	1,90%	16
National University Of Ukraine On Physical Education Sport	2	7	1,90%	0

A graphical representation of the connections between these institutions is given in Figure 10, whereas Figure 11 showcases their bibliometric coupling density. Based on the bibliometric coupling analysis of institutions illustrated in Figures 10 and 11, it becomes apparent that four distinct clusters emerge. The research reveals that seven institutions belong to the red cluster, five to the green cluster, four to the blue cluster, and three to the yellow cluster, all exhibiting solid relationships. According to total link strength, the leading institutions behind these clusters are Lund University, Vrije Universiteit Amsterdam, Loughborough University, and Universidade Federal De Minas Gerais, respectively, corresponding to the red, green, blue, and yellow clusters.

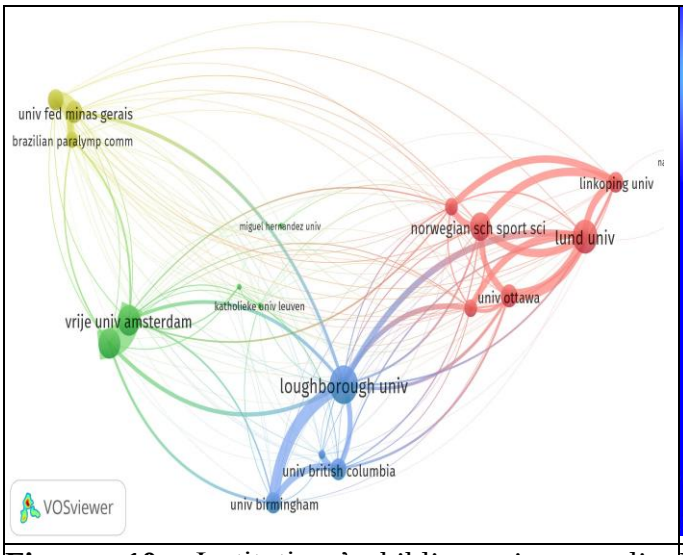

Figure 10. Institutions' bibliometric coupling network visualization

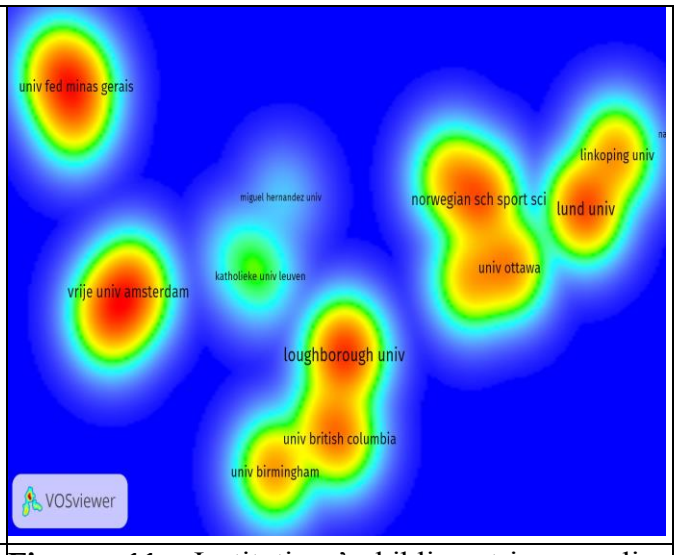

Figure 11. Institutions' bibliometric coupling density visualization

Figure 11 reveals the distinct density zones around Universidade Federal De Minas Gerais and Brazilian Paralympic Committee, around Vrije Universiteit Amsterdam, around Loughborough University, University of British Columbia and University of Birmingham, around the Norwegian School of Sport Sciences and University of Ottowa, and finally around Lund University and Linkoping University.

Bibliographic Coupling Analyses of Countries

The bibliometric coupling analysis involved an examination of the countries in which the documents had been published. Only countries with at least five documents were considered to establish a default threshold value. It was found that 23 out of 43 countries exceeded this threshold value. These countries were then ranked based on their connection strength, and the top 15 countries

with the most robust connections are listed in Table 6.

According to Table 6, the countries with the highest link strength ranked England (52 documents and 3255 citations), Canada (38 documents and 2865 citations), the United States (48 documents and 3318 citations), and Australia (31 documents and 3160 citations) took the first four places. Among the countries listed in Table 6, the country with the highest publication percentage in the total quantity of analyzed with the count of 263 is England (19,77%), followed by the USA (18,25%) and Canada (14,45%).

Table 6. Bibliographic coupling between countries

Countries	Total Link Strength	Publication		Citations Count
		Count	Percentage	
England	7345	52	19,77%	3255
Canada	6745	38	14,45%	2865
USA	6549	48	18,25%	3318
Australia	5160	31	11,79%	3160
Norway	3897	20	7,60%	2857
Netherlands	3603	21	7,98%	2666
South Africa	3565	11	4,18%	2677
Sweden	3428	13	4,94%	420
Switzerland	3357	7	2,66%	2709
Brazil	2714	29	11,03%	241
Belgium	2678	10	3,80%	342
Japan	2398	11	4,18%	2246
Ireland	2397	8	3,04%	516
Spain	1905	26	9,89%	177
Finland	1888	5	1,90%	82

The bibliometric coupling of the networks between the countries listed in Table 6 is presented in Figure 12, and their density map is displayed in Figure 13.

Through bibliometric coupling analyses, it has been uncovered that nations can be classified into three unique clusters. The first cluster, marked in red, includes 10 countries, while the remaining clusters, highlighted in green and blue, consist of 7 and 6 countries, respectively. Canada, England, and Norway emerged as the leading countries in their corresponding clusters in that precise order.

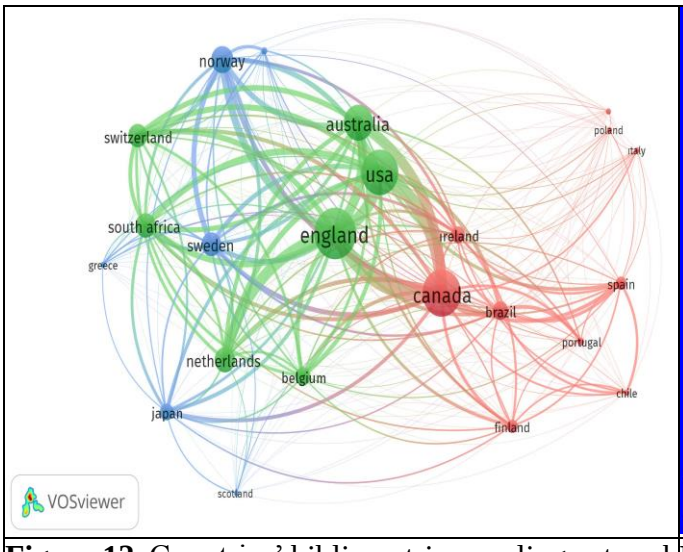

Figure 12. Countries' bibliometric coupling network visualization

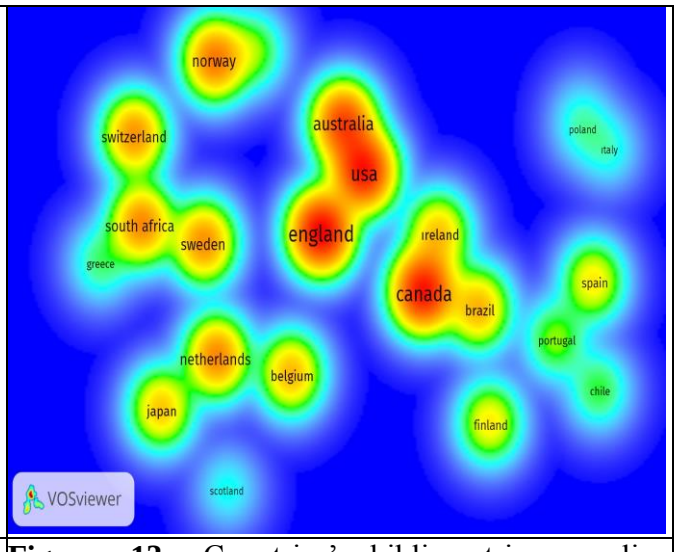

Figure 13. Countries' bibliometric coupling density visualization

Keyword Analysis

In order to identify the main research themes related to the psychology of Paralympic athletes, a data visualization was conducted using keyword analysis. A default threshold value of at least four keyword repetitions was used, and it was observed that 43 out of 717 keywords exceeded this threshold. The results of the analysis are displayed in Figure 14. The density visualization of the keywords is shown in Figure 15.

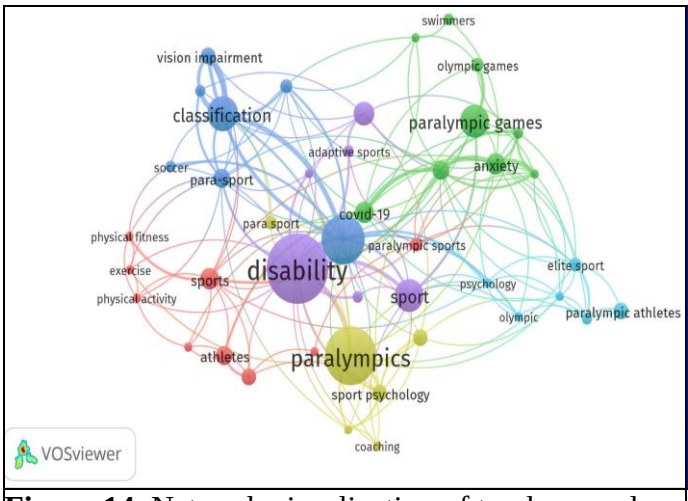

Figure 14. Network visualization of top keywords

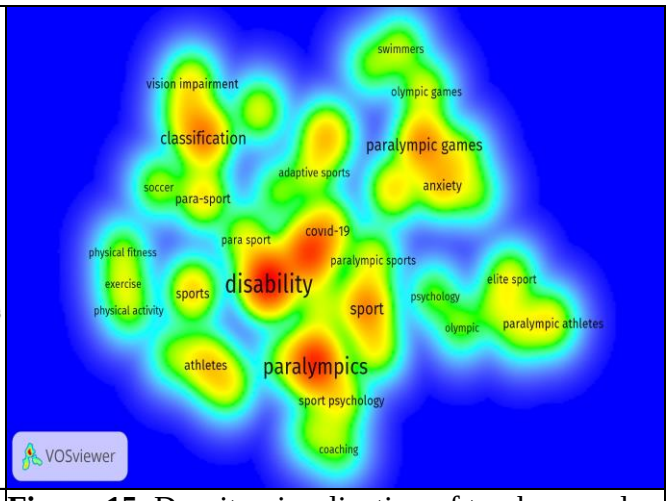

Figure 15. Density visualization of top keywords

Figure 14 displays a grouping of keywords into six main clusters. Within the red cluster, sports (9 occurrences) and athletes (8 occurrences) are the most common ones, while in the green cluster, paralympic games (14 occurrences) is the most robust keyword. The blue cluster fosters paralympic (21 occurrences), and the yellow cluster underlines paralympics (25 occurrences) as the most mentioned keywords. Finally, the purple cluster displays disability (30 occurrences), whereas the turquoise cluster reveals paralympic athletes (7 occurrences) and elite sport (6 occurrences) as the most common keywords.

Regarding total link strength (tls), the following keywords are prominent: disability (33 tls), paralympic (27 tls), classification (23 tls), paralympics (22 tls), anxiety (20 tls) and mental health (20 tls).

Analysis of Top Terms in Abstract

The visualization technique was used to analyze the abstract sections' top terms. A threshold value of at least ten repetitions for each keyword was set to ensure relevance, revealing that 131 out of 6336 words surpassed the threshold. The findings are shown in Figure 16. The density of the most frequently used terms in abstracts is shown in Figure 17.

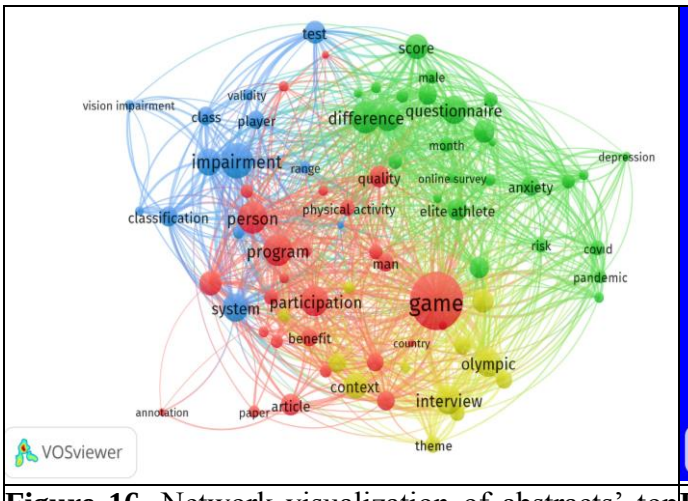

Figure 16. Network visualization of abstracts' top terms

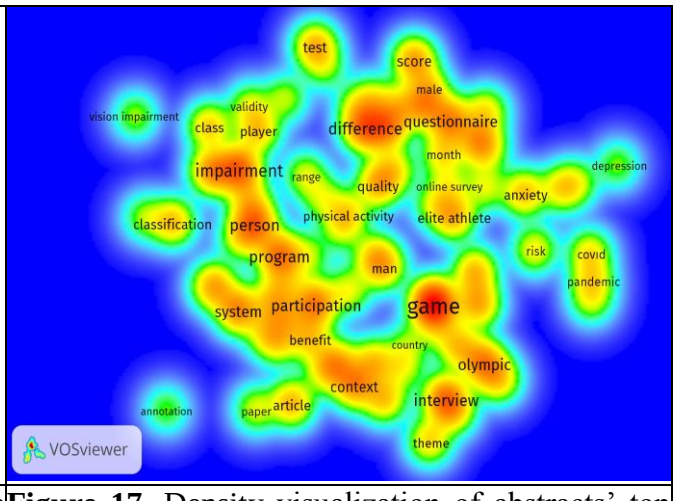

Figure 17. Density visualization of abstracts' top terms

Figure 16 gathered four main clusters. There are 27 terms in the red cluster, 27 in the green, 13 in the blue, and 12 in the yellow cluster. The most mentioned term in the red cluster is game (72 occurrences), followed by the green cluster that fosters difference (40 occurrences). In comparison, the blue cluster's top-used term was impairment (44 occurrences). Finally, the forerunner terms in the yellow cluster were interview (36 occurrences) and olympic (35 occurrences).

The density map in Figure 17 also highlights the terms that are most frequently mentioned. According their occurrences these can be lined up as follows; game (72 occurrences), impairment (44 occurrences), person (40 occurrences), difference (40 occurrences), program (39 occurrences), participation (38 occurrences), interview (36 occurrences) and olympic (35 occurrences). On the other hand, the ranking based on relevance rate highlights that vision impairment (5.99), classification system (3.42), depression (2.98), and annotation (2.84) are the main focus of the abstracts.

Co-Citation Analyses

Co-Citation Analyses of Cited-References

The analysis showed that out of 8611 cited references, 10 exceeded the threshold value of 12 citations. The results are displayed in Table 7.

Table 7. Cited-references' co-citation analyses

Author	Article	Co-citation Count	Total Link Strength
Tweedy, S.M. and Vanlandewijck, Y.C., 2011	International Paralympic Committee position stand—background and scientific principles of classification in Paralympic sport	22	12
Smith, B. and McGannon, K.R., 2018	Developing rigor in qualitative research: problems and opportunities within sport and exercise psychology	20	36
Rice, S.M. et al. 2016	The Mental Health of Elite Athletes: A Narrative Systematic Review	17	24
Braun, V. and Clarke, V., 2006	Using thematic analysis in psychology	16	32
Reardon, C.L. et al. 2019	Mental health in elite athletes: International Olympic Committee consensus statement (2019)	15	20
Braun, V. and Clarke, V., 2019	Reflecting on reflexive thematic analysis	14	35
Sparkes, A.C. and Smith, B., 2014	Qualitative Research Methods in Sport, Exercise and Health	13	26
Cohen, J., 1998	Statistical power analysis	13	2
Ravensbergen, R.H.J.C. et al. 2016	Expert consensus statement to guide the evidence-based classification of Paralympic athletes with vision impairment: a Delphi study	12	15
DePauw, K.P. and Gavron, S.J., 2005	Disability Sport	12	2

The findings of cited-references' co-citation analyses are demonstrated through two different mapping techniques. The first of these is the co-citation network visualization shown in Figure 18, and the second is the density visualization displayed in Figure 19.

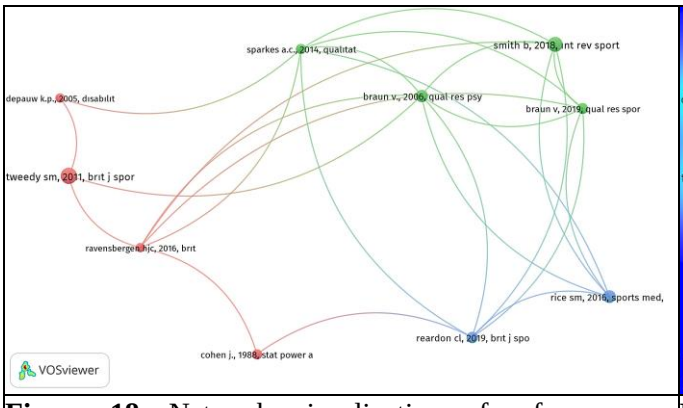

Figure 18. Network visualization of reference co-citation

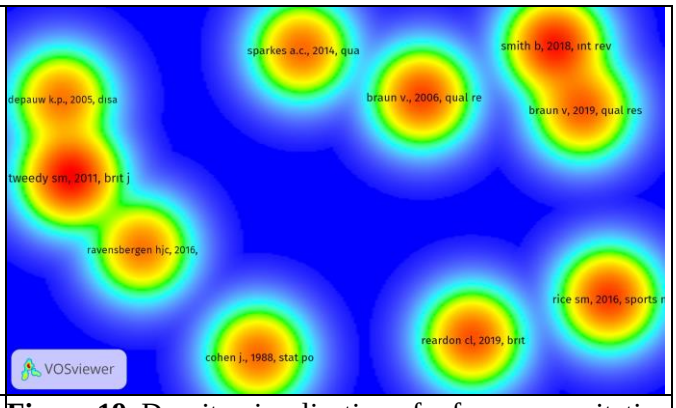

Figure 19. Density visualization of reference co-citation

Based on Figure 18, three reference clusters have emerged as the most prevalent. Notably, four authors belong to the red cluster, four to the green cluster, and two to the blue cluster.

Tweedy and Vanlandewijck's (2011) article is recognized as the trailblazer in the red cluster. While Smith and McGannon (2018) is acknowledged as the pioneer in the green cluster, Rice et al. (2016) is credited as the pioneer in the blue cluster.

Co-Citation Analyses of Cited-Journals

Upon analyzing sources with a minimum of 40 citations, a co-citation network was revealed within the journal. Out of the 3,809 references, 30 surpassed the threshold value. Table 8 displays the top 10 journals.

Tablo 8. Cited-journals' co-citation analyses

Journal	Co-citation Count	Total Link Strength
British Journal of Sports Medicine	397	4353
Psychology of Sport and Exercise	265	4485
Adapted Physical Activity Quarterly	264	2867
Journal of Sports Sciences	205	3423
Sports Medicine	142	2435
Sport Psychologist	133	2170
Med Science Sport and Exercise	117	1868
Journal of Applied Sport Psychology	114	2035
Frontiers Psychology	102	1529
Scandinavian Journal of Medicine Science in Sports	88	1658

The utilized co-citation analyses of the cited journals are demonstrated in Figure 20. Figure 20 displays two prominent clusters. Notably, eighteen journals emerge in the red cluster, and twelve are grouped in the green cluster.

Psychology of Sport and Exercise and Adapted Physical Activity Quarterly are the leading journals of the red cluster, while the British Journal of Sports Medicine is at the top of the green cluster. According to Figure 21, it is seen that the density of the co-citation network of cited journals becomes evident around the British Journal of Sports Medicine, Journal of Sport and Exercise Psychology, Adapted Physical Activity Quarterly, and Journal of Sports Sciences.

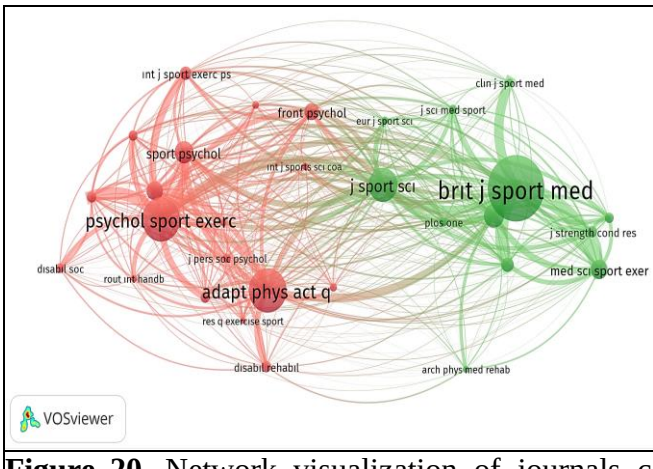

Figure 20. Network visualization of journals co-citation

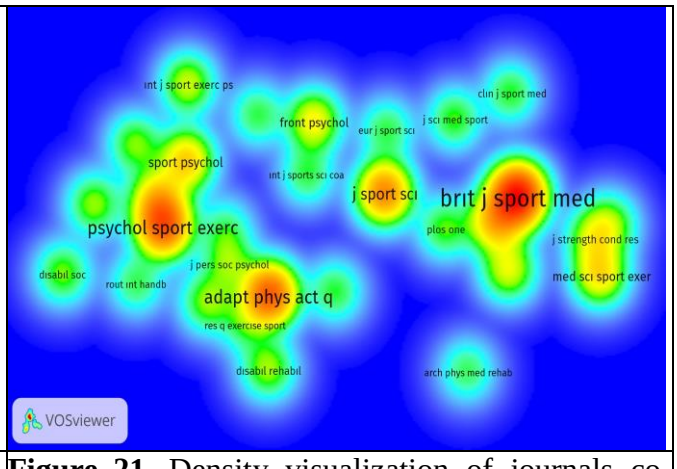

Figure 21. Density visualization of journals co-citation

In other relatively small co-citation networks, the intensity around Frontiers Psychology and Medicine and Science in Sports and Exercise attracts attention. On the other hand, the Archives of Physical Medicine and Rehabilitation is monitored relatively distant from the co-citation networks in the density analysis of journals.

Co-Citation Analyses of Cited- Authors

Upon selecting a minimum threshold of 25 citations for authors, it was noted that only 14 out of the 5987 authors exceeded this criterion. Further details regarding these findings are shown in Table 9.

Tablo 9. Cited-authors' co-citation analyses

Author	Co-citation Count	Total Link Strength
Brett Smith	72	385
Jeffrey J. Martin	71	233
Virginia Braun	51	283
International Paralympic Committee	50	176
Sean M. Tweedy	40	87
Wayne Derman	35	16
Andrew C. Sparkes	33	230
Simon M. Rice	32	64
Raul Reina	29	22
Stephanie J. Hanrahan	27	74
Rachel Arnold	25	124
Robert J. Schinke	25	110
Elizabeth Campbell	25	102
R M. Ryan	25	40

In Table 9, the authors Brett Smith, Jeffrey J. Martin, and Virginia Braun emerged as the frontrunners with the highest number of co-citations and their total link strength.

Revealing the cited-authors' co-citation network, Figure 22 visualized their connections.

As shown in Figure 22, the red and green clusters each group four authors, while the blue and yellow clusters each cover three authors.

The density visualization of the cited-authors' co-citation is depicted in Figure 23.

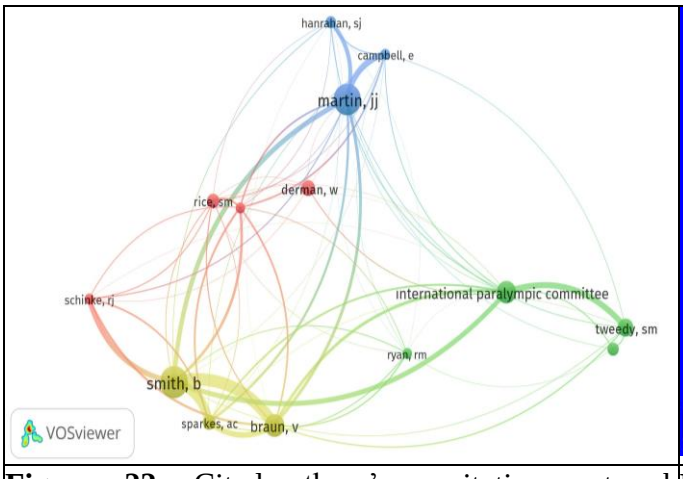

Figure 22. Cited-authors' co-citation network visualization

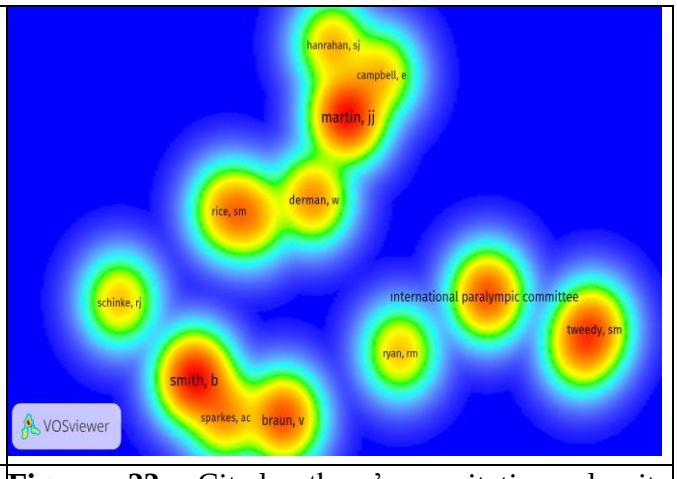

Figure 23. Cited-authors' co-citation density visualization

Brett Smith is the leading authority of the yellow cluster. In contrast, the International Paralympic Committee pioneered the green cluster, and Jeffrey J. Martin is the top in the blue cluster. Arnold and Schinke stood out with their total link strength in the red cluster, while Derman and Rice had higher co-citation numbers than those.

According to Figure 23, in the authors' co-citation distribution, Tweedy, International Paralympic Committee, Smith, Martin, Rice, and Braun are the names that show the highest co-citation network density.

DISCUSSION

The study's objective is to explore the psychological aspects of Paralympic athletes through the implementation of bibliometric analysis of research articles published in the WoS database from 1992 to September 1, 2023. A meticulous assessment of a significant part of scientific publications has been conducted, providing a comprehensive and insightful overview of research trends and studies within the relevant literature.

This research revealed that studies on the paralympic athletes' psychology followed a fluctuating course in the beginning years. As of 2016, it fluctuated and increased without returning to this level and reached the highest number of publications, with 34 articles in 2022.

The most cited document in the citation analysis is McCroy et al.'s publication titled Consensus Statement on Concussions in sport-the 5th International Conference on Concussions in Sport held in Berlin, October 2016. This document was developed for physicians and healthcare providers involved in the care of athletes at the recreational, elite, or professional level. While this publication focuses on the causes and consequences of concussion in athletes, it also draws attention to the effects of trauma that develop due to injury, neuropsychological evaluation protocols, and returning to sports. Based on the general content of this work, the relative scarcity of publications addressing psychological traumas that possible injury experiences of paralympic athletes may trigger has been evaluated as a sign of a gap in the field.

The article entitled "How much is too much? (Part 2) International Olympic Committee consensus statement on load in sport and risk of illness," ranked second in the documents' citation analyses, presents a comprehensive overview of the findings that establish a correlation between load and athletes' susceptibility to overtraining and illness. It aims to equip athletes, coaches, and support staff with actionable recommendations for managing load effectively and minimizing the risk of sports-related health issues. These recommendations encompass guidelines for determining the optimal training and competition load and strategies for monitoring various aspects of load, such as training intensity, psychological stress, athlete wellness, and illness.

The third most cited document recommended a systematic approach to translate and culturally adapt the SCAT5 into a broad range of languages. It encouraged establishing a comprehensive set of norms across language groups, sports, gender, age and disabilities.

These three articles share a commonality: they may provide valuable tips and inspiration to professionals seeking to work with paralympic athletes despite not being centered on them directly. Additionally, these articles were published in the esteemed British Journal of Sports Medicine.

England emerged as the most productive country in the analysis, with a total connection strength of 7345 and 52 publications. Ludwig Guttmann established a center in 1944 for rehabilitating people with spinal cord injuries at Stoke Mandeville Hospital in England upon the request of the British Government, which eventually grew into a recreational and competitive sport. Moreover, Guttmann organized a pioneering competition for wheelchair athletes on the opening day of the 1948 London Olympic Games (TMPK, n. d.). Considering these, the outcome revealing England's productivity is one of the foreseeable results of this research.

On the other hand, Loughborough University was the most productive institution, with a total connection strength of 837 and 11 publications. The fact that Loughborough University is a British institution fosters the idea that studies on the psychology of paralympic athletes are given significant support in the UK.

The prominence of Brett Smith, who ranks highest in co-citation and total link strength, is particularly noteworthy given his past affiliation with Loughborough University. This case speaks

to England's prominent position in the field as well. The colaboration between the countries, institutions, and authors is a positive sign for advancing science through academic partnerships. Öner's (2022) bibliometric analysis study on the psychology of sports injuries confirms the significant impact of the collaborative orientation of countries, institutions, and researchers in driving scientific progress, which aligns with the results of this research.

According to another study result, the Lund University, Vrije Universiteit Amsterdam, Loughborough University, and Universidade Federal De Minas Gerais have emerged as the frontrunners in the clusters of studies related to the psychology of Paralympic athletes. This point confidently establishes that European nations are at the forefront of conducting research in this field on a global scale.

Based on another research result, the most significant keywords in the studies include sports, athletes, paralympic games, paralympic, paralympics, disability, paralympic athletes, and elite sport. This result indicates that the keywords selected by the authors are tailored to the unique conceptualization of paralympism. However, the researcher also encountered several other terms, including anxiety, mental health, depression, motivation, quality of life, mental skill, and emotion, which were underrepresented in the keyword query. This fact highlights the vital role of keyword selection in comprehending scientific content.

The findings of this study indicate that prominent authors, organizations, and nations not only engage in robust interactions within their respective domains, but also maintain substantial and significant connections with one another. These results highlight the importance of fostering strong relationships between entities in order to promote collaboration and advancement in various fields. It is evident that these distinguished actors recognize the value of maintaining meaningful connections and actively work towards cultivating them, thereby contributing to the overall growth and development of their respective disciplines.

This study has some significant limitations. One is that the research data is obtained only from the Web of Science database, and the other is the review of only research articles. Future studies should explore various databases and publication types to gather more insights. This study also showed that national publications on the psychological experiences of paralympic athletes are limited. This context points to an essential gap in Turkish Exercise and Sports Psychology regarding the psychology of paralympic athletes. Therefore, focusing on studies in this area is envisaged to fortify the national literature.

Additionally, this study provides an overview of the psychology of paralympic athletes. In analyzing the most emphasized terms in the keyword analyses and abstracts, the stand-out words emphasize more basic meanings, such as paralympic games, paralympic athlete, paralympics, disability, impairment, program, and participation. This issue sheds light on the need for original thematic studies focusing on the psychology of paralympic athletes. Finally, innovative studies that include social support units such as coaches, instructors, peers, and families that appear as facilitators in the Paralympic performance processes will further strengthen the field.

Conflict of interest:

The author declared no conflict of interest.

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There is no financial support from any institution or organization in this study.

Author Contribution:

In this study, the contribution rate of the sole author was 100%.

Ethics Statements

This article followed the journal writing rules, publication principles, research and publication ethics, and journal's ethical rules. The author is responsible for any violations that may arise regarding the article. The Istanbul Rumeli University Ethics Committee approved the article with the decision dated 21/12 /2022 and numbered 2022/11-08."

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RESEARCH ARTICLE

Investigation of Attitudes towards Leisure Satisfaction of Individuals Attending Fitness Centers

Atakan AKSU[1*] and Gürkan TANOĞLU[2]

1Muş Alparslan University, Faculty of Sport Sciences, Muş / Turkey
2 Muş Alparslan University, Faculty of Sport Sciences, Muş / Turkey
*Corresponding author: atakanaksu23@gmail.com

Abstract
This study was conducted to determine the attitudes of individuals attending fitness centers in Muş province towards leisure satisfaction in terms of some variables. The research is a mixed design research in which both quantitative and qualitative data are collected together. The margin of error was accepted as 0.05. Data were analyzed using descriptive statistical methods (percentage/frequency) as well as Mann Whitney-U Test and Kruskal Wallis-H tests. Furthermore, the Mann Whitney-U Test was used to determine between which groups the significant difference arose from the results obtained from the Kruskal Wallis-H Test. While the population of the research consists of individuals who attend fitness centers in Muş province in Turkey, the sample group consists of 227 people who voluntarily participated in our study and were selected by the random sampling method. Accordingly, it is determined that the scores of the physiological and psychological subscales of the leisure satisfaction scale demonstrate a statistically significant difference according to the employment status variable ($p<0.05$) but the scores of the recreational, social, educational, and aesthetic subscales do not create a statistically significant difference according to the employment status variable($p<0.05$). Based on the results of the study, it was determined that there was no significant difference in terms of the age, gender, educational status, and leisure duration variables of the participants, while the scores of physiological and psychological subscales created a statistically significant difference in terms of the employment status variable. In conclusion, it is important to conduct these and similar studies on a regional or national scale in terms of determining the attitude towards fitness centers.

Keywords
Fitness, Recreation, Satisfaction, Attitude

INTRODUCTION

Human beings have made some efforts to measure and count time to describe it. Although there are some debates about time, time, which is a very old concept, is briefly described as hours, days, or weeks (Karaküçük & Gürbüz, 2007). Simit (1998) defined time as the process of events coming one after another from the past to the present and one day to the future and continuing without stopping outside the will and control of human beings. Another definition of time was made by Sucu (1996). Sucu defines time as a concept that has no beginning and no end, and that defines what will occur after this time in the minds of people. Researchers in the literature underlined the significance of managing time properly and efficiently. In a study, it was stated that not only time itself but also the effective and efficient use of time is of great importance (Çiftçi and Özavcı, 2023) In developed countries, it has become a requirement of the working environment and welfare level to reduce working hours and increase leisure. Time to work and time outside work should complement each other and be in balance. Aristotle defined what should be done with the

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[1]**ORCID:** 0000-0002-5648-9234 , [2]**ORCID:** 0000-0002-2111-677X

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time not spent working as follows: "Surely, we are not to spend all our leisure in play because then having fun would be the purpose of life. For those who are engaged in serious work, recreation is essential, while those who work need to rest. The act of rest is entertaining. Our leisure gives both those who work and those who do not work the pleasure and happiness of life" (Koçer, 1980).

Various disciplines related to leisure have defined the concept of leisure in different ways in terms of the way it is applied and handled. Sociologists have defined leisure as the period in which individuals renew themselves, while sports scientists have defined leisure as the time spent on an activity during the time left over from non-work time. Concepts related to leisure have been subjected to a shift in meaning according to the gigantic industrial planning and capitalist order and it has been determined that it has gained new meanings (Argan, 2007). Capitalist civilization wants to increase the productivity to be obtained from the individual by enabling employees who are tired and fed up during working time to recover by resting and enjoying themselves outside of working time. In this case, leisure is seen as a commodity for the capitalist order. In the early periods, the concept of leisure was not welcomed by the capitalists, but later they made an effort to turn leisure into a market because it became a market where people could consume the products produced in leisure (Aytaç, 2005).

Nowadays, the desire and importance of participating in leisure activities are rapidly increasing. Active use of free time has become a part of our lifestyle. Therefore, it is of great importance to inculcate this habit in the young generation (Tel et al. 2020). The concept of leisure has been seen as a field of activity defined by a number of value expressions from the past to the present. While leisure was valued in ancient times as a time to fulfill philosophical and religious needs in the Middle Ages. In today's world, with the influence of capitalism, leisure was first seen as worthless and neglected as a reward for physical work while later, due to the economic crisis that occurred, leisure was defined as additional time that positively affects work. In addition to this, leisure has been sanctified as a time that one should make an effort to earn. For this reason, industrialization has turned the concept of leisure into a dimension that includes all classes of society (Bahadır, 2016).

Some of the stressful and boring situations brought about by this age, such as intense, tiring work life and city life, can wear people out. As a result, human beings lead an unhealthy life in many respects. On the other hand, reasons such as fewer working hours as a result of industrialization have contributed to the more effective use of leisure. More efficient use of leisure has led to the formation of mentally healthy individuals (Passmore and French, 2001). Recreation, which is associated with action and movement, is defined with words such as exhibiting activities in leisure, contentment, feeling good, and enjoyment (Torkildsen & Taylor, 2012). Another view on recreation belongs to Torkildsen (1998). Torkildsen stated that recreation involves emotionality rather than action and that it is not only an experience related to movement but also an inner experience.

The word fitness derives from the word fit, which means that the body is measured and healthy. The word fitness has settled in our language as physical fitness. Having a fit body means having a healthy muscle and bone system and also represents living a healthier life (Uz, 2015). Fitness is a very important factor for maintaining a high level of health and a fit life. Physical fitness carries individual responsibilities, protects people against injuries, ensures physical health, and improves mental health. However, over-emphasis on one's physical appearance can have consequences that negatively affect one's emotional, environmental, professional, or intellectual qualities. In fact, being fit is part of being physically healthy. People who are physically fit are also emotionally, socially, or professionally fit (Özer, 2001).

Organizations established by private and legal, voluntary, and public units that are equipped to implement several sports activities in a planned manner to meet the movement and some social needs of the society are called sports enterprises (Ramazanoğlu & Öcalan, 2005). Human beings need movement and to meet this need for movement, they continue to operate by employing people in a unique application hierarchy through several trainers. Those who provide this service use the unique data of their users and aim to match which sports activity will be more suitable. Private gyms cater to very different groups of people regardless of age. However, due to their unique capabilities, private gyms can transform into

different forms of management (Ekinci & İmamoğlu, 2002).

In gyms where user experience is very important, businesses have to ensure the satisfaction of users. The functioning of fitness centers is important considering that the satisfied user will come again. Therefore, the service program is very important. The expectations and demands of users impose fitness centers to be the best and strive for perfection. The reasons why people join a gym may vary. Some people go to relieve stress, some to lose weight, some to lead a healthier life and some to have a different social environment (Akdeniz, 2004). Regular fitness activity increases muscle strength, increases fat burning, increases metabolic rate, provides regular sleep, supports the cardiovascular system and bone muscle tissue, reduces the risk of heart attack in the long term, and may play a role in the prevention of diabetes. In addition to the physical benefits of exercise, it is also known to have mental benefits. For example, fitness is known to help lower anxiety levels and prevent depression. Staying active reduces the risk of obesity. Active life supports a healthy life and is supportive in reducing diseases and preventing chronic health problems (Koruç & Arsan, 2009). This study was conducted to determine the attitudes of individuals attending fitness centers in Muş province toward their leisure satisfaction. Thus, it is planned to describe the attitudes of individuals in Muş province towards leisure time.

MATERIALS AND METHODS

This study aims to examine the satisfaction levels of individuals registered in fitness centers in Muş province in Turkey in terms of several variables.

The following research questions were designed in line with the aim of this study.

1. At what level are the satisfaction levels of individuals who go to fitness centers in Muş province regarding leisure?
2. Between levels of satisfaction with leisure, what are the effects of the following variables?
   a. Gender
   b. Age
   c. Education Status

Research Model

This study, which examines the leisure satisfaction levels of individuals who go to fitness centers in terms of some variables, is shaped by quantitative and qualitative research design.

While the population of this study consists of individuals who go to fitness centers in Muş province, the sample group consists of 229 participants who go to fitness centers in Muş province, who voluntarily participated in our study and were selected by random method. Of the participants in our study, 102 were female and 127 were male.

Data Collection Tools

A 6-question form including socio-demographic characteristics and the leisure satisfaction scale developed by Vapur, M. & Sevin, H.D. (2021) were used for the participants who agreed to participate in the study. This scale is a 5-point Likert scale and the points that can be obtained from the scale scoring are minimum 22 and maximum 110 points. Scoring on the scale is as follows: 1: Almost never correct, 2: Rarely correct, 3: Sometimes correct, 4: Mostly correct, 5: Almost always correct. This scale has recreational, social, physiological, psychological, educational, and aesthetic subscales. In this study, the internal consistency coefficient of the scale was 0.94.

In addition, the following questions were asked to 15 participants who voluntarily participated in the study to collect qualitative data.

What is the purpose of your participation in fitness centers?

What do you think of when you think of leisure?

Statistical Analysis of Data

This study was analyzed using SPSS 22.0 package software and the margin of error was accepted as 0.05. Data were analyzed using descriptive statistical methods (percentage /frequency). A normality test was performed to test the normality. Non-parametric tests were applied to data that did not show normal distribution. Mann Whitney U Test and Kruskal Wallis-H Test were also used to analyze the data. Furthermore, the Mann Whitney-U Test was used to determine between which groups the significant difference arising from the Kruskal Wallis-H Test result occurred.

RESULTS

Table 1 shows that 44.5% of the participants were female and 55.5% were male. 34.1% of the participants were 39 years and over, 24.5% were 33-38 years old, 15.3% were 15-20 years old, 14.8% were 27-32 years old and 11.4% were 21-26 years old. While 49.8% of the individuals who participated in our study were self-employed, 22.7% stated that they worked in the private sector, 8.7% in the public sector, and 18.8% stated that they did not work. On the other hand, 31% of the participants had undergraduate degrees, 28.4% were associate degree graduates, 15.7% were primary and secondary education graduates, 14.8% were literate and 10% had postgraduate degrees.

Table 1. Statistical Distribution of Participants According to Demographic Characteristics

Variables	Groups		n	%
Gender	Female		102	44.5
		Male	127	55.5
		Total	229	100.0
Age	15-20		35	15.3
		21-26	26	11.4
		27-32	34	14.8
		33-38	56	24.5
		39 and above	78	34.1
		Total	229	100.0
Daily Leisure	1-2 Hours		55	24.0
		3-4 Hours	64	27.9
		5-6 Hours	58	25.3
		7 Hours and Over	52	22.7
		Total	229	100.0
Employment Status	Unemployed		43	18.8
		Public Employee	20	8.7
		Private Sector	52	22.7
		Self-Employed	114	49.8
		Total	229	100.0
Education Level	Literate		34	14.8
		Primary-Secondary Education	36	15.7
		Associate Degree	65	28.4
		Undergraduate	71	31.0
		Postgraduate	23	10.0
		Total	229	100.0

Table 2. Comparison of Participants' Leisure Satisfaction Scale Scores According to Gender Variable

Variables	Gender	n	Rank Mean	Rank Total	U	p
Rest	Female	102	111.33	11355.50		
	Male	127	117.95	14979.50	6102.500	0.45
	Total	229				
Social	Female	102	112.48	11472.50		
	Male	127	117.03	14862.50	6219.500	0.60
	Total	229				
Physiological	Female	102	117.76	12012.00		
	Male	127	112.78	14323.00	6195.500	0.57
	Total	229				
Psychological	Female	102	117.69	12004.50		
	Male	127	112.84	14330.50	6202.500	0.58
	Total	229				
Educational	Female	102	116.10	11842.50		
	Male	127	114.11	14492.50	6364.500	0.82
	Total	229				
Aesthetics	Female	102	107.94	11010.00		
	Male	127	120.67	15325.00	5757.000	0.15
	Total	229				

When Table 2 is examined, it is determined that the scores of the recreational, social, physiological, psychological, educational, and aesthetic subscales of the leisure satisfaction scale do not show a statistically significant difference according to the gender variable (p>0.05).

Table 3. Comparison of Participants' Leisure Satisfaction Scale Scores According to Age Variable

Variables	Age	n	Rank Mean	X^2	sd	p
Rest	Between 15-20	35	133.83	4.132	4	0.39
	Between 21-26	26	112.79			
	Between 27-32	34	111.12			
	Between 33-38	56	105.64			
	39 and above	78	115.70			
	Total	229				
Social	Between 15-20	35	134.26	4.489	4	0.34
	Between 21-26	26	113.77			
	Between 27-32	34	101.69			
	Between 33-38	56	112.00			
	39 and above	78	114.72			
	Total	229				
Physiological	Between 15-20	35	133.94	4.003	4	0.41
	Between 21-26	26	114.31			
	Between 27-32	34	105.10			
	Between 33-38	56	110.14			
	39 and above	78	114.53			
	Total	229				
Psychological	Between 15-20	35	126.37	2.764	4	0.60
	Between 21-26	26	116.87			
	Between 27-32	34	104.38			
	Between 33-38	56	108.40			
	39 and above	78	118.64			
	Total	229				
Educational	Between 15-20	35	122.76	2.638	4	0.62
	Between 21-26	26	117.75			
	Between 27-32	34	110.06			
	Between 33-38	56	104.51			
	39 and above	78	120.29			
	Total	229				
Aesthetics	Between 15-20	35	108.01	3.576	4	0.47
	Between 21-26	26	99.48			
	Between 27-32	34	121.50			
	Between 33-38	56	111.20			
	39 and above	78	123.21			
	Total	229				

When Table 3 is examined, it is determined that the scores of the recreational, social, physiological, psychological, educational, and aesthetic subscales of the leisure satisfaction scale do not show a statistically significant difference according to the age variable (p>0.05).

When Table 4 is examined, it is determined that the scores of the recreational, social, physiological, psychological, educational, and aesthetic subscales of the leisure satisfaction scale do not show a statistically significant difference according to the daily leisure duration variable (p>0.05).

Table 4. Comparison of Participants' Leisure Satisfaction Scale Scores According to Daily Leisure Duration Variable

Variables	Daily Leisure	n	Rank Mean	X^2	sd	p
Rest	1-2 Hours	55	128.82	4.135	3	0.25
	3-4 Hours	64	111.53			
	5-6 Hours	58	115.89			
	7 Hours and Over	52	103.66			
	Total	229				
Social	1-2 Hours	55	130.19	5.113	3	0.16
	3-4 Hours	64	105.53			
	5-6 Hours	58	118.15			
	7 Hours and Over	52	107.08			
	Total	229				
Physiological	1-2 Hours	55	130.30	6.175	3	0.10
	3-4 Hours	64	104.26			
	5-6 Hours	58	120.66			
	7 Hours and Over	52	105.72			
	Total	229				
Psychological	1-2 Hours	55	128.02	3.872	3	0.28
	3-4 Hours	64	109.21			
	5-6 Hours	58	117.67			
	7 Hours and Over	52	105.38			
	Total	229				
Educational	1-2 Hours	55	130.59	6.140	3	0.11
	3-4 Hours	64	101.58			
	5-6 Hours	58	118.86			
	7 Hours and Over	52	110.72			
	Total	229				
Aesthetics	1-2 Hours	55	128.84	6.422	3	0.09
	3-4 Hours	64	101.22			
	5-6 Hours	58	122.46			
	7 Hours and Over	52	109.01			
	Total	229				

When Table 5 is examined, it is determined that the scores of the recreational, social, physiological, psychological, educational, and aesthetic subscales of the leisure satisfaction scale do not show a statistically significant difference according to the education level variable (**p>0**.05).

Table 5. Comparison of Participants' Leisure Satisfaction Scale Scores According to Education Level Variable

Variables	Education Level	n	Rank Mean	X^2	sd	p
Rest	Literate	34	137.57	5.983	4	0.20
	Primary-Secondary Education	36	116.89			
	Associate Degree	65	115.12			
	Undergraduate	71	107.90			
	Postgraduate	23	100.24			
	Total	229				
Social	Literate	34	137.84	9.059	4	0.60
	Primary-Secondary Education	36	124.33			
	Associate Degree	65	108.18			
	Undergraduate	71	113.98			
	Postgraduate	23	89.04			
	Total	229				
Physiological	Literate	34	137.78	7.159	4	0.13
	Primary-Secondary Education	36	121.00			
	Associate Degree	65	114.52			
	Undergraduate	71	107.49			
	Postgraduate	23	96.50			
	Total	229				
Psychological	Literate	34	129.35	5.236	4	0.26
	Primary-Secondary Education	36	126.29			
	Associate Degree	65	109.78			
	Undergraduate	71	113.61			
	Postgraduate	23	95.13			
	Total	229				
Educational	Literate	34	126.15	2.768	4	0.60
	Primary-Secondary Education	36	123.25			
	Associate Degree	65	114.94			
	Undergraduate	71	109.25			
	Postgraduate	23	103.54			
	Total	229				
Aesthetics	Literate	34	110.82	5.897	4	0.21
	Primary-Secondary Education	36	108.38			
	Associate Degree	65	125.90			
	Undergraduate	71	118.57			
	Postgraduate	23	89.72			
	Total	229				

When Table 6 is examined, it is determined that the scores of the physiological and psychological subscales of the leisure satisfaction scale created a statistically significant difference according to the employment status variable ($p<0.05$), but the scores of the recreational, social, educational and aesthetic subscales do not result in a statistically significant difference according to the employment status variable ($p<0.05$).

Qualitative Section Findings and Interpretations

Interview technique, one of the qualitative research methods, was used. In the study, the following questions were asked to find out the level of satisfaction and attitudes of individuals towards leisure by going to fitness centers.

1. What is the purpose of your participation in fitness centers?
2. What do you think of when you think of leisure?

Table 7. Distribution by Gender in Qualitative Section

Gender	N	%
Female	6	40
Male	9	60
Total	15	100

When Table 7 is examined, it is seen that 40% of the 15 participants who participated in the qualitative part of the study were female and 60% were male.

Table 8. Distribution by Age in Qualitative Section

Age	N	%
15-20	3	20
21-26	4	26.7
27-32	5	33.3
33-38	2	13.3
39+	1	6.7
Total	15	100

When Table 8 is examined, it is seen that 20% of the 15 participants who participated in the qualitative part of the study were 15-20 years old, 26.7% were 21-26 years old, 33.3% were 27-32 years old, 13.3% were 33-38 years old and 6.7% were 39 and older.

Table 9. Distribution by Education Status in Qualitative Section

Education Status	N	%
Literate	-	-
Primary-Secondary Education	4	26.7
Associate Degree	5	33.3
Undergraduate	5	33.3
Postgraduate	1	6.7
Total	15	100

When Table 9 is examined, it is seen that 26.7% of the 15 participants who participated in the research for the qualitative part have primary-secondary education, 33.3% have undergraduate degrees, 33.3% have associate's degrees and 6.7% have postgraduate education.

Answers to questions

According to Table 10, the answers given to the question "What is the purpose of your participation in fitness centers?" by the individuals who go to fitness centers were examined and as a result, 5 codes belonging to the theme "Reasons for Participation" were created. These codes were formed under the concepts of "Health", "Admiration", "Work", "Muscle Development" and "Strength". What is the purpose of your participation in fitness centers?

Table 10. Findings on the purpose of participation in fitness centers

Theme	Conceptual Codes	n
Reasons for Participation	Health	5
	Admiration	5
	Work	2
	Muscle Development	2
	Strength	1
	Total	15

Participants' responses

P1. To look fitter.
P2. Maintaining a healthy life.
P3. Being liked by people.
P4. Drawing attention to myself.
P5. To lead a healthy life and to be liked.
P6. To be stronger.
P7. I came here because my work life is very boring.
P8. Develop muscle.
P9. I want to make people feel afraid of me.
P10. To be healthy.
P11. To get rid of the boredom of work life.
P12. To look fitter.
P13. To lose weight.
P14. To look more beautiful for my husband.
P15. To be healthy.

According to Table 11, the answers given to the question "What comes to your mind when you think of leisure?" to individuals who go to fitness centers were examined and as a result, 3 codes belonging to the theme of "Leisure" were created. These codes were formed under the concepts of

"Time Away from Work", "Entertainment", and "Time for Sports".

Table 11. Findings on the definition of leisure

Theme	Conceptual Codes	n
Definition of Leisure	Time Away From Work	6
	Entertainment	3
	Time for Sports	6
	Total	15

What do you think of when you think of leisure?
P1. When I am not working.
P2. When I do fitness.
P3. The moment when all kinds of enjoyable activities take place.
P4. When I go to the gym.
P5. When I don't go to work.
P6. Time left over from work.
P7. When I go to the gym.
P8. Fun time.
P9. When I can do what I want.
P10. When I get off work and rest.
P11. When I build muscle.
P12. Out-of-hours time.
P13. When I go to the gym.
P14. Time out of work on weekends.
P15.Time with enjoyable activities.

DISCUSSION

In this study, which was conducted to examine the attitudes of individuals who go to fitness centers in Muş province towards leisure satisfaction in terms of some variables, recreational, social, physiological, psychological, educational, and aesthetic subscales were examined. It was concluded that the scores of the recreational, social, physiological, psychological, educational, and aesthetic subscales of the leisure satisfaction scale did not show a statistically significant difference according to the gender variable. It is thought that the lack of difference in terms of the gender variable is because individuals who go to fitness centers have common concerns, have similar desires, and go to fitness centers for similar purposes. When the literature is examined according to the gender variable, studies that obtained similar or different results from this study were identified. Yiğiter and Yıldız (2018), in the study conducted for the individuals working in the Düzce Police Directorate in terms of determining the factors affecting the attitude towards leisure and the level of hopelessness, no significant difference was found in all subscales in terms of gender variable. In another study conducted on participants registered in sports and CrossFit halls, it was determined that the fact that the participants were of different genders had no effect on exercise participation and that male and female individuals participating in the study participated for similar reasons (Sagiroglu & Ayar, 2017). Another study that reached a similar result was conducted by Sanin (2019) and the leisure attitudes of university students were examined and no difference was found according to gender. There are studies in the literature with results contrary to our study. In a study investigating the attitudes of people enrolled in health and fitness centers towards leisure, it was concluded that there was a significant difference in cognitive and affective subscales for women (Serdar, 2020). In a similar study conducted by Kaya and Gürbüz (2015), in a study in which the participants were university students, it was concluded that leisure attitude showed a significant difference when analyzed in terms of gender variable. Another study found that there were differences in cognitive and affective subscales in terms of the gender variable in a study in which the participants were individuals receiving services from youth centers in Manisa province in Turkey (Durmaz 2020).

It was determined that the scores of the recreational, social, physiological, psychological, educational, and aesthetic subscales of the leisure satisfaction scale did not show a statistically significant difference according to the age variable. When considered in terms of the age variable, it is thought that the reason for the lack of a significant difference is that individuals who go to fitness centers go to fitness centers with similar goals, passions, and concerns, as in the gender factor.

When similar studies were examined, it was determined that they could not obtain a significant difference in terms of the age variable of leisure attitude. In a study conducted on police personnel, no significant difference was found regarding the age variable (Yıldız &Yiğiter 2018). In another study, it was concluded that there was no significant difference in the leisure attitudes of the participants living in Ankara in terms of the age variable, while no difference was found in the age variable dimension for the participants in London. In a study examining the factors that motivate

participants to exercise in leisure, no difference was found between the dimensions of the age variable in the study investigating the level of individuals' orientation towards recreation activities (Çuhadar et al., 2019). In a similar study in which the participants were university students and their attitudes were examined, it was found that the difference between the age dimension and leisure attitude was not significant (Akyüz & Türkmen, 2016).

It was concluded that the difference was not statistically significant when the scores of the recreational, social, physiological, psychological, educational, and aesthetic subscales of the leisure satisfaction scale were evaluated in the dimension of the daily leisure duration variable. It is thought that the reason for this similarity is that individuals who already go to fitness centers do not worry about leisure and can go to fitness centers because they have enough leisure. On the other hand, it is thought that there is no significant difference since the time spent in fitness centers is in parallel with the participants' leisure. When the literature is reviewed, some studies obtained similar or different results from our study. In one of the studies that obtained similar results to our study, when the leisure duration variable and leisure attitude evaluations were examined, no significant difference was found between leisure attitudes in terms of the daily leisure duration variable in the study consisting of Bartın University students (Akyüz & Türkmen, 2016). On the other hand, some studies have reached different results from our study. In the study investigating the leisure attitudes of individuals working in the public or private sector, it was concluded that there was a significant difference between the daily leisure duration variable and leisure attitudes (Korkutata & Özavci, 2022).

It was determined that the scores of the physiological and psychological subscales of the leisure satisfaction scale showed a statistically significant difference according to the employment status variable, but the scores of the rest, social, educational, and aesthetic subscales did not show a statistically significant difference according to the employment status variable. It is thought that the reason for this result is that individuals are more psychologically comfortable whether they are working or not, and physiological needs are met under more favorable conditions. On the other hand, it is thought that the reason why there is no significant difference in the rest, social, educational, and aesthetic subscales is that the participant individuals can already participate in fitness activities and have reached the necessary satisfaction. When the studies in the literature were examined, no significant difference was found in the study examining the effect of leisure attitudes of individuals working desk jobs on their health perceptions (Lee, 2009).

When the scores of the recreational, social, physiological, psychological, educational, and aesthetic subscales of the leisure satisfaction scale were analyzed with the level of education, it was found that there was no statistically significant difference. It is thought that there is no significant difference because individuals at each education level have different needs, expectations, desires for self-realization, and reasons for participation and attendance in fitness centers. When this result of our study is evaluated, some studies have similar or different results in the literature. In the study conducted by Çuhadar et al. (2019), it was concluded that people with postgraduate education have higher levels of participation in activities related to leisure on behalf of being healthy compared to high school graduates. In another study in which Bartın University students participated, leisure attitudes were examined and it was concluded that there was no significant difference between the educational status variable and leisure attitude in the affective dimension, while the difference was significant in the cognitive and behavioral subscale (Akyüz & Türkmen, 2016). In a study that reached a similar result, it was conducted on behalf of people participating in sports organizations and it was concluded that there was no significant difference in all of the subscales related to attitude towards sports in terms of education level variable (Togo & Öztürk 2020).

The study was conducted only in Muş province, and it is thought that increasing the number of cities to be studied would be more beneficial from a scientific point of view. On the other hand, the low number of participants participating in the study is thought to be directly proportional to the number or quality of fitness centers in Muş. Increasing the quantity and quality of fitness centers in Muş province will contribute to the studies that can be conducted in this field.

Conflict of Interest

No conflict of interest is declared by the authors. In addition, no financial support was received.

Ethics Statement

Ethics Committee approval for this study was obtained from Muş Alparslan University Ethics Committee, meeting no: 5 and decision number no: 49, dated 18.05.2023. In this study, all the rules stated to be followed within the scope of the "Higher Education Institutions Scientific Research and Publication Ethics Directive" were complied with. However, none of the actions specified in the second part of the directive, under the title of "Proceedings Contrary to Scientific Research and Publication Ethics," were carried out.

Author Contribution

AA conceived and designed the study, and conducted the research. Material preparation and data collection were performed by, GT. GT performed the data analysis and statistical interpretation and wrote the results section. The first draft of the manuscript was written by AA and all authors commented on previous versions of the manuscript. All the authors have critically reviewed and approved the final draft and are responsible for the content.

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RESEARCH ARTICLE

Effects of Supervised Exercise on Body Composition in Patients Succeeding Bariatric Surgery 1 year Longitudinal Study

Azize Bingöl DIEDHIOU[1*] and Ayten ALTUNSARAY[2]

[1]Şırnak University, School of Physical Education and Sport, Department of Training Education Şırnak / Turkiye
[2]Lokman Hekim University, Department of Nutrition and Dietetics, Ankara / Turkiye
*Corresponding author: bingolazize@gmail.com

Abstract
This study aims to investigate whether a supervised, multicomponent exercise program can provide additional benefits on body composition after bariatric surgery. 18-65 year; body mass index (BMI) >35 kg/m^2; 54 patients (Exercise Group 29; Control Group 25) who had mini gastric bypass or Gastric Sleeve Surgery were included in the study. A verbal suggestion was made to the CG to increase physical activity, but this suggestion was not taken into consideration. The exercise group participated in a supervised multicomponent exercise program, 3 days a week, nonconsecutively, lasting 60 minutes each, for 11 months, starting 1 month after surgery. All variables were tested with two-way ANOVA test according to the effect of exercises on body weight (BW), fat mass (FM), fat-free mass (FFM) and BMI. After completion of descriptive statistics (mean ± SD), an independent t test was used to examine between-group differences in anthropometric components at baseline. Accordingly, there was no significant difference between the groups at baseline, including age, BW, BMI, FM and FFM ($p>.05$). Both groups experienced significant initial BW and FM loss, but these changes did not differ significantly between groups ($p>0.05$). On the other hand, FFM changes showed significant differences between groups ($p<.05$). Although there was no statistical difference in BW, FM and BMI values of the exercise group and the control group in this study, the positive change in the FFM of the exercise group was found to be significant compared to the control group. This clearly shows the importance of exercise in our study.

Keywords
Bariatric surgery; Exercise; Fat Free Mass; Fat Mass; Obesity

INTRODUCTION

Obesity is becoming an important global health problem, not only in healthcare but also increasingly in the economy (Cawley, 2015). For instance, the estimated cost of obesity in the America (USA) exceeds $ 260.6 billion annually (Cawley et al., 2021). There is increasing evidence that being overweight negatively affects functions like standing, walking, and stabilization of balance (Gonzalez, Gates, & Rosenblatt, 2020; King et al., 2016). It has been known that individuals who are obese or overweight face negative health problems such as diabetes, cancer, hypertension and cardiovascular disease (Guh et al., 2009; Wang, McPherson, Marsh, Gortmaker, & Brown, 2011) depression and other psychological disorders (McElroy et al., 2004). In addition, studies showing that obesity and overweight individuals, together with other diseases caused or accompanied by obesity, increase the rate of morbidity and mortality are increasing day by day (Abdelaal, le Roux, & Docherty, 2017; Flegal, Kit, Orpana, & Graubard, 2013; Lenz, Richter, & Mühlhauser, 2009). The data of the Ministry of Health Nutrition Research and TURDEP-II

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[1]**ORC**ID: 0000-0002-7983-7190 , [2]**ORC**ID: 0000-0003-4965-5502

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(Turkiye Diabetes, Hypertension, Obesity and Endocrinological Diseases Prevalence Study) studies report that 2/3 of adults in Turkey are overweight or obese. The prevalence of metabolic syndrome accompanied by central obesity is monitored in 36.6 % of the Turkish adult population. It is estimated that 3% of the adult population in our country (approximately 2.5 million adults) is morbidly obese (Sabuncu et al., 2018).

Methods such as adequate and balanced nutrition, physical activity, behavioral therapy and pharmacotherapy are the most commonly used methods in the treatment of obesity. If bariatric and metabolic surgery is to be implemented in the treatment of obesity, it is considered in patients with a body mass index (BMI) $\geq$ 40 kg/m^2 or in cases where BMI $\geq$ 35 kg/m^2 is accompanied by cardio metabolic diseases (De Lorenzo et al., 2016). Although it is stated that routine exercise is an important parameter in non-operative obese patients, exercising alone does not provide a significant reduction in body weight (BW) in such patients (Jakicic, 2009). There is limited information that exercise provides additional improvement in patients after bariatric surgery (BS). Still, when it comes to metabolic health, exercise is thought to provide greater improvement than BS (Coen & Goodpaster, 2016). The main reason why little is known about the positive results of exercise after BS is the lack of follow-up studies (Puzziferri et al., 2014).

In light of the above information, current study aims to search whether a supervised, multi-component exercise method can provide additional benefit such as BW, BMI, fat mass (FM) and fat free mas (FFM) after BS.

MATERIALS AND METHODS

Participants

Patients on the waiting list for BS were contacted, written informed consent was given, and a pre-surgical baseline assessment was performed 1 to 3 months prior to BS. Between the ages of 18-65; BMI >35 kg/m^2; Patients referred by a physician for mini gastric bypass (MGB) or Sleeve Gastrectomy (SG) surgery are included. The exclusion criteria were: health condition that prevented participation in exercise; amputation, amenorrhea >3 months, pregnancy or breastfeeding, and revisional bariatric surgery. This study is approved by the Şırnak University Ethics Committee (Approval Number: 2021/55). All participants gave their written informed consent, and our study was carried out following the Helsinki Declaration.

Study Design

Patients received usual medical care after BS, as defined in international guidelines, (Mechanick et al., 2013) including prescribing proton pump inhibitors for the first 2 months postoperatively, multivitamin supplements for the first 6 months, and Ursodeoxycholic Acid for the first 3 months. However, no specific calcium and vitamin D supplements were routinely recommended.

Verbal suggestion to increase physical activity was given to the control group, but it was not observed. In addition to usual medical care, the exercise group participated in a supervised multicomponent exercise program, 3 days a week non-consecutive, lasting 60 minutes each, for 11 months, starting 1 month after surgery. When designing the exercise program, The American College of Sports Medicine (ACSM) exercise recommendations for the obese were considered. (Pescatello, Riebe, & Thompson, 2013). The exercise program was organized as follows: warm-up (5 minutes); moderate-intensity aerobic exercise (25 minutes) resistance exercise (20 minutes) flexibility exercises and cool-down (10 minutes).

Aerobic exercise started at low intensity for the first 2 months (Heart rate reserve (HRR) 50%). Moderate intensity (HRR 50-65%) aerobic exercises were performed at 4, 5 and 6 months and high intensity (HRR 65-85%) aerobic exercises were performed from the end of 6 months. Resistance exercises were organized with 40-55% of 1 repeat of maximum (RM), 2-4 sets and 8-12 reps, with machines or free weights, to work large muscle groups. Flexibility exercises were performed as static, dynamic and/or proprioceptive neuromuscular facilitation (PNF).

Body compositions were measured at regular intervals before surgery, 1, 3, 6, and 12 months after surgery. Ethical approval was obtained from the University Ethics Committee for the current study, numbered 2021/55.

Nutrition Plan

The 1-year nutritionchart of theparticipatingpatients is as follows.

Stage 1: First day after surgery in the hospital	Non-Stop
Stage2 2. and 3. Day after surgery	Water, Tea, Herbal Tea, Protein Smoothie, Ayran, 100% Fruit Juice Diluted with Water
Stage 3 Liquid Nutrition 2 Week For 3–18 days after surgery 60–80 grams of protein everyday.	In Addition To The Liquids Consumed On The Second Day: Lactose Free Milk, Soup, Protein Smoothie, Sugar-Free Pudding, Yogurt, Kefir etc.
Stage4 Soft Foods 2 Week For19-30 day after surgery 60–80 grams of protein daily	Egg, Soft Cheese, Fish, mashed potatoes, ground forms of white meat, soft, ripefruit; Avoid tough peels, skin orseeds, Fresh vegetables cooked to softetc.
Stage5 Regular Solid Diet 1 Month For30-60 days after surgery 60–80 grams of protein daily	Scrambled eggs, omelets, alltypes of cheese, chicken, meatball, legumes etc.
Stage6 Optimal Nutrition Life-long Nutrition Plan	Protein: 60- 80 gram/day Carbohydrate: 40-45%of total energy Planned according to the patient

Anthropometric Measurements

The heights of the volunteers included in the study were calculated with a stadiometer (Holtain, UK), and their weight, skeletal muscle mass, lean mass and body fat percentage were calculated with a body impedance analyzer (A-401 Tanita, Japan).

Data Analysis

After the completion of descriptive statistics (mean ± sd) an independentt-test was used to examine between-group differences in anthropometric components at baseline. All variables, according to the effect of exercises on BW, BMI, FM and FFM was tested with a two-way ANOVA test. All statistical processes were conducted on SPSS program (Ver. 21) and the level of significance was set at 0.05.

RESULTS

Exercise and control groupsbaseline characteristics of pre-interventionare reported in Table 1.There were no significant differences between the groups at baseline, including age, BW, BMI, FM and FFM a result of the independent sample t-test (p>.05).

Table 1. Baseline descriptive characteristics of participants

Variables	Exercise group (n = 29)	Control group (n = 25)	p
Age (yr)	40±10	40.4±9	.280
Weight (kg)	123.5±23.6	123±22	.557
FM (%)	57,6±17.3	56,2±13.4	.267
FFM (%)	62.2±13.1	63.7±16.2	.993
BMI (kg/m^2)	44.6±8.3	44.7±7.4	.360

p<.05 FM: fat mass; FFM: fat free mass; BMI; body mass index

The effects of the intervention on anthropometric measures and body composition are shown in Table 2. Both groups lost a significant amount of initial BW, BMI and FM however, these changes did not significantly differ between groups (p>.05). On the other hand, FFM changes was significantly differ between groups (p<.05).

Table 2. Time-dependent change of body weight and body composition

	Exercise group (n=29)			Control group (n=25)			
	Pre	**6. month**	**12. month**	**Pre**	**6. month**	**12. month**	**P**
Weight	123.5±23.6	88.8±18	79.9±16	123±22	87.8±16.9	79.9±14.5	.827
FM	57,6±17.3	30.1±11	19.5±8.2	56±13.4	29.4±10.4	23.7±10.3	.069
FFM	62.2±13.1	59.4±12.5	60.5±12.2	63.7±16.2	55.2±12.4	52.5±8.5	.001*
BMI	44.6±8.3	31.8±6.5	29.9±6.2	44.7±7.4	31.9±5.7	29±4.9	.992

P<0.05 FM: fat mass; FFM: fat free mass; BMI; body mass index

DISCUSSION

BS is the most effective weight loss method among the interventions against obesity today. In a 2015 study, physicians concluded that they can benefit by directing patients to exercise after BS (Miller, Hale, & Dunlap, 2015). The American Society for Metabolic and Bariatric Surgery (ASMBS) specifically recommends a progressive walking program that includes pre-operative exercise and aerobic and strength exercises lasting 30 minutes or longer per day, starting on the first postoperative day (Petering & Webb, 2009). In some studies with patients who exercised 12-24 months after BS, it was reported that exercise-induced muscle strength and mass increased (Herring et al., 2017; Mundbjerg et al., 2018). In contrast, other studies investigating the effect of various forms of exercise after BS have not observed a significant increase in FFM or a significant decrease in FM (Andre et al., 2021; Bellicha et al., 2022; Daniels et al., 2018; Fagevik Olsén, Wiklund, Sandberg, Lundqvist, & Dean, 2022; Huck, 2015).

The main aim of the current study was to investigate whether exercise has a role in the change of body composition of patients undergoing BS. As a result of the study, there was a significant decrease in the FM and BW of the participants, measured before and 12 months after the BS operation, but no significant difference was found between the groups. On the other hand, the decrease in FFM of the exercise group was less than that of the control group.

Studies indicate that exercise affirmatively affects body composition after sudden weight loss caused by BS. Exercise usually changes body composition by increasing FFM and decreasing FM, not the percentage of total body mass lost after surgery. Relatively longer-term results are needed to evaluate whether the effect of exercise after BS is permanent (Metcalf, Rabkin, Rabkin, Metcalf, & Lehman-Becker, 2005). In the study by Daniels et al., 16 female patients after bariatric surgery were randomly divided into 2 groups and the intervention group underwent 12-week resistance exercise.At the end of the study, the exercise group showed an increase in the amount of strength compared to the control group, but no increase in FFM or muscle cross-sectional area was observed.Daniel et al.stated that the reason why they did not observe a change in FFM may be due to the severe decrease in calorie intake and the insufficient dietary protein necessary to stimulate protein synthesis.However, in the aforementioned study, 12 weeks of resistance exercises may not be sufficient to observe the muscle development of patients after bariatric surgery(Daniels et al., 2018).

In the current study, although there was no statistical difference in the BW, FM and BMI values of the exercise group and the control group, the positive change in FFM of the exercise group was found to be significant compared to the control group. This clearly shows the importance of exercise in our study.

Conclusion

As a result of the current study; It has been observed that the exercise program after obesity surgery is effective in increasing muscle mass but not losing fat mass. The reason why the exercise group did not show more decrease in fat mass then control group may be associated with the strong effect of the surgical intervention. When designing an exercise program, the fact that strength exercises are not progressive and the age group is wide range may limit the generalizability of the study's findings for all patients after bariatric surgery.

Conflict of interest

No conflict of interest is declared by the authors. In addition, no financial support was received.

Ethics Committee

This study is approved by the Şırnak University Ethics Committee (Approval Number: 2021/55).

Author Contributions

Planned by the author: Study Design, Data Collection, Statistical Analysis, Data Interpretation, Manuscript Preparation, Literature Search. Authors have read and agreed to the published version of the manuscript.

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RESEARCH ARTICLE

The Effect of Sport Center Employees' Job and Leisure Satisfaction on Quality of Life

Muhammet VAPUR[1*]

[1]Istanbul Rumeli University, Faculty of Sports Sciences, Department of Recreation, İstanbul / Turkey.
*Corresponding author: mvapur37@gmail.com

Abstract
Many studies have been conducted in the literature that affect the quality of life. However, no study has been found that investigates the impact of job and leisure satisfaction on the quality of life of individuals working in sports centres. Therefore, the study aims to measure the impact of job and leisure satisfaction on the quality of life of individuals working in sports centers. For this purpose, data was collected from 395 people working in sports centers in Istanbul. Demographic information form, job satisfaction scale, leisure time satisfaction scale and quality of life scale were used to collect data. The obtained data were processed into the SPSS 27.0 program and frequency average, standard deviation, skewness, kurtosis, correlation and regression analyzes were performed. As a result of the research, the study shows that job satisfaction and leisure satisfaction of individuals working in sports centers have a positive impact on the quality of life ($p<0.01$). As job satisfaction and leisure satisfaction increases, participants' quality of life is higher. These findings show that measures that can be taken to increase the job and leisure satisfaction of employees in sports centers can positively affect their quality of life. This study may contribute to the development of various strategies that can be done to improve the quality of life of employees in sports centers.

Keywords
Leisure Satisfaction, Job Satisfaction, Quality of Life, Recreation

INTRODUCTION

Sports centres are unique organizations that offer labour-intensive services, bringing together a diverse range of people from managers to frontline staff to produce and deliver sports services to customers (Serarslan, 2005). The employees of sports centres are the backbone of sports service provision. To successfully provide quality sports services, it is crucial to pay more attention to factors influencing the quality of life of the human resources working in this industry.

Most researchers agree that quality of life is multidimensional and lacks a universally accepted definition. The most commonly referenced definition in the literature is the one from the World Health Organization (1995). According to the WHO, quality of life refers to an individual's perceptions of their position in life within the context of their culture, value systems, goals, expectations, standards, and concerns. Quality of life is a subjective evaluation of one's life based on their goals, expectations, culture, and values. This includes physical health, psychological state, independence level, social relationships, personal beliefs, and environmental factors, representing an overall subjective assessment shaped by cultural, social, and environmental contexts (WHOQOL Group, 1995). Other related concepts identified in studies include well-being, utility, life satisfaction, needs fulfillment, empowerment, capacity building, poverty, human poverty, happiness,

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[1]**ORCID:** 0000-0002-3417-2156

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living standards, and development (McGillivray & Clarke, 2006; McGillivray, 2007)

Numerous factors influence the quality of life, including work dissatisfaction, emotional burnout, marital status, education level, organizational communication issues (Yıldırım & Hacıhasanoğlu, 2011), leisure activities (Silverstein & Parker, 2002; Ngai, 2005; Balker & Palmer, 2006; Sevil, 2015; Güven, 2018; Çetiner & Yayla, 2021), life satisfaction (Annak, 2005; Demir et al, 2021), emotional well-being, relationships, material well-being, personal growth, physical health, self-determination, social rights, and personal rights (Schalock & Verdugo, 2002; Schalock, 2004). Among the many factors impacting quality of life, this study focuses specifically on job and leisure satisfaction for working individuals.

Working life occupies a substantial and important part of daily life for most people. Job satisfaction or dissatisfaction significantly impacts individuals (Ertürk & Keçecioğlu, 2012). This has led to various definitions of job satisfaction. Davis and Nestrom (1985) define it as the satisfaction or dissatisfaction employees feel about their work, arguing that job satisfaction increases when job characteristics meet worker expectations. Spector (1997:3) defines it as the degree to which people enjoy their job. Barutçugil (2004:389) defines it as the feeling that one's work and what one obtains align with their needs and values. These definitions are generally based on foundational motivation theories like Maslow's hierarchy of needs and Herzberg's two-factor model (Maslow, 1943; Herzberg, 1966).

A strong relationship exists between job satisfaction and quality of life, as job satisfaction has been shown to greatly impact overall quality of life (Teles et al., 2014; Ioannou et al., 2015). Various studies on nurses demonstrate a positive correlation between job satisfaction and quality of life (Cimete et al., 2003; İnci, 2008; Çelik & Kılıç, 2019; Joodaki et al., 2019; Kiliç Barmanpek et al., 2022). A study by Şangar (2016) on academics also found that increased job satisfaction improves quality of life. While prior studies have examined this relationship across occupational groups, no studies were found examining sports center employees specifically. Therefore, the following hypothesis was formed to test this relationship in the context of sports center staff:

H_1: Job satisfaction of sports center employees has a significant and positive effect on their quality of life.

Recreation in leisure time is a phenomenon that includes various activities (Dere, 2023: 34). The satisfaction obtained in recreational activities can be expressed as leisure satisfaction. Beard and Ragheb (1980) define leisure satisfaction as "the positive perceptions or feelings an individual gains from participating in leisure activities and choices." Francken and van Raaij (1981) explained it as a concept judged against standards like individual expectations based on past experiences, personal achievements, or perceived satisfaction levels of others in leisure activities. Meeting expectations brings satisfaction, while unmet expectations cause dissatisfaction. Mannell and Kleiber (1997) suggested leisure satisfaction can be motivation-based (need fulfilment) or appraisal-based (evaluation of satisfaction). To measure different facets of leisure satisfaction, Beard and Ragheb (1980) developed a scale assessing the extent leisure time meets certain needs across six dimensions: psychological, educational, social, relaxation, physiological and aesthetic.

Making effective use of leisure time is important for overall health and well-being. Thus, the satisfaction obtained from leisure activities significantly impacts quality of life (London et al., 1977; Lewis et al., 2001; Ngai, 2005; Spiers & Walker, 2009; Liang et al., 2012; Sevil, 2015; Eruzun, 2017; Tokay Argan & Mersin, 2020). For example, Ngai (2005) found a positive relationship between leisure satisfaction and quality of life among Macau residents, highlighting the importance of recreational activities. In a study on individuals living in Ningbo City, Zhou et al. (2021) found that leisure satisfaction affects all dimensions of quality of life. Kuo (2011), also demonstrated positive links between leisure satisfaction and quality of life dimensions. Tokay Argan and Mersin (2020) conducted a study with 498 healthcare professionals working in the Central Anatolia Region of Turkey. Eruzun (2017), in research on female private sports centre members, determined a positive relationship between leisure satisfaction and quality of life. While prior research has examined this relationship across various samples, no studies have specifically analyzed sports center employees. Therefore, the following hypotheses were developed to test the correlation between

leisure satisfaction and quality of life in this population:

H_2: Leisure satisfaction of sport centre employees has a significant and positive effect on the quality of life.

$H_{2.1}$: Psychological satisfaction of sport centre employees has a significant and positive effect on quality of life.

$H_{2.2}$: Educational satisfaction of sports centre employees has a significant and positive effect on quality of life.

$H_{2.3}$: Social satisfaction of sports centre employees has a significant and positive effect on the quality of life.

$H_{2.4}$: Relaxation satisfaction of sports centre employees has a significant and positive effect on quality of life.

$H_{2.5}$: Physical satisfaction of sports centre employees has a significant and positive effect on the quality of life.

$H_{2.6}$: Aesthetic satisfaction of sports centre employees has a significant and positive effect on the quality of life.

The model of the research was created based on the variables used in the research as a result of the literature review. In the research, a model was created to examine the effect of work and leisure satisfaction of sports center staff on their quality of life. In the model study, the relational survey method and structural equation modeling method, which are among the quantitative research methods, were used.

Figüre 1 Research Model

MATERIALS AND METHODS

Participants

The study population comprises individuals working in private sports centres in Istanbul. As of 2023, Istanbul has 1,345 private physical education and sports facilities (Istanbul GSB, 2023). However, no exact data exists on private sports centre employees in the province. Therefore, to provide research flexibility, a significance level of α=0.05 was set for sampling errors, and required sample sizes were calculated for different population sizes. Consequently, the sample size was determined as n=384 (Çokluk et al., 2010). According to the principles of the Declaration of Helsinki, ethical clearance and informed consent were obtained from all participants before the study.Convenience sampling, a random sampling method, was utilized for sampling participants. Data was collected via questionnaires, a quantitative method. An online survey was used to gather data from 395 employees.

Data Collection Tools

The questionnaire comprises four sections: personal information, job satisfaction, leisure satisfaction, and quality of life scale.

Personal Information Form

Demographic information such as age, marital status, educational status, income status, working period and working position were collected relevant to the study purpose.

Job Satisfaction Scale

It was developed by Brayfield & Rothe (1951) and shortened by Judge et al. (1998). The validity and reliability study of the Turkish version of the scale was conducted by Başol & Çömlekçi (2020). The scale has a structure consisting of 5 items and a single sub-dimension. The internal consistency of the scale was calculated as 0.929. The items are organized as a 5-point Likert type (1= Strongly Agree, 5= Strongly Disagree). The total internal reliability coefficient of the data obtained for this study was calculated as 0.89. The reference range of Cronbach's alpha coefficient of the scale is quite reliable (Altunışık et al., 2010).

Leisure Satisfaction Scale

The 24-item Leisure Satisfaction Scale (LSS) was originally developed in long form by Beard & Ragheb (1980) and later reorganized into a short form in 1992. It was adapted into Turkish by Gökçe & Orhan (2011). The scale comprises six subdimensions across 24 statements:

psychological satisfaction (items 1-4), educational physical satisfaction (13-16), relaxation satisfaction (17, 20), and aesthetic satisfaction (21-24). Items are 5-point Likert-type (1= Strongly Agree, 5= Strongly Disagree). For current research, the total internal reliability coefficient was 0.96, within the quite reliable reference range for Cronbach's alpha per Altunışık et al. (2010).

Individual Quality of Life Scale

Developed by the International Wellbeing Group (2006) based on Gullone & Cummins' (1999) Comprehensive Quality of Life Scale, this 8-item scale focuses on different life areas with a 0-10 scale. The validity and reliability of the Turkish version were established by Şimşek (2011) with a 0.87 reliability coefficient. For the current study, the total internal reliability coefficient was 0.88, within the quite reliable Cronbach's alpha range per Altunışık et al. (2010).

Table 1: Participants' Demographics

Variables		f	%
Gender	Male	218	55.2
	Female	177	44.8
Age	18-23	48	12.2
	24-29	295	74.7
	30-35	17	4.3
	36 years and older	35	8.9
Marital Status	Married	110	27.8
	Single	285	72.2
Education Level	High School	32	8.1
	Associate degree	48	12.2
	Undergraate	281	71.1
	Postgradue	34	8.6
Income Status	0-11.500 TL	214	54.2
	11.501-23.000 TL	130	32.9
	23.001-34.500 TL	34	8.6
	34.501 TL and above	17	4.3
Duration of employment	1-2	57	14.4
	3-4	203	51.4
	5-6	52	13.2
	7-8	54	13.7
	9 years and above	29	7.3
Working position	Sales-marketing	128	32.4
	Consultatin	118	29.9
	Coach	104	26.3
	Administror	36	9.1
	Other personnel	9	2.3

satisfaction (5-8), social satisfaction (9-12), ***Statistical Analysi***

The collected data were analyzed in the SPSS 27.0 statistical program. Descriptive statistics including frequencies, percentages, means, and standard deviations were calculated for the demographic factors and scale scores. Skewness and kurtosis values were examined to determine normality of the scale score distributions. Pearson correlation analysis and multiple linear regression analysis were conducted to test the study hypotheses.

RESULTS

Demographic Information

The data presented herein provides insights into the demographic distribution of the employees who participated in the study.

Out of the participant employees, 55.2% were male and 44.8% were female. Considering the age distribution, 12.2% are between the ages of 18-23, 74.7% are between the ages of 24-29, 4.3% are between the ages of 30-35 and 8.9% are 36 years and above. Regarding the marital status of the employees, 27.8% are married and 72.2% are single. In terms of education level, 8.1% are high school graduates, 12.2% are associate degree graduates, 71.1% are undergraduate and 8.6% are postgraduate graduates. In terms of the income distribution, 52.2% of the employees earn 0-11,500 TL, 32.9% earn 11,500-23,000 TL, 8.6% earn23,001-34,500 TL and 4.3% earn 34,501 TL and above. Considering the seniority of the employees, 14.4% of them have 1-2 years of experience, 51.4% of them 3-4 years, 13.2% of them 5-6 years, 13.7% of them 7-8 years and 7.3% of them 9 or more than 9 years of experience. Regarding their working positions, 32.4% are sales-marketing, 29.9% are consultants, 26.3% are coaches, 9.1% are managers and 2.3% are other personnel.

Mean, Standard Deviation and Normality Analyses

Table 2: Mean, Standard Deviation and Normality Analyses of Job Satisfaction, Leisure Time Satisfaction, and Quality of Life

Variables	N	x̄	Ss	Skewness	Kurtosis
Job Satisfaction	395	3.581	1.815	-0.342	-0.489
Leisure Satisfaction	395	3.728	0.970	-.463	.323
Psychological Satisfaction	395	3.461	0.940	-.430	-.025
Educational Satisfaction	395	3.583	0.928	-.416	-.258
Social Satisfaction	395	3.570	0.925	-.378	-.325
Physical Satisfaction	395	3.874	0.913	-.634	.047
Relaxation Satisfaction	395	3.309	0.956	-.338	-.289
Aesthetic Satisfaction	395	3.576	0.925	-.471	.098
Quality of Life	395	6.324	2.644	-0.271	-0.579

As Table 2 indicates, the mean job satisfaction, leisure satisfaction, psychological satisfaction, educational satisfaction, social satisfaction, social satisfaction, social satisfaction, physical satisfaction, relaxation satisfaction, aesthetic satisfaction, relaxation satisfaction, aesthetic satisfaction and quality of life of sports centre employees were calculated as 3.581, 3.728, 3.461, 3.583, 3.583, 3.570, 3.874, 3.309, 3.576 and 6.324, respectively. Skewness and kurtosis values are between ± 1.5. According to Tabachnick and Fidell (2013), skewness and kurtosis values between -1.5 and +1.5 indicate a largely normal distribution.

Table 3: Results of Pearson Correlation Analyses

Variables	N	R	P
Job Satisfaction	395	0.346	.000
Quality of Life			
Leisure Satisfaction	395	0.575	.000
Quality of Life			
Psychological Satisfaction	395	0.572	.000
Quality of Life			
Educational Satisfaction	395	0.512	.000
Quality of Life			
Social Satisfaction	395	0.514	.000
Quality of Life			
Physical Satisfaction	395	0.481	.000
Quality of Life			
Relaxation Satisfaction	395	0.485	.000
Quality of Life			
Aesthetic Satisfaction	395	0.538	.000
Quality of Life			

According to the result of the Pearson correlation test conducted to determine the relationship between job satisfaction and quality of life level, there is a moderate, positive linear relationship between job satisfaction and quality of life (r=.346, p=.000). The Pearson correlation test conducted to determine the relationship between the level of leisure time satisfaction and quality of life of sports centre employees shows that there is a moderate, positive linear relationship between leisure time satisfaction and quality of life (r=.575, p=.000). The Pearson correlation test conducted to determine the relationship between psychological satisfaction, which is among the sub-dimensions of leisure satisfaction, and quality of life, displays there is a moderate, positive linear relationship between psychological satisfaction and quality of life (r=.572, p=.000). The Pearson correlation test conducted to determine the relationship between educational satisfaction, which is among the sub-dimensions of leisure satisfaction, and quality of life, reveals that there is a moderate, positive linear relationship between educational satisfaction and quality of life (r=.512, p=.000).

The Pearson correlation test conducted to determine the relationship between social satisfaction, which is among the sub-dimensions of leisure satisfaction, and quality of life, indicate that there is a moderate, positive linear relationship between social satisfaction and quality of life (r=.514, p=.000). The Pearson correlation test conducted to determine the relationship between physical satisfaction, which is among the sub-dimensions of leisure satisfaction, and quality of life, shows that there is a moderate, positive linear relationship between physical satisfaction and quality of life (r=.481, p=.000). The Pearson correlation test conducted to determine the relationship between relaxation satisfaction, which is among the sub-dimensions of leisure satisfaction, and quality of life, displays that there is a moderate, positive linear relationship between relaxation satisfaction and quality of life (r=.485, p=.000).

The Pearson correlation test conducted to determine the relationship between aesthetic satisfaction, which is among the sub-dimensions of leisure satisfaction, and quality of life, reveals that there is a moderate, positive linear relationship between aesthetic satisfaction and quality of life (r=.538, p=.000). According to the Pearson correlation analysis, a relationship between 0-0.29 is considered weak, 0.30-0.64 is considered moderate, 0.65-0.84 is considered strong, and 0.85-1 is considered very strong (Ural & Kılıç, 2018).

Table 4: Results of Simple Linear Regression Analysis

Independent Variables	Dependent Variable	R	R^2	F	p	β	t	p
Job Satisfaction	Quality of Life	0.346	.120	53.353	.000	.346	7.304	.000
Leisure Satisfaction		0.575	.331	194.025	.000	.575	26.196	.000
Psychological Satisfaction		0.572	.293	163.082	.000	.542	12.770	.000
Educational Satisfaction		0.512	.262	139.510	.000	.512	11.811	.000
Social Satisfaction		0.514	.264	140.919	.000	.514	11.871	.000
Relaxation Satisfaction		0.481	.232	118.592	.000	.481	10.890	.000
Physical Satisfaction		0.485	.189	91.527	.000	.435	9.567	.000
Aesthetic Satisfaction		0.538	.290	160.369	.000	.538	12.664	.000

Simple linear regression analysis was performed to predict quality of life according to job satisfaction. Job satisfaction is a predictor of quality of life (F (1, 393) =53.353, p<.001). Job satisfaction predicts 12 per cent of the variance in quality of life. When the aesthetic satisfaction of sports centre employees increases by one unit, quality of life will increase by .346 units. According to this result, hypothesis H_1 is accepted. Simple linear regression analysis was performed to predict quality of life according to leisure satisfaction. Leisure satisfaction is a predictor of quality of life (F (1, 393) =194.025, p<.001). Leisure satisfaction predicts 33 per cent of the

variance in quality of life. When leisure satisfaction of sports centre employees increases by one unit, quality of life will increase by .575 units. According to this result, hypothesis H_2 is accepted. Simple linear regression analysis was performed to predict quality of life according to psychological satisfaction, a sub-dimension of leisure satisfaction. Psychological satisfaction is a predictor of quality of life (F (1, 393) =163.082, p<.001). Psychological satisfaction predicts 29 per cent of the variance in quality of life. When the psychological satisfaction of sports centre employees increases by one unit, quality of life will increase by .542 units. According to this result, hypothesis $H_{2.1}$ is accepted.

Simple linear regression analysis was performed to predict quality of life according to educational satisfaction, which is a sub-dimension of leisure satisfaction. Educational satisfaction is a predictor of quality of life (F (1, 393) =139.510, p<.001). Educational satisfaction predicts 26 per cent of the variance in quality of life. When the educational satisfaction of sports centre employees increases by one unit, their quality of life will increase by .512 units. According to this result, hypothesis $H_{2.2}$ is accepted. Simple linear regression analysis was performed to predict quality of life according to social satisfaction, a sub-dimension of leisure satisfaction. Social satisfaction is a predictor of quality of life (F (1, 393) =140.919, p<.001).

Social satisfaction predicts 26 per cent of the variance in quality of life. When the social satisfaction of sports centre employees increases by one unit, quality of life will increase by .514 units. According to this result, hypothesis $H_{2.3}$ is accepted. Simple linear regression analysis was performed to predict quality of life according to relaxation satisfaction, which is a sub-dimension of leisure satisfaction. Physical satisfaction is a predictor of quality of life (F (1, 393) =118.592, p<.001). Physical satisfaction predicts 23 per cent of the variance in quality of life. When the physical satisfaction of sports centre employees increases by one unit, quality of life will increase by .481 units. According to this result, hypothesis $H_{2.4}$ is accepted.

Simple linear regression analysis was performed to predict quality of life according to physical satisfaction, a sub-dimension of leisure satisfaction. Relaxation satisfaction is a predictor of quality of life (F (1, 393) =91.527, p<.001). Relaxation satisfaction predicts 19 per cent of the variance in quality of life. When the relaxation satisfaction of sports centre employees increases by one unit, quality of life will increase by .435 units. According to this result, hypothesis $H_{2.5}$ is accepted.

Simple linear regression analysis was performed to predict quality of life according to aesthetic satisfaction, which is a sub-dimension of leisure satisfaction. Aesthetic satisfaction is a predictor of quality of life (F (1, 393) =160.369, p<.001). Aesthetic satisfaction predicts 29 per cent of the variance in quality of life. When the aesthetic satisfaction of sports centre employees increases by one unit, quality of life will increase by .538 units. According to this result, hypothesis $H_{2.6}$ is accepted.

DISCUSSION and CONCLUSION

This study aims to investigate the effect of job and leisure satisfactions of sports center employees on their quality of life. The sample group of the study consists of individuals working in sports businesses operating in the province of Istanbul. Data were collected from 395 employees using a survey form consisting of a demographic information form, job satisfaction scale, leisure satisfaction scale, and quality of life scale. The collected data were analyzed in the SPSS 27.0 statistical program. Frequency, percentage, mean, and standard deviation values were used to perform descriptive statistics of demographic factors and scale scores. Skewness and kurtosis values were examined to determine the normal distribution of the scales. Pearson correlation analysis and multiple linear regression analysis were conducted to test the hypotheses.

The results showed that individuals working in sports centers have job and leisure satisfaction scores above the scale average and their quality of life is at a good level. It can be said that the employees enjoy their jobs, have high motivation levels, and are generally happy at work. Additionally, they make good use of their time outside of work, enjoy recreational activities, and are psychologically and socially satisfied. Furthermore, it has been identified that the employees have high levels of physical, mental, emotional, and social well-being and lead happy and healthy lives. The research findings indicate that job satisfaction positively affects quality of

life. Employees enjoying and taking pleasure in their work, being happy and satisfied at the workplace, have a positive effect on the quality of life rawing on the findings of the study, it can be averred that job satisfaction positively affects quality of life. The fact that employees love and enjoy their jobs and are happy and satisfied at work positively affects their quality of life (β:.346). There are studies in the literature supporting this result, which is supported by the studies in the relevant literature (Cimete et al., 2003; İnci, 2008; Çelik & Kılıç, 2019; Joodaki el al., 2019; Kiliç Barmanpek et al., 2022).

Leisure satisfaction positively affects the quality of life (β: .575). Psychological, educational, social, physical, relaxation and aesthetic satisfaction obtained from recreational activities positively increase the quality of life. Studies in the literature support this result (London et al., 1977; Lewis et al., 2001; Ngai, 2004; Spiers & Walker, 2009; Liang et al., 2012; Sevil, 2015; Eruzun, 2017; Tokay Argan & Mersin, 2020; Vapur & Yavuz, 2022). Psychological satisfaction, which is the sub-dimension of leisure participation, positively affects the quality of life (β: .542). The fact that the recreational activities that employees participate in their leisure time are interesting, increase self-confidence and give a sense of achievement positively supports quality of life.

Educational satisfaction, which is the sub-dimension of leisure participation, positively affects the quality of life (β: .512). It can be claimed that employees' quality of life is enhanced by learning new things, increasing their personal development, and gaining knowledge about new people through the recreational activities they participate in. Social satisfaction, which is the sub-dimension of leisure participation, positively affects quality of life (β: .514). The satisfaction derived from employees making new friendships and meeting other people participating in the same recreational activities enhances the quality of life in a positive direction. Physical satisfaction, which is the sub-dimension of leisure time participation, positively affects the quality of life (β: .481). Recreational activities that employees participate in during their leisure time may improve quality of life as they help to improve physical fitness, renew themselves physically, and stay healthy. Relaxation satisfaction, a leisure participation subdimension, positively impacts the quality of life (β: .435). Stress reduction, emotional well-being, and physical fitness from leisure activities support quality of life. Aesthetic satisfaction, another leisure subdimension, also positively affects the quality of life (β: .538). Aesthetically pleasing, well-designed recreational settings increase quality of life.

Conflict of Interest

No conflict of interest is declared by the authors. In addition, no financial support was received.

Ethics Committee

The Istanbul Rumeli University Ethics Commission approved the study procedures and ethics in their 23/08/2023 meeting, decision number 2023/08.

Author Contributions

Study Design, Data Collection, Statistical Analysis, Data Interpretation, Manuscript Preparation, Final review and editing, performed by the author.

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RESEARCH ARTICLE

The Effect of Volleyball Training on Trait Anxiety Levels of 9-12 Ages Female Students

Levent GÖRÜN[1*], Rümeysa ALPER[2] and Barış YILMAZ[3]

[1,2,3]Duzce University, Faculty of Sports Sciences, Physical Education Department, Düzce / Turkey
*Corresponding author: leventgorun@duzce.edu.tr

Abstract
The aim of this study is to determine the impact of volleyball education on the levels of trait anxiety of 9-12-year-old female students. The sample of the study is a group of 9-12-year-old girls from the Düzce Volleyball Youth and Sports Club in 2021-2022, who have just begun the sport. In total, 37 female students volunteered to participate in the study. This study is the single group pretest-posttest model, which is one of the pre-experimental models. As a data collection tool, trait anxiety Scale (CKDSE) is used developed by Spielberger (1973) to measure individual differences in children's anxiety and is the lower scale of children's State-constant anxiety inventory. As an analysis method, the Wilcoxon Signed Ranks Test was used to compare two associated samples. When the findings are analyzed, it is understood that there is a significant difference between the pre-test scores for trait anxiety and the final test scores for trait anxiety for girls attending volleyball training ($p<.05$). The results of the study are important to guide families and coaches.

Keywords
Trait Anxiety, Volleyball, Anxiety

INTRODUCTION

Anxiety can be defined as "a state of expectation about the future that upsets and bores people, a state of excitement mixed with a sense of insecurity" (Oktay & Yıldız, 2018). In addition to this definition, it can also be defined as "an emotion experienced in the face of the possibility of danger arising from the outside world or any situation that is perceived and interpreted as dangerous by the person"(Alisinanoğlu & Ulutaş, 2000).

Anxiety is a situation in which stimuli that do not normally cause fear cause various fear reactions. In other words, they are the feelings felt for a situation that has not already happened or will not happen (Köknel, 1990; as cited in İkizler, 1993). As the reaction to situations that cause anxiety or are perceived as a threat becomes chronic, the emotion we call constant anxiety emerges. (Öner, 1994; as cited in Öztürk, 2019).

Trait anxiety is an aspect and predisposition of personality. A person with trait anxiety will react more intensely to momentary stressful situations than someone who is not (Ercan, 2013). Individuals with high trait anxiety experience higher state anxiety in challenging competitions or similar activities that require performance (Weinberg & Gould, 2019). In a study in which elite team athletes participated, it was concluded that there was a negative significant relationship between trait anxiety and self-actualization behavior (Mirzeoğlu ve Çetinkanat, 2005).

Anxiety is one of the psychological factors in athletes. The level of anxiety can negatively affect the outcome of the competition or performance (Başer, 1998; Türksoy et al., 2012).

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[1]**ORCID:** 0000-0003-1142-3167 , [2]**ORCID:** 0000-0003-1261-3835, [3]**ORCID:** 0000-0002-1221-8782

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Excessive anxiety can cause athletes to forget some movements that they know very well and that they perform many times in training, as well as cause confusion in their emotions and make some negative movements (Gümüş, 2002). Anxiety is a serious condition that can occur in sports matches, and it is possible to prevent anxiety and increase performance with the psychological support to be given to the athlete (Sopa, 2021). According to a study in which active volleyball players between the ages of 11-13 participated; It has been revealed that the ability of athletes to cope with anxiety has a positive effect on their physical performance. In this context, it is thought that the exercise programs of the athletes as well as the training for coping with anxiety will positively affect their performance of the athletes. (Akel & Akı, 2020).

In this study, trait anxiety levels of female students in the group of students who are new to volleyball and the changes in these anxiety levels through volleyball training were examined. In the literature, there are many studies investigating the effects of volleyball training on physical properties such as physical fitness (Ersöz, Mitat, Koz, Sunay, & Gündüz, 1996), hematological and biochemical parameters (Günay, Çelik, Aksu, & Çoksevim, 2011) or motor skills (Çitak, 2019). However, it has been observed that studies addressing the psychological effects of volleyball are quite rare. This research aims to examine the effects of volleyball training given to 9-12-year-old girls on their trait anxiety levels and discuss the results in light of the literature and offer useful suggestions. The findings obtained as a result of the study are important in terms of guiding families and coaches

MATERIALS AND METHODS

This study, it is aimed to reveal the effect of volleyball training on trait anxiety levels of 9-12-year-old female students. This study is in the single-group pretest-posttest model, which is one of the pre-experimental models. In this model, measurements are made both before and after the experiment. The argument is applied to the selected group. The effect of the application on the dependent variable is examined (Karasar, 2020).

In this context, volleyball training was given to 37 female students aged 9-12, who are new to volleyball, at Düzce Volleyball Youth and Sports Club, for 12 weeks. These training were carried out under the leadership of the 3rd level volleyball coach. The training was planned and implemented as 60 minutes, 2 days a week. Training practices were carried out in 3 stages. In the first stage, warm-up practices (stretching, jogging, ball pulling, and educational games) were made.

The second stage consists of the movements used in the basic techniques of volleyball. At this stage, the cuff pass basic position movements were explained conceptually and simply applied. In addition, gliding steps, ball picks, cuff pass on the bench, standing cuff pass, cuff pass on bosuball, cuff pass by running back and forth, cross cuff pass, control cuff pass practices, finger pass ball catch, opposing ball with finger pass in a controlled manner, finger pass studies on the wall, games including basic finger pass in the educational game were carried out.

In the third stage, educational games were played, which did not include competition and elimination, and where the participation of children was at the forefront. At the end of the educational games, the stretching movements and the evaluation of the training process were completed.

The training programs are designed in accordance with the principles from easy to difficult, from simple to complex, and from concrete to abstract. In addition, parents were not allowed to watch the training so that the children would feel more comfortable and free during the training sessions and their performance would not be affected.

This study was approved by Duzce University Scientific Research And Publication Ethics Committee (decision dated 31/03/2022 and numbered E- -78187535-640-155622). Necessary permissions were obtained from the scale owner for the use of the scale. Since the students were underage, parent consent forms were prepared and necessary permissions were obtained from the parents of the students who could participate in the research. It has been observed that the same scale has been used safely in many studies (Turan Cebeci, 2009; Deniz, Yorgancı, & Özgüven, 2009; Karakaya, Coşkun & Ağaoğlu, 2006).

Participants

The universe of the research consists of 40 students who are in the 9-12 age group of Düzce Volleyball Youth and Sports Club in the year 2021-2022 and who have just started volleyball. The sample of the research consists of 9-12 age

group female students who are new to volleyball and who are in Düzce Volleyball Youth and Sports Club in 2021-2022. A total of 37 female students voluntarily participated in the research. Demographic information and percentiles of the participants are given in the table below.

Table 1. Descriptive statistics of participants

Variables		F	%
School	Private School	18	48,6
	Public School	19	51,4
	Total	37	100,0
Number of Siblings	One Sibling	14	37,8
	Two Siblings	17	45,9
	Three Siblings	6	16,2
	Total	37	100,0

When the Table 1 is examined, it is seen that 48.6% of the participants were educated in a private school and 54.4% in a public school. It is understood that 37.8% had one sibling, 45.9% had two siblings, and 16.2% had three siblings.

Instruments and Data Collectionable

The Trait Anxiety Inventory (TCSE), a subscale of the State-Trait Anxiety Inventory in Children, developed by Spielberger (1973) to measure the individual differences in children's anxiety susceptibility, was used as a data collection tool in the study (Özusta, 1995). The Turkish validity and reliability of The Trait Anxiety Inventory (TCSE) were done by Özusta (1995). The lowest score that can be obtained from the scale is 20, and the highest score is 60. A high score on the scale indicates a high level of trait anxiety.

Analysis of Data

After data entry, trait anxiety pretest and posttest total scores were calculated. A normality test was performed to check the normality of the distributions of the data. As a result of the normality test, it was understood that the skewness and kurtosis values in the pretest scores were within +/-1 limits, but outside the +/-1 values in the posttest scores. (Skewness: 2,167; Kurtosis: 5,566). It was deemed appropriate to perform nonparametric tests when the skewness and kurtosis values were not within the limits of +/-1(Büyüköztürk, 2017). Wilcoxon signed-rank test was used to compare two related samples from nonparametric tests. SPSS 22.0 package program was used for the analysis of the obtained data.

Table 2. Skewness and kurtosis values of the scale results

Scales	N	Sd	Skewness	Kurtosis
Pretest Total Score	37	5.93	.747	.526
Posttest Total Score	37	4.81	2.167	5.566

RESULTS

Table 3. Wilcoxon Signed Ranks Test Results of Trait Anxiety Pretest and Posttest Mean Scores

PRETEST-POSTTEST	N	Mean Rank	Sum of Ranks	Z	p
Negative Ranks	23	17.37	399.50	-3.438	.001*
Pozitive Ranks	7	9.36	65.50		
Ties	7				

*p<.01

When the results in Table 3 are examined, it is understood that there is a significant difference between the trait anxiety pretest scores and trait anxiety posttest scores of the girls participating in volleyball training. Based on this finding, it can be said that volleyball training reduces the trait anxiety levels of girls. (p<.05).

DISCUSSION

As a result of our research, it is understood that the trait anxiety levels of children decreased through volleyball training. This result may be due to the fact that volleyball is a sport that especially girls are interested in (Rokita, 2005; Ściślak, Rokita & Popowczak, 2013). It is thought that children's education in an area they are interested in and having a good time affects their trait anxiety levels positively. It has been concluded that the fact that the volleyball training is carried out in the company of a 3rd-level senior head coach who knows the development level of the children and prepares the program as an expert on this subject also affects this result. In addition, it is thought that the program has a positive effect on the level of anxiety due to factors such as the lack of an alternative that triggers competition, the absence of loss anxiety in children, the creation of a comfortable process in which children are not worried about making mistakes in the training environment, the absence of parents during training and not watching the children.

When the literature was examined, studies supporting our findings were found. As a result of a study, it was found that the trait anxiety levels of secondary school students who participated in badminton training for 12 weeks decreased significantly (Efek & Eryiğit, 2022). In another study, the depression and anxiety levels of individuals who participated in regular volleyball activities were positively affected compared to those who participated in irregular recreational activities (Vaccaro et al., 2021).

When the studies conducted in different branches are examined, it is understood that the findings obtained are in different directions. In a study, the state and trait anxiety levels of children aged 9-13 who are actively engaged in swimming and children who are not actively involved in sports were compared. According to the results of the study, trait anxiety levels of children who are actively engaged in swimming sports were found to be significantly higher (Karakaya, Coşkun & Ağaoğlu, 2006). According to the results of a study examining the state and trait anxiety levels of taekwondo players before the competition, it was found that the state anxiety levels of the athletes were high and their trait anxiety levels were low (Öntürk, İmamoğlu & Karacabey, 2019).

Conclusion

As a result, it was revealed that volleyball training had a positive effect on the trait anxiety levels of girls aged 9-12. In addition to girls, the effect of volleyball training on the trait anxiety levels of boys and the effect of volleyball training on trait anxiety levels of individuals in different age groups can be examined. In addition, research can be conducted on the effects of training given in different sports branches on the anxiety levels of individuals.

Conflict of interest

There is no conflict of interest between authors related to the publication of this article.

Ethical approval

This study was approved by Duzce University Scientific Research And Publication Ethics Committee (decision dated 31/03/2022 and numbered E- -78187535-640-155622).

Author Contributions

Study Design, LG, RA; Data Collection LG; Statistical Analysis, RA; Data Interpretation, RA, LG, BY; Manuscript Preparation, LG, RA, BY; Literature Search, RA, BY. All authors have read and agreed to the published version of the manuscript.

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RESEARCH ARTICLE

Relationship of the Leadership Styles of Sports Business Managers and Their Levels of Crisis Management

Harun AYAR[1*] and Ebru BARUT[2]

[1]Istanbul Gelisim University, College of Physical Education and Sports, Recreation, Istanbul / Türkiye
[2] Ministry of Youth and Sports, Swimming Coaching, Istanbul / Türkiye
Corresponding author: hayar@gelisim.edu.tr

Abstract
The purpose of this study was to investigate the correlations between sports managers' levels of crisis management and their leadership styles. Additionally, it was investigated whether managerial traits including age, gender, marital status, and length of employment affect the managers' leadership and crisis management capacities. The research's target population consists of in private and public organizations people managing sports in Istanbul in 2023. Among quantitative research techniques, the relational scanning model was used for this study. The scanning strategy in the relational scanning model tries to identify the presence of co-variation between two or more variables. The convenience sampling method was used to select 212 people from the identified universe who willingly agreed to take part in the study. An online data collecting instrument that included a personal information form, a self-leadership scale, and a crisis management scale was used to gather data for the study. On a computer, the collected data was examined using the statistical program SPSS 22.0. Correlation analysis was used to look at the connections between sports managers' leadership philosophies and how well they handle crises. The significance level for statistical procedures was set at 0.05. The study found that while sports managers' crisis management is at a moderate level, their leadership styles are displayed at a high level. Only two of the eight leadership attributes examined in the study were shown to have an effect on crisis management: setting self-reminders and focusing on intrinsic rewards p<0,05. It was shown that these dimensions increased crisis management by 51.3%.

Keywords
Sports, Crisis Management, Sports Management, Leader Management, Leadership Models

INTRODUCTION

States and societies interact; in today's world, where economic, social, sporting, and cultural interactions are inevitable, the structures of institutions and organizations providing goods and services can become complex over time.

Due to the rapid development of technology, new needs arise, and consequently, new demands are formed. In addition to the demand for commodities, various products, tools, etc., there is also an increasing demand to improve living standards so that employees can live under better conditions, as well as to enhance their personal rights. To meet these needs, public or private institutions and organizations in the relevant sectors need to develop various strategies, taking competition into consideration. The proposed strategy should be analyzed sufficiently, and the process should be managed appropriately in the event of a crisis. Managers with high self-confidence and the ability to make timely and appropriate decisions should be trained, and those with this ability should be given opportunities to manage, guide, and lead (Atılgan ve Kaplan 2018).

Within the framework of technology and interactivity, crises such as natural disasters and economic downturns that happen anywhere

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[1]**ORCID:** 0000-0002-7123-8695 , [2]**ORCID:** 0000-0004-6007-4922

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globally have an impact on all sectors, including social, cultural, and sports. When dealing with a crisis, it's crucial in crisis management to navigate the situation with minimal losses, derive lessons from the process, and plan for the future. Sports, in contemporary times, serve as a benchmark for advancement and prestige. A crisis in sports management generally causes sports organizations to lose their value and prestige. Sports managers should thoroughly assess the past and establish a decision-making mechanism through strategic evaluation (Atılgan & Kaplan 2018).

The impact of sports managers' leadership styles on their levels of crisis management has become a focal point in both academic and applied research in recent years. The dynamic and constantly evolving nature of the sports sector necessitates that sports managers deal with a wide array of complex challenges. Many of these issues can be unexpected situations and crises. From this perspective, there are several factors determining the effectiveness of sports managers in crisis management, with perhaps their leadership styles being the most significant (Yıldız, 2022).

Leadership is a process that ensures an organization achieves its objectives. In this process, leaders engage with individuals and groups, coordinating and guiding their activities. Sports managers can utilize various theories and models to comprehend the effects of their leadership styles and implement them effectively. The leadership styles of managers enable them to handle various situations and challenges. In crisis situations, the leadership styles of managers are particularly crucial as they determine their ability to manage and resolve crises.

The ability to respond to a crisis and manage the post-crisis recovery process is a significant indicator of the success of sports managers. Hence, understanding the impact of sports managers' leadership styles on their levels of crisis management is crucial. Different leadership styles can elicit varied responses to various crisis types and situations, ultimately influencing the overall performance and success of the organization.

This study examines the leadership styles of sports managers and their impact on crisis management levels. It also discusses the influence of effective crisis management on the success of sports organizations and how leadership styles can play a role in this process.

Based on this information, the research question for this study has been determined as: 'What is the relationship between the leadership styles of sports business managers and their levels of crisis management?'

MATERIALS AND METHODS

Research Model

Among quantitative research techniques, the relational scanning model was used for this study. The scanning strategy in the relational scanning model tries to identify the presence of co-variation between two or more variables. According to Karasar (2012), the relational scanning model aims to ascertain whether the variables change concurrently and, if so, how. This study looked at the connections between the leadership philosophies of sports managers and how they handle crises.

The consent of all volunteers was obtained, and their participation was ensured regularly. This study is approved by the Istanbul Gelisim University (IGU) and Ethics Committee of the IGU (Approvel Nummer: 2022/16). All participants gave their written informed consent, and our study was carried out following the Helsinki Declaration.

At the same time, this study, conducted with the aim of determining the differentiation of sports managers' leadership styles and crisis management levels based on demographic characteristics, is a causal comparative research. 'According to Büyüköztürk et al. (2018), causal comparative researches are studies done to identify the factors that contribute to or are affected by the causes of an existing or naturally occurring condition or event.'

Universe and Sampling

The population of the research consists of managers working in sports complexes located on the European side of Istanbul. The sample, determined using the convenience sampling method, consists of 212 voluntary participating sports managers.

A non-random selection technique known as 'convenience sampling' relies on the researcher's judgment to choose the sample group from the larger population. According to Aaker et al. (2007), convenience sampling is the easiest,

quickest, and most economical method of gathering data from the general population.

Data Collection Tools

In the research, data was collected through the survey method. The survey form in question consisted of a personal information form, a crisis management scale, and a self-leadership scale. Surveys prepared online were delivered to managers via smartphones.

Personal Information Form

The personal information form, created by the researcher, contained 6 questions aimed at determining descriptive information such as age and gender of sports managers.

Crisis Management Scale

In order to examine participants' levels of crisis management, the 'Crisis Management Scale,' developed by Sayın (2008) and subjected to validity and reliability studies, was used. The scale consists of 45 five-point Likert-type items under 6 dimensions. The scale items are categorized as follows: '1=Never (1.00-1.79), 2=Very Rarely (1.80-2.59), 3=Sometimes (2.60-3.39), 4=Often (3.40-4.19), and 5=Always (4.20-5.00).' Sayın (2008) found a Cronbach's Alpha coefficient of 0.85 for the entire scale in the reliability analysis conducted. In the research, the factor structure of the scale was used, but the reliability analysis was conducted again. The reliability of the Crisis Management scale was found to be Cronbach's Alpha = 0.845.

Self-Leadership Scale

In examining the leadership qualities of sports managers in the research, the Self-Leadership scale was utilized. The Self-Leadership Scale was developed by Anderson and Prussia (1997) and has been subjected to confirmatory studies by Houghton and Neck (2002). It was translated into Turkish by Tabak, Sığrı, and Türköz (2013), and validity and reliability studies were conducted. The scale consists of 29 five point Likert-type propositions under 8 dimensions. The reliability value of the scale dimensions ranged from 0.61 to 0.80. In this study, the existing factor structure of the scale was used, but the reliability analysis was conducted again. In this research, the reliability of the Self-Leadership Scale was found to be Cronbach's Alpha = 0.903.

Statistical Analysis of Data

The obtained data in the study was analyzed using the SPSS 22.0 statistical software in a computer environment. Frequency and percentage analyses were performed to assess the descriptive characteristics of the participating managers in the study, and mean and standard deviation statistics were employed to analyze scale data. Measures of kurtosis and skewness of the distribution of the data were investigated in order to decide the analysis to be done to the research's data.

RESULTS

Managers are distributed as 104 (49.1%) male and 108 (50.9%) female according to their gender. Managers are distributed as 22 (10.4%) associate's degree or lower, 142 (67.0%) bachelor's degree, and 48 (22.6%) master's degree or higher according to their education level. Managers are distributed as 14 (6.6%) in the age group 18-25, 50 (23.6%) in the age group 26-35, 116 (54.7%) in the age group 36-45, and 32 (15.1%) in the age group 46-55 according to their age. Managers are distributed as 138 (65.1%) married and 74 (34.9%) single according to their marital status. Managers are distributed as 32 (15.1%) with 5 years and less of total work experience, 34 (16.0%) with 6-10 years, 76 (35.8%) with 11-15 years, and 70 (33.0%) with 16 years and more. Managers are distributed as 64 (30.2%) with 1 year and below of working duration in sports facility, 90 (42.5%) with 1-5 years, 24 (11.3%) with 6-10 years, and 34 (16.0%) with over 10 years.

Table 1. Descriptive characteristics of managers

Groups	Frequency (n)	Percentage (%)
Gender		
Male	104	49.1
Female	108	50.9
Education Level		
Associate's Degree or Lower	22	10.4
Bachelor's Degree	142	67.0
Master's Degree or Higher	48	22.6
Age		
18-25	14	6.6
26-35	50	23.6
36-45	116	54.7
46-55	32	15.1
Marital Status		
Married	138	65.1
Single	74	34.9
Total Work Experience		
5 Years and Less	32	15.1
6-10 Years	34	16.0
11-15 Years	76	35.8
16 Years and More	70	33.0
Working Duration in Sports Facility		
1 Year and Less	64	30.2
1-5 Years	90	42.5
6-10 Years	24	11.3
10 Years and More	34	16.0

When correlation analyses were examined between participants' crisis management and self-leadership scores;

A positive weak relationship was found between ‘Self-Leadership in General’ and ‘Crisis Management in General’ with r=0.449 (p=0.000<0.05), a positive weak relationship between ‘Preparation and Prevention’ with r=0.374 (p=0.000<0.05), a positive weak relationship between ‘Preventing Damage Spread’ with r=0.434 (p=0.000<0.05), a very weak positive relationship between ‘Recovery and Resilience’ with r=0.247 (p=0.000<0.05), and a positive weak relationship between ‘Learning’ with r=0.361 (p=0.000<0.05).

A positive weak relationship was found between ‘Self-Leadership in General’ and ‘Crisis Management in General’ with r=0.367 (p=0.000<0.05), a positive weak relationship between ‘Preparation and Prevention’ with r=0.41 (p=0.000<0.05), a positive weak relationship between ‘Preventing Damage Spread’ with r=0.25 (p=0.000<0.05), a very weak positive relationship between ‘Recovery and Resilience’ with r=0.143 (p=0.000<0.05), and a positive weak relationship between ‘Learning’ with r=0.346 (p=0.000<0.05).

A very weak positive relationship was found between ‘Self-Reward’ and ‘Crisis Management General’ with r=0.219 (p=0.001<0.05), a very weak positive relationship between ‘Preparation and Prevention’ with r=0.165 (p=0.016<0.05), a very weak positive relationship between ‘Preventing Damage Spread’ with r=0.202 (p=0.003<0.05), a very weak positive relationship between ‘Learning’ with r=0.17 (p=0.013<0.05), a high positive relationship between ‘Self-Leadership in General’ with r=0.739 (p=0.000<0.05), and a moderate positive relationship between ‘Setting Personal Goals and Envisioning Successful Performance’ with r=0.652 (p=0.000<0.05). Goals and Envisioning Successful Performance’ with r=0.652 (p=0.000<0.05).

Table 2. Correlation Analysis between Leadership and Crisis Management Scores

		'Crisis Management in General'	'Early Warning Signal Gathering'	'Preparation and Prevention'	'Crisis Moment'	'Preventing Damage Spread'	'Recovery and Resilience'	'Learning'
'Self-Leadership in General'	r	0.449**	-0.002	0.374**	-0.064	0.434**	0.247**	0.361**
	p	0.000	0.972	0.000	0.352	0.000	0.000	0.000
'Setting Personal Goals and Envisioning Successful Performance'	r	0.367**	-0.021	0.410**	-0.010	0.250**	0.143*	0.346**
	p	0.000	0.756	0.000	0.883	0.000	0.037	0.000
'Self-Reward'	r	0.219**	-0.019	0.165*	0.101	0.202**	0.099	0.170*
	p	0.001	0.779	0.016	0.143	0.003	0.152	0.013
'Self-Talk'	r	0.403**	0.127	0.427**	0.014	0.197**	0.244**	0.305**
	p	0.000	0.065	0.000	0.836	0.004	0.000	0.000
'Evaluating Thoughts and Ideas'	r	0.388**	-0.041	0.233**	-0.163*	**0.551****	0.211**	0.287**
	p	0.000	0.557	0.001	0.017	0.000	0.002	0.000
'Self-Punishment'	r	0.295**	0.034	0.237**	0.186**	0.165*	0.141*	0.252**
	p	0.000	0.624	0.000	0.007	0.016	0.040	0.000
'Self-Observation'	r	0.371**	-0.010	0.214**	-0.192**	**0.502****	0.215**	0.289**
	p	0.000	0.888	0.002	0.005	0.000	0.002	0.000
'Setting Self-Reminders'	r	**0.656****	0.430**	0.331**	0.118	0.160*	0.332**	0.760**
	p	0.000	0.000	0.000	0.088	0.020	0.000	0.000
'Focusing on Natural Rewards'	r	0.532**	0.144*	0.120	0.029	0.297**	0.406**	**0.640****
	p	0.000	0.037	0.081	0.679	0.000	0.000	0.000

*<0.05; **<0.01; Pearson Correlation Analysis

A positive weak relationship was found between 'Self Talk' and 'Crisis Management in General' with r=0.403 (p=0.000<0.05), a positive weak relationship between 'Preparation and Prevention' with r=0.427 (p=0.000<0.05), a positive very weak relationship between 'Preventing Damage Spread' with r=0.197 (p=0.004<0.05), a very weak positive relationship between 'Recovery and Resilience' with r=0.244 (p=0.000<0.05), and a positive weak relationship between 'Learning' with r=0.305 (p=0.000<0.05).

A weak positive relationship was found between 'Evaluating Thoughts and Ideas' and 'Crisis Management in General' with r=0.388 (p=0.000<0.05), a very weak positive relationship between 'Evaluating Thoughts and Ideas' and 'Preparation and Prevention' with r=0.233 (p=0.001<0.05), a very weak negative relationship between 'Crisis Moment' with r=-0.163 (p=0.017<0.05), a moderate positive relationship between 'Preventing Damage Spread' with r=0.551 (p=0.000<0.05), a very weak positive relationship between 'Recovery and Resilience' with r=0.211 (p=0.002<0.05), and a weak positive relationship between 'Learning' with r=0.287 (p=0.000<0.05).

A weak positive relationship was found between 'Self-Punishment' and 'Crisis Management in General' with r=0.295 (p=0.000<0.05), a very weak positive relationship between 'Self-Punishment' and 'Preparation and Prevention' with r=0.237 (p=0.000<0.05), a very weak positive relationship between 'Crisis Moment' with r=0.186 (p=0.007<0.05), a very weak positive relationship between 'Preventing Damage Spread' with r=0.165 (p=0.016<0.05), a very weak positive relationship between 'Recovery and Resilience' with r=0.141 (p=0.040<0.05), and a weak positive relationship between 'Learning' with r=0.252 (p=0.000<0.05).

A weak positive relationship was found between 'Self-Observation' and 'Crisis Management in General' with r=0.371 (p=0.000<0.05), a very weak positive relationship between 'Self-Observation' and 'Preparation and Prevention' with r=0.214 (p=0.002<0.05), a very weak negative relationship between 'Self-Observation' and 'Crisis Moment' with r=-0.192 (p=0.005<0.05), a moderate positive relationship between 'Self-Observation' and 'Preventing Damage Spread' with r=0.502 (p=0.000<0.05), a very weak positive relationship between 'Self-Observation' and 'Recovery and Resilience' with r=0.215 (p=0.002<0.05), and a weak positive relationship between 'Self-Observation' and 'Learning' with r=0.289 (p=0.000<0.05).

A moderate positive relationship was found between 'Setting Self-Reminders' and 'Crisis Management in General' with r=0.656 (p=0.000<0.05), a weak positive relationship between 'Setting Self-Reminders' and 'Early Warning Signal Gathering' with r=0.43 (p=0.000<0.05), a weak positive relationship between 'Setting Self-Reminders' and 'Preparation

and Prevention' with r=0.331 (p=0.000<0.05), a very weak positive relationship between 'Setting Self-Reminders' and 'Preventing Damage Spread' with r=0.16 (p=0.020<0.05), a weak positive relationship between 'Setting Self-Reminders' and 'Recovery and Resilience' with r=0.332 (p=0.000<0.05), and a high positive relationship between 'Setting Self-Reminders' and 'Learning' with r=0.76 (p=0.000<0.05).

A moderate positive relationship was found between 'Focusing on Natural Rewards' and 'Crisis Management in General' with r=0.532 (p=0.000<0.05), a very weak positive relationship between 'Focusing on Natural Rewards' and 'Early Warning Signal Gathering' with r=0.144 (p=0.037<0.05), a weak positive relationship between 'Focusing on Natural Rewards' and 'Preventing Damage Spread' with r=0.297 (p=0.000<0.05), a weak positive relationship between 'Focusing on Natural Rewards' and 'Recovery and Rehabilitation' with r=0.406 (p=0.000<0.05), and a moderate positive relationship between 'Focusing on Natural Rewards' and 'Learning' with r=0.64 (p=0.000<0.05). Statistically significant relationships were not found among the other dimensions (p>0.05).

The regression analysis conducted to examine the impact of the dimensions 'Setting Personal Goals and Envisioning Successful Performance,' 'Self-Reward,' 'Self-Talk,' 'Evaluating Thoughts and Ideas,' 'Self-Punishment,' 'Self-Observation,' 'Setting Self-Reminders,' and 'Focusing on Natural Rewards' on 'Crisis Management in General,' as shown in Table 3, was found to be statistically significant (F=37.539; p=0.000<0.05). The total variation in 'Crisis Management in General' level is explained by 'Setting Personal Goals and Envisioning Successful Performance,' 'Self-Reward,' 'Self-Talk,' 'Evaluating Thoughts and Ideas,' 'Self-Punishment,' 'Self-Observation,' 'Setting Self-Reminders,' and 'Focusing on Natural Rewards' at a rate of 58.1% (R2=0.581). The 'Setting Personal Goals and Envisioning Successful Performance' dimension does not significantly impact the 'Crisis Management in General' level (p=0.280>0.05). The 'Self-Reward' dimension does not significantly impact the 'Crisis Management in General' level (p=0.778>0.05). The 'Self-Talk' dimension does not significantly impact the 'Crisis Management in General' level (p=0.061>0.05). The 'Evaluating Thoughts and Ideas' dimension does not significantly impact the 'Crisis Management in General' level (p=0.089>0.05). The 'Self-Punishment' dimension does not significantly impact the 'Crisis Management in General' level (p=0.081>0.05). The 'Self-Observation' dimension does not significantly impact the 'Crisis Management in General' level (p=0.534>0.05). The 'Setting Self-Reminders' dimension positively influences the 'Crisis Management in General' level (ß=0.492). The 'Focusing on Natural Rewards' dimension positively influences the 'Crisis Management in General' level (ß=0.259).

The regression analysis conducted to examine the influence of 'Self-Leadership in General' on 'Crisis Management in General' as shown in Table 4, is found to be significant (F=53.127; p=0.000<0.05). The total variation in Crisis Management in General' level is explained by 'Self-Leadership in General' to the extent of 19.8% (R2=0.198). The 'Self-Leadership in General' dimension positively influences the 'Crisis Management in General' level (ß=0.449).

Table 3. The impact of sub-dimensions of self-leadership on 'Crisis Management in General'

Independent Variable	Unstandardized Coefficients		Standardized Coefficients	t	p	95% Confidence Interval	
	B	SE	ß			Lower	Upper
Stable	1.847	0.110		16.813	0.000	1.630	2.064
'Setting Personal Goals and Envisioning Successful Performance'	-0.037	0.035	-0.076	-1.082	0.280	-0.106	0.031
'Self-Reward'	-0.008	0.028	-0.021	-0.282	0.778	-0.063	0.047
'Self-Talk'	0.052	0.028	0.107	1.886	0.061	-0.002	0.107
'Evaluating Thoughts and Ideas'	0.063	0.037	0.151	1.708	0.089	-0.010	0.136
'Self-Punishment'	0.069	0.027	0.159	1.742	0.081	0.016	0.122

'Self-Observation'	0.024	0.039	0.053	0.623	0.534	-0.053	0.101
'Setting Self-Reminders'	0.159	0.016	0.492	9.658	**0.000**	0.126	0.191
'Focusing on Natural Rewards'	0.067	0.013	0.259	5.005	**0.000**	0.041	0.093

*Dependent Variable = 'Crisis Management in General', R = 0.772; R2 = 0.581; F = 37.539; p = 0.000; Durbin-Watson Value = 1.928

Table 4. The impact of self-leadership on 'Crisis Management in General'

Stable	2.226	0.144		15.482	0.000	1.942	2.509
'Self-Leadership in General'	0.264	0.036	0.449	7.289	**0.000**	0.193	0.335

*Dependent Variable = 'Crisis Management in General', R = 0.449; R2 = 0.198; F = 53.127; p = 0.000; Durbin-Watson Value = 1.836

Sequential regression analysis was conducted to determine how the dimensions of 'Setting Self-Reminders' and 'Focusing on Natural Rewards' changed the R2 level based on these obtained results. The results obtained are presented in Table 5.

Table 5. The impact of the Setting Self-Reminders' and 'Focusing on Natural Rewards' dimensions on 'Crisis Management in General' is as follows:

Dependent Variable	Independent Variable	ß	t	p	F	Model (p)	R^2
Crisis Management in General	Stable	2.555	44.093	0.000	158.855	**0.000**	0.428
	Setting Self-Reminders	0.656	12.604	**0.000**			
Crisis Management in General	Stable	2.391	39.954	0.000	111.972	**0.000**	0.513
	Setting Self-Reminders	0.528	10.063	**0.000**			
	Focusing on Natural Rewards	0.321	6.123	**0.000**			

The regression analysis conducted to determine the cause-and-effect relationship between setting self-reminders and crisis management in general was found to be significant (F=158.855; p=0.000<0.05). The total variation in the General Crisis Management level is explained by setting self-reminders by 42.8% (R2=0.428). Setting Self-Reminders increases the crisis management in general level (ß=0.656).

The regression analysis conducted to determine the cause-and-effect relationship between setting self-reminders, focusing on natural rewards and crisis management in general was found to be significant (F=111.972; p=0.000<0.05). The total variatio in the Crisis Management in General level is explained by setting self-reminders and focusing on natural rewards by 51.3% (R2=0.513). Setting Self-Reminders increases the crisis management in general level (ß=0.528). The Focusing on Natural Rewards dimension positively influences the crisis management in general level (ß=0.321).

DISCUSSION

According to the results of the study regarding the relationship between the leadership styles of sports managers and their crisis management levels, it is observed that the 'Setting Self-Reminders' dimension has a high level of relationship with 'Crisis Management in General'. The conclusion drawn from the study is that as managers increase their ability to set self-reminders, their crisis management levels also increase. Conversely, when the level of setting self-reminders decreases, crisis management levels tend to increase. Research conducted on different sample groups in the literature also supports the findings of this study, indicating a relationship between crisis management and leadership (Aksu, 2009; Ulutaş, 2010; Balaban, 2018; Düzgün, 2020; Ercan and Aksu, 2022).

When examining the impact of sports managers' leadership styles on their crisis management levels in the study, it is observed that the dimensions of setting self-reminders and focusing on natural rewards have a positive effect on overall crisis management. However, it is also

observed that other leadership styles do not have a positive impact. 'Setting Self-Reminders' increases crisis management by 42.8%, and when 'Setting Self-Reminders' and 'Focusing on Natural Rewards' dimensions are considered together, they jointly increase the level of crisis management by 51.3%. The current study, which partially yielded similar results, suggests that leadership styles do not predict crisis management, which aligns with the findings of Düzgün (2020). Balaban (2018) found that individuals with more leadership qualities are more effective in crisis management skills. The current study shows partial similarity to this finding. Indeed, the regression analysis conducted in the current study also indicates that the setting self-reminders leadership dimension has a significant impact on overall crisis management. It is recommended that sports managers who aim to effectively manage crises should work on improving their leadership skills, especially in the dimension of setting self-reminders. It is noteworthy that only the leadership styles of 'Setting Self-Reminders' and 'Focusing on Natura Rewards' have a significant impact on crisis management. It is recommended that managers who want to effectively manage crises should improve themselves in the leadership dimensions of 'Setting Self-Reminders' and 'Focusing on Natural Rewards.'

Conflict of interest

The authors have not declared any conflicts of interest. Furthermore, no financial assistance was given.

Ethics Committee

The Ethics Committee of the IGU (Approval Number: 2022-16) and Istanbul Gelisim

Author Contributions

This research was adapted from Ebru Barut's master's program with thesis in Sports Management, Department of Coaching Education, Istanbul Gelisim University.

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RESEARCH ARTICLE

Does Gender, Sports Age, Type of Listening Music Affect Pre-Competition Anxiety in Adolescent Athletes?

Esra KÜRKCÜ AKGÖNÜL[1*] and Cem GÜÇLÜERLER[2]

[1]Dokuz Eylul University, Necat Hepkon Sports Faculty, Physical Education and Sport Department, Izmir / Turkiye
[2]Dokuz Eylul University, Health Science Institute, Physical Education and Sport Department, Izmir / Turkiye
*Corresponding author: bestfemalecyclist@gmail.com

Abstract
Athletes listen to music during training and competitions, in order to have fun, gain motivation and increase performance. The aim of this study is to examine the effect of gender, sports age and type of listening music to pre-competition anxiety level in adolescent athletes. Cross-sectional research method, one of the quantitative research design was used. The population of the study consists of athletes between the ages of 14-18 who have a good training level and participate to competitions. The sample consists of a total of 140 adolescent athletes (age: 16.55±4.67) who are engaged in individual and team sports from different branches. Data were collected with the "Revised Competition State Anxiety Inventory-2 (CSAI-2R)". "T-test" and "ANOVA" test were used in the analysis of the data. No significant difference between the groups in sognitive anxiety (CA) and somatic anxiety (SA) scores according to type of listening music ($p>0.05$), but a significant difference in self-confidence (SC) scores in favor of those who listening to arabesque music ($p<0.05$). While there was a significant difference in CA and SC scores according to gender ($p<0.05$); no significant difference in SA scores ($p>0.05$). According to two variables; sports age and place of residence that may affect the type of listening music in adolescent, no significant difference between the groups on CA, SC and SA scores ($p>0.05$). As a result, it can be said that listening to arabesque music before the competition increases the level of self-confidence of adolescent athletes and accordingly reduces the level of anxiety.

Keywords
Adolescent Athlete, Competition Anxiety, Gender, Sports Age, Type Of Music

INTRODUCTION

Adolescence is a period in which an individual's interest in sports and sports skills increase and he/she focuses on a certain branch. In this period, it is very important to guide and train the individual for the development of his/her psychomotor and sports skills (Dilekçi, 2023). Since the transition from basic sports training to a specific branch training in the adolescence period, the individual's strengths and weaknesses are analyzed and directed to the selection of the branch. For this reason, during this period, adolescent individuals may experience more intense feelings of stress and anxiety, both physically and psychologically, than individuals of other ages, in situations that they cannot overcome within the scope of their strengths and weaknesses.

Nowadays, anxiety has become an emotion that people frequently encounter in their daily lives. Anxiety can be defined as a state of uneasiness or irrational fear that occurs as a result of any danger; an anxious person feels uncomfortable as if he is afraid of something and experiences a delusional mood (Manav, 2011). Anxiety can also negatively impact athletes' ability to make decisions in their behavior; as the level of anxiety increases, the athlete may lose their ability to make decisions and perform (Başaran et al., 2009). The athlete experiences state anxiety

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[1]**ORC**ID: 0000-0003-3771-937X , [2]**ORC**ID: 0009-0002-0494-6306

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before, during or after the competition (Civan et al., 2010). The ability to cope with competitive anxiety is considered an integral part of sports from a psychological perspective (Burton and Naylor, 2008). In this regard, relaxation methods such as advanced relaxation, meditation, biofeedback, breathing control and autogenic training are recommended for athletes to relieve anxiety symptoms. However, although these methods are recommended and supported, the fact that athletes have to spend effort and time to master these techniques (Payne and Donaghy, 2010), the relaxation process takes a long time and methods such as biofeedback require special equipment (Patel, 2013) are the factors that make their use difficult. Due to such limitations, it is thought that athletes cannot easily adopt these methods. With this in mind, it can be said that listening to music is one of the best methods for athletes to relax and gain motivation before training or competition.

Music is an aesthetic whole consisting of sounds assimilated and combined according to a certain perception of beauty (Çelik, 2023). It is widely accepted that music encountered in every aspect of life has an impact on emotional state. Being a social being, human beings have perceived, analyzed and evaluated the sounds they have heard since the beginning of their existence and transformed them into expressions over time. The name of this type of vocal expression art is "music" (Ekiz and Atasoy, 2021). Nowadays, it can be observed that almost every athlete listens to music, especially before the competition, during training, while warming up and even during the competition. It is known that music not only entertains individuals, but also increases exercise performance, strength and endurance, and delays fatigue (Thakare et al., 2017). In studies conducted on this subject, it has been reported that athletes prefer listening to music instead of methods with limitations in order to relieve their anxiety and worry and gain motivation. Çelik and Karabilgin (2022) said that one of the newest ideas in the field of sports is the idea of utilizing musical memory in performance enhancement and relaxation. As an example of research on athletes, Laukka and Quick (2011) in their study titled "Emotional and motivational uses of music in sports and exercise: A survey study among athletes", in the survey applied to Swedish athletes, asked the athletes about when, in what situations and why they listen to music and there were various questions. In the survey results, athletes reported that their most common goals for listening to music were to increase positive emotions, motivation, performance level and experience flow. Athletes also stated that they experienced mostly positive affective states such as happiness, alertness, confidence, and relaxation while listening to music (Laukka and Quick, 2011). Although some research does not support (Nilsson, 2008; Pelletier, 2004); there is evidence that music has the potential to aid relaxation.

The fact that there are studies with high limitations and criteria that have not yet been taken into account on this subject, which affects both athletes and coaches physically, and psychologically, makes the contribution of the study to science even more important. For this reason, the research aims to examine the effects of the type of listening music, gender and sports age on the pre-competition anxiety level of adolescent athletes.

MATERIALS AND METHODS

Procedure

In this study, "random sampling method" was used because the sample selection was taken from a relevant part of the universe and from any club (Kılıç, 2013). Volunteer athletes were identified among the participants eligible for the study, and the scale forms were sent to all participants online and their answers were received. Before the study, athletes and their parents were informed online and consent was obtained from all athletes' parents in accordance with the Declaration of Helsinki. Athletes were asked for their competition calendars, and through their club coaches, the athletes were asked to fill out the scales and forms 60 minutes before the competition. The procedure and purpose were briefly explained to all participants, and the application was made 60 minutes before the competition, allowed the participants to prepare individually for the competition. Ethics committee approval for the study was received from Çanakkale Onsekiz Mart University Schools of Graduate Studies Ethics Committee with decision number 11/53 dated 08/09/2023.

Participants

The population of the research consists of adolescent athletes who have good training level sample size was calculated using the "G-power" analysis program, with a medium effect size and a and a 95% confidence interval, with a total of at least 111 athletes for the t-test and at least 130 people in total for the ANOVA test. In this regard, the research sample consists of a total of 140 athletes (age: 16.55±4.67), including 56 women between the ages of 14-18, who do sports and participate in competitions. In the study, the and 84 men who participate competitions regularly. Criteria for participants to be included in the research; being between the ages of 14-18 and volunteer, doing sports regularly, participating national or international competitions for at least one year.

Table 1. Descriptive statistics of the physical characteristics of the participants

Variables	N	Min	Max	Mean	Sd
Heigth (cm)	140	153.00	193.00	173.54	9.18
Body mass (kg)	140	42.00	115.00	64.94	12.96
BMI (kg/m^2)	140	16.53	37.55	21.45	3.29
Age (year)	140	14.00	18.00	16.55	4.67

BMI: Body Mass Index, Min: Minimum, Max: Maksimum, Sd: Standart deviaton

Data collection tools

As data collection tools in the study, the "Personal Information Form" developed by the researchers to collect information about the demographic characteristics of the athletes and "Revised Competition State Anxiety Inventory-2 (CSAI-2R)", developed by Cox et al. (2003) and validated in Turkish by Akgönül et al. (2021) was used.

Personal Information Form (PIF)

PIF was developed by researchers to collect athlete-specific information such as age, height, body weight, gender, sports age, economic level, type of listening music, and consists of 10 questions.

Revised Competition State Anxiety Inventory-2 (CSAI-2R)

The Revised Competition State Anxiety Inventory-2 consists of 14 items and 3 subscales. Sub-dimensions; cognitive anxiety (CA) (1,3,8,11), somatic anxiety (SA) (4,6,9,12,14) and self-confidence (SC) (2,5,7,10,13). The inventory has a 4-point Likert scale: not at all (1), a little (2), quite a bit (3) and a lot (4). In evaluating the scores obtained by the participants from the inventory, the scores obtained from the items are summed. Higher scores indicate higher levels of somatic and cognitive anxiety or self-confidence (Akgönül et al., 2021). However, three sub-dimensions of the scale, cognitive and somatic anxiety, reveal the athlete's anxiety level; self-confidence sub-dimension is related to the athlete's sense of self-confidence and consists of positive expressions. The total score of the scale does not reveal the level of anxiety; therefore the evaluation was made at the level of sub-dimensions. The score range in the scale sub-dimensions is 4-20 points; for CA subscale range is 4-16 points; for SA and SC subscales range is 5-20 points. Accordingly, for CA; (0-4.0) point is low, (4.1-8.0) point is medium, (8.1-12.0) point is high, (12.1-16.0) point is very high; for SA and SC; it was evaluated as (0-5.0) point is low, (5.1-10.0) point is medium, (10.1-15.0) point is high, (15.1-20.0) point is very high.

Analysis of Data

The data obtained in the study were analyzed in the SPSS 25 statistical analysis program. Normality analyzes of the data were tested with "Skewness-Kurtosis" values. We found Skewness between (-398 and 1110) and Kurtosis between (-526 and 1195). According to these results, it was determined that the data had a normal distribution because the Skewness-Kurtosis values were between -1.5/+1.5 (Tabachnick and Fidel, 2013). Accordingly, in the analysis of the data, frequency distribution was used for descriptive statistics and "Independent group t-test" was used for the mean difference between independent groups. The difference between competition anxiety scores according to variables such as sports age, economic level and type of listening music was evaluated with the "ANOVA" test. Post-hoc tests such as LSD and Bonferonni tests were used to determine which group caused the difference. The statistical significance level was accepted as 0.05.

It is known that (α= 0.70 ≤) is sufficient for internal consistency reliability (Büyüköztürk, 2011). In this regard, the validity and reliability level of the alpha coefficient for the sub-finding it between (α = 0.70-0.87) (Büyüköztürk, 2002; Özüdoğru and Aydın, 2016). dimensions of CSAI-2R is between (α = 0.71-0.80) in the current research group, it was determined that the inventory was a reliable measurement tool by

RESULTS

Table 1. Descriptive statistics of the physical characteristics of the participants

Variables	Gruplar	N	%
Gender	Female	56	40,0
	Male	84	60,0
Sports age (year)	0-1	20	14,3
	2-3	33	23,6
	≥4	87	62,1
Type of Music	Hip/Hop	72	51,4
	Rap/Rock	59	42,1
	Arabesque	9	6,4
Club type	Private	84	60,0
	YSPD	11	7,9
	Municipality	12	8,6
	College Team	33	23,6
Economic level	Almost good	85	60,7
	Good	47	33,6
	Very good	8	5,7

YSPD: Youth Sports Provincial Directorate

According to the data in Table 2, 60% of the athletes are male, 62.1% have a sports history of four years or more, 60.7% have almost good economic level, 60% do sports in a private club and it is seen that before the races, 51.4% of the participants listening to Hip/Hop music, 42.1% listening to Rap/Rock music and 6.4% listening to arabesque music. Descriptive statistics of the participants' subscale scores are presented in Table 3.

Table 3. Descriptive statistics of participants' subscale scores

Variable	N	Min	Max	Mean	Sd
CA	140	4.00	16.00	8.66	2.85
SC	140	8.00	20.00	15.24	2.92
SA	140	5.00	20.00	8.57	3.21

CA: Cognitive Anxiety, SC: Self Confidence, SA: Somatic Anxiety, Min: Minimum, Max: Maksimum, Sd: Standart deviation

In line with the data in Table 3, it was determined that adolescent athletes had high levels of CA, very high levels of SC, and moderate levels of SA before the competition. The difference in CSAI-2R subscale scores of the participants according to gender is presented in Table 4.

Table 4. Difference statistics of CSAI-2R subscale scores according to gender

Variables		N	Mean	Sd	t	*p*
CA	Female	56	9.63	3.07		
	Male	84	8.01	2.50	3.266	**0.001***
SC	Female	56	14.45	3.02		
	Male	84	15.77	2.74	-2.698	**0.008***
SA	Female	56	9.11	3.77		
	Male	84	8.21	2.75	1.522	0.131

***p<0.05,** CA: Cognitive Anxiety, SC: Self Confidence, SA: Somatic Anxiety, Sd: Standart deviation

According to the results in Table 4, a significant difference in CA and SC subscale scores of CSAI-2R according to gender (p <0.05); however, although SA subscale score was higher in female, it was determined that there was no significant difference (p>0.05). Among the sub-dimensions with significant differences according to gender, CA scores were found to be higher in female and SC sub-dimension scores were higher in male. CSAI-2R subscale score differences of the participants according to sports age are presented in Table 5.

Table 5. Difference statistics of CSAI-2R subscale scores according to sports age

Variables (year)		N	Mean	Sd	F	*p*
CA	0-1	20	9.25	2.59		
	2-3	33	9.30	3.05	2.090	0.128
	≥4	87	8.28	2.79		
SC	0-1	20	14.20	3.22		
	2-3	33	15.30	2.87	1.539	0.218
	≥4	87	15.46	2.84		
SA	0-1	20	9.45	3.21		
	2-3	33	9.18	3.09	2.169	0.118
	≥4	87	8.14	3.22		

*p<0,05, CA: Cognitive Anxiety, SC: Self Confidence, SA: Somatic Anxiety, Sd: Standart deviation

In line with the results in Table 5, the level of CA and SA in adolescent athletes before the competition is lower than in experienced athletes with a sports age of four years or more; accordingly, it was determined that the level of SC was higher. However, it was determined that there was no significant difference between the athletes' pre-competition CA, SC and SA subscale scores according to sports age (p>0.05). The difference in participants' CSAI-2R subscale scores according to the type of listening music is presented in Table 6.

Table 6. Difference statistics of CSAI-2R subscale scores according to type of listening music

Variables	Type of music	N	Mean	Sd	F	*p*
CA	Hip/Hop	72	8.64	3.06		
	Rap/Rock	59	8.76	2.58	0.205	0.815
	Arabesque	9	8.11	3.02		
SC	Hip/Hop	72	15.50	2.94		
	Rap/Rock	59	14.66	2.92	3.186	**0.044***
	Arabesque	9	17.00	1.58		
SA	Hip/Hop	72	8.26	3.13		
	Rap/Rock	59	8.97	3.37	0.779	0.461
	Arabesque	9	8.44	2.92		

*p<0,05, CA: Cognitive Anxiety, SC: Self Confidence, SA: Somatic Anxiety, Sd: Standart deviation

No significant difference between the groups in CA and SA subscale scores of adolescent athletes according to type of listening music before the competition (p>0.05). Although no significant difference between the groups, it was determined that the level of CA and SA in adolescent athletes before the competition was higher in athletes who listening rap/rock music than in those who

listening hip/hop or arabesque music. Despite these findings, there was a significant difference in SC subscale scores in favor of those who listening arabesque music ($p<0.05$). The difference in participants' CSAI-2R subscale scores according to place of residence is presented in Table 7.

Table 7. Difference statistics of CSAI-2R subscale scores according to place of residence

Variables		N	Mean	Sd	t	*p*
CA	City	105	8.63	2.94		
	Village	35	8.74	2.59	-0.205	0.838
SC	City	105	15.41	2.74		
	Village	35	14.74	3.39	1.055	0.297
SA	City	105	8.50	3.17		
	Village	35	8.77	3.39	-0.424	0.131

*p<0,05, CA: Cognitive Anxiety, SC: Self Confidence, SA: Somatic Anxiety, Sd: Standart deviation

line with the results in Table 7, it was determined that there was no significant difference in CA, SC and SA sub-dimension scores of CSAI-2R according to place of residence ($p < 0.05$). Although there is no significant difference between scores based on place of residence, adolescent athletes living in small places such as village have higher levels of CA and SA; lower levels SC before the competition than athletes living in large places such as city.

DISCUSSION

Research aims to examine the effects of the type of listening music, gender and sports age on the pre-competition anxiety level of adolescent athletes. According to the results of the study, it was determined that adolescent athletes had high levels of cognitive anxiety, very high levels of self-confidence, and moderate levels of somatic anxiety before the competition. Branches of the athletes participating in the study; football (40%), volleyball (36%), basketball (12%), handball, bocce, fitness etc. from other branches (12%). Since the participants are mostly involved in team sports, it is expected that their self-confidence levels are very high. Pluhar et al (2019) found that anxiety and depression among young athletes are more common in individual athletes than team athletes; Zamani and Moradi (2009) suggested that competitive anxiety for young participants is higher in individual sports than in team sports. Anxiety in team sports is lower than in individual sports; this can be attributed to the fact that the outcome during and after the competition concerns the whole team, that negative actions can be corrected with the support of other athletes in the team, that the rate of any athlete being held solely responsible in case of defeat is lower, and that the rate of a single athlete being held responsible for negative results is lower (Civan et al., 2010).

As a matter of fact, in team sports, the level of anxiety before the competition may be higher in coaches than in athletes. Because the role of the coach is great in achieving success in team sports the anxiety experienced by coaches can negatively affect the performance of athletes. Coaches may have a major and influential role in young athletes experiencing pre-competition anxiety (Sedarati, 2007). Regarding the subject, Mottaghi et al. (2013) study examined the relationship between anxiety and race performance of coaches and adolescent athletes, they reported that there was a positive significant relationship between the coaches' anxiety level and the athletes' sports competition anxiety level, and a negative significant relationship between the coaches' anxiety level and the athletes' performance levels. Since the role of the coach is to maintain the team culture that supports the athlete's mental health and to encourage the athlete (Bisset et al., 2020), the role of the coach in individual sports is often greater in the period before the competition and during the training. Since success in the competition is mostly related to the athlete him/herself, the pre-competition anxiety level of athletes involved in individual sports may be high depending on the coach and communication with. At this point, the participants' anxiety levels of this research being medium-high may also be related to the coach. It is thought that pre-competition anxiety or self-confidence in team athletes is directly related to the competence of the coach and coach's communication with the athletes.

According to the results of the research, the high cognitive anxiety levels of athletes may be due to the coach not exchanging information or communicating with the athletes. Since technical tactics are very involved in team sports, it is important that the coach guides the athletes and the athlete's cognitive readiness for the competition according to these directions. On the other hand, the expectations of the managers and the desire to win the match may cause the coach to worry, and an anxious coach will not be able to make the right decision and direct the team (Mottaghi et al., 2013). As a result, the entire team may become anxious and depressed and may not be able to achieve the goal.

The moderate level of somatic anxiety of the participants may be related to the high motivation of athletes to participate in training or races. The training level of athletes who train with motivation improves, and accordingly, athletes who do not skip their training feel physically ready for the competition, which may reduce their level of somatic anxiety. It has been reported that competition anxiety will increase with poor performance and decreased enjoyment and motivation from participation in both adults and children (Grossbard et al., 2009). At this point, it is thought that this study should be conducted separately, considering that the results may vary among individual athletes and that the sports branch of the participants is individual.

In the current study, it was determined that there was a significant difference in favor of men in the cognitive anxiety and self-confidence subscale scores according to gender, but although the somatic anxiety subscale score was higher in women, there was no significant difference. It was determined that the pre-competition cognitive anxiety level was higher and the self-confidence level was lower in adolescent female athletes than in men. In Correia and Rosado's (2019) study, which investigated anxiety in athletes according to gender and sport type, they explained that female athletes had higher anxiety scores than male athletes, and reported that the results were in line with previous studies (Martens et al., 1990; Clifton and Gill, 1994). On the other hand, Başaran et al. (2009) reported that men's state anxiety levels are higher than women. In a study examining the effect of university athletes' favorite music on pre-competition cognitive and somatic state anxiety and self-confidence; it has been reported that music and gender have an impact on the intensity of situational self-confidence, and that an individual music session that includes the participants' favorite music significantly increases the sense of self-confidence in college athletes (Lanzillo, 2000). In a study conducted by Grossboard et al. (2009) on differentiating anxiety, somatic anxiety and concentration disorders in young athletes between the ages of 9-14, it was found that anxiety about performing poorly was at the highest level in female athletes and older athletes; they reported that male athletes had higher levels of concentration impairment in competitive situations than females. These results show the importance of considering the intensity of competitive anxiety in men and women. It is thought that these differences in pre-competition anxiety and self-confidence levels between male and female athletes may be related to other variables such as performance, enjoyment level or sports commitment, which were not evaluated in the current study.

It was found that there was no significant difference in the anxiety and self-confidence levels of adolescent athletes according to sports age. In their study with young football players, Karabulut et al. (2013) reported that there was no significant difference in state and trait anxiety levels according to the year of playing sports. On the other hand, Tellioğlu and Karadenizli (2018) reported that there was a significant difference in the anxiety levels of athletes with sports ages of 3-7 and 8-12 years. Anxiety and other psychological emotion levels are thought to be related to the development of individuals. In this regard, the fact that the participants in the current study were close to adulthood may support the high level of anxiety. Thus In the study of Grossboard et al. (2009), 12-14 year old athletes reported more worry and total anxiety than younger athletes. They reported that this is consistent with previous research (e.g., Muris et al., 2002) showing that levels of worry elaboration in children are positively related to levels of cognitive development. On the other hand, it can be said that as age increases, the level of anxiety may increase as the pressure to win increases, and as the age-sport age increases, the level of anxiety may increase as the athlete moves towards adulthood. It is seen that the literature findings and the current research results are different from each other. Therefore, it is thought that the effect of sports age on anxiety may vary

depending on the individuals' starting sports and competition status. In this context, the anxiety or self-confidence level of athletes should be experience, the results may vary depending on the branch. As a result, sports experience has positive effects on competition and training; It can be said that as athletes develop and gain experience, they may have the ability to control negative emotional states such as anxiety, worry and fear and they will decrease.

Although there was no significant difference between the groups in the pre-competition, cognitive and somatic anxiety subscale scores of adolescent athletes according to the type of listening music before the competition; it was determined that the cognitive and somatic anxiety scores of athletes listening to rap/rock music were slightly higher than those of athletes listening to arabesque or hip/hop. Kurul (2020), stated that the stress levels of individuals who listen to rock music after stressful situations do not decrease, on the contrary, rock music increases the stress level. In light of this information, in the current study, the stress levels of athletes who preferred rap/rock music before the competition may have increased, triggering an increase in their cognitive and somatic anxiety levels. On the other hand, it was found that there was a significant difference between the self-confidence scores of adolescent athletes who listening to arabesque music before the competition and those who listening to hip/hop and rap/rock music; it has been determined that athletes who prefer arabesque music have more self-confidence. Erdal (2015) suggested that arabesque music does not only evoke negative emotions such as sadness, grief and tension, but also more complex and positive emotions such as sensitivity, strength, calmness and admiration, especially nostalgia. On the other hand, there are also studies arguing that young individuals who prefer to listen to arabesque music in daily life are more angry and aggressive (Sezer, 2011; Uluçay, 2018). In light of all these results, it can be deduced that arabesque music evokes emotions such as a feeling of power, anger, and aggression in the individual and makes athletes feel more self-confident before the competitions.

Although the anxiety levels of athletes living in a small place such as a town/village are investigated as well as the age of competing as a variable of sports age. On the other hand, since an adolescent athlete may not have much competition higher than the athletes living in a city and the self-confidence of athletes living in districts/villages was lower than athletes living in the province according to the place of residence, it was found that there was no significant difference between the groups. Despite these findings, there are also studies showing that the anxiety levels of athletes living in cities are higher than athletes living in small places such as villages or towns (Öz and Öztürk, 2018; Saxena and Sathe, 2016). Reasons such as athletes living in provinces participating in more tournaments than athletes living in districts/villages, pressure for success in big teams, high expectations of family and social circle, and anxiety about the future may have caused the anxiety scores of athletes living in provinces to be higher.

As a result, adolescent athletes have high levels of cognitive and somatic anxiety and very high levels of self-confidence before the competition. Compared to adolescent male athletes, female athletes have higher pre-competition cognitive anxiety levels and lower self-confidence levels. Pre-competition anxiety and self-confidence levels do not change depending on sports age and place of residence. Listening to arabesque music before the competition increases the self-confidence level of adolescent athletes.

Conflict of Interest

No conflict of interest is declared by the authors. In addition, no financial support was received.

Author Contributions

Study Design, EKA; Data Collection, CG; Statistical Analysis, EKA; Data Interpretation, EKA; Manuscript Preparation, EKA, CG; Literature Search, EKA, CG. All authors have read and agreed to the published version of the manuscript

Ethics Committee

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RESEARCH ARTICLE

Investigation of the Foot Arch Postures of Sport Sciences Students According to Some Variables

Hasan ABANOZ[1*]

[1] Çanakkale Onsekiz Mart University, Faculty of Sport Sciences, Çanakkale / Turkey
*Corresponding author: abanoz.hasan@comu.edu.tr

Abstract
Purpose: In this study, it was aimed to investigate the foot arch structures of undergraduate students of sports sciences faculty according to some demographic characteristics. **Method:** A total of 159 volunteer participants, 34 females and 125 males aged 18-34 years, were included in the study. General information form and podoscope imaging device for foot images were used as data collection tools. Foot images were analysed according to Staheli's Arc Index. The plantar arch index status of the participants was analysed according to gender, department, sporting status, sporting age and post-training pain variables. Cross-tabulation and Fisher's exact chi-square test were used to determine the distributions between the plantar arch index categories according to the variables. Kruskal-Wallis test was used for comparisons between groups according to arch categories and Mann-Whitney-U tests were used to determine the source of the difference. **Results:** According to the plantar index scores, 53.5% of the participants had normal, 25.8% flexible, 6.3% rigid flat, and 15.5% high arches. While there was no difference in the variables of gender, height, body weight and BMI in terms of foot arch index scores ($p>0.05$), significant differences were detected in sports status, pain status and pain scores ($p<0.05$). **Conclusion**: As a result, the incidence of flexible arches was higher in active athletes, while high arches were more common in recreational athletes. In terms of post-training pain scores, it was determined that participants with flexible arch soles felt higher pain than participants with normal and rigid flat soles.

Keywords
Arc, Foot Posture, Pes Planus, Pes Cavus, Student, Sport

INTRODUCTION

As one of the most extreme organs of the human body, the foot provides contact with the ground in walking, running and standing positions. The feet are the limb that transfers the effect of the gravitational force of the earth on the body to the ground during contact with the ground and the response from the ground to the body in physical body activities. Feet fulfil important functions in physical activities such as maintaining balance in the human body, body stabilisation and walking, running and jumping (Yüksel, 2015; Smith, Lichtwark, & Kelly, 2021). Foot structure is one of the most effective factors in terms of movement efficiency and economy, especially in physical activities such as walking, running, and jumping (Buldt et al., 2018). Under ordinary conditions, the foot has a certain anatomical size and morphological structure with reference values depending on genetic characteristics. However, anatomical and morphological abnormalities may develop due to some orthopedic, clinical and physiological factors. Distortions in the foot structure may cause balance problems, deformations in the skeletal and muscular system, pain and movement limitations, especially in standing, walking and running, where the foot undertakes major functions (Nalbant, 2014). In recent scientific studies, it has been determined

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[1]**ORCID:** 0000-0002-4415-6723

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that disorders in foot posture cause secondary health problems such as excessive weight gain, type 2 diabetes, high blood pressure, cardiovascular diseases by causing a decrease in physical activity level as well as the mentioned health problems (Azhagiri et al., 2021; Stolzman et al., 2015).

Distortions in the foot structure are commonly characterised as pes planus-flat sole and pes cavus-high arch. Among these two types of foot deformities, pes planus occurs due to collapse of the medial longitudinal arch of the foot, while pes cavus occurs as a result of the medial longitudinal arch height being higher than the standard values (Statler & Tullis, 2005; Yeagerman et al., 2011). The most common problem among these foot posture disorders is pes planus (Fabry, 2010). This health problem, which occurs especially at an early age, can negatively affect the whole life by reducing physical development and quality of life (Carr, Yang & Lather, 2016). Studies conducted in our country and abroad suggest that pes planus in children and young people is a cause of physical inactivity and obesity with its physical and psychological effects (Stolzman et al., 2015; Açak, Özen, & Tan, 2023). Like pes planus, pes cavus similarly causes similar negative effects because it negatively affects the skeletal-muscular structure and restriction of movement in the lower extremities (Aminian & Sangeorzan, 2008; Troiano, Nante & Citarelli, 2017; Açak, 2020).

Regular physical activity and participation in sports since childhood cause both the development of psychomotor skills and the development of sportive abilities (Akgönül & Yıldırım, 2021; Dilekçi, 2023). Foot posture also has a significant effect on people's sportive abilities and motor skills along with its effect on physical activity and development. In this direction, foot posture analyses should be performed in terms of children's participation in sports and the development of their abilities. However, foot posture disorders, which are often ignored or unrecognised by parents, negatively affect the quality of life and general health with multiple effects in childhood and adolescence. Decreased performance in physical and sportive activities or pain and injuries also cause withdrawal from these activities (Michelson, Durant & McFarland, 2002; Açak, Özen, & Tan, 2023). The sole of the foot deformity negatively affects the quality of life and physical fitness parameters of individuals. In this direction, it is important to identify health problems related to foot posture and to initiate preventive practices at an early stage (Korkmaz et al., 2020). In this context, in this study, it was aimed to examine the foot postures in the students of the faculty of sports sciences, who are directly related to this issue both individually and professionally, and indirectly to raise awareness on this issue.

MATERIALS AND METHODS

Research Procedure

This cross-sectional descriptive study was conducted at Çanakkale Onsekiz Mart University, Faculty of Sport Sciences during the 2022-2023 academic year. The research was carried out in accordance with the Declaration of Helsinki after obtaining approval from Çanakkale Onsekiz Mart University Graduate Education Institute Scientific Research Ethics Committee. Participants were informed about the purpose and procedures of the research before the study.

Participants

At the time of the study, a total of 159 students, 34 females and 125 males, aged 18-34 years, out of approximately 650 students studying at Çanakkale Onsekiz Mart University Faculty of Sport Sciences, Departments of Coaching Education, Sport Management and Recreation, participated in the study voluntarily..

Data Collection

In the study, as a data collection tool the general information form prepared by the researcher was used and the foot images of the participants were taken using the podoscope imaging device. In addition, body mass index values were calculated by measuring the height and body weight of the participants. Foot images were analysed according to Staheli's Arc Index. The plantar arch index values of the participants were analysed according to their gender, department of study, sporting status, sporting age and pain threshold after training.

Foot Posture Analysis

Foot posture analyses of the participants were performed under laboratory conditions using the podoscope device. The participants were made to stand barefoot on the glass platform on the device with both feet and stand in the anatomical position for five seconds. After the correct

standing position was achieved, the sole of the foot was imaged and recorded on the computer. The images obtained were analysed with the Global Postural System computer software. After the analysis, the narrowest point of the arch of the foot and the widest points of the heel track were measured and the ratio of these two measurements was calculated. According to this calculation, a value of <0.3 was accepted as pes cavus, a value range of 0.3 - 0.70 as normal arch and a value of 1.01 and above as pes planus (Staheli et al., 1987).

Figure 1. Podoscope imaging device

Statistical Analysis

The research data were analysed using SPSS 21.0 statistical analysis software. Descriptive data were presented as frequency, percentage, arithmetic mean and standard deviation. The relationship between the demographic characteristics of the participants according to their plantar arch index scores was analysed by Fisher's exact Chi-Square test. Kruskal Wallis test was used to compare the arithmetic averages according to the foot analysis results of the participants because the data showed non-parametric distribution, and Mann Whitney-U tests were used to determine the source of the difference. The significance level was accepted as ($p<0.05$) in statistical analyses.

RESULTS

Table 1. General descriptive information of the participants

Variables	Min	Max	M±Sd
Age (year)	18	34	20.70±2.43
Body Height (cm)	153	193	175.1±8.83
Body Weight (kg)	47	104	69.93±12.58
BMI (kg/m^2)	17.28	33.41	22.67±2.85
training frequency (week/day)	1	7	4±2

According to Table 1, it was determined that the participants had an average age of 20.7 years in the age range of 18-34 years, an average height of 175.1 cm in the range of 153-193 cm, an average body weight of 69.9 kg in the range of 47-104 kg, and an average BMI of 22.67 kg/m2 in the range of 17-33. The training frequency of the participants; It was determined that they trained at least 1 day a week, at most 7 days a week and on average 4 days a week.

Looking at the % distribution of the demographic characteristics of the participants in Table 2; in terms of gender variable; 78.6% of the participants were males, in terms of department variable; 59.7% of the participants were students of the department of coaching education, in terms of sports age variable; 45.3% of the participants had a sports age in the range of 5-9 years, and

74.2% of the participants were active athletes. In the results of foot analysis according to plantar index scores; 53.5% of the participants were found to have normal soles, 25.8% flexible, 14.5% high arch and 6.3% rigid flat soles. According to the post-training pain status, it was determined that 62.9% of the participants did not feel pain and 37.1% felt pain (Table 2).

Table 2. Frequency and percentage distribution of general characteristics of the participants

Variables		f (159)	(%)
Gender			
	Female	34	(21.4)
	Male	125	(78.6)
Department			
	Choaching Education	95	(59.7)
	Sports Management	43	(27)
	Recreation	21	(13.2)
Training Age			
	1-4 year	50	(31.4)
	5-9 year	72	(45.3)
	10+ year	37	(23.3)
Athlete Status			
	Active Athlete	118	(74.2)
	Recreative	41	(25.8)
Chronic Health Problem			
	Yes	3	(1.9)
	No	156	(98.1)
Plantar Index			
	Normal foot sole	85	(53.5)
	Flexible Flatfoot	41	(25.8)
	Rigid Pes Planus	10	(6.3)
	High Arch	23	(14.5)
Post-Workout Pain			
	Yes	59	(37.1)
	No	100	(62.9)

In Table 3, it was determined that 53.5% of the participants had normal soles, 25.8% had flexible soles, 6.3% had rigid flat soles and 15.5% had high arch soles in the foot analysis results according to the plantar index scores. When the results of the sole analysis in terms of gender variable were analysed, it was determined that there was no statistically significant difference between the distribution percentages of the sole distribution of females and males (X^2= 4.870, p>0.05).

Table 3. Foot posture analysis results of participants according to gender

Variables		Female	Male	Total	X^2	*p*
Normal foot sole	f	16	69	85	4.870	.182
	%	47.1	55.2	53.5		
Flexible Flatfoot	f	12	29	41		
	%	35.3	23.2	25.8		
Rigid Pes Planus	f	0	10	10		
	%	0	8.0	6.3		
Pes Cavus	f	6	17	23		
	%	17.6	13.6	15.5		

In Table 4, when the results of the analysis of the sole in terms of the department variable according to the plantar index scores of the participants were examined; it was determined that there was no statistically significant difference between the distribution percentages of the sole of the foot of the students of the departments of coaching education, sports management and recreation (X^2=7.795, p>0.05).

Table 4. Foot posture analysis results according to participants' departments

Variables		Coaching (f:95)	Manegment (f:43)	Recreation (f:21)	X^2	*p*
Normal foot sole	f	55	22	8	7,795	0,254
	%	57.9	51.2	38.1		
Flexible Flatfoot	f	22	11	8		
	%	23.2	25.6	38.1		
Rigid Pes Planus	f	8	2	0		
	%	8.4	4.7	0		
Pes Cavus	f	10	8	5		
	%	10.5	18.6	23.8		

When the results of the sole of the foot analyses in terms of the athletic status variable according to the plantar index scores in Table 5 were examined, it was determined that there were statistically significant differences between the participants' sole of the foot distribution percentages (X^2=10.150, p<0.05).

Table 5. Foot posture analysis results according to the athletic status of the participants

Variables		Recreational Athletes (n:118)	Licensed Athletes (n:41)	X^2	*p*
Normal foot sole	f	56	29	10.150	0.017*
	%	47.5	70.7		
Flexible Flatfoot	f	37	4		
	%	31.4	9.8		
Rigid Pes Planus	f	9	1		
	%	7.6	2.4		
Pes Cavus	f	16	7		
	%	13.6	17.1		

*=p<0,05

When the results of the analysis of the sole according to the pain status after training were examined in Table 6, it was determined that there were statistically significant differences between the pain status of the participants and the distribution percentages of the sole (X^2=12.229, p<0.05).

Table 6. Foot posture analysis results according to participants' post-training pain status

Variables		Pain (n:59)	No Pain (n:100)	X^2	*p*
Normal	f	24	61	12.229	0.007*
	%	28.2	71.8		
Flexible Flatfoot	f	24	17		
	%	58.5	41.5		
Rigid Pes Planus	f	2	8		
	%	20	80		
Pes Cavus	f	9	14		
	%	39.1	60.9		

*=p<0,05

Table 7. Analysis of the difference in physical characteristics of the participants according to their Plantar Arch Index Scores

Variables	Group	M±Sd	$f_{(3,155)}$	p	Post-Hoc
Body Height (cm)	1) Normal foot sole	176.1±8.86	3.687	0.227	N.S
	2) FlexibleArch	173±9.42			
	3) Rigid Pes planus	174.5±3.17			
	4) Pes Cavus	175.5±9.07			
Body Mass (kg)	1) Normal	70.81±1.46	3.034	0.386	N.S
	2) FlexibleArch	67.01±1.60			
	3) Rigid Pes planus	74.90±4.14			
	4) Pes Cavus	69.61±2.59			
BMI (kg/m^2)	1) Normal	22.69±3.04	3.034	0.475	N.S
	2) FlexibleArch	22.32±2.26			
	3) Rigid Pes planus	24.56±3.97			
	4) Pes Cavus	22.41±2.31			

N.S: Not Significant

When the physical characteristics of the participants were analysed according to the Plantar Arch Index scores in Table 7, it was determined that there was no statistically significant difference between the height, body weight and BMI averages of the participants with normal, flexible, rigid flat feet and high arch feet in terms of foot postures ($p>0.05$).

Table 8. Analysis of participants' pain scores according to Plantar Arch Index Scores

Variables	Group	M±Sd	X^2	p	Post-Hoc
Pain Score	1) Normal foot sole	1.45±1.94	9.052	0.029*	1<2 3<2
	2) FlexibleArch	2.73±2.60			
	3) Rigid Pes planus	1.10±2.42			
	4) Pes Cavus	2.04±2.38			

*=p<0,05

When the post-training pain scores of the participants according to the results of foot analysis in Table 8 were analysed; it was determined that the participants with flexible arch soles had a statistically significant higher mean pain score than the participants with normal and rigid flat soles ($p<0.05$).

DISCUSSION

In the study, according to the results of foot posture analysis of 34 female and 125 male students between the ages of 18-34 who were undergraduate students at Çanakkale Onsekiz Mart University, Faculty of Sports Sciences, significant differences were determined in the status of doing sports, pain status and post-training pain scores ($p<0.05$).

According to the general distribution of the results of foot posture analysis, 53.5% of the participants had no problem, 25.8% were flexible, 6.3% were rigid flat and 15.5% had high arch. In terms of general population studies, it can be stated that the rate of foot posture disorder is higher than predicted. When compared with the literature examples, Açak et al. (2023) examined the foot postures of 252 secondary school students aged 10-14 years in Ezine district of Çanakkale and determined that 39% of the participants had foot posture disorder according to Staheli's Arch Index scores. In the study conducted by Kazdal-Kabakulak (2015) on 733 children aged 8-11 years in Fatih district of Istanbul, 16.8% of the children had foot posture disorder according to Staheli's Arc Index scores. In a study conducted by Mølgaard, Lundbye-Christensen, and Simonsen (2010) on 2100 adults in Denmark, it was reported that 17.9% had pes planus and pes cavus problems. When the results of our study and the literature samples are compared, it can be stated that the prevalence of foot posture disorders in the students of the faculty of sport sciences, which constitute the research sample, is quite high.

When foot posture disorders were analysed in terms of gender in the study, flexible sole were found in 35.3% and pes cavus was detrmined in

the 17.6% of females, respectively. In males, these rates were 23.2% and 13.6%, respectively. The remarkable result was that pes planus was not seen in women, while pes planus was detected in 8% of men. Although some descriptive differences were observed in terms of foot posture disorder, it was determined that these proportional differences were not significant in statistical analysis. When the literature samples were examined, in the study conducted by Açak et al. (2023), although foot posture disorder was more common in male children compared to females, no statistically significant difference was determined in the analysis results similar to our study. In the study conducted by Özçadırcı et al. (2021) in which foot posture analysis was performed in pre-adolescent swimmers; it was stated that there was no difference between foot posture conditions in terms of gender. In the study conducted by Carvalho et al. (2017), it was stated that foot posture disorders were more common in young women, especially due to wearing high-heeled shoes. In this direction, our research findings are consistent with the literature.

In the study, it was determined that there was no significant difference between the height, body weight and BMI averages of the participants grouped according to the arch index scores in terms of anthropometric characteristics. In literature studies, the general opinion is that individuals with rigid flat feet have excessive body weight and high BMI scores (Atak, Özbek & Algun, 2016; Aktan & Kutlay, 2022). In this research group, this predicted difference may not have emerged because the students of the faculty of sport sciences who do more physical activity and sports than the general population were examined. Confirming this result, it was found that foot posture deformity was less common in participants who were active in sports with a rate of 29.3%, while 52.5% of those who were engaged in recreational sports activities had foot posture disorder. In this respect, it can be said that doing active sports is beneficial for the protection of foot posture health. In addition, it was determined that there was no proportional difference in the foot posture conditions of the participants in terms of the department they studied in sports sciences.

In the study, when the pain conditions of the participants after sportive training and activities were analysed according to their foot posture conditions; it was determined that participants with flexible feet had more pain complaints than other groups. In the studies on foot posture and pain in the literature, Mølgaard, Lundbye-Christensen, and Simonsen (2010) examined Danish adults between the ages of 18-80 years; it was stated that the prevalence of lower extremity pain was higher in individuals with foot deformity. However, unlike our study, this sample included both older age and sedentary people, so there is a reasonable difference. The fact that the participants in our study were both younger and engaged in more physical activity may be the reason for the absence of pain. The fact that more pain is seen in individuals with flexible soles is thought to be due to the fact that tendons and muscles cause pain due to more stretching of the feet in movements such as running and jumping in sportive activities. In the study conducted by Aktan and Kutlay (2022), it was reported that those with foot posture disorder among sedentary individuals in the 18-30 age range also had pain complaints. In this respect, it is clinically expected that flexible flat soles experience post-activity pain due to foot posture disorder in physical activities.

Conclusion

As a result of the study, it was determined that the rate of foot posture disorder was higher in students studying at the faculty of sport sciences compared to the general population. While there was no difference in terms of gender, height, body weight and BMI values, the rate of foot posture disorder was lower in active athletes. When the pain conditions of the participants after physical activity and training were examined, it was observed that the pain complaints of those with flexible flat feet were more. In this context, it can be said that participation in regular physical activity and training will help to reduce complaints related to foot posture disorders.

Foot health has an important place in the context of protecting and improving health, quality of life and increasing work efficiency or sportive performance. However, when the literature is examined, it is seen that the prevalence of studies on the subject is limited. Therefore, it is thought that there is a need for clinical research on more participants with different demographic characteristics and that such research will contribute to the field by filling an important gap.

Conflict of interest

There is no conflict of interest for the authors in this study. In addition, no financial support was received from any institution or organisation for the study.

Ethics Committee

This research was conducted with the approval of Çanakkale Onsekiz Mart University, Institute of Graduate Education Scientific Research Ethics Committee (Approvel Nummer: E-84026528-050.01.04-2300214054).

Author Contributions

The preparation of this study, design of the topic, collection of data, statistics, findings, discussion, conclusion and added references were done by the researcher. The author has read and accepted the published version of the article.

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RESEARCH ARTICLE

Investigation of Educational Game-Playing Skills of Preschool Teachers

Serpil AKÇINAR[1*] and Ramazan ARAK[2]

[1]İnönü Üniversitesi, Spor Bilimleri Fakültesi, Malatya / Türkiye
[2]İnönü Üniversitesi, Spor Bilimleri Fakültesi, Malatya / Türkiye
*Corresponding author: stimurkaanakcinar@gmail.com

Abstract
This study aims to assess the educational game-playing skill levels of preschool teachers. The survey method, a quantitative research approach, was employed in this study. The study involved 61 preschool teachers from official kindergartens and kindergartens affiliated with the Diyarbakır Provincial Directorate of National Education during the 2022-2023 education period. As the data collection tool, the "Educational Game Playing Skill Observation Scale" was used. The data were analyzed using the SPSS statistical software. Independent Samples T-Test and One-Way ANOVA were utilized for the analyses while the LSD test, a Post-Hoc test, was employed to identify which group contributed to significant differences. It was discovered that preschool teachers' educational game-playing skill levels ($\bar{x}$=100.47) were at satisfactory levels. In terms of the subscales of the observation scale, preschool teachers demonstrated very good skills in the preparation ($\bar{x}$=3.60) and game phases ($\bar{x}$=3.41), while their skills in the evaluation phase ($\bar{x}$=2.66) were sufficient. There was no significant difference in the game skill levels of preschool teachers based on gender and educational level ($p>0.05$). The significant difference in skill levels among preschool teachers in the preparation phase, game phase, subscales, and evaluation phase subscale arises from participants with service periods between 21-31 years ($p<0.05$). In the study, the educational game-playing skills of preschool teachers are considered sufficient. The "preparation phase" and "game phase" exhibit very good levels of skill, while the "evaluation phase" is at satisfactory levels.

Keywords
Skill, Educational Game Play, Observation Scale, Preschool Teacher

INTRODUCTION

Preschool education covers the period from the moment an individual is born until basic education. It is a period in which most of the cognitive, physical, social, emotional, linguistic, and psychomotor development is completed. This period is defined as the education process provided in institutions together with parents. When the developmental dimensions in question (cognitive, emotional, social, etc.) are examined, the first stage of systematic education is the preschool period (Gemici, 2023).

The preschool period is the period in childhood when learning is at its peak. All the acquisitions and habits acquired by the child in this period are maintained similarly in the future life of the child. Moreover, it can be stated that games are one of the most effective techniques for children to communicate with their peers and spend quality time during this period.

Games are activities that are as old as the history of humankind and have a deep-rooted history. Especially in the preschool period, many skills, behaviors, and knowledge taught to individuals are gained through games (Koçyiğit et al. 2007). Game-based learning has become an effective teaching technique to facilitate the learning of preschool students. Games in the educational environment have two goals: being fun and being educational. Therefore, it is hoped that games in educational institutions have

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[1]**ORCID:** 0000-0001-9454-0582 , [2]**ORCID:** 0009-0000-8440-3242

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developmentally appropriate content, are socially enriched, and provide a balance between the game world and the real world. Educational games have an important position among teaching techniques. Educational games constitute a sound technique for collaborative learning environments when they are planned correctly. Games provide an opportunity for learners to learn by practicing and to have experience. In general, they also ensure the participation of students who choose to remain silent or inactive in the classroom. They develop decision-making and problem-solving-oriented approach skills while motivating and encouraging students, as well as arousing curiosity and supporting the learning of many skills such as critical thinking, reading, discussion, and acting in coordination. Furthermore, games are effective techniques that can be applied to support the efforts of children who are not successful while motivating them (Demirtaş et al. 2021).

Educational games affect many developmental dimensions in terms of the development of young learners. Among the experimental studies in the literature, there are studies on the positive effects of educational games on different developmental dimensions such as cognitive, social, motor skills, physical development and the development in classes that include students with disabilities (Münüroğlu 1995; Akar 2013; Koç 2017; Özdenk 2007; Üstündağ 2017; Yılmaz 2017; Kekeç 2013; Gülsoy 2013; Alp 2015; Bektaş 2015).

Educational games shape the character, attitude, value judgments, and beliefs of individuals in adulthood based on the behaviors learned in childhood (Karaömerlioğlu, 2010; Tanrıverdi, 2012). As can be understood from this statement, educational games have the power and quality to affect the behaviors of individuals. Therefore, educational games are highly effective in learning behaviors and permanent learning (Ajibade et al. 2008; Yıldız et al. 2017). The permanence of the acquired knowledge is largely because the learning process is quite enjoyable as well as learning by doing and living (Michael and Chan, 2006). The learning-by-doing process enables abstract concepts to be rendered concrete and these concretized concepts to be shaped by experience. The concepts shaped by experience take place in the cognitive schema of children or students more than other learning techniques and gain permanence (Baki, 1999). The quality of abstract thinking of a kindergarten student or a person who is still in childhood has not developed (Bilici, 2014). The most effective way to transfer abstract concepts to the student who lacks this ability and to help them make sense of these concepts is to facilitate the learning process with educational games (Çalışkan and Karadağ, 2005).

When the Council of Higher Education (CoHE) preschool teaching undergraduate program is examined, it is seen that the course "Game Development and Education in Early Childhood" is provided in the 4th semester (2nd grade) with 3 theoretical courses and that there is no course called "game" or "educational game" in the program (CoHE, 2023). When the preschool education program of the Ministry of National Education (MoNE) is examined, it is emphasized that the lessons should be game-based. Furthermore, within the framework of the program, there is a "game and movement activity" hour in preschool education institutions. However, there is no course called "educational game" (MoNE, 2023). Additionally, when the central and local in-service training of MoNE were examined, no in-service training activities under the name of "game" or "educational game" were found (MoNE, 2023).

Although educational games are the subject of countless studies, the fact that they are included as a course in education plans reveals the importance of educational games in terms of education. Over time, the educational game, whose importance in educational activities has become more apparent, has become even more imperative to be implemented by individuals who can implement educational games (Akçınar, 2018). In this context, preschool teachers can play educational games.

Competent education and training institutions are needed for a competent human profile. One of the remarkable elements that determine the quality of education is teachers. The behaviors expected from teachers who will fulfill their duties in educational environments should be acquired by prospective teachers before they start their duties. For this purpose, it is important to determine the program criteria for the objectives and the desired level of competence in teacher education programs. Program criteria in teacher education programs include teacher abilities such as being conscious and behaving appropriately in all conditions that prospective teachers may

encounter during their teaching duties, working with children with different personal qualities and backgrounds in educational environments, and being more active in the classroom environment (Adıgüzel, 2008).

In this kind of process, it will be beneficial for teachers to build the competencies and skills they will learn for practice more effectively. With the development of education, a person's competence largely reflects the competence of the teacher. Learners' competencies are the same as teacher competencies. The competence of the teacher plays an important role in the functioning and success of the education system (Aydın, 2008).

Considering the master's and doctoral studies on preschool games conducted in Turkey between 1986 and 2013, 45% of these studies consisted of experimental research. When these studies were analyzed, it was determined that they mainly focused on the effects of educational games on development (Kaytez & Durualp, 2014). Additionally, similar studies continued in the following years. However, research on whether the individuals who implement educational games have the ability, experience, and expertise to implement these games is very rare. Among these studies, the "playfulness scale" (Hazar, 2014), "children's perceptions of games scale" (Kaşkaya et al. 2017), and "preschool teachers' self-efficacy scale for teaching games" (Kadim, 2012) were used to test the importance of games. Research in the literature in the field of preschool education has remained in the mental or emotional dimension. Within this framework, there are no studies that can test the expertise and experience of individuals who implement educational games based on practice and test whether they can implement educational games.

The achievement of the goals of preschool education, as desired at all levels of education, is directly linked to the competence of teachers. The results of many studies on the competence of teachers identify the link between the competence of teachers and the achievement of students (Biçer, 2021). The ability, practice, and experience of preschool teachers are very important in determining the extent to which children learn and how children grow in the educational institution (Chakravarthi, 2009).

Since preschool children are not yet in the abstract thinking period, their education and training are generally based on games. Moreover, the fact that educational games benefit the child's physical, cognitive, social, emotional, and linguistic development dimensions makes the educational game course essential for children. For the educational game course to achieve its purpose, there is a need for preschool teachers who have been scientifically trained, adopted, and employed correctly.

In this study, the levels of educational game-playing skills of preschool teachers who spend their working life intertwined with games are investigated. Accordingly, the current study aims to reach the following aims and answers by applying the Educational Game Playing Skill Observation Scale to preschool teachers.

- What is the level of educational game-playing skills of preschool teachers?
- Is there a difference between preschool teachers' skill levels of educational game playing in terms of gender?
- Is there a difference between preschool teachers' skill levels of educational game playing in terms of years of service?
- Is there a difference between preschool teachers' skill levels of educational game playing in terms of their educational level?

In terms of the significance of the study, the place of educational games in education has reached almost indisputable points. After the importance of the game, the importance of the player is a candidate to be a new topic in the literature. As in every level of education, getting efficiency from educational games, which is one of the effective education and training tools in preschool, largely depends on the game-playing skills of the preschool teacher. Playing qualified educational games by qualified people will provide the opportunity to complete the trivet for an efficient and effective education (Akçınar, 2018). To make strong use of games in the game environment, the theoretical and practical details specific to the play of games should be known to the teacher (Akçınar, 2018).

In this study, the skill levels of preschool teachers who are involved in games in their professional lives are examined. When the literature was examined, there were no studies that measured the educational game skill levels of preschool teachers. Accordingly, the current study is thought to be a significant study both in terms of providing feedback to preschool teachers who

continue their professional lives and providing data to faculty members in preschool teaching departments of universities, CoHE and MoNE.

The study assumes that the "Educational Game Playing Skill Observation Scale" measures the educational game-playing skill levels of preschool teachers. On the other hand, the study was limited to preschool teachers working in official kindergartens and nursery schools in Diyarbakır province in the 2022-2023 academic year.

Certain definitions related to the subject of the study were presented as the following:

Preschool education: Preschool education is the education process provided in families and institutions where the individual's developmental dimensions and self-care skills are supported, rich environmental opportunities conducive to his/her interest and development are offered, his/her character and personality are shaped, and he/she is prepared for primary school in line with the culture of the society (Hayıroğlu, 2017).

Preschool teacher: Preschool teachers are individuals who provide the necessary physical, cognitive, social, and emotional education to students in the 0-6 age group (Yılmaz, 2015).

Games: Games are a part of real life and an effective learning process, which is the basis of physical, mental, language, social, and emotional development. Games are played with or without a goal, with or without rules; however, the individuals are voluntarily and willingly involved under all circumstances (Bekmezci, 2015).

Educational games: Educational games are purposeful activities that make the learning process fun and benefit the physical, linguistic, cognitive, social, and emotional skills of individuals (Erol et al. 2021).

Skill: Skills are the abilities to apply acquired knowledge, solve problems, and complete tasks (Güneş, 2012).

MATERIALS AND METHODS

Research Design

In this study, the research method was designed in two stages.

In the first stage, the survey model, one of the quantitative research methods, was used to determine the skill levels of preschool teachers in playing educational games. The survey design provides a quantitative or numerical description of attitudes, tendencies, or opinions in the population through research conducted on a sample determined from a population (Creswell, 2017).

In the second stage, a causal comparison was used to determine whether there was a difference according to the educational level, years of service, and gender of preschool teachers. Causal comparison studies are investigations carried out to examine the level or existence of connections between two or more variables, reach clues related to cause and effect, and comprehend the phenomena examined more accurately (Büyüköztürk et al. 2015). Ethical Approval was received by İnönü University Scientific Research and Ethics Committee on 09.06.2022 with decision number 2022/12-9.

Population and Sample

Research Population

The study population consisted of 1319 female and 329 male preschool teachers, totaling 1648 preschool teachers (1319 female and 329 male) working in official kindergartens and preschool education institutions affiliated to Diyarbakır Provincial Directorate of National Education in the 2022-2023 education period.

Sample of the Study

In the power analysis performed while creating the sample, when the effect size was equal to 0.5, alpha to 0.05, and beta (power) to 0.95, it was concluded that the sample size should consist of at least 47 preschool teachers. Considering the above criteria, the sample of the study consists of 61 preschool teachers who work in the official kindergartens and preschool education institutions affiliated with the Diyarbakır Provincial Directorate of National Education and who voluntarily participated in the study.

Demographic Information

The demographic information of the 61 preschool teachers constituting the sample of the study is presented below.

Percentage distributions and frequency distributions of preschool teachers who participated in the study according to demographic variables are presented above. In this context, 75.4% (n=46) of the preschool teachers in the study were female and 24.6% (n=15) were male. In terms of years of service, 62.3% (n=38) of the participant preschool teachers had 1-10 years of service, 29.5% (n=18) had 11-20 years of service, and 8.2% (n=5) had 21-31 years of service. In terms of the educational level of the participant

preschool teachers, 90.2% (n=55) of them completed undergraduate degrees, and 9.8% (n=6) completed master's degrees.

Table 1. Distribution of Preschool Teachers' Demographic Information

Variable		n	%
Gender	Male	15	24.6
	Female	46	75.4
	Total	**61**	**100**
Years of Experience	1-10 year	38	62.3
	11-20 year	18	29.5
	21-31 year	5	8.2
	Total	**61**	**100**
Educational Level	Undergraduate	55	90.2
	Master Degree	6	9.8
	Total	**61**	**100**

Data Collection Tool

In the collection of the data for this study, the "Educational Game Playing Skill Observation Scale" designed by Akçınar 2018 in her doctoral thesis was used (Akçınar, 2018).

Educational Game Play Skill Observation Scale

The educational game-playing skill observation scale used in this study consists of three subscales: preparation, game, and evaluation. The preparation stage consists of 5 items, the game stage consists of 21 items and the evaluation stage consists of 4 items, totaling 30 items. This scale evaluates the skill level of the educational game player as very appropriate (4), sufficiently appropriate (3), less appropriate (2), and not appropriate at all (1). When the scale is evaluated according to its subscales, 1.00-1.75 points is a very poor level, 1.76-2.50 points is an inadequate level, 2.51-3.25 points is an adequate level, and 3.26-4.00 points is a very good level. When the observation scale is evaluated as a whole, a score between 30-120 is obtained. As the score increases, the skill level of playing games also increases. A score range of 30-45 means very poor level, a score range of 46-75 means inadequate level, a score range of 76-105 means adequate level, score range of 106-120 means very good level. The Cronbach Alpha value for the scale is 0.94, indicating high internal consistency.

Data Analysis

Descriptive statistics were used to analyze the percentages and frequencies of the data. The results obtained as a result of the statistical analyses are presented in the "demographic information" table. Before analyzing the data, skewness, and kurtosis values were reviewed, and a normality test was performed. According to Table 2, since the skewness and kurtosis values were between +1.5 and -1.5, the data were found to have a normal distribution (Tabachnick & Fidell, 2007). For these normally distributed data, the One-Way ANOVA test was used for three or more comparisons, and the Independent Samples T-Test was used for pairwise comparisons. Apart from this, the LSD test, one of the Post-Hoc tests, was used to determine which group the difference originated from among the significant results.

RESULTS

Table 2. Educational Game Play Skill Levels of Preschool Teachers

Subscale	n	$\bar{x}$	sd	Skewness	Kurtosis
1. Preparation Phase	61	3.60	0.30	-1.379	0.999
2. Game Phase	61	3.41	0.31	-0.439	-1.174
2.1. Introduction to Educational Game	61	3.13	0.29	0.034	-1.330
2.2. Educational Game Play	61	3.55	0.35	-0.597	-1.063
3. Evaluation Phase	61	2.66	0.26	0.034	-0.052
Total	61	100.47	8.30	-0.498	-0.897

Table 2 shows the skill levels of the teachers in playing educational games. The preparation stage has a mean of $\bar{x}$ =3.60 at a very good skill level. The game phase has a mean of $\bar{x}$ =3.41 at a very good skill level. Again, the introduction to the game, one of the subscales of the game phase, has a mean of $\bar{x}$ =3.13 at the adequate skill level. Another subscale of the game stage, game playing subscale has a mean of $\bar{x}$ =3.55 at a very good skill level. The evaluation phase has a mean score of $\bar{x}$ =2.66 at the adequate skill level. In total, game-playing skill has a mean score of $\bar{x}$ =100.47 at the adequate skill level.

Table 3 shows teachers' skill levels in educational game playing in terms of the gender variable. In the preparation stage, the male gender variable had a score of $\bar{x}$ =3.44 and no significant difference was found ($p>0.05$). The preparation stage female gender variable was $\bar{x}$ =3.66 and no significant difference was found ($p>0.05$).

In the game phase, the male gender variable had a mean of x̄ =3.34 and no significant difference was found (p>0.05). In the game phase subscale, the female gender variable was x̄ =3.44 and no significant difference was found (p>0.05). In the subscales of the game stage, in terms of the game introduction, the male gender variable had a mean of x̄ =3.06 and the female gender variable had a mean of x̄ =3.15 and no significant difference was found (p>0.05). In the game stage, in the subscale of starting the game, the male gender variable was x̄ =3.48, the female gender variable was x̄ =3.58 and no significant difference was found (p>0.05). In the evaluation phase, the male gender variable was x̄ =2.68, the female gender variable was x̄ =2.66 and no significant difference was found (p>0.05). In terms of the game-playing skill, the male gender variable was x̄ =98.13, the female gender variable was x̄ =101.23, and no significant difference was found (p>0.05).

Table 3. T-Test Results of Preschool Teachers' Educational Game Playing Skill Levels According to Gender

Subscale	Gender	n	x̄	sd	t	p
1. Preparation Phase	Male	15	3.44	0.40	-2.016	0.059
	Female	46	3.66	0.24		
2. Game Phase	Male	15	3.34	0.32	-1.057	0.295
	Female	46	3.44	0.30		
2.1. Introduction to Educational Game	Male	15	3.06	0.32	-0.958	0.342
	Female	46	3.15	0.29		
2.2. Educational Game Play	Male	15	3.48	0.35	-1.003	0.320
	Female	46	3.58	0.34		
3. Evaluation Phase	Male	15	2.68	0.30	0.252	0.802
	Female	46	2.66	0.25		
Total	Male	15	98.13	9.30	-1.264	0.211
	Female	46	101.23	7.91		

Table 4. One-Way ANOVA Results of Educational Game Playing Skill Levels of Preschool Teachers According to Years of Service

Subscale	Years of Service	n	x̄	sd	F	p	d	LSD
1. Preparation Phase	1-10 years (a)	38	3.52	0.34	4.822	**0.012**	0.14	**c>a** **c>b**
	11-20 years (b)	18	3.71	0.15				
	21-31 years (c)	5	3.88	0.10				
	Total	61	3.60	0.30				
2. Game Phase	1-10 years (a)	38	3.35	0.30	3.698	**0.031**	0.11	**c>a**
	11-20 years (b)	18	3.45	0.31				
	21-31 years (c)	5	3.73	0.07				
	Total	61	3.41	0.31				
2.1. Introduction to Educational Game	1-10 years (a)	38	3.07	0.29	3.252	**0.046**	0.10	**c>a**
	11-20 years (b)	18	3.18	0.30				
	21-31 years (c)	5	3.40	0.15				
	Total	61	3.13	0.29				
2.2. Educational Game Play	1-10 years (a)	38	3.50	0.34	3.205	**0.048**	0.09	**c>a**
	11-20 years (b)	18	3.59	0.34				
	21-31 years (c)	5	3.90	0.08				
	Total	61	3.55	0.35				
3. Evaluation Phase	1-10 years (a)	38	2.61	0.23	6.786	**0.002**	0.18	**c>a** **c>b**
	11-20 years (b)	18	2.66	0.25				
	21-31 years (c)	5	3.05	0.27				
	Total	61	2.66	0.26				
Total	1-10 years (a)	38	98.60	8.06	5.077	**0.009**	0.14	**c>a** **c>b**
	11-20 years (b)	18	101.77	7.98				
	21-31 years (c)	5	110.00	2.91				
	Total	61	100.47	8.30				

Table 4 shows teachers' skill levels in educational game playing in terms of years of service. In terms of the variable of years of service in the preparation stage, teachers with 1-10 years of service had a mean of $\bar{x}$=3.52, teachers with 11-20 years of service had a mean of $\bar{x}$=3.71, teachers with 21-31 years of service had a mean of $\bar{x}$=3.88 and a significant difference was observed ($p<0.05$; Table 4). In terms of the years of service variable for the game phase, the scores were $\bar{x}$=3.35 with 1-10 years of service, $\bar{x}$=3.45 with 11-20 years of service, $\bar{x}$=3.45 with 21-31 years of service, and $\bar{x}$=3.73 with a significant difference. In the game phase, in terms of the game introduction subscale, the scores were $\bar{x}$ =3.07 with 1-10 years of service, $\bar{x}$ =3.18 with 11-20 years of service, $\bar{x}$ =3.18 with 21-31 years of service and $\bar{x}$ =3.40 with a significant difference ($p<0.05$; Table 4). In the subscale of the game stage, in terms of the years of service variable in the subscale of game implementation, those with 1-10 years of service have a mean of $\bar{x}$=3.50, those with 11-20 years of service have a mean of $\bar{x}$=3.59, and those with 21-31 years of service have a mean of $\bar{x}$=3.90 and a significant difference is observed ($p<0.05$; Table 4). In terms of the variable of years of service for the evaluation phase, the mean scores were $\bar{x}$=2.61 for those with 1-10 years of service, $\bar{x}$=2.66 for those with 11-20 years of service, and $\bar{x}$=3.05 for those with 21-31 years of service, and there is a significant difference ($p<0.05$; Table 4). In terms of the years of service variable for the skill of playing games, the scores were $\bar{x}$=98.60 with 1-10 years of service, $\bar{x}$=101.77 with 11-20 years of service, $\bar{x}$=110 with 21-31 years of service and there is significant difference ($p<0.05$; Table 4)

The significant difference in the preparation phase, the game phase and its subscales, and the evaluation phase is due to the participants with 21-31 years of service. While the significant difference in the preparation phase (d=0.14) and evaluation (d=0.18) phases has a large effect size, the significant difference in the game phase (d=0.11) has a medium effect size, and the significant difference in its subscales, introduction to the educational game (d=0.10) and educational game (d=0.09) have a medium effect size. In the total score, it is seen that it has a large effect size.

Table 5. T-Test Results of Educational Game Playing Skill Levels of Preschool Teachers According to Educational Level

Subscale	Educational Level	n	$\bar{x}$	sd	t	P
1. Preparation Phase	Undergraduate	55	3.62	0.29	1.201	0.234
	Master Degree	6	3.46	0.39		
2. Game Phase	Undergraduate	55	3.42	0.30	0.687	0.495
	Master Degree	6	3.33	0.36		
2.1. Introduction to Educational Game	Undergraduate	55	3.12	0.29	0.666	0.921
	Master Degree	6	3.14	0.36		
2.2. Educational Game Play	Undergraduate	55	3.57	0.34	0.907	0.338
	Master Degree	6	3.42	0.37		
3. Evaluation Phase	Undergraduate	55	2.67	0.28	0.134	0.683
	Master Degree	6	2.62	0.13		
Total	Undergraduate	55	100.76	8.21	0.818	0.417
	Master Degree	6	97.83	9.53		

Table 5 shows the skill levels of teachers' educational game-playing skills in terms of the educational level variable. In terms of the preparation stage educational level variable, those with undergraduate degrees had a mean of $\bar{x}$ =3.62, master's degree graduates had a mean of $\bar{x}$=3.46 and no significant difference was found ($p>0.05$). In terms of the educational level variable, those with undergraduate degrees had a mean of $\bar{x}$=3.42, master's degree graduates had a mean of $\bar{x}$=3.33 and no significant difference was found ($p>0.05$). In the game phase, in terms of the game introduction subscale, those with undergraduate degrees had a mean of $\bar{x}$=3.12, master's degree graduates had a mean of $\bar{x}$=3.14 and no significant difference was found ($p>0.05$). In the game stage, in the subscale of game implementation, those with undergraduate degrees had a mean of $\bar{x}$=3.57, master's degree graduates had a mean of $\bar{x}$=3.42 and no significant difference was found ($p>0.05$).

In terms of the educational level variable, those with undergraduate degrees had a mean of $\bar{x}$=2.67, master's degree graduates had a mean of $\bar{x}$=2.62 and no difference was found (p>0.05). In terms of the educational level variable, those with undergraduate degrees had a mean of $\bar{x}$=100.76, master's degree graduates had a mean of $\bar{x}$=97.83 and no difference was found (p>0.05).

DISCUSSION

In this study, the "Educational Play Skill Observation Scale" was applied to determine the educational game-playing skill levels of preschool teachers. To determine the educational game-playing skill levels of the teachers, the educational game-playing skill score was analyzed in terms of educational level, years of service, and gender, and certain comments were presented.

The skill level of preschool teachers in playing educational games was found to be at the level of adequate skill. In the undergraduate program of preschool teacher training departments of universities, the game course is given in the 4th semester (2nd grade) with 3 theoretical courses. In the 7th semester (4th grade) of their education, teaching practice is given as 1, 6 hours, and in the 8th semester (4th grade), teaching practice is given as 2, 6 hours. In addition, elective games or educational game courses may be offered, varying from university to university (CoHE, 2023). When MoNE's preschool education program is examined, the courses must be game-based (MoNE, 2023). Accordingly, it is thought to have a positive effect on the result both because they take a game course and a teaching practice course at university and because most of their courses are game-based in their professional lives. The game-based progress of preschool education is similar to the management and referral of educational games.

The skill level of preschool teachers in playing educational games was seen at a very good skill level at the "preparation stage". Preschool teachers teach their lessons following the daily plan within the scope of the annual plan. Accordingly, it can be said that the preparation of the daily plan, in which different preliminary preparations are essential for all lessons, through preschool teachers has a positive effect on this issue. Before the daily lesson plans are put into practice, preliminary preparation in the field is necessary. This structure of the game and movement activity hour is parallel to the content of the preparation phase of the educational game.

The skill level of preschool teachers in educational game-playing was seen at a very good skill level in the "game phase". Among the subscale of the game phase, "introduction to the game" was seen at a sufficient skill level, while the subscale of "playing the game" was seen at a very good skill level. The "introduction to the game" subscale mainly consists of criteria specific to the explanation of the educational game, introduction of the game-playing field, and safety. Accordingly, it is thought that the reason why the "introduction to the game" subscale is seen at a sufficient skill level is that preschool teachers do not attach enough importance to this aspect and focus more on the "playing the game" aspect.

The skill level of the evaluation phase was at an adequate skill level. Although the skill levels of the preparation phase and the game phase were found to be at very good skill levels, the reason why the evaluation phase was found to be at the adequate skill level is thought to be that preschool teachers did not take the educational game course in their undergraduate education and were not aware of the scope of the course. Moreover, the fact that preschool teachers see games as enjoyment, warming up, and leisure time evaluation can be expressed as the fact that they may not have looked at the game to provide information, evaluation, and feedback at the end of the game. Accordingly, it can be said that this perspective will cause the evaluation phase to be insufficient.

No significant difference was found between the skill levels of preschool teachers' educational game in terms of the gender variable. No significant difference was found in terms of the gender variable in preparation, game, and evaluation extensions of educational game-playing skills. Gömleksiz and Serhatlıoğlu examined the views of preschool teachers on their self-efficacy beliefs and found no significant difference between gender and self-efficacy levels (Gömleksiz, 2013). Akçınar, in her study, did not find a significant difference between physical education teachers' skill levels of playing educational games in terms of gender in parallel with our study (Akçınar, 2018). Yılmaz, Kırımoğlu, and Yamanyurt examined the self-efficacy levels of physical education and sports teachers in educational game-playing in their study

and concluded that there was no significant relationship between gender variable and game-playing self-efficacy (Yılmaz et al. 2019). Genç did not find a statistically significant difference between gender and subscales in the study examining the self-efficacy of physical education and sports teaching and coaching department students to play educational games (Genç, 2021). Kaymaz, the study examining the self-efficacy of physical education teachers in educational game playing and their professional satisfaction, did not find a significant difference in terms of planning, implementation, and evaluation, which are subscales of educational game playing self-efficacy according to gender (Kaymaz, 2022). The results of these studies support our study.

In this context, it can be concluded that the reason why there is no significant difference between male and female teachers is that they have taken similar courses in their education life and that they are aware of the seriousness of the game as teachers.

A significant difference was found in terms of years of professional service in the preparation phase, game phase and its subscales, and evaluation phase of educational game-playing skill levels of preschool teachers. As the years of professional service increased, the level of educational game-playing skills also increased. Since preschool teachers' lessons are game-based, as the years of service in the profession increase, the experience increases in the same direction. This naturally led to an adequate level of skill in playing educational games. Akmeşe and Kayhan, in the study examining the self-efficacy levels of special education teachers regarding game teaching, observed that a significant difference was found between years of service and game self-efficacy levels (Akmeşe & Kayhan, 2017). Akçınar, in her study, found an increase in the skill level of physical education teachers in playing educational games as the years of service increased in the skill level of playing educational games (Akçınar, 2018). In a study conducted by Turhan, it was determined that teachers with 6-10 years of professional experience scored higher than teachers with 1-5 years of professional experience in their self-efficacy perceptions of educational game playing according to the variable of professional years (Turhan, 2021). The results of these studies support our study. In this context, we can say that as the skills are experienced, we conclude that permanence and competence increase in the same direction.

No significant difference was found between the educational game-playing skill levels of preschool teachers in terms of their education level. In another study, Tortop did not find any difference in the formation levels of classroom teachers in terms of their education level in terms of educational game teaching and practice (Tortop, 2005). In a study with preschool teachers, Turak and Demir did not find a significant difference between the education levels of preschool teachers and their game-playing and teaching self-efficacy (Turak, 2019). In a study conducted by Gemici with preschool teachers, no significant difference was found between the game planning, implementation, and evaluation extensions of teachers' game-playing self-efficacy in terms of their educational level (Gemici, 2023). These studies support our study. Within this scope, it is thought that the reasons why the educational level does not change the results are the limited number of teachers who have a master's degree or are currently doing a master's degree, the fact that educational sciences have a wide range of fields of study, and the fact that the fields of study of preschool teachers who have a master's degree may be different.

The skill level of preschool teachers whose educational game-playing skills were measured with the educational game-playing scale was found to be adequate. "Preparation Phase" was seen at a very good skill level and "Game Phase" was seen at a very good skill level. "Introduction to the Game" subscales of the game phase were seen at an adequate skill level, and the "Game Play" subscale of the game phase was seen at a very good skill level. "Evaluation Phase" was seen at a sufficient skill level. There was no significant difference between the educational game-playing skill levels of preschool teachers in terms of gender. In the study, a significant difference was found between the educational game-playing skill levels of preschool teachers according to their years of service variable. At the end of the study, no significant difference was found between the educational game-playing skill levels of preschool teachers in terms of their educational level variable.

Suggestions

As a result of our study, we propose the following recommendations:

Preschool teachers' skills in educational games were found to be at the level of adequate skill. Although the "preparation stage" was found to be at a very good skill level and the "game stage" was found to be at a very good skill level, the fact that the "evaluation stage" was found to be adequate and the total scale score remained at the adequate skill level can be considered as an issue that needs to be studied. In this context, it can be considered that the Council of Higher Education should make the "educational game" course compulsory in the preschool teaching undergraduate program. In addition, care should be taken in determining the instructors who will teach the course. More duties should be given to qualified individuals for the mentioned field.

It is thought that the purpose of educational games would be better served if the "game and movement activity" hour, which is compulsory in preschool education institutions, is separated into "free game" and "educational game" hours by the Ministry of National Education.

In the study, it was seen that the "evaluation phase" remained at the adequate skill level and was close to the border of the less adequate skill level. Preschool teachers should be given the perspective to use the educational game as a teaching technique in the main line of the lesson in addition to the goal of giving pleasure to the students, focusing on the lesson, and calming them down. Utilizing educational games as a technique can raise the awareness of preschool teachers by taking the evaluation phase seriously.

Preschool teachers' perceptions of making the distinction between games and educational games can be determined. In this case, their perceptions of educational games may affect the preparation, implementation, and evaluation processes, which are the stages of educational games.

Suggestions for those who will carry out the same study are listed below:

This study was limited to Diyarbakır province and its districts. It may be advisable to study and research with a more comprehensive sample group. When similar studies are conducted regionally or nationwide, regional comparisons of the study can also be made and the literature can benefit more.

During the implementation of the educational game-playing skill observation scale in the research process, it was determined that some teachers did not want to participate and some teachers were cautious about participating in the study. The reason for this is the perception of grading them or questioning their teaching. Explaining this situation to them and preventing misunderstandings will make it easier for the people who will conduct the study to manage the process.

Conflict of interest

There is no conflict of interest for the authors in this study. In addition, no financial support was received from any institution or organisation for the study.

Ethics Committee

Ethical Approval was received by İnönü University Scientific Research and Ethics Committee on 09.06.2022 with decision number 2022/12-9.

Author Contributions

Study Design, SA; Data Collection, SA and Statistical Analysis, RA; Data Interpretation, SA and R; MA anuscript Preparation, SA; Literature Search, SA and RA. All authors have read and agreed to the published version of the manuscript.

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RESEARCH ARTICLE

Comparison of Covid-19 Fear and Perceived Stress Level in Tennis Players with Positivie and Negative PCR Results at Elazig/Turkiye

Fikret SEÇEN[1], Fethi ARSLAN[2*] and Mehmet Akif ZİYAGİL[3]

[1]Mersin University, Faculty of Sport Science, Mersin / Turkey
[2]Mersin University, Faculty of Sport, Coaching Education Department, Mersin / Turkey
[3]Mersin University, Faculty of Sport, Department of Physical Education, Mersin / Turkey
*Corresponding author: fethiarslan23@gmail.com

Abstract
The purpose of this research was to compare the COVID-19 fear and perceived stress levels of tennis players in Elazığ province who tested positive and negative for PCR. PCR test results were examined considering variables such as gender, education level, age, and years of playing tennis. The research sample was determined using accessible sampling method and consisted of two participant groups, one with PCR positive (4 participants) and the other with PCR negative (16 participants), in the age range of 10-49. A survey technique was used in the research. The participants' levels of stress perception were measured using the "Perceived Stress Scale Long Form (PSS-14)" and the "COVID-19 Fear Scale (FCV-19S)". Due to the non-normal distribution of the data, PCR test distributions based on gender, age groups, education level, and years of playing tennis were presented with cross-tables. Mann-Whitney U test was used to compare COVID-19 fear and perceived stress levels according to gender and PCR test status. The findings of this study indicated a significant difference in the years of playing tennis for female athletes with negative and positive PCR tests ($p = .031 * p < .05$) and for male athletes with negative and positive PCR tests ($p = .005 * p < .05$). It was also found that PCR positive and negative individuals, both females and males, did not differ significantly in terms of COVID-19 fear and perceived stress levels. As a result, the likelihood of testing negative for PCR increases with increasing age groups.

Keywords
COVID-19, Pandemic, Tennis, Fear, Stress

INTRODUCTION

Throughout history, various periods have witnessed the emergence of infectious diseases. In the 21st century, two coronavirus outbreaks, namely SARS-CoV and Middle East Respiratory Syndrome, or MERS-CoV, are the most widespread and deadly global pandemics.

In December 2019, an unusual pneumonia case with previously unseen symptoms was discovered in the city of Wuhan, located in the Hubei province of China. Health authorities promptly initiated measures such as the isolation of individuals suspected of having the disease, close monitoring of those in contact with infected individuals, and the urgent collection of epidemiological and clinical data for disease progression (Wang and Zhao, 2020).

On December 31, 2019, the first case of COVID-19 was reported to the World Health Organization (WHO) by Chinese authorities (Weston and Frieman, 2020). Due to the disease's spread to 160 countries, with more than 200,000 cases and over 8,000 deaths, the WHO declared it a "pandemic." As cases rapidly increased, countries began implementing necessary restrictions. "The coronavirus, which has been the subject of newspaper headlines and news headlines

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[1]**ORCID:** 0000-0002-6098-0018 , [2]**ORCID:** 0000-0002-6098-0018, [3]**ORCID:** 0000-0003-0884-0607

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in many countries, creates an atmosphere of uncertainty and affects individuals not only physically but also psychologically. Fear, loneliness, boredom, and anger are among the most common emotions experienced by individuals during this period (Ornell, Schuch, Sordi, and Kessler, 2020). The virus's rate of transmission, incubation period, the number of infected individuals, news on social media, and different policies implemented by countries have further intensified feelings of insecurity and fear among individuals. The fear during the pandemic has been shown to increase anxiety and stress levels in otherwise healthy individuals (Barzilay, Moore, Greenberg, Didomenico, Brown, White, Gur, and Gur, 2020). A study examining the fear of contracting or transmitting COVID-19 found that individuals experienced high levels of emotions such as fear, distress, loneliness, anxiety, insomnia, and anger (Shigemura, Ursano, Morganstein, Kurosawa, and Benedek, 2020).

The COVID-19 pandemic not only affects individuals' physical health but also significantly impacts people's mental well-being (Harper, Satchell, Fido, and Latzman, 2020; Satici, Gecet-Tekin, Deniz, and Satıcı, 2021; Yıldırım and Güler, 2020)."During the COVID-19 pandemic, the fear of entering shopping centers or crowded places due to the transmission of the virus from person to person, the fear of encountering infected individuals in healthcare facilities, and the stress of approaching people have been observed as reactions (Doğan and Düzel, 2020; Altunalan et al., 2022). Furthermore, it is known that the implementation of precautions, such as the closure of schools, universities, restaurants, and many factories, has led to people suddenly losing their jobs and income. Unemployment issues and an uncertain future create additional stress and fear among individuals (Fuchs Matonog, Pilarska, Sieradzka, Szul, Czuba, and Drosdzol-Cop, 2020)."

Research studies have shown that age, education level, place of residence, marital status, economic status, and gender are among the factors influencing the fear of COVID-19 (Doğan and Düzel, 2020; Gashi, 2020; Gencer, 2020). Regarding the pandemic, it has been observed that high school graduates are more stressed compared to university graduates, and men are more stressed than women (Doğan and Düzel, 2020). These negative circumstances have also affected social and sporting activities. In response to these adverse conditions, our country has implemented measures such as quarantine, the closure of institutions and organizations, and the enforcement of mask-wearing and social distancing. During the closure period, gyms and sports activities were suspended, and this situation has also affected sports like tennis.

Tennis, among the sports disciplines, stands out as a visually exciting and pleasant activity due to its inclusion of aesthetic movements based on competition. Therefore, it is among the popular sports. It is observed that many individuals participate in tennis competitions that manage to captivate the audience visually, making it a popular sporting event. Tennis, which is also held in many countries around the world, contributes to the tourism potential of the host country. In countries where tennis competitions are held, major organizations and promotions related to sports competitions are carried out. These sports competitions also offer substantial prizes. Tennis, which enjoys great interest in the countries where it is played, provides opportunities for athletes to showcase their abilities thanks to its broad audience base and major events (Ölçücü, Erdil, Bostancı, Canikli, and Aybek, 2012). Furthermore, tennis today ranks among the sports that are practiced both professionally and recreationally (İmamoğlu, 2009). Additionally, tennis is one of the most popular sports in the world, played by 1.12% of the global population (Turner, Beranek, Rogers, Nosaka, Girart, and Cruickshank, 2021).

Unlike many other sports, tennis is played across all age groups. Therefore, it is considered a valuable lifelong sport for maintaining healthy levels of physical activity in middle-aged and older adults. Due to its accessibility across all age groups, it is expected that the COVID-19 pandemic will exert significant pressure on tennis players, leading to psychological issues such as stress and fear. From the athletes' perspective, COVID-19 has not only posed significant health concerns but has also disrupted training and competition schedules due to the fear of infection (Hellewell, Abbott, and Gimma, 2020). Unfortunately, during the COVID-19 pandemic, the reduction in physical activity levels during periods of social isolation and quarantine, along with interruptions in training programs, is likely to have negative effects on respiratory function and exercise capacity in the short and long term.

Additionally, even for athletes who do not contract the disease, the cancellation of competitions and the resulting loss of income have increased pandemic-related stress levels (Bao, Sun, and Meng, 2020).

In light of this information, this study has been prepared to examine the impact of changes in perceived stress levels on the levels of COVID-19 fear among tennis players with both positive and negative PCR test results who continue to play tennis during the pandemic, using certain variables.

The aim of this research is to determine the extent to which the fear of COVID-19 and stress levels of tennis players with positive and negative PCR test results were affected during the COVID-19 pandemic.

MATERIALS AND METHODS

This section provides information about the research design, location and characteristics of the study, the population and sample, data collection instruments, the data collection process, and data analysis.

Research Design

The data collected in this research was gathered at a specific point in time and in a single instance, making the study a cross-sectional research design (Ruane, 2005; Frankel and Wollen, 2005). The research aims to investigate the impact of perceived stress levels on the change in the COVID-19 fear levels of individuals who play tennis, while also exploring how this effect varies based on factors such as PCR testing, gender, age, education, and years of playing tennis. In this regard, the research design can be described as a causal-comparative model since it examines whether the change in the COVID-19 fear levels of individuals who play tennis is attributed to their stress perception, and it also examines whether the measured socio-demographic factors alter the direction, effect, and strength of the interaction between stress and fear.

Descriptive research model is a type of research that aims to describe, explain and interpret the phenomenon or event as it is. Descriptive research generally uses quantitative data collection methods and analyzes the data with descriptive statistics. In this study, descriptive-comparative model, it aims to make comparisons between different groups, conditions, variables or time periods (Buyukozturk, 2016).

The Research Group

This research was conducted with 50 athletes who played tennis in the Elazığ province during the COVID-19 pandemic period, between November 2021 and January 2022, and had both positive and negative COVID-19 PCR test results. The population of the research consisted of athletes who played tennis in the Elazığ province during the pandemic period with both positive and negative COVID-19 PCR test results. The research sample was not determined through a systematic sampling method but rather through a complete enumeration based on voluntary participation. Complete enumeration is the examination of all units in the research population (Ergin, 1991). In this context, the participants of the study were composed of amateur and professional tennis players. To account for potential data loss, it was decided to include 10% reserve participants. Therefore, the sample size of the research was determined as 60 participants. The study was completed with the participation of 50 volunteers.

Data Collection Instruments

The information about the data collection instruments used in the research is as follows:

Socio-Demographic Questionnaire:

This questionnaire aimed to gather information about the participants' gender, age, education level, and occupation. It also included questions related to PCR test results, symptoms exhibited by those who tested positive, accompanying illnesses, and the course of the disease. Additionally, it included questions to determine participants' emotional and behavioral attitudes towards pandemic measures and questions regarding their sports experience before and after COVID-19.

Fear of COVID-19 Scale (FCV-19S):

The Fear of COVID-19 Scale was developed by Ahorsu and others (2020) and adapted into Turkish for use in a study titled "Fear of COVID-19 and Positivity: Mediating Role of Intolerance of Uncertainty, Depression, Anxiety, and Stress" by Bakioğlu and others (2020). The scale consists of seven items and has a single subscale. Participants rate each item on a scale from "1: Strongly Disagree" to "5: Strongly Agree." According to Ahorsu and others (2020), the original scale has factor loadings between 0.66 and 0.74, indicating good validity. The Cronbach's alpha internal

consistency coefficient is 0.82, indicating good reliability. Moderate correlations were found with depression (r=0.43), anxiety (r=0.51), perceived infectivity (r=0.48), and germ avoidance (r=0.46) scales. After ensuring the linguistic validity of the Turkish version, confirmatory factor analysis was conducted using the data collected from the sample. The Turkish version had good fit indices (x^2/sd=2.45; RMSEA=0.03; CFI=0.99; IFI=0.99; GFI=0.99; AGFI=0.99; NFI=0.99; RFI=0.99; SRMR=0.014). Factor loadings ranged from 0.73 to 0.82. The scale explained 58.86% of the total variance. Internal consistency was high (α=0.88) when examined for internal consistency (Bakioğlu et al., 2020).

Perceived Stress Scale Long Form (PSS-14):

This scale was developed by Cohen, Kamarck, and Mermelstein (1983). It consists of 14 items designed to measure how individuals perceive the stressfulness of certain situations in life and is rated on a 5-point Likert scale. Higher total scores indicate higher perceived stress. The reliability and validity analyses of the Turkish long and short forms of the Perceived Stress Scale were conducted by Eskin and others. They found that the internal consistency coefficient of the long form of the scale was 0.84, and the test-retest reliability was 0.87, indicating that the scale is a reliable measurement tool. When the structural validity of the scale was examined using the principal components method, two factors named "insufficiency-self-sufficiency" and "stress / discomfort" were identified. The two-factor structure explained 46.50% of the total variance. The PSS-14 scale had correlation coefficients of 0.45 with the "Life Events List," 0.64 with the "Beck Depression Inventory," -0.43 with the "Rosenberg Self-Esteem Scale," 0.42 with the "Satisfaction with Life Scale," 0.31 with the family subscale of the "Perceived Social Support Scale," and -0.26 with the friend subscale of the "Perceived Social Support Scale" (all $p < 0.01$). Based on these correlation coefficients, the scale has concurrent validity. Therefore, the scale is sufficiently valid for measuring individuals' subjective stress perceptions. Items that need to be reverse-scored are "4, 5, 6, 7, 9, 10, 13" (Eskin et al., 2013).

Data Collection

The implementation of this study began after obtaining ethical approval from the Mersin University Social Sciences Ethics Committee following the acceptance of the thesis proposal. The data collection form was pre-tested on five individuals, and it took an average of 20 minutes to complete.

In the research, the most commonly used data collection method, which is the survey technique, was utilized. The survey was conducted between November 2021 and January 2022. Survey forms were sent to the participants who constituted the sample of the research via an online survey platform (Google Forms) link. At the beginning of the data collection form, the purpose of the study was explained to the participants, and their consent was obtained. Participants were informed that their personal information would be protected and that their responses would never be used with their names in any place or at any time. They were then asked to mark the appropriate options. Also This study has been approved by the Mersin University Social and Human Sciences Ethics Committee with decision number 100 on September 7, 2021.

Data Analysis

After the data were collected through the online survey tool on Google Forms, they were analyzed using SPSS version 21. Subsequently, a frequency analysis was conducted for the factors in the "general information questionnaire."

The reverse items in the Perceived Stress Scale Long Form were recoded to prepare them for analysis. Then, the scores for each participant on this scale were calculated by summing all the scale items. For participants who left some questions blank, the total score was assigned as the mean score. The responses of each participant to the items of the COVID-19 Fear Scale (FCV-19S) were summed to obtain the total score for the scale, and for participants who did not have a total score calculated, the mean score was assigned.

In statistical analyzes, PCR test distributions based on gender, age groups, education level, and the duration tennis playing experience are shown in cross tables. Since the data do not show a normal distribution, Mann Whitney U test was used to compare COVID-19 fear and perceived stress levels by gender and PCR test status.

RESULTS

This research, which aimed to examine the effects of the relationship between COVID-19 fear and perceived COVID-19 risk in individuals

playing tennis during the COVID-19 pandemic, was conducted to contribute to the literature related to the pandemic process.

Table 1: Participants descriptive Statistics

		Female			Male		
Variable	Group	Positive	Negative	Total	Positive	Negative	Total
Yaş Grupları	10-18 Years Old	0	0	0	0	1	1
	19-28 Years Old	6	3	9	4	1	5
	29-38 Years Old	6	6	12	5	1	6
	39-48 Years Old	2	1	3	3	5	8
	49 Years and Older	0	1	1	3	2	5
	Total	14	11	25	15	10	25
Education Level	Primary School	0	1	1	0	2	2
	High School	2	0	2	4	1	5
	University	10	8	18	6	5	11
	Postgraduate	2	2	4	5	2	7
	Total	14	14	25	15	10	25
Years of Playing Tennis	0-4 Years	13	5	18	8	1	9
	5-9 Years	1	5	6	4	4	8
	10-14 Years	0	0	0	3	0	3
	15 Years and Over	0	1	1	0	5	5
	Total	14	11	25	15	10	25

Table 1: Cross-tabulation Analysis of PCR Test Results for Female and Male Athletes by Age *Groups For Female Athletes:*

Chi-square test (X^2) = 2.02, degrees of freedom (df) = 3, Asymptotic Significance (Asymp. Sig.) = 0.572. There is no significant difference in the distribution of PCR positive and negative results among age groups for female athletes. The distribution of PCR positive and negative female athletes is not statistically different by age group.

For Male Athletes:

Chi-square test (X^2) = 5.382, degrees of freedom (df) = 3, Asymptotic Significance (Asymp. Sig.) = 0.250. There is no significant difference in the distribution of PCR positive and negative results among age groups for male athletes. The distribution of PCR positive and negative male athletes by age group is shown. There is no statistically significant difference between PCR positive and PCR negative male athletes.

Cross-tabulation Analysis of PCR Test Results for Female and Male Athletes by Education Level For Female Athletes:

Chi-square test (X^2) = 2.904, degrees of freedom (df) = 3, Asymptotic Significance (Asymp. Sig.) = 0.407. There is no significant difference in the distribution of PCR positive and negative results among education levels for female athletes. The distribution of PCR positive and negative female athletes by education level is shown. There is no statistically significant difference between PCR positive and PCR negative female athletes.

For Male Athletes:

Chi-square test (X^2) = 4.351, degrees of freedom (df) = 3, Asymptotic Significance (Asymp. Sig.) = 0.226. There is no significant difference in the distribution of PCR positive and negative results among education levels for male athletes. The distribution of PCR positive and negative male athletes by education level is presented. There is no statistically significant difference between PCR positive and PCR negative male athletes.

Cross-tabulation Analysis of PCR Test Results for Female Athletes by Years of Playing Tennis: Chi-square test (X^2) = 6.962*, degrees of freedom (df) = 2, Asymptotic Significance (Asymp. Sig.) = 0.031. There is a significant difference in the distribution of PCR positive and negative results among years of playing tennis for female athletes (*p<0.05). The distribution of PCR positive and negative female athletes by years of playing tennis is shown.

Cross-tabulation Analysis of PCR Test Results for Male Athletes by Years of Playing Tennis:

Chi-square test (X^2) = 12.963**, degrees of freedom (df) = 3, Asymptotic Significance (Asymp. Sig.) = 0.005. There is a significant difference in the distribution of PCR positive and negative results among years of playing tennis for male athletes (**p<0.01). The distribution of PCR positive and negative male athletes by years of playing tennis is presented. Male athletes who played tennis for 0-4 years have higher PCR positive rates, while the highest PCR negative rate is observed among male athletes who played tennis for 15 years and above.

Table 2. Comparison of COVID-19 Fear and Perceived Stress Levels of Female Athletes with PCR Negative and Positive Test Results

Variables	Group	N	Mean	SD	Min.	Max.	MWU	z	Asymp. Sig.
COVID-19 Fear	Positive	14	20,07	7,51	11,00	34,00			
	Negative	11	20,00	6,37	10,00	29,00	77,000	,000	1,00
	Total	25	20,04	6,89	10,00	34,00			
Perceived Stress Level (PSL)	Positive	14	23,00	3,92	16,00	29,00			
	Negative	11	24,36	5,18	17,00	35,00	66,500	-,577	,564
	Total	25	23,60	4,47	16,00	35,00			
PSL Inadequate Self-Efficacy Subscale	Positive	14	23,64	2,92	19,00	28,00			
	Negative	11	22,00	5,51	15,00	32,00	47,500	-1,624	,104
	Total	25	22,92	4,24	15,00	32,00			
PSL Stress/Discomfort Perception Subscale	Positive	14	18,64	5,23	10,00	29,00			
	Negative	11	22,09	4,95	11,00	31,00	45,500	-1,730	,085
	Total	25	20,16	5,30	10,00	31,00			

Table 2: Comparison of COVID-19 Fear and Perceived Stress Levels Between Female Athletes with PCR Negative and PCR Positive Results. There were no statistically significant differences found between female athletes with PCR positive and negative results in terms of mean values for COVID-19 fear, perceived stress level, inadequate self-efficacy perception, and stress/discomfort perception variables.

Table 3: Comparison of COVID-19 Fear and Perceived Stress Levels in Male Athletes with Negative and Positive PCR Test Results.

Variables	Group	N	Mean	SD	Min.	Max.	MWU	z	Asymp. Sig.
COVID-19 Fear	Positive	15	17,47	6,12	7,00	26,00			
	Negative	10	18,90	10,83	7,00	42,00	72,500	-,139	,889
	Total	25	18,04	8,14	7,00	42,00			
Perceived Stress Level (PSL)	Positive	15	21,40	5,12	12,00	31,00			
	Negative	10	23,30	9,12	15,00	48,00	73,500	-,084	,933
	Total	25	22,16	6,88	12,00	48,00			
PSL Inadequate Self-Efficacy Subscale	Positive	15	22,47	3,46	16,00	29,00			
	Negative	10	24,40	8,58	15,00	42,00	73,500	-,084	,933
	Total	25	23,24	5,96	15,00	42,00			
PSL Stress/Discomfort Perception Subscale	Positive	15	19,60	5,12	10,00	31,00			
	Negative	10	20,90	8,44	11,00	42,00	72,000	-,167	,867
	Total	25	20,12	6,51	10,00	42,00			

Table 3: Comparison of COVID-19 Fear and Perceived Stress Levels in Male Athletes with Negative and Positive PCR Test Results. There were no statistically significant differences found between male athletes with positive PCR results and those with negative PCR results in terms of mean values for COVID-19 fear, perceived stress level, inadequate self-efficacy perception, and stress/discomfort perception variables.

Within the scope of the research objective, the results of 34 participants who were PCR positive and 16 participants who were PCR negative, aged between 10 and over 49 years, and living in the Elazığ province are provided below:

There is no statistically significant difference in the distributions of male and female athletes between PCR-negative and PCR-positive groups.

There is no statistically significant difference in the distributions of age and education levels among female and male athletes in both PCR-negative and PCR-positive groups. The likelihood of athletes testing PCR-positive increases statistically significantly as the years of playing tennis increase, both in females and males. COVID-19 fear and perceived stress levels do not differ between PCR-positive and PCR-negative individuals in both females and males.

DISCUSSION

This study was conducted to examine the relationship between the fear of COVID-19 and perceived COVID-19 risk among individuals who play tennis during the pandemic. In this context, data were collected from individuals playing tennis in Elazığ province, and an applied research method was followed.

Discussion on the Results of Descriptive Findings Regarding COVID-19 Diagnosis In order to control the COVID-19 pandemic, rapid and accurate detection of the disease is crucial (Bhadra, Jiang, Kumar, Johnson, Hensley, & Ellington, 2015). Globally, COVID-19 diagnosis is made through the examination of samples obtained from nasopharyngeal and oropharyngeal swabs in the laboratory. Currently, the gold standard method used for COVID-19 diagnosis is the RT-PCR test. RT-PCR results generally turn positive a few days (2-8 days) after infection (Lee, Baek, Kim, Choi, Song, & Ahn, 2017). According to the results obtained, the time it takes for individuals with COVID-19 infection to return to tennis, the time spent exercising weekly before COVID-19 infection, the time spent exercising weekly after COVID-19 infection, taking vitamin supplements after COVID-19 infection, adhering to hygiene rules, wearing masks regularly, avoiding crowds, changes in dietary habits, and the impact of the coronavirus on themselves were found to be influential variables. Since no similar research has been found in the relevant literature, the results of the study are considered important. However, the limited sample size of the study is a limitation of the research. Based on the results obtained, it can be said that the gender of the participants does not have an effect on PCR positive or negative status. Since no similar research has been found in the relevant literature, the results of the study are considered important. However, the limited sample size of the study is a limitation.

Discussion on the Results of the Relationship Between Perceived COVID-19 Fear and Socio-Demographic Variables during the COVID-19 Pandemic Risk perception affects health behaviors against diseases with unpredictable outcomes, such as COVID-19 (WHO, 2020). The average COVID-19 risk scores of the tennis-playing individuals who participated in the research were not different between women and men in both PCR negative and positive groups. According to the results obtained, it can be said that the perceived COVID-19 risks of the participants are at a moderate level. In the relevant literature, it is observed that the COVID-19 risk scores perceived by the participants in this study parallel the findings obtained in different sample groups in the studies conducted by Yıldırım and Güler (2020), Jaspal et al. (2022), Yanez et al. (2020), Caserotti et al. (2021), Yorguner et al. (2021), Yıldırım et al. (2021), and Yıldırım and Güler (2021). It was found that there was no statistically significant difference between all participants included in the research according to PCR test results in terms of their perceived COVID-19 risks. Since a limited number of similar studies have been found in the relevant literature, it can be said that the result obtained is due to the limited number of samples.

It was found that there was no statistically significant difference in COVID-19 risks among the participants included in the study according to their gender. While Yıldırım and Güler (2020), Rodriguez-Besteiro et al. (2021), Yıldırım et al. (2021), and Yıldırım and Güler (2021) stated that the gender variable is effective in the COVID-19 risk levels in their studies conducted with different sample groups, Jaspal et al. (2020) and Caserotti et al. (2021) reported that it was not effective, similar to the results of this study. These results can be considered variable in terms of sample size and sample groups. It was found that there was no significant relationship between the age groups of the participants and their COVID-19 risk levels. Since researches conducted by different sample groups, such as Cihan et al. (2020), Huynh (2020), Iorfa et al. (2020), Yıldırım and Güler (2020), Caserotti et al. (2021), and Yıldırım et al. (2021), have reported that there is a relationship between age groups and COVID-19 risk levels, this does not overlap with the results of this thesis. It is

thought that the reason for the difference in the results obtained in the research is the small sample size of the participants forming the sample of the research. It was found that there was no significant relationship between the education levels of the participants included in the research and COVID-19 risk. Since researches conducted with different sample groups, such as Huynh (2020), Iorfa et al. (2020), Yıldırım and Güler (2020), and Yıldırım et al. (2021), have reported a relationship between education levels and COVID-19 fear levels, this does not overlap with the results of the research. It is thought that the reason for the difference in the results obtained in the research is the small sample size of the participants forming the sample of the research.

It was observed that individuals included in the research who had fewer years of playing tennis had generally shorter tennis experience, and those who had longer tennis experience protected themselves from the coronavirus disease. Although there is a positive relationship between the age factor and being PCR positive, it suggests that experienced tennis players in this thesis adhere to hygiene rules sufficiently and have strong immune systems. Since no similar research has been found in the relevant literature, the results of the study are considered important. However, the limited sample size of the study is a limitation.

Discussion of the Results of the Relationship Between COVID-19 Fear Levels and Perceived COVID-19 Risk Although fear is defined as a negative emotion from a psychological perspective, it is an important factor that prompts individuals to engage in protective behaviors in various situations. It is reported that pathologically low levels of fear increase risk-taking behavior and even hinder protective behaviors by increasing risk perception among individuals during the COVID-19 pandemic (Harper et al., 2021). The prolonged duration of the COVID-19 process and the still high mortality rate affect individuals' fear of COVID-19 and perceived risk levels (Sperling, 2021). In the literature, individuals' cognitive and emotional risk perceptions related to COVID-19 are positively associated with protective behaviors against COVID-19. However, excessive perceived risk is reported to be associated with various psychological health problems such as fear, anxiety, stress, death anxiety, decreased life satisfaction, sleep disturbances, suicide attempts, and ineffective coping (Yıldırım and Güler, 2021). It was found that there was a positive low-level significant relationship between the perceived COVID-19 risk and the perceived risk of the participants included in the research. In a study conducted by Harper et al. (2021), it was reported that there was a positive and moderate correlation between COVID-19 fear and perceived risk. In the literature, other studies have also reported a positive correlation between COVID-19 fear and perceived risk (Ahorsu et al., 2020; Li et al., 2020).

Recommendations

To make the results of the study more meaningful, a larger number of participants should be included in the research. In this regard, similar research can be conducted by involving a greater number of athletes to achieve more comprehensive findings. In this sense, conducting similar research with different sample groups can make the results of the study more comprehensive and generalizable. The research design can be applied to individuals participating in different sports disciplines. While there has been an increase in studies in the literature that examine the effects of COVID-19 fear and perceived risk levels on athletes in different sports disciplines, no studies focusing on individuals who play tennis have been found. Therefore, research can be conducted to explore the relationship between tennis players and COVID-19 with various variables. Young tennis players may exhibit some differences based on their developmental stage. Research can be conducted on male and female athletes regarding the effects of COVID-19 in the context of their respective developmental stages.

Conflict of interest

There is no conflict of interest with any author. Additionally, no financial support has been provided to any author.

Ethics Committee

This study has been approved by the Mersin University Social and Human Sciences Ethics Committee with decision number 100 on September 7, 2021.

Author Contributions

Contribution has been made from the design stage of the study to the implementation stage, from data collection to statistical analysis and interpretation. The authors have read and accepted the published version of the article.

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REVİEW ARTICLE

Accessibility Technologies in Esports and Their Impact on Quality of Life in People with Physical Disabilities

Mehmet KARTAL[1*]

[1]Adiyaman University, Faculty of Sports Sciences, Physical Education and Sports Teaching, Adiyaman, Turkey
*Corresponding author: m.kartal@adiyaman.edu.tr

Abstract
This study addresses the multifaceted challenges faced by individuals with physical disabilities, encompassing health, economic, and social aspects. The sustainable development of societies hinges on the collective contributions of both disabled and healthy individuals. Esports has recently emerged as a promising avenue for the integration of individuals with physical disabilities into societal life, primarily due to its capacity to transcend physical and demographic constraints. This research therefore aimed to explore the impact of accessibility technologies employed in esports on the quality of life for individuals living with physical disabilities. For this purpose, a literature review was conducted to examine the effect of accessibility technologies currently used in esports on the quality of life of physically disabled individuals. A comprehensive review of the literature suggests that esports, coupled with diverse software and hardware technologies designed to enhance the accessibility of individuals with physical disabilities to esports, yields positive outcomes, which encompass improved socialization, enhanced career opportunities within esports, heightened cognitive and intellectual skills, ultimately leading to an elevated quality of life. As a result, it can be said that these technologies, in addition to widening accessibility to esports, hold the potential to facilitate the organization of tailored esports tournaments and events for disabled individuals, thereby encouraging greater participation in the esports realm.

Keywords
Esports, Physically Disabled, Accessibility Technologies, Quality of Life

INTRODUCTION

Individuals grappling with physical disabilities often confront a multitude of economic, social, and psychological challenges that are contingent upon their specific disability status (Okhabska et al. 2022; Shakespeare, 2017). Consequently, they require a tool that can alleviate this arduous process and offer them both social support and extend that support to their caregivers. Although the ever-evolving landscape of internet technologies is at times branded as an 'addiction' among the general populace (Fekih-Romdhane et al. 2023), it can be contended that these technologies serve as a crucial social supportmechanism, akin to a "necessary addiction," particularly when it comes to enhancing the quality of life for individuals confronting the manifold challenges posed by physical disabilities.

It is imperative for individuals with disabilities to actively participate in social life, be able to articulate their ideas, emotions, and thoughts, and, more importantly, assume an active and constructive role in the dynamics of their social milieu in terms of improving their quality of life and, consequently, fostering social development. In essence, the concept of quality of life underscores four fundamental principles. The first of these principles asserts that quality of life

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[1]**ORCID:** 0000-0003-3153-0496

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encompasses the same factors and relationships for all individuals. Second, it can only be realized when an individual's needs are met, providing them with the opportunity to enrich their own lives. Third, it is a dynamic process comprising both objective and subjective components. The fourth principle underscores that quality of life possesses a multifaceted nature, susceptible to influences from personal and environmental factors (Verdugo et al. 2012). In this regard, esports, which renders physical and demographic characteristics inconsequential, emerges as a potential tool to bolster the productivity of individuals with physical disabilities, enrich their lives in social and economic dimensions, and offer them career prospects. This is because esports allows participation without necessitating face-to-face interaction. Technologies specific to esports are now finding applications in fields such as medicine, education, and even international exchange. Moreover, the classification of esports as a disability sport, facilitating disability-themed exchanges, has elevated it to a position where lifelong participation can be ensured. It is noteworthy that this positioning of esports holds a significant role in advancing the sustainable development goals of nations (Komatsu et al. 2021). Physical disabilities can, at times, confine individuals to a specific physical area, limiting their mobility. Esports, on the other hand, offers the potential to create a 'digital realm' where disabled individuals, particularly those facing such limitations, can navigate freely, engage in social interactions, and uncover employment prospects.

Over recent years, the literature has seen a growing but still limited body of research that bridges the topics of disability and esports. One illustrative study by Hak-Jun et al. (2022) delved into eleven scientific journals featuring publications related to esports and disability. Their analysis revealed that a majority of the scientific research published in these journals primarily centered on examining the disparities in how disabled individuals perceive esports. Meanwhile, other studies explored various facets of esports, including the overall esports experience, policies, and practices. Yeo (2022) undertook research aimed at outlining a blueprint for the advancement of esports for disabled individuals in Korea. This research underscored that esports activities for people with disabilities are currently quite limited, emphasizing the necessity of tailoring esports activities according to the specific types of disabilities and advocated for the development of new esports games designed to enhance accessibility based on the different disability types. Similarly, Choi (2021) conducted a study to assess the level of interest and knowledge among disabled individuals regarding esports, revealing that the majority of participants possessed knowledge about esports, regarded it as a novel form of sport, and actively engaged in esports. The primary platform utilized by participants for esports involvement was smartphones, and many initiated their esports journey on the recommendation of friends. On top of that, the study reported that participants primarily participated in esports as a means to alleviate stress, and one prominent concern raised by participants was the limited availability of esports programs tailored to individuals with disabilities.

Empirical evidence suggests that people with disabilities are just as motivated and inclined towards esports as their non-disabled peers. However, they often face unique challenges in accessing and actively participating in esports, such as inaccessible equipment, lack of accommodations, and social stigma. The active participation of individuals with disabilities, regardless of their gender, is of greater significance in terms of potential positive contributions to their quality of life as compared to their passive participation (as spectators). These contributions encompass financial, social, psychological, and cultural dimensions, surpassing the benefits of passive participation as mere spectators in esports events. The technological software and hardware tools capable to enable this active participation and bolstering the incentive for people with disabilities to engage in esports are the accessibility technologies already utilized in the realm of esports and digital gaming. In this context, the primary objective of this study is to scrutinize the technologies that can render esports accessible for individuals with physical disabilities. The study aimed to explore the potential impacts of such technologies on the quality of life experienced by these individuals, ultimately aspiring to make a valuable contribution to the existing literature in this evolving field.

Physical Disability And Quality of Life in People With Physical Disabilities

Physical disability is defined as a condition resulting from either congenital factors or acquired

diseases or traumas, leading individuals to contend wirewiwth enduring physical limitations lasting at least one year (Liou et al. 2005). Shakespeare (2017) posits that disability should be viewed as a societal construct, highlighting that it primarily reflects how societies respond to these bodies rather than being solely a matter of personal bodily disorders. This perspective underscores the far-reaching social implications of disability. Consequently, it is well-established that individuals with disabilities encounter a range of challenges and situations in their interactions with others, contingent upon the prevailing social structures and their specific disability statuses (Okhabska et al. 2022). Particularly, those who are unemployed, possess lower levels of education, have recently acquired their disability, or experience poor health may endure heightened levels of psychological distress. This is often attributed to their perception of being subjected to discrimination and receiving inadequate social support. Thus, it is imperative to raise awareness among individuals with disabilities about their rights and the array of social opportunities and services available to them. Equally crucial is providing the necessary psychological assistance and taking proactive measures to eradicate discrimination, which may prove instrumental in enhancing the overall quality of life for individuals with disabilities (Kagan et al. 2018).

The World Health Organization (WHO) has defined the concept of quality of life as "the individual's perception of their position in life about to their goals, expectations, standards, and concerns, within the context of the culture and value systems of their society" (WHO, 2012). This definition underscores that disability is not solely an inherent condition but rather something that can affect anyone, leading to a sudden change in their quality of life. In this regard, it is worth noting that another social group susceptible to experiencing physical disabilities and a dramatic alteration in their quality of life, particularly at a young age, is military personnel serving in the armed forces. In the existing literature, there are notable scientific studies that delve into the challenges faced by individuals who undergo the process of becoming veterans at an early stage of their lives, as well as the adverse consequences of these challenges on their the quality of life (Abraham et al. 2021; Burdett et al. 2021; Hamilton et al. 2015). For instance, Keeling et al. (2018) shed light on the economic difficulties encountered by veterans, highlighting that while some US veterans successfully transition into civilian life and secure employment, others confront various obstacles during this transition that can lead to mental health issues. Similarly, Ikin et al. (2009) found that Korean War veterans exhibited significantly lower levels of life satisfaction and quality of life scores across the four domains of the World Health Organization Quality of Life (WHOQOL-Bref) scale when compared to Australian men of similar age.

Another social group where the experience of disability significantly impacts quality of life is the parents of individuals with disabilities. For instance, Savari et al. (2023) emphasized that raising a child with a disability can be highly stressful for parents, exerting a negative influence on their quality of life. Consequently, they highlighted the importance of resilience as a coping mechanism for parents to mitigate these challenges and difficulties.

The studies presented in the literature underscore that individuals with physical disabilities, spanning various age groups and irrespective of gender, encounter a range of social and psychological challenges in their social lives. These challenges, as documented in the research, have a detrimental impact on their overall quality of life. It is crucial to recognize and address these difficulties to improve the well-being and inclusion of individuals with physical disabilities in society (Byra and Gabryś, 2023; Holm et al. 2022). Individuals struggling to overcome similar challenges often find themselves entering a cycle of social and psychological isolation, which over time may lead to addiction issues, such as gambling and alcohol dependency, further exacerbating the negative impact on their quality of life (Grant and Chamberlain, 2023; Heilig, 2023). Despite the fact that a significant portion of individuals with disabilities engage in gaming, inaccessible interfaces and gaming consoles can act as barriers, preventing them from fully participating in this form of entertainment. We should note that research dating back to 2008 reveals that an impressive 92% of disabled gamers persist in playing games, even in the face of these obstacles (Ellis and Kao, 2019).

In this sense, esports, which has gained popularity over recent years alongside the growing interest in digital games, serves as a technological

tool and process capable of positively influencing the participation of individuals with physical disabilities in social life. Esports eliminates barriers related to demographic and physical characteristics, offering a platform where these individuals can unleash their productivity potential, potentially turning it into a career path, and consequently enhancing their overall quality of life.

Esports And Its Characteristics

Esports, arising from the digitalization wave and captivating the attention of the younger generation, can be described as a form of sport in which amateur or professional players engage in competitive gameplay using computers or game consoles (Kartal, 2020). As digital and online games gain prominence in this era of digitalization, it has become increasingly important to assess their role in the cognitive development of individuals, given the growing interest in enhancing cognitive abilities. A concept often categorized alongside mind-intensive sports like chess, esports revolves around the organization of tournaments and competitions, whether individual or team-based, within a digital environment encompassing various types of games. What sets esports apart from traditional sports competitions is the shift from the physical arena to the digital realm (Campbell et al. 2018; Hollist, 2015). This transition has reshaped the landscape of competitive gaming, making it accessible and appealing to a global audience.

The history of esports can be traced back to the early stages of computer and digital game development (Pizzo et al. 2018). However, it was during the 1980s that the interest in digital games began to surge, notably with the involvement of major multinational corporations like Atari and Nintendo, which introduced game and entertainment systems. The pivotal turning point came in the early 2000s when personal computers and internet technologies became widely adopted. It was during this period that the modern iteration of esports took shape, and it has since evolved into a rapidly growing industry (Scholz, 2019).

At its core, esports revolves around competition and encompasses a wide array of digital game genres. In general, popular esports game genres can be classified into categories such as Multiplayer Online Battle Arena (MOBA), First-Person Shooter (FPS), Real-Time Strategy (RTS), Card Collecting Games, Combat Games, and Sports Games (Ströh, 2017). The diverse range of game genres within esports caters to a broad audience of gaming enthusiasts and has contributed to the industry's widespread appeal and success.

Esports has now evolved into a global phenomenon and a significant facet of popular culture, thanks to the presence of global esports organizations, tournaments, and live broadcasting platforms (Butcher and Teah, 2023;Lin et al. 2023; Newman et al. 2022). The expansive esports ecosystem has attracted scholarly attention, resulting in research that examines its multifaceted social, economic, and cultural impacts. More recently, health-related studies have started to explore the effects of esports on public health, with a particular focus on potential negative consequences. However, one should recognize that esports also carries the potential to promote physical activity and health, serving as a novel avenue for providing access to social engagement, especially for often marginalized groups like people with disabilities (Ketelhut et al. 2021). Many individuals with disabilities are actively participating in esports games today, sharing their experiences and gameplay with thousands of followers through live streaming platforms. This not only allows them to establish a social environment but also provides an opportunity to transcend their disabled identities through their engagement in esports (Johnson, 2019; Ringland, 2019). Esports has thus proven to be an empowering medium for individuals with disabilities, enabling them to connect with others, showcase their talents, and contribute to the broader gaming community.

Accessibility Technologies in Esports

Technological advancements have led to the development of specialized hardware and software designed specifically to assist individuals with physical disabilities in accessing esports games, and such technologies are continuously improved based on user feedback and experiences (Lin et al. 2014). Several prominent private companies, particularly major multinational players in the gaming and software technology industry like Sony and Microsoft, have taken initiatives to produce special controllers aimed at enhancing the accessibility of individuals with physical disabilities to the digital games that underpin esports. Some notable examples of adaptive game

controllers developed for this purpose include the following.

Quadstick:

The Quadstick represents a specialized gaming controller tailored to individuals with paralysis, offering a hands-free mechanism for engaging in digital gaming across gaming consoles and personal computers. Notably, an esports competitor using the pseudonym 'RockyNoHands', who experienced paralysis due to an unfortunate accident, employs a mouth-operated Quadstick controller to participate in esports gaming seamlessly. Despite substantial physical limitations, including the inability to move all four limbs, this esports athlete maintains a noteworthy presence in the esports arena, securing diverse sponsorships and competing alongside able-bodied counterparts within a professional esports organization (Anderson and Johnson, 2022).

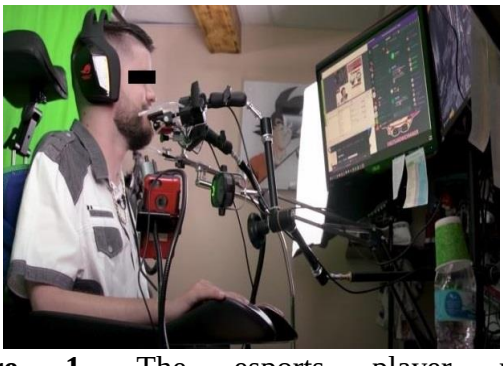

Figure 1. The esports player named RockyNoHands and Quadstick technology
(Source: https://www.thedad.com/rockynohands-pro-esports/)

Microsoft Xbox Adaptive Controller:

This adaptive controller represents a groundbreaking innovation aimed at facilitating access to digital esports games for individuals with disabilities. Its development stemmed from a collaborative effort involving individuals with disabilities and organizations in the United States. A streamer known as 'Blink,' who was born without hands, recently showcased a unique utilization of the Xbox adaptive controller, deviating from the typical approach employed by healthy gamers. This distinctive approach allowed Blink to compete alongside regular players in mainstream esports titles (Ellcessor and Kirkpatrick, 2017; Godineau, 2018). In a similar vein, a physically disabled athlete, bearing the digital identity 'Brolylegs', has achieved professional esports status on an equal footing with nondisabled individuals. Brolylegs is also celebrated as the author of the book titled "*My Life Beyond the Floor"*.

Figure 2. Professional esports player called Brolylegs and an adaptive Xbox controller
(Source: https://www.gamingdose.com/tag/ps4/page/2/)

Playstation's Project Leonardo:

A product of collaborative efforts involving accessibility experts, community members, and game developers, it represents a customizable player controller designed to enhance accessibility for numerous disabled gamers. Its primary objective is to facilitate easier access to digital esports games and provide a more comfortable gaming experience (Nishino, 2023).

While the above-mentioned technological tools and devices are structured to require physical interaction, facilitating disabled individuals' access to esports (Taheri et al. 2021), we can mention existence of new technological software and hardware solutions that offer the capability to control these tools and devices through brain activity. For example, Vidal (1973) characterized electroencephalographic (EEG) signals obtained from the human scalp as continuous fluctuations in electrical potential, reflecting corresponding changes in the upper layers of the cerebral cortex beneath the scalp's surface. He then posed the following question from his inner world to the readers: "*Could these observable electrical brain signals be used as information carriers in human-computer communication or to control external devices such as prosthetic devices or spaceships?*". Vidal's (1973) inquiry remains relevant today, as advancements in technologies such as the Brain-Computer Interface (BCI) have provided answers to this question.

Brain-Computer Interface (BCI):

The BCI is characterized as an alternative means of communication and control connecting the human brain with computers, finding applications in areas like neuroprosthetics,

brainwave-controlled computer games, and related fields (Thomas et al. 2013). Real-time monitoring of brain activity presents a range of opportunities, including support for physical health, mental well-being, and methods of interaction controlled by thought. Moreover, these technological tools have the potential to facilitate the exploration of experiences among disabled individuals, particularly those with an interest in esports, ultimately enhancing their overall gaming experiences (Knierim et al. 2021).

Figure 3. Mind control in a VR game through Brain-Computer Interface

(Source: https://www.bbc.com/news/technology-64720533)

Impacts of Esports on The Quality of Life in People With Physical Disabilities

The rapid advancement of information and communication technologies holds significant potential as a pivotal tool for enhancing the economic well-being of individuals with physical disabilities while simultaneously mitigating social exclusion and isolation (Kim and Zhu, 2023). This potential is particularly potent when complemented by the support of both family and the broader social environment (Nota et al. 2007; Wehmeyer and Palmer, 2003), leading to a positive impact on the overall quality of life of those with physical disabilities. While the assistance of the social environment and stakeholders plays a crucial role in addressing the challenges faced by individuals with disabilities, the primary objective remains the enhancement of their capacity and overall quality of life.

Given the ease of access and effectiveness of today's internet technologies, they represent a versatile tool capable of generating diverse solutions, particularly for individuals with physical disabilities. One noteworthy internet-based solution is esports, which has experienced a surge in popularity, especially during the COVID-19 pandemic. Esports allows for removing accessibility barriers and fostering inclusivity at the highest level, allowing participants to communicate and interact with others independently of their physical environment.

Physical education and sports are widely acknowledged for their positive influence on the quality of life for individuals with disabilities (Özkan and Kale, 2023). In contrast to traditional sports, esports is centered on digital gaming and presents unique advantages for individuals with physical disabilities. Within this context, the literature indicates that digital games contribute positively to cognitive and emotional development (Sana and Sosso, 2017;Shams et al. 2015; Pallavicini et al. 2018), foster socialization (Chen et al. 2021; Raith et al. 2021; Vari, 2021;Wiederhold, 2021), support foreign language learning (Pinto et al. 2021; Toh and Lim, 2021), and even exhibit potential in rehabilitating certain psychological and mental disorders, as evidenced by various scientific studies. Digital games have garnered attention for their potential preventive and therapeutic roles in medicine. Colder Carras et al. (2018), for example, highlighted that these games offer preventive and therapeutic aspects, suggesting their potential as tools for addressing mental and other health issues. Furthermore, research examining the Body Mass Index (BMI) of esports players found that traditional sports training had limited effects on the body composition of professional players. Cognitive and fine motor skills emerged as critical factors influencing performance and decision-making in esports (Giakoni-Ramírez et al. 2021), underscoring the significance of esports activities in this regard. Viana and De Lira (2020) also noted the potential of online digital games in combating psychological issues stemming from social isolation. In contrast, Etter et al. (2017) discovered that veterans who engaged in first-person shooter games exhibited higher levels of traumatic stress disorder as compared to those who did not partake in such games, emphasizing the complex relationship between gaming and mental health. Complementing these findings, recent research has demonstrated that video games in general can enhance motivation and compliance in individuals who have undergone upper limb amputation (Hashim et al. 2021). Additionally, video games have been shown to positively influence the motivation of children and adolescents with motor dysfunction, encouraging them to engage in

necessary exercises while enjoying gaming (Eckert et al. 2017).

Geleta and Hirpa (2023) conducted a study to examine how literacy skills contribute to the livelihoods of people with physical disabilities, concluding that literacy skills could improve the economic conditions of people with disabilities. Horowitz (2019) investigated the relationship between the amount of time university students in Puerto Rico spend playing online esports games and their concerns about learning English as a second language. The findings revealed that students who played online multiplayer video games had increased self-confidence and decreased anxiety about foreign language learning. Dae-Won and Hyun-Woo (2022) examined the motivations of individuals with physical disabilities to visit esports event venues, revealing that among the motivating factors of event viewers, escape from daily life was found to be one of the most important factors, and this situation had a significant positive effect on happiness. Yamazaki et al. (2022) stated that the standard controllers used in esports games could hinder the participation of disabled individuals in esports. They suggested that using Brain-Computer Interface, which allows disabled people to play esports games without the need for a controller, might be an alternative solution to this problem. Cairns et al. (2021) have also noted that there are games that help gamers with disabilities to feel active or to be at the same level as people with no disabilities. They argue that the value of accessible digital games lies not just in playing or having fun, but in playing the same games with everyone. This means that ensuring accessibility through adaptation of games is an important approach to ensure the socialization that games provide and the active and equal participation of people with disabilities. Relevant research in the field emphasizes that disabled gamers should be given the opportunity to become professional esports players or athletes, and that they should not be deprived of the potential to compete in national and international esports tournaments and organizations that may be organized in the near future (Dinansyah et al. 2022).

A common theme in all previous research in the relevant literature is the shared objective of enhancing the quality of life for individuals with disabilities. As such, esportsstands out as a versatile tool that transcends physical limitations and knows no “physical barriers.” Its potential to empower and engage individuals with disabilities underscores its value as a means to promote inclusivity, improve mental and physical well-being, and foster a sense of belonging in the digital realm.

Conclusion

Over recent years, there has been a notable surge in scientific research spotlighting the growing interest of individuals with physical disabilities in digital gaming and esports (Anderson and Johnson, 2022; Johnson, 2019;Dae-Won & Hyun-Woo, 2022; Ringland, 2019). Rooted in digital gaming, esports holds significant potential for providing employment and career prospects, particularly for individuals with physical disabilities (Tjokrodinata et al. 2022).

The comprehensive literature review in this study reveals that esports, along with advancements in software and hardware technologies aimed at enhancing accessibility for people with physical disabilities, can profoundly impact the socialization, career development, cognitive and intellectual growth, and overall quality of life of disabled individuals. Such technologies facilitate access to esports for people with physical disabilities, actively contribute to the organization of esports events tailored to disabled participants, and promote greater involvement of disabled individuals in esports. Individuals with physical challenges aspiring to capitalize on such opportunities may require software and hardware solutions enabling them to participate in esports. Prominent figures in the esports realm, recognized by their digital personas, including Rockynohands, Blink, and Brolylegs, exemplify how access to esports through these technological tools not only enables competition with healthy individuals but also paves the way for successful professional careers. This phenomenon underscores the potential of esports as a promising avenue for people with physical disabilities.

This research highlights that esports is a multifaceted tool with the potential to reintegrate persons with physical disabilities into the societies they inhabit or even the global community. It can reestablish their social connections, bridging the gap created by their disabilities and reversing the process of social isolation, ultimately bringing them back “online” and enhancing their overall quality of life.

Conflict of Interest

There are no conflicts of interest for the contributing author.

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Author Contributions

The entire research plan was performed by the author (Study Design; Data Collection; Data Interpretation; Manuscript Preparation; Literature Search).

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REVİEW ARTICLE

An Overview of Paralympic Sport from a Historical and Psychosocial Perspective

Gözde ERSÖZ[1*] and Serkan ESEN[2]

[1]Marmara University, Faculty of Sport Sciences, Department of Physical Education and Sports Training, Istanbul / Türkiye
[2]Fenerbahce University, Faculty of Sport Sciences, Department of Sport Management, Istanbul / Türkiye
*Corresponding author: gozde.ersoz@marmara.edu.tr

Abstract
The Paralympic Olympic Games initiated within the framework of the Paralympic movement is not well known by the society. Understanding the psychological characteristics of para-athletes and revealing their social position will contribute to coaches, managers and all sports professionals working with these athletes. Based on this idea, in this study, the concept of Paralympics is defined, the history of the Paralympic Olympic Games and statistical information in these games are included, and the psychosocial characteristics of athletes who operate in sports environments as para-athletes are discussed. A narrative based literature review was preferred as a methodology in the study. As a result of the research, it has been seen that para sports have progressed rapidly over the years since the first day of its emergence in the historical process. When the psychological characteristics of para athletes are examined, it is understood that para athletes do sports for reasons such as performing well and winning, looking normal, adapting to injury, defending themselves, fighting against marginalization and encouraging the disabled sports movement. It has been stated that para-athletes who are emotionally stable, have cognitive flexibility and mental endurance, are self-confident, can manage stress and control their emotions are more successful in sports. It has been stated that social support is important for para-athletes when they start sports, but an overprotective structure may negatively affect the psychosocial development of para-athletes. In addition, coaches' communication and leadership skills are important for para-athletes to be successful in sports and persistence in sports.

Keywords
Paralympic, Paralympian, Para-Athlete, Psychosocial

INTRODUCTION

Society consists of healthy individuals as well as individuals with disabilities who continue their lives with different disabilities, either congenital or acquired. Depending on the degree of disabilities of people with disabilities, some disadvantages that may arise due to mobility limitation, limb deficiency, sensory or mental losses may negatively affect their quality of life and social life (Demir and İlhan, 2019). Sport, which strengthens the physical, psychological, mental and social health of individuals, is a social phenomenon that facilitates people to adapt to society, improves motor skills, and contributes to the personal development of individuals (Ersöz, 2016). These positive effects of sports on individuals with normal development are much higher in individuals with disabilities. Through sports, the disabled person is brought into society and production, as well as physically strengthened and can easily perform physical activities that will facilitate their daily life. Sports also have a tendency to give disabled individuals a sense of confidence, social role, competition and friendship (Kalyon, 1994). In addition to these, sports enable

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[1]**ORC**ID: 0000-0002-4848-1929 , [2]**ORC**ID: 0000-0001-9839-0390

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disabled individuals to control their negative emotions such as aggression and anger that may arise due to their disability, to be happy individuals, to gain self-confidence, to establish social relationships, to have a pleasant time, to taste the sense of achievement (Gür, 2001; Kınalı, 2003). Individuals find the opportunity to discover themselves through sports, recognize themselves and realize their talents. In addition to this, the disabled individual who does sports learns to establish good relationships with his/her environment, cooperation, tolerance and sharing, expresses his/her feelings comfortably, and thus increases his/her quality of life and motivation for life (Savucu et al. 2006; Demir et al. 2011). Sports can also be considered as a means of rehabilitation for disabled individuals who are included in the society and feel that they are a part of the society (Çevik and Kabasakal, 2013).

Since disabled individuals are seen as consumers and in need of care in the society, they move away from the society and lose their self-confidence. By raising awareness of the society on this issue, various arrangements are made to reinforce the social relations of disabled individuals and to increase their quality of life as in developed countries (Bekçi, 2012). The fact that the issues such as athletes with disabilities, para sports, Paralympic Games, psychosocial characteristics of para-athletes are not conceptualized much in the society and the lack of awareness on this issue may affect athletes who perform in sports environments as para-athletes. In the light of this information, within the scope of this study, the concepts of para-athletes and disabled athletes are defined, the history of the Paralympic Games is discussed, statistical information in the Paralympic Games is given and the psychological characteristics of para-athletes are mentioned.

MATERIALS AND METHODS

In this study, it was aimed to compile the historical and psychosocial research on the subject of "paralympic sport" in national and international arena. In this context, by using the keywords "paralympic", "para-athlete", "disabled athlete", "paralympic", "para-athlete", "disabled athlete", articles published in national and international journals, books written in the field and theses published in the national thesis center were examined. A review was made by examining the scientific publications gathered through literature review.

Descriptive of Para-Athlete and Disabled Athlete

Disability is part of being human. Everyone may experience functional difficulties at some point in their lives, perhaps after an accident or disaster or as they age. Disability is a term used to describe an individual's health status, the negative interaction between environmental and subjective factors, limitations in physical activity and restrictions in participation in social activities. It is estimated that more than one billion people live with some form of disability (World Health Organization, 2011; Gönener, 2011). Disability can be caused by prenatal and birth-related problems, accidents, infectious diseases and mental disorders (Girgin, 2003).

Paralympic Games are games organized in parallel to the Modern Olympic Games. They represent the peak moment of each four-year sport cycle for Paralympic athletes and the components of the Paralympic movement. The world championships constitute the final goal to which the national and regional competitions lead. Therefore, they are very important for athletes (EYHGM, 2022).

Athletes competing in Para sport (Para athletes) have a health condition that manifests as a disability and leads to a competitive disadvantage in sport. All Para athletes who want to compete in Para sport should have a sport-specific class. Correct classification is an integral part of Para sport so that Para athletes can compete fairly and equally within the "Paralympic Movement". With classification, athletes with disabilities are divided into sport classes according to how much their disability affects their ability to perform the core activities in a particular sport. The purpose of classification in para sports is to determine the disability level of the para athlete and to ensure that the impact of the injury is minimized in each race. Since the ability to perform in each sport varies, classification in para sports is made specific to the sport. As a result, a para-athlete may meet the criteria in one sport but not another (https://www.paralympic.org).

The terminological information recommended to be considered in para sports is given below (https://www.paralympic.org):

Para Athlete:

A general term for professional and amateur disabled athletes who play sport but have not competed at the Paralympic Games. An athlete is a Paralympian only when they participate in the Paralympic Games.

Paralympian/Paralympic Athlete:

An athlete who has participated in the Paralympic Games. A Paralympian is never a former Paralympian. If a Paralympian has participated in the Paralympic Games once, they are a Paralympian "for life". If the person is no longer an athlete, they are a former athlete.

Paralympic sport means any sport recognized by International Federations and the IPC, in which para-athletes participate by meeting various criteria according to the IPC athlete classification code. Not all sports branches are included in the Paralympic Games as para sports. Para sport means any sport in which persons with disabilities participate and which has rules of thumb in accordance with the IPC Athlete Classification Code.

The correct terminology in para sport should be para athlete or athlete with a disability. Para athlete, disabled athlete, visually impaired athlete, physically and/or mentally disabled athlete. Terms such as disabled sport, disabled athlete, disabled person, blind athlete, blind person are incorrect expressions. The IPC chooses first-person language, i.e. addressing the athlete first and the disabled person second. Therefore, it would be more accurate to refer to Para athletes wherever possible. If you feel the need to mention disability, the correct term encouraged is 'athlete/disabled person'. So it is more appropriate to say the athlete identity first.

History of the Paralympic Games

The Olympic Games, the foundations of which were laid in the city of Olympia in the 8th century A.D., were held in Athens in 1896. In these Olympics, 241 athletes from 14 countries participated and competed in 43 races (Güngör, 2009). Unlike the modern Olympic Games, the Paralympic Games, which emerged in the mid-20th century, have the same interest and importance as the Olympic Games today. The name of Paralympic Games, which is defined as the events in which athletes from different countries and different disabled groups participate, is a combination of the Greek words 'para' (besides) and olympic, and means the competition organized in parallel with the Olympic Games (Ergün, 2011). The history of disabled sports dates back to the 1870s. Its institutional structure was realized when a group of gymnastics, bowling and chess players came together to form a sports community, and consequently, the Berlin Deaf Gymnastics Association (Taubmutme Turnvereinigung Berlin) was established on October 18, 1888. With the development of the Berlin Deaf Gymnastics Association over the years and the increasing number of participants, the realization of the International Silent Games in Paris in 1924 became the basis of the Olympic Games for the Deaf (Deaflympics) (Uslu, 2020). The birth of the Paralympic Games is considered to be the Stoke Mandeville Games organized by Dr. Lutwing Guttmann in 1948 (Zengin and Şentürk, 2022). The games, organized for wheelchair veterans, attracted great attention in a short time and became the first international competition of its kind with the participation of a group of disabled athletes from the Netherlands in 1952. The ninth Stoke Mandeville Games were held a few days after the Olympic Games in Rome. Considered as the first Paralympic Games, the games have been organized every 4 years in parallel with the Olympic Games since then. After 16 years of summer sports, the games were organized as the Swedish Winter Games in 1976 with the participation of athletes with different types of disabilities. The Paralympic Games moved to another dimension in 1988 and were held in Seoul in the same facilities immediately after the Olympic Games. Due to the great interest in the Seoul Paralympic Games, the International Paralympic Committee (IPC) was established in 1989 and the games were organized by this committee from that year on. After the Games in 1992, 1996 and 2000 were held in Olympic cities, as in Seoul in 1988, an agreement between the International Paralympic Committee (IPC) and the International Olympic Committee (IOC) in 2001 made it official that the Olympics and Paralympics would be held in the same city. The Winter Olympics and Winter Paralympics were held in the same facilities in 1992. The Summer-Winter Paralympic and Olympic Games, which were held every four years in the same year, were changed in 1992 to have two years between the Summer and Winter Games (Özay, 2019; Zengin and Şentürk, 2022).

The first logo of the Paralympic Games was the Tea-Geuk emblem from Korea. The Three Agitos logo was renewed in 2003. The Paralympic Movement is symbolized by the Agito, united at the centre, to bring together para athletes from all over the world to compete. In addition, the Agito symbol highlights the strong will of Paralympic athletes, how they continually inspire and excite the world with their performances, and reflects the Paralympic Motto, "Spirit in Motion." (https:// www.paralympic.org).

Figure 1. The Logo of the Paralympic Olympic Games

The Rome Paralympic Games, the first Paralympic Games, were held in 1960, a few weeks after the 17th Summer Olympic Games were completed. Since the first games, the Paralympic Games have been held every four years without interruption. The year of the Paralympic Summer Olympic Games, the place where they were held, the disability content, information on how many countries and athletes participated, and interesting events during the period of the Olympics are given in Table 1.

Table 1. Descriptive information for the Paralympic Summer Olympics (https://www.paralympic.org).

YEAR	LOCATION	DISABILITIES INCLUDED	COUNTRIES	ATHLETES	HIGHLIGHTS
2020	Tokyo (JPN)	Spinal injury, Amputee, Vision Impairment, Cerebral Palsy, Les Autres, Intellectual Disability	162	4,393	Para badminton and Para taekwondo were added to the Paralympic programme for the first time.
2016	Rio (BRA)	Spinal injury, Amputee, Vision Impairment, Cerebral Palsy, Les Autres, Intellectual Disability	160	4,328	Para Canoe and Para Triathlon added as sports bringing total number to 22
2012	London (GBR)	Spinal injury, Amputee, Vision Impairment, Cerebral Palsy, Les Autres, Intellectual Disability	164	4,237	After an absence of 12 years intellectually disabled athletes competed in athletics, swimming and table tennis
2008	China (CHN)	Spinal injury, Amputee, Vision Impairment, Cerebral Palsy, Les Autres	146	3.951	Rowing added as sport. Cumulated TV audience of 3.8 billion
2004	Athens (GRE)	Spinal injury, Amputee, Vision Impairment, Cerebral Palsy, Les Autres	135	3,808	Football 5-a-side added as a sport
2000	Sydney (AUS)	Spinal injury, Amputee, Vision Impairment, Cerebral Palsy, Les Autres, Intellectual Disability	123	3,879	Sailing and Wheelchair Rugby added as sports. Record ticket sales
1996	Atlanta (USA)	Spinal injury, Amputee, Vision Impairment, Cerebral Palsy, Les Autres, Intellectual Disability	104	3,259	Equestrian added as a sport. Track cycling added as a discipline

Table 1. Continue

1992	Barcelona (ESP)	Spinal injury, Amputee, Vision Impairment, Cerebral Palsy, Les Autres	83	2,999	Event benchmark in organisational excellence
1988	Seoul (KOR)	Spinal injury, Amputee, Vision Impairment, Cerebral Palsy, Les Autres	60	3,057	Judo and Wheelchair Tennis added as sports. Co-operation between Olympic and Paralympic Organizing Committees. Shared venues with Olympics which has continued ever since
1984	Stoke Mandeville (GBR) & New York (USA)	Spinal injury, Amputee, Vision Impairment, Cerebral Palsy, Les Autres	41 (GBR) 45 (USA)	1,100 (GBR) 1,800 (USA)	Football 7-a-side and Boccia added as sports. Cycling added as a discipline. Wheelchair Racing included as demonstration event at Olympic Games
1980	Arnhem (NED)	Spinal injury, Amputee, Vision Impairment, Cerebral Palsy, Les Autres	43	1,973	Sitting Volleyball added as a discipline. Events for athletes with Cerebral Palsy included
1976	Toronto (CAN)	Spinal injury, Amputee, Vision Impairment, Les Autres	40	1,657	First use of specialised racing wheelchairs. Volleyball (Standing), Goalball and Shooting added as sports
1972	Heidelberg (GER)	Spinal injury	43	984	First quadraplegic competition added. Demonstration events for vision impaired athletes
1968	Tel Aviv (ISR)	Spinal injury	29	750	Lawn Bowls added as a sport
1964	Tokyo (JAP)	Spinal injury	21	375	Weightlifting added as a sport
1960	Rome (ITA)	Spinal injury	23	400	First Games with a disability held in same venues as Olympic Games

The number of athletes participating in the Paralympic Summer Olympics by years is shown in Table 2 and Figure 2 below (https://www.paralympic.org).

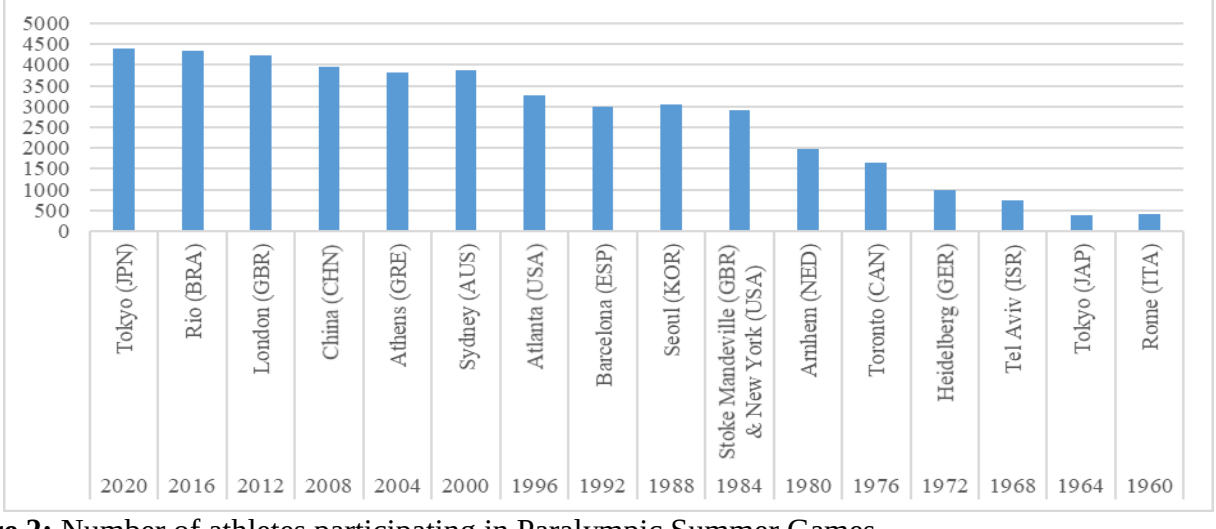

Figure 2: Number of athletes participating in Paralympic Summer Games

The Paralympic Winter Olympic Games were held in Sweden in 1976 as the first Paralympic Winter Games in history in only two sports (Arslan and Sezer, 2020). In the games organized in Örnsköldsvik, Sweden, 53 athletes from 16 countries competed in Para mountain skiing and Para cross-country skiing (Ürkmez, 2019). The year of the Paralympic Winter Olympic Games, the place where it was held, disability content, information on how many countries and athletes participated, and interesting events during the period of the Olympics are given in Table 3 (https://www.paralympic.org).

Table 2. Descriptive information for the Paralympic Winter Olympics

YEAR	LOCATION	DISABILITIES INCLUDED	COUNTRIES	ATHLETES	HIGHLIGHTS
2022	Beijing (CHN)	Spinal injury, Amputee, Vision Impairment, Cerebral Palsy, Les Autres	46	558	Record number of female Para-athletes (136) took part in the Games.
2018	PyeongChang (KOR)	Spinal injury, Amputee, Vision Impairment, Cerebral	49	567	Record numbers of spectators (343,000), accredited media (629) and international viewers outside of the host nation (1.87bn)
2014	Sochi (RUS)	Spinal injury, Amputee, Vision Impairment, Cerebral Palsy, Les Autres	45	541	316,200 tickets were sold, the most ever for Paralympic Winter Games. Para snowboard made its Paralympic Winter Games debut as part of IPC Alpine Skiing.
2010	Vancouver (CAN)	Spinal injury, Amputee, Vision Impairment, Cerebral Palsy, Les Autres	44	502	Ticket sales exceeded 230,000, the most ever.
2006	Torino (ITA)	Spinal injury, Amputee, Vision Impairment, Cerebral Palsy, Les Autres	38	474	Wheelchair Curling added as a new sport.
2002	Salt Lake City (USA)	Spinal injury, Amputee, Vision Impairment, Cerebral Palsy, Les Autres	36	415	Number of tickets on sale had to be augmented due to high demand
1998	Nagano (JPN)	Spinal injury, Amputee, Vision Impairment, Cerebral Palsy, Les Autres	31	562	Demonstrated rising media interest in Paralympic Winter Sport
1994	Lillehammer (NOR)	Spinal injury, Amputee, Vision Impairment, Cerebral Palsy, Les Autres	31	469	Ice Sledge Hockey added as a sport
1992	Tignes-Albertville (FRA)	Spinal injury, Amputee, Vision Impairment, Cerebral Palsy, Les Autres	24	365	Biathlon added as a discipline. Demonstration events: Alpine and Cross Country Skiing for athletes with an intellectual disability. First Games to share Olympic venues. Continued ever since
1988	Innsbruck (AUT)	Spinal injury, Amputee, Vision Impairment, Cerebral Palsy, Les Autres	22	377	Sit-Ski events introduced in the sports of Alpine and Nordic Skiing
1984	Innsbruck (AUT)	Spinal injury, Amputee, Vision Impairment, Cerebral Palsy, Les Autres	21	419	Demonstration event at Olympics in Sarajevo: Giant Slalom.
1980	Geilo (NOR)	Spinal injury, Amputee, Vision Impairment, Les Autres	18	299	Demonstration event: Downhill Sledge Racing
1976	Örnsköldsvik, Sweden	Spinal injury	16	198	Demonstration event: Sledge Racing

The number of athletes participating in the Paralympic Winter Olympics by years is shown in Table 4 and Figure 3 below(https://www.paralympic.org)

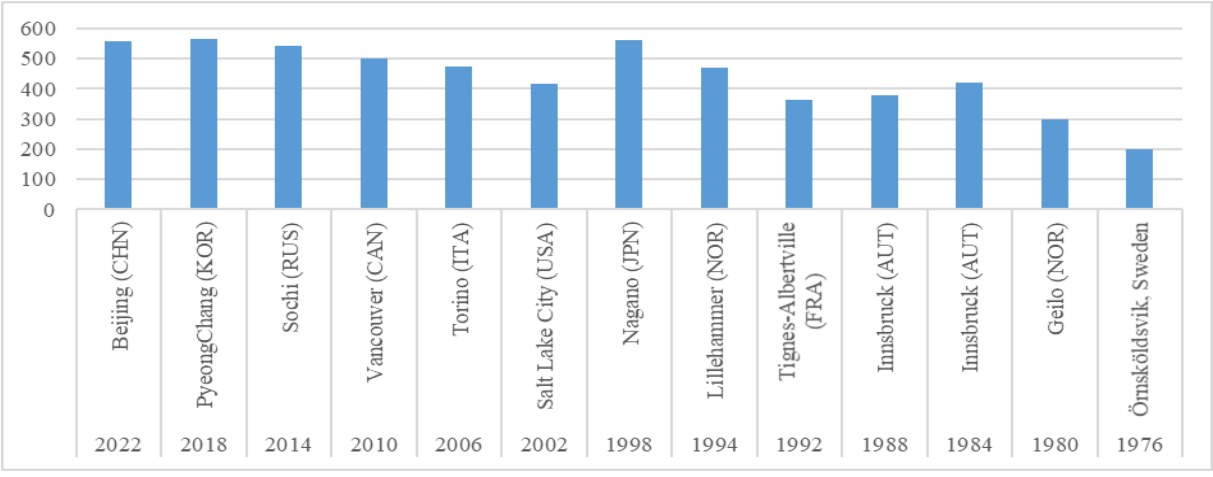

Figure 3: Number of athletes participating in Paralympic Winter Games

Psychology of Paralympic Athletes

British sports psychologist Jonathan Katz said of Paralympic sport: "The Paralympic environment is intense, exciting, with constant emotional ups and downs. It is also unforgiving and taxing" (Katz, 2007). These words help us to understand the importance of psychological preparation in Paralympic sport. In this context, psychological skills training described in the field of sport psychology is thought to be necessary for para-athletes, para coaches, para managers (Martin, 2016).

It is important to be aware of the psychosocial climate of para-athletes. Although there are many similarities between para-athletes and healthy athletes, there are many psychological, social and physiological factors that are different for disabled athletes. One of these differences is that approximately 85% of disabled athletes have an acquired disability (e.g. earthquake, car or work accident). Athletes with disabilities socialize more through sport than healthy athletes, and adults have more opportunities for para sport than children (Sherrill, 1998; Martin, 1999). Para-athletes may experience many difficulties such as transportation difficulties and architectural barriers in coming to the training area and performing daily activities. In addition, people with disabilities are considered a minority and may be subject to discrimination and abuse (Shapiro, 1993).

Para-athletes often deal with chronic pain and injuries. Para-athletes' self-awareness to distinguish between disability-related discomfort and chronic pain from sports injury and fatigue-related pain is important. Failure to recognize the differences between the intensities can lead to injury or withdrawal from training when trying to train through pain, resulting in loss of fitness. Given that many para-athletes have short careers and limited opportunities to compete at the elite level, it is critical to reduce time lost to injury. In addition, para-athletes' readiness for sport cannot be determined by chronological age, as athletes in Paralympic sport start at different ages depending on the timing of the injury (Radtke and Doll-Tepper, 2014).

From a holistic perspective, there are many different parameters that affect the sporting performance of para-athletes. These factors are listed below (Erickson and Côté, 2016; Post et al. 2018; Baxter-Jones et al. 2002; Roberts et al. 2019; Ullrich-French and Smith, 2009; Estabrooks et al. 2003; Barker-Ruchti et al. 2018):

• Demographic factors (e.g., socioeconomic status, family status, sports background,
• Physical characteristics (e.g. endurance, flexibility)
• Psychological (e.g. psychological resilience, anxiety level)
• Disability-related factors (e.g. type, timing and nature of disability, potential classification)
• Sport-related factors (e.g., quality coaching, coach-athlete relationship),
• Social factors (e.g. relationships with peers),
• Environmental factors (e.g. access to facilities)
• Political factors (e.g. access to sport policy, funding)

Motivation:

Understanding the psychological processes that initiate and sustain behavior in sport settings is important to reveal the reasons why athletes start, continue and quit sport (Clancy et al. 2016). Being aware of para-athletes' thoughts (e.g., motivation) and emotions (e.g., anger versus frustration), understanding the impact of these emotions and thoughts on behavior, and revealing their reasons for playing sport are important for success and continuity in sport (Martin, 1999). Although the sport motivations of para-athletes and non-disabled athletes are similar, para-athletes are known to have multifaceted and complex motivations. Para-athletes play sport to perform well and win, to appear both normal and beyond normal, to adapt to a recent injury, to defend themselves, to combat marginalization, and to promote the disability sport movement.

Personality:

Personality is a relatively stable trait that is also thought to indirectly help performance. The gold medal winning para women's basketball team at the Paralympic Games in the USA was found to have higher psychological resilience and lower levels of anxiety than other para-athletes (Martin et al. 2011). Research has also suggested that emotional stability (i.e. being less anxious) and cognitive flexibility and mental resilience may contribute to sporting performance in para-athletes (Martin, 2016).

Self-confidence: It refers to athletes' own thoughts and beliefs about the skills they have in sports. It is an important feature required for superior sports performance in athletes (Plakona et al., 2014).

Psychological Resilience:

High performance expectations for athletes in sports environments bring about stress, negative experiences and emotional state. Psychological resilience is a dynamic process expressed as the ability to stand up to different challenges faced by athletes from the sports environment and the ability to cope with difficulties, and the ability to recover easily after negative experiences (Fletcher & Sarkar, 2012).

Self-awareness:

Self-awareness is the recognition of all the characteristics that athletes need to have in order to perform well in sports, in other words, being aware of these characteristics. Individuals with high self-awareness engage in introspection and reflection to understand their own internal processes. These in-depth self-awareness exercises provide athletes with the opportunity to self-regulate (Faull and Cropley, 2009).

Regulation of emotions and stimulation:

Emotions are primitive, automatic, and unconscious responses to a wide variety of environmental demands. Recognizing emotions is very important for managing emotions. Since para-athletes experience very different emotional processes related to their disability, apart from the stressful environment of sports, it is also important to manage their emotions. It is necessary to have the ability to regulate emotions in order to achieve high performance in para sports and for psychological well-being. With techniques for managing emotions and regulating arousal, athletes can become prepared to perform at a high level (Anderson et al. 2014; Hansen, 2005).

Attention Control:

Another skill required for high performance in sports is attention control. Attention control, also called concentration or focus, is defined as the athlete's intentional directing of his or her attention to a stimulus in order to perform a task (Eysenck and Wilson, 2016).

Stress Management:

Athletes face many challenges to achieve superior performance in sports. Athletes become stressed when they start to think that they cannot cope with these difficulties. These stressful thoughts can harm athletes' performance and mental health. Therefore, stress management is another skill that athletes must have in order to demonstrate high performance in sports. Para-athletes who are aware of their thoughts and emotions and can control them can reduce their stress reactions by changing how they evaluate stress factors (Rumbold et al. 2012; Neil et al. 2011).

Stress Factors in Paralympic Athletes

Factors that cause stress in Paralympic athletes are summarized below:

Competition

The Paralympic Games are considered to be the highest level of competition that para-athletes can aim for. The attention paid to Paralympic athletes and the importance placed on Paralympic performance by governments, media, families and friends can make the Paralympic Games particularly challenging/stressful (Martin, 2012).

Feeling responsible for buying tickets for relatives at the Paralympic Games

Studies investigating the factors that create stress in para-athletes have revealed that para-athletes feel responsible for buying tickets for their families and friends at the Paralympic Games and that organizing tickets increases their stress. For this reason, organizing tickets for athletes' relatives will relieve them during the games (Dieffenbach and Statler, 2012).

Travel

Paralympic athletes experience stress when traveling to major international competitions. First or last boarding, transfer from wheelchair to airplane seat, bathroom accessibility and personal care support during the flight are some of the travel concerns of para-athletes (Martin, 2012).

Social support

Research has found that Paralympic athletes being away from home for long periods of time is another source of stress. Social support is very important for Para-athletes. Para-athletes reported that their family and friends supported their training. The lack of social support for an extended period of time (e.g. 7-14 days) at the Paralympics can have negative consequences for para-athletes. In order to cope with this source of stress, it would be beneficial for para-athletes to have face-to-face communication with family and friends through technology (Campbell, and Jones, 2002a; Campbell and Jones, 2002b; Martin and Mushett, 1996; Omar-Fauzee et al. 2010).

Getting used to the Paralympic village

Para-athletes spend a significant amount of time in the Paralympic village. Para-athletes have to sleep in an unfamiliar environment with different mattresses and pillows. A study of Brazilian Paralympic athletes participating in the Beijing Paralympic Games found that the majority of athletes had poor sleep quality during the games (Silva et al. 2012). The decrease in the sleep quality of para-athletes may be due to competition anxiety, as well as the physical difference in the sleeping area and not getting along with the roommate. It should not be forgotten that decreased sleep quality is a factor that increases competition anxiety. In the study conducted by Silva et al. (2012), 72% of para-athletes with poor sleep quality had moderate anxiety, while this rate was only 28% in athletes with good quality sleep. Similarly, members of the British national team reported that sleep was the source of anxiety and stress in para-athletes (Campbell and Jones, 2002). Athletes were generally concerned about lack of sleep, who they would have to share a room with and having to compete after a bad night's sleep. Therefore, it is useful for para-athletes to carry sleep aids (e.g. earplugs) and familiar bedding (e.g. pillows) with them to the Paralympic Games (Martin, 1999).

Difficulty accessing support staff

While it is easier to access support staff (chiropractor, sports psychologist, physiotherapist) in competitions for a specific sport (e.g. Archery World Championships), support staff are often overworked and tired in Paralympic Games where many sports are competed. Good planning for access to support staff can help to reduce the stress of athletes (Martin, 1999).

Classification

In para sports, athletes are classified according to their disability level, and this allows athletes with different disabilities to compete. For example, an athlete with cerebral palsy can compete with an athlete with missing limbs. Incorrect classification in para sports is a situation that is frequently encountered and causes stress and anger in para sports (Wu & Williams, 2001). Athletes fear being reclassified at a different level than they were before, and when they are reclassified, they may have to compete with athletes whose injuries are less effective (Martin, 1999).

Doping testing

The Paralympics are doping tested in a similar way to the Olympics. For many para-athletes, doping testing can be a stressful experience. Testing at the Paralympics is likely to be more extensive than at the Olympics. Para-athletes often provide urine for doping testing, and they need to apply for exemptions for medicines they take because of their disability. Sometimes para-athletes can make lifestyle changes prior to the Paralympics to avoid substances that could be seen as doping (Nadarajan, 2000; Collier, 2008).

Psychosocial Factors in Para-Athletes

Para-athletes train and compete in a social context, so interpersonal relationships are crucial in sport settings. Such skills are also key to optimize mental health and create safe, productive environments conducive to learning and development (Martin, 2016).

Family Engagement

In the early years of para-athletes' careers, it is vital that the parent or caregiver is there for the athlete (Johnson, Fraser, Ganesh, Skowron, & Ipsos, 2008; Johnson et al. (n.d.); Radtke and Doll-Tepper, 2014). However, this social support may harm the athlete in the context of overprotectiveness. The overprotective nature of the parent undermines the para-athlete's ability to adapt and cope with the demands of sport (e.g., travel to training, travel to camps and competitions, pressure to perform and expectations of consistency). The overprotective attitude of the parent or caregiver may suppress the para-athlete's sense of independence and risk-taking impulses. If parents realize that they cannot always be there for the para-athlete and create an environment where the para-athlete can act on his/her own and meet his/her needs on his/her own, this will have a positive impact on sporting performance (Dehghansai et al. 2021).

Coaches also emphasized the importance of para-athletes' level of independence for successful sporting development in the Paralympic context. Parental/caregiver overprotectiveness can increase pressure on para-athletes by reducing their opportunities to be independent (Tawse et al. 2016). Research findings on Paralympic athletes suggest that children whose parents and siblings are involved in sports are more likely to participate in sports (Hopwood et al. 2015; Papadopoulos et al. 2020) and that parental support plays an important role in para-athletes (Hopwood et al. 2015; Papadopoulos et al. 2020).

Coaches

Coaches are critical to success in sport and can influence para-athletes in many positive and negative ways. Para sport in general tends to be of secondary status to disability sport. Some successful coaches may not want to coach para sport for fear of less fame and status. In countries with limited financial resources, Paralympic athletes may not receive consistent pre-competition coaching because they work with coaches who have not completed para sport-specific training. It is very important to receive field-specific training to coach in Para sport. Coaches who try to coach at the Paralympic Games without training in this field and without prior training and competition experience with the athlete may act more as managers than coaches because they do not interact with their athletes beforehand (Martin, 2016).

Para coaches face a dual challenge of understanding the sport and disability of para-athletes. In a study examining the roles and responsibilities of coaches of para-athletes in wheelchair rugby, two themes emerged. One is coaching the para-athlete and the other is coaching the individual. In terms of coaching, coaches emphasized that elite disability sport is in a transition period and creating an elite sport environment is very important in para sport. Individual coaching is important to meet with para-athletes individually on a regular basis outside of formal training sessions (Martin, 2016).

The knowledge and experience of coaches has a significant impact on sports performance. In addition to the knowledge and experience of the coach, interpersonal relationships between the coach and the athlete are also of critical importance for sporting success. A study of eight disabled swimmers revealed that the athletes' training in the sport was linked to a personal and close relationship with their coaches (Martin, 2016).

Making para-athletes a partner in the decisions taken in the sport environment and supporting the sense of independence of athletes are important for participation and continuity in para-sports. In sports environments where autonomy is supported, athletes also have more positive relationships with their teammates. In addition, athletes who think that their coaches support their desire to be independent are more intrinsically motivated. It is known that providing social support, positive feedback and democratic behavior of coaches contribute to their success in sports and their continuity in sports. Para-athletes have expressed their satisfaction with coaches who approach them with democratic leadership style. However, coaches who approach their athletes with autocratic leadership that determines what is expected from para-athletes, corrects mistakes and explains what to do to para-athletes are also very valuable for athletes (Martin, 2016).

In the camps of Paralympic teams, athletes come to the camp from different regions and live together for a long period of time. From this perspective, it is critical for coaches to create a spirit of team unity, determine roles and responsibilities in the team and ensure social cohesion in the team (Martin, 2016).

Establishing a trust-based relationship between the coach and the athlete is very important for good sports performance. The relationship network created between the coach and the athlete with the themes of sincerity, commitment, complementarity and joint effort will positively affect sports performance (Poczwardowski et al. 2002; Jowett, 2007).

Leadership:

Leadership, which is expressed as influencing and leading other people to achieve common goals, is an important concept in sports. In sports, the leader's approach to defining roles and developing relationships within the team enables the development of team chemistry, climate, communication, and athletic experience (Duguay et al. 2019; O'Boyle et al. 2015).

Teamwork:

Teamwork is a dynamic process that involves team members striving collaboratively to effectively carry out the independent and at the same time interdependent behaviors necessary to maximize the likelihood of a team achieving its goals. Teamwork significantly affects satisfaction, harmony and performance in sports (Bloom et al. 2003; Collins and Durand-Bush, 2019; McEwan and Beauchamp, 2014).

Communication:

Communication, which expresses the message exchange of information and ideas through verbal and non-verbal means, is the basis of effective teamwork. Communication, which is affected by different factors such as age, gender, religion, language and culture, affects team interaction, conflict resolution and stress management. In teams, the ability to communicate openly and reliably is essential for carrying out a range of team processes such as goal setting, leadership, support, decision making and conflict resolution (Beauchamp et al. 2005; Carron et al. 2005; Collins and Durand-Bush, 2019).

Conclusion

The aim of this study is to define the Paralympic concept, to reveal the history of the Paralympic Olympic Games and to examine the psychological and psychosocial characteristics of para-athletes in order to increase knowledge and awareness about the concept of para sport.

As a result of the literature review, the change and development that para sport has shown over the years since the first day it emerged has been revealed. Para sport, which started with the realization of the positive effects of physical activity and sports on the treatment of disabled individuals, has shown positive developments in terms of both the number of athletes and the sports branch every year and the Paralympic Games have taken its place in the international arena in a short time. The increase in the number of athletes participating in the games has enabled different branches and different disability groups to take part in the competitions. With the first winter games held in 1976, the games, which were divided into two formats as summer and winter, started to be held in the same venues after the Olympic Games and turned into organizations as big as the Olympics. In 1989, with the establishment of the International Paralympic Committee, the organization of the games and disabled sports branches with many disabled federations were gathered under a single roof and took the form of today's Paralympic Games. Considering the problems experienced by disabled individuals in terms of physical activity and participation in sports even today, the developments that the Paralympic Games have shown from the date of its emergence to the present day cannot be underestimated. Paralympic Games not only proved to the whole world that disabled individuals can also be elite level athletes, but also increased the motivation of individuals to participate in physical activity and sports regardless of their disability group.

In this study, in addition to the history of para sport, the psychological characteristics of para-athletes were discussed and psychosocial factors in para sport were examined. An in-depth understanding of psychological and psychosocial factors in Paralympic sport is very important for para coaches and managers, sport scientists and students in this field to better understand para-athletes. After the review, personal characteristics, motivational factors, self-confidence, psychological resilience, self-awareness, stress management, regulation of emotions and stimulation, attention control and factors that cause stress in para-athletes were revealed. Family, coach, leadership, team unity and communication issues among psychosocial factors in para sports were also examined within the scope of the study.

When the psychological characteristics of para athletes are examined, it is stated that para athletes have a versatile and complex psychology. It has been understood that para athletes do sports

for reasons such as performing well and winning, looking normal, adapting to injury, defending themselves, fighting against marginalization and encouraging the disabled sports movement. It has been stated that para-athletes who are emotionally stable, have cognitive flexibility and mental endurance, are self-confident, can manage stress and control their emotions are more successful in sports. As a result of the literature review, it has been revealed that issues such as competition, feeling responsible for buying tickets for relatives at the Paralympic Games, travel, social support, getting used to the Paralympic village, difficulty accessing support staff, classification and doping testing increase stress in para-athletes.

It is very important for a parent or caregiver to be with the athlete when para-athletes begin their sport, but if this social support continues as overprotectiveness, it harms the para-athlete's ability to adapt and cope with the demands of the sport. self-thought coaches, who are quite limited in numbers, are very crucial for success in the sport and can influence para-athletes in many positive and negative ways. In parasport, apart from sport-specific knowledge, relationships with athletes, communication, leadership skills and an environment that provides team cohesion are also important.

Based on this research, some field-specific suggestions are given below:

• Although studies to raise awareness about para-athletes have increased, there is still a need for awareness studies on this subject.

• Para-athletes should be trained on how to behave. An approach that prioritizes being an athlete, not being disabled in para-sports, needs to be taught to all sports personnel who work in the field, receive training, and are in contact with para-athletes.

• It is recommended that research on the psychosocial characteristics of para athletes be increased in the field.

• Specific research to the sports branch should be increased in para sports.

• Projects should be produced on how disabled individuals who do not participate in sports can be included in sports.

Conflict of Interest

There are no conflicts of interest for the contributing author.

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