ISSN: 2548-0723

SPOR BİLİMLERİ ARAŞTIRMALARI DERGİSİ
JOURNAL OF SPORT SCIENCES RESEARCH
JSSR

Cilt: 10; Sayı: 1, 2025 / Volume: 10; Issue: 1, 2025

SPOR BİLİMLERİ ARAŞTIRMALARI DERGİSİ | **JOURNAL OF SPORT SCIENCES RESEARCH**

2025, Cilt: 10, Sayı: 1 | 2025, Volume: 10, Issue: 1
Çevrimiçi Basım Tarihi: Şubat 2025 | Online Publishing Date: February 2025
ISSN: 2548-0723

Spor Bilimleri Araştırmaları Dergisi yılda 3 kez (Şubat, Haziran ve Ekim) yayımlanan hakemli süreli bir yayındır.
JSSR is published biannually (February, June, October)
https://dergipark.org.tr/tr/pub/jssr

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Spor Bilimleri Araştırmaları Dergisi'nin temel amacı, Spor Bilimleri alanına ilişkin güncel gelişmeleri bütüncül ve kapsayıcı bir biçimde inceleyerek bu doğrultuda ortaya çıkan özgün makale ve derlemeleri hedef kitle ile paylaşmaktır.

Kapsam

Spor Bilimleri Araştırmaları Dergisi, 2016 yılında yayın hayatına başlamış olup yılda 3 kez yayımlanan Hakemli bir dergidir. Dergi Türkçe ve İngilizce yazılara yer vermektedir. Spor Bilimleri Araştırmaları Dergisi, Spor Bilimleri alanına ilişkin olarak; Beden Eğitimi ve Spor Öğretimi, Spor Yönetimi, Rekreasyon, Hareket ve Antrenman Bilimleri, Sporda Psiko-sosyal Alanlar ve Spor-Sağlık Bilimleri alanlarında kavramsal veya araştırmaya dayanan, sahasına katkı sağlayacağı düşünülen özgün araştırmaları ve derleme makaleleri yayımlamaktadır.

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Journal of Sport Sciences Research

Aim

The main purpose of the Journal of Sport Sciences Research is to analyze the current developments in the field of Sport Sciences in a holistic and inclusive way and to share the original articles and reviews that emerged in this direction with the target audience.

Scope

Journal of Sports Sciences Research is a refereed journal that began its publication life in 2016 and is published 3 times a year. The journal welcomes articles in Turkish and English languages. Regarding the field of Sport Sciences, the Journal publishes conceptual or research-based original research and review articles in the fields of Physical Education and Sports Teaching, Sports Management, Recreation, Movement and Training Sciences, Psycho-social Fields in Sports and Sports-Health Sciences.

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Journal of Sport Sciences Research
Vol: 10, Issue: 1, 2025
E-ISSN: 2548-0723
URL: http://www.dergipark.org.tr/jssr

Investigation of Physical Performance of Young Elite Football Players: "Positional Comparison"

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Research Article **DOI: 10.25307/jssr.1513205**
Received: 09.07.2024 Accepted: 26.11.2024 Online Publishing: 28.02.2025

Abstract

This study aims to compare the positional physical performances of young elite A league football players. A total of 38 players from MKE Ankaragücü's U17 and U19 categories, competing in the young elite league during the 2023-2024 season, participated in the research. A Shapiro-Wilk normality test was applied to the data obtained in the study, and based on the results of the normality test, the Spearman test was used for correlation analysis. The Kruskal-Wallis test was used to determine the differences between groups, and the Mann-Whitney U test was used to define these differences. Additionally, Spearman correlation analysis was used to examine the relationship between the participants' physical performance data. When the vertical jump variable was examined, it was found that defenders performed better than goalkeepers in vertical jump ($p<0.05$), midfielders performed better than goalkeepers ($p<0.01$), and forwards also performed better than goalkeepers ($p<0.05$). Regarding the long jump variable, it was found that midfielders performed better in vertical jump than goalkeepers ($p<0.01$). When the 20-meter sprint variable was examined, it was found that defenders performed better than goalkeepers in the 20m sprint ($p<0.01$), midfielders performed better than goalkeepers ($p<0.01$), and forwards also performed better than goalkeepers ($p<0.05$). For the 40m sprint performance variable, it was found that defenders performed better than goalkeepers in the 40m sprint ($p<0.05$), midfielders performed better than goalkeepers ($p<0.01$), and forwards also performed better than goalkeepers ($p<0.05$). In conclusion, the findings of the study reveal that defenders, midfielders, and forwards exhibit significant superiority in vertical jump, long jump, and sprint performances compared to goalkeepers.
Keywords: Physical performance, Young football players, Positional difference

Genç Elit Futbolcuların Fiziksel Performanslarının İncelenmesi: "Mevkisel Karşılaştırma"

Öz

Bu çalışmanın amacı, genç elit A ligi futbolcularının pozisyonel fiziksel performanslarını karşılaştırmaktır. Araştırmaya 2023-2024 sezonunda genç elit liginde mücadele eden MKE Ankaragücü'nün U17 ve U19 kategorilerinden toplam 38 oyuncu katılmıştır. Çalışmada elde edilen verilere Shapiro-Wilk normallik testi uygulanmış, normallik testi sonuçlarına göre korelasyon analizi için Spearman testi kullanılmıştır. Gruplar arası farklılıkları belirlemek için Kruskal-Wallis testi, bu farklılıkları tanımlamak için Mann-Whitney U testi kullanılmıştır. Ayrıca katılımcıların fiziksel performans verileri arasındaki ilişkiyi incelemek için Spearman korelasyon analizi kullanılmıştır. Dikey sıçrama değişkeni incelendiğinde dikey sıçramada defans oyuncularının kalecilerden daha iyi performans gösterdiği ($p<0,05$), orta saha oyuncularının kalecilerden daha iyi performans gösterdiği ($p<0,01$) ve forvetlerin de kalecilerden daha iyi performans gösterdiği ($p<0,05$) bulunmuştur. Uzun atlama değişkeninde, orta saha oyuncularının dikey sıçramada kalecilerden daha iyi performans gösterdiği bulunmuştur ($p<0,01$). 20 metre sprint değişkeni incelendiğinde, 20 metre sprintte defans oyuncularının kalecilerden daha iyi performans gösterdiği ($p<0,01$), orta saha oyuncularının kalecilerden daha iyi performans gösterdiği ($p<0,01$) ve forvetlerin de kalecilerden daha iyi performans gösterdiği ($p<0,05$) bulunmuştur. 40 metre sprint performans değişkeninde, 40 metre sprintte defans oyuncularının kalecilerden daha iyi performans gösterdiği ($p<0,05$), orta saha oyuncularının kalecilerden daha iyi performans gösterdiği ($p<0,01$) ve forvetlerin de kalecilerden daha iyi performans gösterdiği ($p<0,05$) bulunmuştur. Sonuç olarak araştırmanın bulguları, defans oyuncularının, orta saha oyuncularının ve forvetlerin kalecilere kıyasla dikey sıçrama, uzun atlama ve sprint performanslarında anlamlı üstünlükler sergilediğini ortaya koymaktadır.
Anahtar kelimeler: Fiziksel performans, Genç futbolcu, Mevkisel farklılık

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INTRODUCTION

Due to the structure of football, players need to possess various physical abilities, and there are many factors that affect their success in training and on the field. The physical characteristics of football players, such as sprinting and anaerobic power are fundamental elements that determine success on the field (Oliva et al., 2020). With the advancement of technology today, modern football has become a branch of sport that can present scientific solutions to reflect speed, tactics, technique, strength, power, and endurance performance on the field (Bădescu, 2022). In football, which is aerobically based but has anaerobic characteristics, it is necessary to continuously develop various variables (morphological, physiological, psychological, biomechanical, cognitive, etc.) to maintain high performance. In football, it is important to constantly develop and optimize players' mental and technical skills as well as their physical abilities. Developments in these various areas play a critical role in enhancing football players' performance and gaining a competitive edge (Hermassi et al., 2019). Scientific studies frequently examine the physical and physiological needs of football and the different movement forms applied by football players on the field (Asimakidis, 2024).

Understanding how the physical characteristics of young football players differ according to their positions is important for increasing the efficiency of training programs and helping young players better understand their positions (Miçooğulları, 2024). The goal of modern football is to develop the responsibilities of players in every position (Berber, 2020). While football differs from other sports branches in terms of game structure, it also differs within itself according to the positions in the game (Söyler & Kayantaş, 2020). Every player on the field is important and assumes variable roles. With these roles constantly changing on the field, the physical demand on each player increases (Dolci et al., 2020). Research indicates that the distance covered, variety of movements, and frequency of these movements vary according to the positions played by football players (Modric et al., 2019). However, in football today, players in all positions, including goalkeepers, need to possess almost all motor skills. Offensive and defensive players should assist each other's positions depending on the situation of the game (Berber et al., 2020).

As a result, due to the multidisciplinary nature of football, which includes an intermittent structure involving jumps, sudden changes in direction, sprints, and high-intensity movements on the field, many scientific studies have been conducted to develop versatile movement skills (Dong et al., 2022; Lee et al., 2024; Živković et al., 2024). Studies have observed differences in the distances covered by players, the movements they perform, and the frequency of these movements based on their playing positions (Lorenzo-Martinez et al., 2021; Low et al., 2020; Modric et al., 2020). Bujnovsky et al. (2019), in their study examining the physical and physiological capacities of young footballers according to their playing positions, reported a statistically significant difference (Bujnovsky et al., 2019). In this context, studies conducted on the field requirements of football and the positional needs of players are important for the development of the game (Arjol-Serrano et al., 2021).

In this study, the aim is to examine the basic needs of football, such as VO2max, vertical jump, standing long jump, and 10 m, 20 m, 30 m, and 40 m sprint performances based on positions, and to reveal the differences. It is believed that this research will contribute to both the field of sports science and the athletes, especially in relation to young footballers playing in elite leagues (League A).

METHOD

Research Model

In this study, a cross-sectional research model was used to examine the physical performance of young elite football players, determine the relationship between physical performances, and reveal the differences between positions.

Research Groups

Young football players who have been licensed for at least 3 years and train at least 3 days a week participated in the study. The research was conducted in April, during the second half of the 2023-2024 season, with football players from the U17 and U19 categories of MKE Ankaragücü, competing in the elite youth A league. As seen in Table 1, a total of 38 individuals participated in the study.

Table 1. Demographic characteristics

Variables	Groups	N	$\bar{X}$	SS	Min.	Max.
Age (Years)	Goalkeeper	6	17.666	1.211	16.000	19.000
	Defender	12	17.666	1.154	16.000	19.000
	Midfielder	16	17.875	1.147	16.000	19.000
	Forward	4	18.000	1.154	17.000	19.000
Height (Cm)	Goalkeeper	6	185.166	4.070	180.00	190.000
	Defender	12	180.916	6.006	170.00	191.000
	Midfielder	16	177.625	4.588	170.00	185.000
	Forward	4	179.500	2.886	176.00	183.000
Body Weight (Kg)	Goalkeeper	6	76.000	10.373	60.000	85.000
	Defender	12	71.416	6.612	64.000	86.000
	Midfielder	16	70.187	6.389	58.000	80.000
	Forward	4	73.250	3.593	68.000	76.000

In this study, which compares some motoric characteristics of football players playing in different positions, it was found that the average age of goalkeepers is 17.6 years, average height is 185.1 cm, and average body weight is 76 kg; the average age of defenders is 17.6 years, average height is 180.9 cm, and average body weight is 71.4 kg; the average age of midfielders is 17.8 years, average height is 177.6 cm, and average body weight is 70.1 kg; and the average age of forwards is 18 years, average height is 179.5 cm, and average body weight is 73.2 kg (Table 1).

Procedures

Two days before the start of the study, a meeting was held with the football players and detailed information was given about the purpose of the study, its duration, the tests to be applied, possible risks and benefits. After the meeting, the participants who agreed to participate in the study were asked to read and sign a form prepared in accordance with the Declaration of Helsinki, indicating their voluntary participation and providing detailed information about the study. The test equipment to be used was then introduced to the participants. On the first day, the players' height and body weight were measured in accordance with the procedure and the Vo2max test was applied on the same day. On the second day, standing long jump, vertical jump and sprint tests were performed.

Ethical Approval

In order to conduct the research, an ethics committee approval dated 27/06/2024 and numbered E-95674917-108.99-259799 was obtained from the Gümüşhane University Ethics Committee. In addition, permission to work with players was obtained from the MKE Ankaragücü youth athletic performance coordinator team before applying to the ethics committee.

Data Collection Tools

Height: The height of the football players was measured using a stadiometer with the players standing barefoot and in an upright position, their heels together, and the device aligned with the highest point of their head.

Body Weight: The body weight of the players was measured using Tanita BC-418 (Tanita, Japan) in a standing position wearing only shorts, and recorded in kilograms.

Yo-Yo Intermittent Recovery Level 1 Test: The Yo-Yo intermittent recovery test, used as a field measurement method, was used in the study. In this test, players performed runs back and forth over a 20-meter distance, followed by a recovery run (active recovery) in a 5-meter area. The test is conducted with two signal sounds. The player starts the test at a speed of 10 km/h with the first signal sound and must reach the line at the end of the 20-meter distance by the second signal sound. Upon hearing the second signal sound, the player returns to the starting line and performs active recovery for 10 seconds in the 5-meter area until the next signal. The test continues with increased running speed at each level. Players who miss two consecutive signals end the test, and the distance covered is recorded (Bangsbo et al., 2008; Krustrup et al., 2003).

Standing Long Jump: The test was conducted with players standing and jumping forward from a standing position with feet parallel. The distance between the starting point and the landing point was measured and recorded in centimeters. The test was performed twice, and the best result was noted (Karavelioğlu, 2008).

Vertical Jump: The vertical jump performance of the players was tested using the Smartspeed (Smartspeed, Fusion Sport Pty Queensland, Australia) device. The vertical jump performance was measured using a countermovement jump (CMJ) with free arms. Players participated in

the test in their training attire and sports shoes. Players were subjected to three technically correct jumps. Each test was repeated three times, and the best result was used (Glatthorn et al., 2011).

10-20-30-40 Meter Sprint: The test was conducted with photocells (Microgate brand) placed at the start and finish lines. Players started the test from a point 1 meter behind the starting photocell. Four separate sprint tests of 10m, 20m, 30m, and 40m were applied to the players. Players performed the test twice in total, and the best results were recorded. Full rest periods were given to the players between tests.

Analysis of Data

Shapiro-Wilk normality test was applied to the data obtained in the study and Spearman test was used for correlation analysis according to the normality test results obtained. Kruskal-Wallis test was used to determine the difference between groups. Mann-Whitney U test was used to define the difference between groups. In addition, Spearman correlation analysis was used to examine the relationship between the physical performance data of the participants.

RESULTS

In this study, a comparison was made between the goalkeeper, defender, midfielder and forward positions and the values with significant differences are shown in the tables below.

Statistical data on VO2max, vertical jump, long jump and sprint test results of football players are shown in Table 2.

Table 2. Descriptive statistics

Variable	N	$\bar{X}$	SS	Min.	Max.
VO_2max (ml/kg^{-1}/min^{-1})	38	52.320	3.454	45.500	60.900
Vertical jump (cm)	38	38.090	4.348	30.100	48.500
Long jump (cm)	38	208.55	16.270	174.360	241.000
10m sprint (sec)	38	1.660	0.073	1.500	1.780
20m sprint (sec)	38	2.670	3.770	2.950	0.190
30m sprint (sec)	38	3.820	4.880	4.140	0.180
40m sprint (sec)	38	4.940	6.110	5.370	0.230

When examining the data in Table 2, it is observed that the participants' average VO2 max values are 52.32 ml/kg/min, vertical jump values are 38.09 cm, standing long jump values are 208.55 cm, 10m sprint times are 1.66 seconds, 20m sprint times are 2.67 seconds, 30m sprint times are 3.82 seconds, and finally, 40m sprint times are 4.94 seconds.

Table 3. Correlation analysis

Variable		VO_2max	Vertical	Long jump	10m	20m	30m	40m
VO_2max	*r*	1	-0.056	0.115	-0.108	0.342	0.267	0.324
(ml/kg^{-1}/min^{-1})	*p*	.	0.738	0.493	0.517	0.035*	0.105	0.047*
	N	38	38	38	38	38	38	38
Vertical	*r*	-	1.000	.511**	-.112	-.310	-.296	.452**
(cm)	*p*	-	.	0.001	0.505	0.058	0.071	0.004
	N	-	38	38	38	38	38	38
Long jump	*r*	-	-	1.000	0.-338*	0.-174	0.-261	0.-258
(cm)	*p*	-	-	.	0.038	0.295	0.114	0.117
	N	-	-	38	38	38	38	38
10m	*r*	-	-	-	1.000	0.432**	0.508**	0.422**
(sec)	*p*	-	-	-	.	0.007	0.001	0.008
	N	-	-	-	38	38	38	38
20m	*r*	-	-	-	-	1.000	0.833**	0.878**
(sec)	*p*	-	-	-	-	.	0.000	0.000
	N	-	-	-	-	38	38	38
30m	*r*	-	-	-	-	-	1.000	0.848**
(sec)	*p*	-	-	-	-	-	.	0.001
	N	-	-	-	-	-	38	38
40m	*r*	-	-	-	-	-	-	1.000
(sec)	*p*	-	-	-	-	-	-	.
	N	-	-	-	-	-	-	38

*p<0,05; **p<0,01.

A positive but low-level correlation was detected between VO2 max and 20m and 40m sprints; a positive moderate significant relationship was found between vertical jump and long jump; and a negative moderate significant relationship was detected between vertical jump and both 20m and 40m sprints. A negative moderate relationship was identified between long jump and 10m sprint. Additionally, a positive moderate relationship was found between 40m and 10m sprints, while a positive high-level relationship was determined between 40m and both 20m and 30m sprints (Table 3).

Table 4. Kruskal Wallis analysis between positions

Variable	F	p
VO_2max (ml/kg^{-1}/dk^{-1})	2.405	0.493
Vertical jump (cm)	9.261	0.026*
Long jump(cm)	10.279	0.016*
10m (sec)	3.478	0.324
20m (sec)	14.288	0.002**
30m (sec)	7.730	0.015*
40m (sec)	15.492	0.004**

*p<0,05; **p<0,01.

A significant difference was detected between positions for the variables of vertical jump, long jump, 20m sprint, 30m sprint, and 40m sprint (p<0.05), while no significant difference was

found between positions for the variables of VO2 max and 10m sprint (p>0.05) (Table 4). The variables that cause the difference are shown in Table 5.

Table 5. Bonferroni test comparison of football players across positions

Variable	N	Groups	$\bar{X}$	SS	Rank Average	Z	P
Vertical jump (cm)	6	Goalkeeper	33.660	2.900	5.750	-2.113	.035*
	12	Defender	38.460	4.800	11.380		
	6	Goalkeeper	33.660	2.900	5.000	-2.882	.004**
	16	Midfielder	38.750	3.280	13.940		
	6	Goalkeeper	33.660	2.900	3.500	-2.566	.010*
	4	Forward	40.970	5.240	8.500		
Long jump (cm)	6	Goalkeeper	191.570	13.610	4.500	-3.098	.002**
	16	Midfielder	216.090	10.750	14.130		
20m (sec)	6	Goalkeeper	3.300	0.270	15.250	-3.238	.001**
	12	Defender	2.890	0.090	6,630		
	6	Goalkeeper	3.300	0.270	19.500	-3.551	.000**
	16	Midfielder	2.880	0.080	8.500		
	6	Goalkeeper	3.300	0.270	7.500	-2.566	.010*
	4	Forward	2.890	0.010	2.500		
30m (sec)	6	Goalkeeper	4.420	0.250	14.580	-2.861	.004*
	12	Defender	4.080	0.100	6.960		
	6	Goalkeeper	4.420	0.250	17.670	-2.732	.006*
	16	Midfielder	5.270	0.120	9.190		
	6	Goalkeeper	4.420	0.250	7.500	-2.566	.010*
	4	Forward	5.280	0.000	2.500		
40m (sec)	6	Goalkeeper	5.750	0.240	14.420	-2.767	.006*
	12	Defender	5.350	0.190	7.0400		
	6	Goalkeeper	5.750	0.240	19.500	-3.542	.000**
	16	Midfielder	5.270	0.120	8.500		
	6	Goalkeeper	5.750	0.240	7.500	-2.566	.010*
	4	Forward	5.280	0.000	2.500		

*p<0,05; **p<0,01.

When examining Table 5, it is determined that in the vertical jump variable, defenders perform better in vertical jump than goalkeepers (p<0.05), midfielders perform better in vertical jump than goalkeepers (p<0.01), and forwards perform better in vertical jump than goalkeepers. In the long jump variable, midfielders perform better in long jump than goalkeepers (p<0.01). When examining the 20-meter sprint variable, defenders perform better in the 20m sprint than goalkeepers (p<0.01), midfielders perform better in the 20m sprint than goalkeepers (p<0.01), and forwards perform better in the 20m sprint than goalkeepers (p<0.05). Regarding the 40m sprint performance variable, defenders perform better in the 40m sprint than goalkeepers (p<0.05), midfielders perform better in the 40m sprint than goalkeepers (p<0.01), and forwards perform better in the 40m sprint than goalkeepers (p<0.05).

DISCUSSION and CONCLUSION

The aim of this study is to reveal positional differences by examining VO2 max, 10, 20, 30, and 40-meter sprints, standing long jump, and vertical jump performances, which are fundamental needs of football, positionally. Due to the limited number of studies related to footballers playing in elite A leagues within the scope of this study, it is thought that it will contribute to both the field of sports science and the athletes.

Due to the nature of football, players need to have various physical abilities, while many factors affect their success in training and on the field. The physical characteristics of football players, especially elements such as sprinting and anaerobic power, are among the fundamental factors affecting their success on the field (Oliva et al., 2020). Sprinting is a critical physical ability that includes elements requiring speed, agility, and sudden movements in football. Sprinting ability is important for players in situations such as outpacing opposing defenders, gaining possession of the ball, stopping the opponent, or quickly moving to their position (Haugen et al., 2014). Quick sprints help a footballer gain an advantage during competition, achieve positional superiority, and thus increase the efficiency of their team. Additionally, it should not be overlooked that quick sprints require intense energy and are mostly performed using the anaerobic energy system (Ramirez et al., 2020).

In general, midfielders run along the line between defensder and forward. It has been stated that while defenders and forwards competing in top leagues cover the same average distance, midfielders cover this distance less (Bloomfield et al., 2007). When comparing the distances covered at high speeds among footballers, no differences were obtained between the groups, but it was found that midfielders covered the distance at a lower speed compared to forwards and defenders (Can, 2009). Some studies have concluded that forwards run longer and at higher maximum speeds compared to midfielders and defenders (Bloomfield et al., 2007). According to the literature; Cometti et al. (2001) reported that the 10-meter sprint values of footballers were 1.80 s and the 20-meter sprint values were 4.22 s. According to the results of this study, the best sprint values for 10, 20, and 30 meters were found in forwards: 1.67±0.09 s for 10 meters, 2.94±0.16 s for 20 meters, and 4.15±0.20 s for 30 meters. Additionally in another study, 30-m sprint performance of the wing players were found to be statistically better than the central players (Atlı, 2021). In another study Significant differences were found in the acceleration profiles and sprint variables of the central defender (CD), full-back (FB), forward (FW), midfielder (MF) and wide midfielder (WMF) (Vardakis et al., 2024). In the research conducted by. In this study, the 20m sprint values of goalkeepers, defenders, midfielders, and forwards were found to be 3.30, 2.89, 2.88, and 2.89 on average, respectively, while the 30m sprint values were 4.42, 4.08, 5.27, and 5.28 on average, respectively, and the 40m sprint values were 5.75, 5.35, 5.27, and 5.28 s on average, respectively.

Yapıcı et al. (2016), the standing long jump values of footballers playing as midfielders, defenders, and forwards were determined to be 2.38 ± 0.095 m, 2.41 ± 0.096 m, and 2.41 ± 0.130 m, respectively. In the study conducted by Karavelioğlu (2008), the standing long jump values of midfielders, defenders, and forwards were reported to be 2.27 ± 0.193 m, 2.30 ± 0.186 m, and 2.23 ± 0.191 m, respectively. Additionally, the physical fitness profiles of elite young

football players were examined according to different positions. In the study, vertical jump values were found as Defenders: 51.8±4.9 cm, Midfielders: 48.6±4.8 cm, Strikers: 52.3±4.4 cm. The results of the research showed that forwards and defenders have slightly better explosive power performance than midfielders (Wong et al., 2009). Additionally in another study, the vertical jump performance of the wing players were found to be statistically better than the central players (Atlı, 2021). When the vertical jump values of another study were examined, it was determined that defenders had the highest jump value and that forward players were close to defenders (Arslan, 2024) .In this study, the standing long jump results, the average values for goalkeepers, defenders, midfielders, and forwards were found to be 191.57 cm, 206.09 cm, 216.09 cm, and 211.29 cm, respectively. Additionally, the average vertical jump results for midfielders, goalkeepers, and forwards were found to be 38.46 cm, 33.66 cm, 38.75 cm, and 40.97 cm, respectively.

Overall, these findings show that football players have different physical and performance profiles according to their positions, and these differences are shaped by their roles and duties in the game. While midfielders perform more balanced and continuous runs, forwards perform sudden accelerations and high-speed runs. Defenders contribute to the game mostly by taking positions and short-distance accelerations. This information emphasizes the need to customize training programs according to the positions of the players. Defenders have to expend 20-40% more energy than forwards due to having to run more backward and sideways (Cerrah et al., 2011). Many studies have proven that the physical profiles and performance criteria of football players are shaped in line with the roles and tasks they undertake in the game and Full-backs: While a larger physical structure provides an advantage in aerial balls and physical contact, defensive backs can be more agile and speed-oriented (Gao & Yu, 2023). Midfielders: Durability and agility are at the forefront; Players in this position require greater aerobic endurance because they are active in both aspects of the game (Sloth et al., 2013). Offensive Players: Sprint performance and explosive power (e.g. vertical jump) are at the forefront. Speed and rapid acceleration abilities are critical for these players (Liu et al., 2024). Additionally in another study, anaerobic power values of the central players were found to be statistically higher than the wing players (Atlı, 2021). Additionally, the skills exhibited by players vary depending on their positions; for example, footballers in forward and defensive midfield positions jump more to gain superiority in aerial duels, while defenders make more sliding tackles (Cerrah et al., 2011). In another study, statistically significant differences were determined in the aerobic power parameter between defenders, goalkeepers and midfielders in favor of defenders (Koç, 2021). In a study, it was found that defenders covered less distance during a match, but their high-intensity runs were shorter, and their strength was better. On the contrary, it was concluded that forwards performed more sprints and had more high-intensity activities compared to defenders (Modric et al., 2021). In the research conducted by Bujnovsky et al. (2019) examining the physical and physiological abilities of young footballers according to their positions, it was stated that there were statistically significant differences between goalkeepers and fullbacks in sprint tests and between fullbacks and central midfielders in repeated sprint abilities (Bujnovsky et al., 2019). In the research conducted by Yapıcı et al. (2016), a statistically significant difference was found in terms of speed between forward and midfield positions. In this study, it was found that in the vertical jump variable, defenders

perform better in vertical jump than goalkeepers ($p<0.05$), midfielders perform better in vertical jump than goalkeepers ($p<0.01$), and forwards perform better in vertical jump than goalkeepers. In the long jump variable, midfielders perform better in long jump than goalkeepers ($p<0.01$). When examining the 20-meter sprint variable, defenders perform better in the 20m sprint than goalkeepers ($p<0.01$), midfielders perform better in the 20m sprint than goalkeepers ($p<0.01$), and forwards perform better in the 20m sprint than goalkeepers ($p<0.05$). Regarding the 40m sprint performance variable, defenders perform better in the 40m sprint than goalkeepers ($p<0.05$), midfielders perform better in the 40m sprint than goalkeepers ($p<0.01$), and forwards perform better in the 40m sprint than goalkeepers ($p<0.05$). These findings indicate that players have different physical and physiological requirements according to their positions, and training programs should be shaped according to these requirements. Especially conducting special training sessions for the skills needed by players in specific positions will play an important role in improving their performance.

In this study, while a positive but low-level correlation was detected between VO2 max and 20m and 40m sprints, a positive moderate significant relationship was found between vertical jump and long jump, and a negative moderate significant relationship was detected between vertical jump and both 20m and 40m sprints. A negative moderate relationship was identified between long jump and 10m sprint. These results may be due to various biomechanical and physiological interactions between different physical performance measures. Since VO2 max is an indicator of aerobic capacity, it is expected to show a lower level of correlation with short-distance sprint performances. Sprint performances typically rely on anaerobic energy systems, which is why VO2 max is thought to show a weaker relationship with short sprints. Additionally, a positive moderate relationship was found between 40m and 10m sprints, while a positive high-level relationship was determined between 40m and both 20m and 30m sprints. The findings obtained in this study indicate that there are significant relationships between different athletic performance measures, and these relationships provide important information for optimizing athletes' training programs and performance evaluations.

When the studies conducted in this field are examined; VO2 max is expected to show low correlation with short distance sprints (20m, 40m). Because VO2 max represents aerobic capacity and sprints represent anaerobic energy systems. However, training methods such as HIIT (high-intensity interval training) can enhance both VO2 max and sprint performance by bridging the gap between the two systems. This type of training enhances both aerobic capacity and the activation of fast-twitch muscle fibers, which indirectly affects sprinting ability (Liu et al., 2024). It has been found that 40m sprint performance is highly correlated with other short distance sprints (such as 10m and 20m). This may be due to the similarity of anaerobic energy systems and acceleration mechanics. Especially 0-10m sprints are directly related to linear acceleration ability, and training in these areas has been proven to increase sprint performance (Sloth et al., 2013). The positive correlation between vertical jump and long jump shows that explosive power and muscle hypertrophy are effective in both skills. Recent studies confirm that activation of fast-twitch fibers and movements requiring explosive strength (e.g. vertical jump and long jump) exhibit a strong relationship (Widodo et al., 2023).

The negative relationship between sprint and jumping performances may stem from biomechanical differences. During sprinting, energy is focused more on horizontal movement, while vertical jumping directs energy production upward. This difference may limit the relationship between the two performance measures (Liu et al., 2024).

Positive relationships between sprint distances (10m, 20m, 30m, 40m) show that acceleration and maximal speed develop together. Research indicates that the correlation between various sprint distances is often influenced by the specificity of training. For example, short-distance sprint workouts can improve acceleration, while longer distances can improve speed endurance (Liu et al., 2024).

In this study, it was concluded that the physical performance of young elite football players competing in League A varies depending on their positions. According to these findings, defenders, midfielders, and forwards demonstrated significant superiority in vertical jump, long jump, and sprint performance compared to goalkeepers. The study is limited to young elite A league footballers. Conducting similar studies with footballers of different age groups and league would provide valuable insights into positional differences from a broader perspective. Long-term monitoring of changes in footballers' physical performance is crucial for assessing their development processes and the effects of training. Comparing footballers' physical performances across different periods (e.g., pre-season, mid-season, and post-season) is recommended to evaluate performance changes and the effectiveness of training programs. In addition to the tests used in the study, examining the positional differences of footballers using other physical performance tests (e.g., strength test, flexibility test) may yield additional insights.

Conflicts of Interest: The author(s) of the article do not have any personal or financial conflict of interest within the scope of the study.

Authors' Contribution: The authors contributed equally to all phases of this research. Research Design - MI, Data Collection - KIB, Statistical Analysis – KG, Manuscript Preparation - MB.

Ethical Approval
Ethics Committee: Gümüşhane University Scientific Research and Publication Ethics Committee
Date: 27/06/2024
Decision No: E-95674917-108.99-259799

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Spor Bilimleri Araştırmaları Dergisi
Journal of Sport Sciences Research
Vol: 10, Issue: 1, 2025
E-ISSN: 2548-0723
URL: http://www.dergipark.org.tr/jssr

The Role of Lower Extremity Neuromuscular Control and Stability in Predicting Biomotor Skills in Soccer Players*

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Research Article
DOI: 10.25307/jssr.1570091
Received: 18.10.2024 Accepted: 12.01.2025 Online Published: 28.02.2025

Abstract

Soccer is a complex sport that requires the utilization of multiple motor skills. The effective use of these skills enables players to make accurate and quick decisions. The kinetic chain in sports is a mechanism that activates neuromuscular coordination of the body segments to perform sport-specific tasks. In this context, this study aims to examine the role of lower extremity neuromuscular control and stability in predicting biomotor skills in soccer players. This study was designed with descriptive and relational survey models from quantitative research methods. A total of 53 male soccer players voluntarily participated in the study. The data collection tools included the "Personal Information Form," "20 Meter Sprint Test," "Standing Long Jump," "505 Agility Test," and the "Closed Kinetic Chain Lower Extremity Stability Test (CKCLEST)." The data were analyzed using the Pearson Correlation Test and regression analysis. According to the analysis, no significant relationship was found between the biomotor skills of the athletes and the CKCLEST points (for all variables; $p>0.212$; $r<0.130$). However, a significant positive correlation was found between agility and sprint performance ($r = 0.349$, $p = 0.010$), and a significant negative correlation was identified between agility and long jump performance ($r = -0.575$, $p < 0.001$). Regression analysis showed that the long jump explained 0.0002% of the CKCLEST variance ($R^2 = 0.000002$, $\beta = -0.019$), agility explained 1.7% ($R^2 = 0.017$, $\beta = 1.54$), and sprint explained 3.0% ($R^2 = 0.030$, $\beta = -2.87$). The findings showed no significant correlation between biomotor performance and the neuromuscular control and stability test points. However, significant positive relationships were observed between agility and sprint, and a significant negative relationship between long jump and agility. In conclusion, the findings suggest that multiple tests should be used simultaneously to differentiate athletes with similar biomotor performance levels.

Keywords: Agility, Soccer, Closed kinetic chain, Strength, Sprint

* This study was supported by TÜBİTAK BİDEB (1919B012322157) 2209-A University Students Research Projects Support Program. Also, this study was presented as an oral presentation at the 8th International Academic Sports Research Congress.
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INTRODUCTION

Speed, one of the most important physical attributes in sports, is the ability to move quickly or change position rapidly. In mechanics, speed is expressed as the ratio of distance to time (Paul et al., 2016). Achieving the desired performance level in sports disciplines requires using scientific tools and methods effectively. It is crucial to apply scientifically grounded and modern training methods alongside sport-specific exercises to enhance an athlete's essential motor skills, such as endurance, strength, agility, agility, sprint and flexibility, and success in their specific discipline (Kızılet et al., 2010). Speed has a direct impact on the success of a football player. Footballers must be fast when running, competing, and defending during a match. The ability to move the body at high speed depends on strength while covering the maximum possible distance in the shortest time is related to speed (Günay and Yüce, 2008). Like in all other sports, muscle strength is also essential in football. This is because core and functional muscle strength are necessary during sports activities to achieve optimal performance and prevent potential injuries.

To optimize performance and prevent injuries, it is particularly essential to maintain a balance between core muscle strength and functional strength levels in the lower limbs. The hamstring and quadriceps muscle groups, which are part of the lower extremity musculature, play a pivotal role in activities such as acceleration, deceleration, jumping, landing, and other sport-specific movements (Hoshikawa et al., 2009; Ulupinar et al., 2021). In this context, lower limb stability, strength, and neuromuscular control are paramount in football (Tortu et al., 2024). Neuromuscular adaptation enables athletes to execute various movements during competitions with the utmost precision. Neuromuscular control refers to the body's dynamic response to internal and external sensory stimuli and irregularities (Asan, 2023; Kaya, 2017). This control facilitates motor responses by ensuring regulated muscle activity during voluntary movements, unexpected circumstances, and in response to both internal and external stimuli (Asan, 2023; Silfies et al., 2015). Neuromuscular control is typically evaluated using closed kinetic chain tests.

A closed kinetic chain refers to an activity where the distal segment of the lower limb is fixed and supports body weight, allowing the proximal segment to move over the stable distal segment (Fu et al., 1992). The closed kinetic chain lower extremity dynamic stability test is a novel method that examines functional performance and evaluates the antigravity posterolateral hip muscle system (Lee et al., 2020). Closed kinetic chain exercises can enhance lower limb strength, stability, and neuromuscular adaptation. CKCLEST assesses endurance, strength, whole-body stability, functional lower limb stability, core stability, and static/dynamic control of the lower limbs, alongside simultaneous coactivation of the quadriceps and hamstring muscles. CKCLEST is a valid and reliable objective measurement tool that evaluates the function of the closed kinetic chain (Arikan et al., 2022). Unlike plyometric tests, CKCLEST places no pressure on the joints.

Studies have shown that closed kinetic chain exercises in rehabilitation programs significantly increase muscle strength through eccentric, concentric, and isometric contractions. These exercises contribute to the strength and power required for daily activities such as walking,

running, and stair climbing (Girgin et al., 2020; Pamboris et al., 2024). Additionally, closed kinetic chain exercises enhance proprioception and neuromuscular control by improving joint stability, thereby accelerating functional recovery (Abbas and Daher, 2017). As a result, valid tests have been developed to measure the outcomes of closed kinetic chain exercises. These tests can symmetrically assess differences between the two lower limbs. The CKCLEST has been designed to measure the strength, power, and stability of the lower limbs, torso, and whole body. Furthermore, it can be used to evaluate the functional stability of the lower limbs and the static or dynamic control of the lower extremities (knees/hips) or the torso (Arikan et al., 2022). Closed kinetic chain (CKC) exercises have been widely recognized for their effectiveness in improving neuromuscular control and joint stability. Girgin et al. (2020) demonstrated that CKC exercises significantly enhanced physical function and reduced pain in patients with knee osteoarthritis, emphasizing their importance in lower extremity rehabilitation. Similarly, Ubinger et al. (1999) found that a 4-week CKC training program improved neuromuscular control in the upper extremity, highlighting the versatility of CKC exercises across different body regions. These findings suggest that incorporating CKC exercises into rehabilitation programs can enhance joint stability and functional performance for various populations. In light of this information, the CKCLEST not only provides insight into the performance of athletes in football but also highlights that incorporating exercises appropriate for the test into training programs can enhance athlete performance.

Football is played at a much faster pace today compared to the past, and physical power has not only retained its importance. However, it has also become one of the most crucial components of the sport, highlighting the significance of children's early development in youth academies. Therefore, athletes' sporting success or readiness typically depends on their physical fitness, coordination abilities (strength, speed, balance, agility, endurance, mobility), and technical and tactical skills (Ulupınar et al., 2021). The motor learning process, which serves as a transition to the application of understanding, refining, and reinforcing motor skills, manifests through the acquisition and development of coordination and synchronization abilities (Bayazıt, 2007). The number of activities supporting motor development is increasing day by day. Maximizing children's motor skills is directly related to the continuity of activities and skills acquisition. When considering individual differences, the timing and correct execution of movements are very important (Sayın, 2011). Proper evaluation of sports performance and adapting training programs to individual needs contribute to optimizing performance in the specific discipline. In this context, this study aims to investigate the impact of lower extremity neuromuscular control and stability on predicting biomotor skills in football players.

Therefore, our hypotheses for this research:

H1: There is a significant positive relationship between lower extremity neuromuscular control and stability, as measured by CKCLEST, and biomotor skills such as sprint speed, agility, and standing long jump performance in soccer players.

H2: Athletes with higher agility performance will demonstrate stronger correlations with sprint speed and lower correlations with standing long jump distance due to the differing motor and biomechanical demands of these skills.

METHOD

Research Model

In this study, descriptive and relational survey models from quantitative research methods were used. The descriptive model examines the current state of a phenomenon without manipulation, while the correlational survey model examines the relationship between two or more variables and its direction (Karasar, 2014).

Research Group

The study group consisted of licensed male athletes aged between 15 and 18, actively playing football with at least two years of team experience. The following exclusion criteria were applied in selecting participants: a) history of limb injuries, b) cardiovascular or respiratory system diseases, c) ongoing chronic pain, and d) significant differences between limbs. Based on the G*Power analysis, with a 95% confidence interval, 95% test power, and 5% effect size, the sample size was determined to be 34. However, to enhance the study's validity and prevent potential participant attrition, 53 participants were included in the research.

Table 1. Descriptive characteristics of the participants (n=53)

	Mean ± SD	**Min**	**Max**
Age (year)	16.49 ±1.13	15.00	18.00
Training Experience (year)	5.11 ± 1.78	2.00	8.00
Body Mass (kg)	64.94 ± 9.58	45.00	85.00
Height (cm)	1.75 ± 0.06	1.62	1.90
BMI (kg/$m^{2)}$	20.99 ± 2.28	16.26	24.89

Values are presented as mean (M) ± standard deviation (SD); BMI: Body Mass Index; Min: Minimum value; Max: Maximum value.

Reviewing Table 1, it was determined that the participants consisted of 53 male football players aged between 15 and 18 years (16.49 ± 1.13). Their years of sports experience ranged from 2 to 8 years (5.11 ± 1.78), body weight ranged from 45 to 85 kg (64.94 ± 9.58), height ranged from 1.62 to 1.90 m (1.75 ± 0.066), and BMI ranged from 16.26 to 24.89 kg/m² (20.99 ± 2.28).

Data Collection Tools

The participants were administered the following data collection tools: the "Personal Information Form" (comprising descriptive questions such as age, years of sports experience, height, and weight), the "20-Meter Sprint Test," the "Standing Long Jump Test," the "505 Agility Test," and the "Closed Kinetic Chain Lower Extremity Stability Test (CKCLEST).

Closed Kinetic Chain Lower Extremity Stability Test (CKCLEST)

CKCLEST is conducted on a solid surface to assess neuromuscular control and stability of the lower extremities. Participants begin in a plank position, supported by their forearms, with feet shoulder-width apart, toes touching the ground, and the body in a straight alignment. While maintaining this position, participants are instructed to cross one foot over to touch the outside

of the opposite foot and then return to the starting position. The same movement is then repeated with the other foot. Participants perform this movement as quickly and consecutively as possible, with the number of repetitions completed within a 15-second interval recorded (Arıkan et al., 2022).

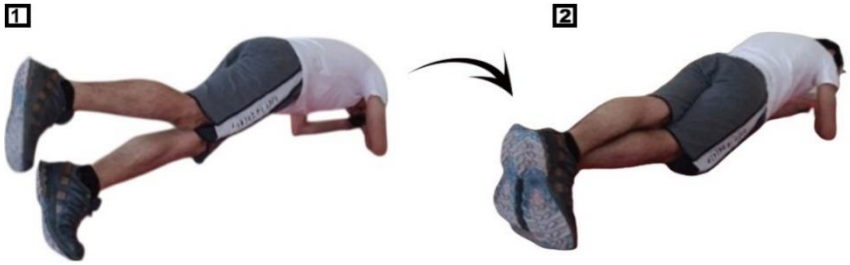

Figure 1. Closed kinetic chain lower extremity stability test - visual representation of the test procedure (Arslan et al., 2022)

Agility Test

The 505 Agility Test, utilized in this study, measures the time between the final 5 meters of a 15-meter sprint and the same 5 meters on the return leg. Participants are required to sprint towards a designated line located 15 meters from the starting point, make contact with the line using one foot, perform a 180-degree turn, and then sprint 5 meters back past the finish line. The attempt is not scored if the participant initiates the turn before reaching the designated line. Each participant completed three trials, with the best time being considered for analysis. The timing for the test was measured using a photocell system (Microgate Witty, Microgate, ITALY) to ensure accuracy (Nimphius et al., 2016; Özbay et al., 2018).

20 Meter Sprint Test

The 20-meter sprint test measures how quickly an athlete completes a 20-meter distance (Ulupınar et al., 2021). Athletes start 1 meter behind the starting line and complete the distance at maximum speed. Participants are allowed two trials, with a 3-minute rest period between each. The athlete's best time is recorded as valid for the statistical analysis (Yanci et al., 2017). Sprint times were measured using a photocell timing system (Microgate Witty, Microgate, ITALY).

The Standing Long Jump Test (SLJT)

The Standing Long Jump Test (SLJT) measures how far participants can jump from a stationary position (Castro-Piñero et al., 2010; Gençoğlu et al., 2023). Participants position themselves with their toes as close as possible to the starting line without a running start. Using maximum effort, they swing their arms backward and forward to assist with the jump. Each participant is allowed two attempts, and the best distance is recorded as the test result (Castro-Piñero et al., 2010).

Ethics Approval

The ethical process of the research was completed by Decision No. 10, made during the 04th meeting of the Erzurum Technical University Research and Publication Ethics Committee on

04.04.2024. Voluntary consent was obtained from all participants, and for individuals under 18, permission was secured from their parents or legal guardians.

Collection of Data

The study was conducted in a single session. An anthropometric assessment was initially performed to determine the participants' height, weight, and body mass index. The participants completed a 15-minute general warm-up protocol and a 5-minute stretching protocol. After the warm-up, the participants were randomly assigned to perform the tests randomly. First, they completed CKCLEST, followed by the standing long jump, agility, and 20-meter sprint tests. All participants were thoroughly informed about the protocol process and any associated experimental risks.

To ensure standardization, participants were instructed to refrain from consuming caffeine or carbonated drinks and engaging in intense physical activity 24 hours prior to the test session. Additionally, all participants were asked to maintain their regular sleep routines, achieving at least 8 hours of sleep before the session. The testing took approximately 90 minutes per participant, with breaks of 3-5 minutes between trials and 10 minutes between different tests to minimize fatigue. The testing process was supervised by three experienced researchers to ensure accurate data collection and participant safety. Standardized verbal encouragement was provided during the tests to motivate participants.

Analysis of Data

The statistical analysis of the data collected in this study was performed using SPSS 27 software (IBM Corp., Armonk, NY, USA). The normality of the data was assessed through the Shapiro-Wilk test, which confirmed that the variables were normally distributed ($p > 0.05$). Given that the assumption of normality was satisfied, parametric tests were deemed appropriate for the analysis. Pearson's correlation coefficient (r) was utilized to explore the relationships between variables. At the same time, regression analysis (R^2) was conducted to assess the influence of the CKCLEST on performance in the sprint, agility, and standing long jump tests. A threshold for statistical significance was set at $p < 0.05$ for all analyses.

FINDINGS

The presented findings encompass a detailed analysis of the participants' neuromuscular control, stability, and biomotor abilities, alongside their interrelations and predictive factors. This comprehensive evaluation provides a robust foundation for understanding performance outcomes and their underlying mechanisms, as demonstrated in the subsequent tables and discussions.

Table 2. Findings regarding the neuromuscular control, stability, and biomotor abilities of the participants

Variables	Mean ± SD	Min.	Max.
CKCLEST (rep number)	24.96 ± 3.73	17.00	33.00
SLJT (cm)	1.95 ± 0.27	1.30	2.80
Agility (sec)	2.86 ± 0.31	2.42	3.54
Sprint (sec)	3.38 ± 0.22	2.96	3.90

Values are presented as mean ± standard deviation (SD); SLJT: Standing Long Jump Test; Min: Minimum value; Max: Maximum value; CKCLEST: Closed Kinetic Chain Lower Extremity Stability Test.

As indicated in Table 2, the results of the CKCLEST ranged from 17 to 33 repetitions (24.96 ± 3.73), the Standing Long Jump distances ranged from 1.30 to 2.80 meters (1.95 ± 0.27), the Agility Test times ranged from 2.42 to 3.54 seconds (2.86 ± 0.31), and the 20-meter Sprint Test times ranged from 2.96 to 3.90 seconds (3.38 ± 0.22).

Table 3. Findings regarding the relationship between participants' neuromuscular control, stability, and biomotor skills

Variables (r)	Mean ± SD	CKCLEST	SLJT	Agility	Sprint
CKCLEST (rep number)	24.96 ± 3.73	—			
SLJT (cm)	1.95 ± 0.27	-0.001	—		
Agility (sec)	2.86 ± 0.31	0.130	-0.575**	—	
Sprint (sec)	3.38 ± 0.22	-0.174	-0.154	0.349*	—

*The relationship between the variables is presented as the correlation coefficient (r); CKCLEST: Closed Kinetic Chain Lower Extremity Stability Test; SLJT: Standing Long Jump Test; *: $p < 0.05$; **: $p < 0.01$.*

As shown in Table 3, no significant correlations were found between CKCLEST scores and performance in the Standing Long Jump Test ($r = -0.001$, $p = 0.992$), Agility Test ($r = -0.130$, $p = 0.355$), or Sprint Test ($r = -0.174$, $p = 0.212$) ($p > 0.05$). However, there was a significant relationship between agility and standing long jump performance ($r = -0.575$, $p < 0.001$), as well as between agility and sprint performance ($r = -0.349$, $p = 0.010$) ($p < 0.05$).

Table 4. Findings of the regression analysis regarding the relationship between participants' neuromuscular control, stability, and biomotor skills

CKCLEST	R^2	β	Constant	Standard Error
SLJT	0.000002	-0.019	24.99	1.91
Agility	0.017	1.54	20.54	1.65
Sprint	0.030	-2.87	34.69	2.27

*The regression values between the variables are presented as R^2; CKCLEST: Closed Kinetic Chain Lower Extremity Stability Test; SLJT: Standing Long Jump Test; β: regression coefficient; *: $p < 0.05$; **: $p < 0.01$.*

According to the results in Table 4, no significant effect was found between CKCLEST scores and the relationships with SLJT, agility, and sprint ($p > 0.05$ for all variables). The impact of SLJT performance on CKCLEST scores was minimal ($R^2 = 0.000002$, $\beta = -0.019$), and the regression equation is expressed as CKCLEST = 24.99 - 0.019 * SLJT. Agility exhibited a slight positive effect on CKCLEST scores, though it did not contribute significantly ($R^2 = 0.017$, $\beta = 1.54$), with the regression equation being CKCLEST = 20.54 + 1.54 * Agility. Sprint, likewise, did not show a significant impact on CKCLEST scores ($R^2 = 0.030$, $\beta = -2.87$), with the regression equation expressed as CKCLEST = 34.69 - 2.87 * Sprint.

DISCUSSION and CONCLUSION

This research examined the effects of lower extremity neuromuscular control and stability on biomotor skills in football players. The findings demonstrated no significant correlation between biomotor performance, neuromuscular control, and stability scores. However, a significant positive relationship was identified between agility and sprint performance, while a significant negative relationship was observed between SLJT and agility. These results indicate that lower extremity stability and neuromuscular control alone cannot fully explain biomotor skills. Furthermore, simultaneously evaluating multiple performance parameters is crucial for distinguishing athletes with similar performance levels. It is suggested that moving beyond individual tests to incorporate multiple assessments provides a more accurate prediction of an athlete's overall performance level.

The lack of a significant relationship between neuromuscular control and biomotor skills observed in this study may be attributed to the specific characteristics of the CKCLEST. As Stapleton et al. (2021) demonstrated, functional and dynamic movement tests provide a better prediction of athletic performance than static assessments, particularly in sports requiring rapid and coordinated movements. Moreover, Behm and Colado (2012) emphasized the principle of task specificity, highlighting that test outcomes may vary depending on the degree to which the assessment mirrors the physical demands of the sport.

In the study conducted by Martin et al. (2014) on neuromuscular control, the impact of energy transfer on performance and injury during tennis serves was examined in detail. The research demonstrated that efficient energy flow was associated with higher ball speeds in athletes, which, in turn, led to reduced joint stress and a potential decrease in injury risk. Both studies

highlighted the potential of neuromuscular control, particularly in sport-specific movements, to enhance performance (Martin et al., 2014). In their study on plyometric training, the effects of neuromuscular control on improving sports performance are further supported by Chelly et al. (2010). Chelly et al. (2010) found that plyometric exercises improved football players' leg strength, jump height, and sprint performance. This improvement may be linked to the development of neuromuscular control, as plyometric exercises engage the stretch-shortening cycle (SSC), which enhances muscle force production and coordination. Similarly, Martin et al. (2014) found that effective energy transfer and muscle control in tennis players were associated with a lower risk of injury, indicating that proper energy transmission and muscle control can both reduce injury risk and enhance performance.

Closed kinetic chain exercises have been widely supported in the literature for their effectiveness in enhancing sports performance and reducing injury risk (Almansoof et al., 2023). Specifically, closed kinetic chain exercises have been highlighted for improving joint stability and force transmission, positively impacting the musculoskeletal system by reducing the risk of injuries caused by overloading and compensatory movements (Myer et al., 2010). As noted in the study by Almansoof et al. (2023) the coordination of the kinetic chain ensures that body segments move with optimal speed and timing, with energy transfer between these segments playing a critical role. When this energy transfer is disrupted, the risk of injury in athletes may increase. In particular, imbalances between the quadriceps and hamstring muscles are significant in anterior cruciate ligament (ACL) injuries (Hewett et al., 2006). These findings suggest that closed kinetic chain exercises promote neuromuscular adaptations, enhancing performance and significantly reducing injury risk (Almansoof et al., 2023; Chelly et al., 2010). However, our study found no significant relationship between CKCLEST and biomotor skills. This discrepancy may be attributed to differences in sample characteristics across studies and the similar performance levels of the athletes in our study.

In another study, Almansoof et al. (2023) examined the correlation between ankle dorsiflexion range of motion (ADROM) and lower extremity kinetic chain function and its relationship with performance-based tests. The study found that closed kinetic chain activities enhance lower extremity stability, allowing muscles to engage more effectively during movement. It was also noted that closed kinetic chain exercises contribute to joint stability by reducing shear forces on the joints and promoting the coordinated function of agonist-antagonist muscle groups (Almansoof et al., 2023; Lutz et al., 1993). Additionally, the ankle dorsiflexion range of motion was closely linked to closed kinetic chain exercises, significantly contributing to success in performance tests. The kinetic chain is a system where body segments work in coordinated harmony to transfer force, optimizing athletic performance. Specifically, in the overhead throwing mechanism, the lower extremities and core muscles provide essential support by maximizing ground reaction forces during the throw (Chu et al., 2016). Research has shown that 51-55% of the kinetic energy generated by larger muscle groups is transferred to hand movements, demonstrating the direct impact of coordinated and optimally functioning muscles on performance (Chu et al., 2016). The role of closed kinetic chain exercises in enhancing lower extremity stability, reducing shear forces on the joints, and encouraging the co-contraction of agonist-antagonist muscles is vital for athletes, as it aids in both performance enhancement and injury prevention (Almansoof et al., 2023). In this context, the literature

supports the critical role of closed kinetic chain exercises in improving performance and preventing injuries, particularly by enhancing joint stability and energy transfer (Chelly et al., 2010; Chu et al., 2016).

Another finding of the present study revealed a significant positive relationship between agility and sprint performance and a significant negative relationship between SLJT and agility. Studies in the literature support similar findings. Gisladottir et al. (2024) examined the relationships between agility, linear speed, and vertical jump performance among professional and U-14 athletes. A strong correlation between linear speed and agility was found in professional athletes ($r = 0.90$, $p = 0.01$), whereas no significant relationship was observed between these two parameters in U-14 athletes. These results highlight the contribution of advanced neuromuscular coordination and motor skills to physical performance in professional athletes. A similar study by Köklü et al. (2015) reported a strong correlation between 30-meter sprint time and countermovement jump (CMJ) performance ($r = -0.599$, $p = 0.02$) in young football players. Both studies emphasize the impact of integrating and developing motor skills on athletes' overall performance. Enhancing biomotor abilities such as speed, agility, and vertical jump is particularly critical for optimizing athletic performance.

In conclusion; the absence of a statistically significant correlation between the neuromuscular control and stability test scores and the biomotor performance of young athletes could be attributed to the homogeneity of the sample in this study. The similarity in biomotor performance values among athletes likely made distinguishing apparent differences between groups complex. Additionally, while a significant positive relationship was observed between sprint and agility, a negative correlation was found between SLJT and agility performance. The differences in measurement units can explain this negative correlation; in the standing long jump, a greater distance indicates better performance, whereas a shorter time in sprinting reflects better speed. These inverse relationships are natural and expected outcomes when evaluating biomotor abilities.

Limitations and Suggestions

The results indicate that tests such as the CKCLEST may lack the sensitivity to effectively discriminate biomotor skill performance among athletes with similar proficiency levels. The cross-sectional design of this study, alongside its limited sample size comprising only male football players aged 15-18 years, is a significant constraint in establishing causal inferences. The homogeneity of the sample in terms of age, gender, and sporting discipline may have further limited the generalizability of the findings. Future studies should aim to include broader and more heterogeneous populations by incorporating both male and female athletes from various age groups and diverse sports disciplines. For instance, younger athletes or adults competing in sports requiring different neuromuscular demands, such as gymnastics or track and field, may yield different outcomes, potentially providing more robust conclusions about the relationship between neuromuscular control and biomotor skills.

Additionally, the potential influence of uncontrolled variables, such as psychological factors like anxiety, motivation, or familiarity with the testing protocol, should be considered, as these

may have affected participants' performance. Environmental factors, such as the testing conditions, surface type, and timing of the assessment (e.g., morning versus evening), may also have contributed to variability in the results. To address these limitations, future research should adopt longitudinal designs to observe changes over time, incorporate larger sample sizes, and ensure controlled testing environments. Such methodological improvements will help refine the sensitivity and applicability of the CKCLEST and similar assessments in evaluating neuromuscular control and biomotor performance across diverse athletic populations.

Funding: None

Conflicts of Interest: The authors declare that they have no conficts of interest.

Authorship Contribution Statement: Study Design; SA, CG, Data Collection; EÖ, CG, SA, Statistical Analysis; CG, SA, Manusicript Preparation; CG, SA, EÖ. All authors read and approved the final manuscript.

Ethics Approval
Ethics Committee: Erzurum Technical University Research and Publication Ethics Committee
Date/Protocol number: 04.04.2024 / 10

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Spor Bilimleri Araştırmaları Dergisi
Journal of Sport Sciences Research
Vol: 10, Issue: 1, 2025
E-ISSN: 2548-0723
URL: http://www.dergipark.org.tr/jssr

How Fanatic? Examining the Relationship between Sports Team Evangelism and Media Fanaticism

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Research Article
DOI: 10.25307/jssr.1551456
Received: 17.09.2024 Accepted: 26.01.2025 Online Published: 28.02.2025

Abstract

The purpose of this study is to examine the relationship between sports team evangelism and media fanaticism levels of Atatürk University Faculty of Sports Sciences students. The research was conducted with a total of 320 students studying Faculty of Sports Sciences at Atatürk University. In the study, Sports Team Evangelism (eFANgelism) Scale and Fans' Motivation to Follow Their Teams on Social Media Scale were applied by using the relational survey model, one of the quantitative research methods. Independent Sample T-Test and One-Way Analysis of Variance were used to analyze the data. In cases where a significant difference was observed as a result of One-Way Analysis of Variance, Post Hoc (Tukey) test was applied to find the source of the difference. In order to determine the relationship between the scales, "Pearson Correlation" analyzes were performed and evaluated at the $p < .05$ significance level. A significant difference was found in the gender variable in the participants' sports team evangelism levels ($p < .05$). Significant difference wasn't found in the variables of age, sports license status, income level, department, and favorite team. Significant differences were detected in the participants' motivation to follow their teams on social media in terms of gender, sports license status, department and favorite team variables. No significant difference was found in age and income level variables. It was concluded that there was a highly positive relationship between the participants' sports team evangelism levels and their motivation to follow their teams on social media. It can be said that as the participants' level of sports team evangelism increases, their motivation to follow their teams on social media also increases; as the level of sports team evangelism decreases, their motivation to follow their teams on social media also decreases.
Keywords: Fanaticism, Evangelism, Social media

Ne Kadar Fanatik? Spor Takımı Evangelizmi ile Medya Fanatizmi Arasındaki İlişkinin İncelenmesi

Öz

Bu çalışmanın amacı, Atatürk Üniversitesi Spor Bilimleri Fakültesi öğrencilerinin spor takımı evangelizmi ile medya fanatizmi düzeyleri arasındaki ilişkinin incelenmesidir. Araştırma, Atatürk Üniversitesi Spor Bilimleri Fakültesi'nde öğrenim gören toplam 320 öğrenci ile gerçekleştirilmiştir. Çalışmada nicel araştırma yöntemlerinden ilişkisel tarama modeli kullanılarak Spor Takımı Evangelizmi (eFANgelizm) Ölçeği ile Taraftarların Sosyal Medyada Takımlarını Takip Etme Motivasyonları Ölçeği uygulanmıştır. Verilerin analizinde Bağımsız Örneklem T-Testi ve Tek Yönlü Varyans Analizi yapılmıştır. Tek Yönlü Varyans Analizi sonucunda anlamlı farklılık gözlenen durumlarda farkın kaynağını bulmak için Post Hoc (Tukey) testi uygulanmıştır. Ölçekler arasındaki ilişkiyi belirlemek amacıyla "Pearson korelasyon" analizleri yapılarak, $p< .05$ anlamlılık düzeyinde değerlendirilmiştir. Katılımcıların spor takımı evangelizmi düzeylerinde cinsiyet değişkeninde anlamlı farklılık saptanırken ($p< .05$); yaş, lisans durumu, gelir durumu, bölüm, taraftarı olunan takım değişkenlerinde anlamlı farklılık saptanmamıştır. Katılımcıların sosyal medyada takımlarını takip etme motivasyonlarında cinsiyet, lisans durumu, bölüm, taraftarı olunan takım değişkenlerinde anlamlı farklılıklar saptanırken ($p< .05$); yaş ve gelir durumu değişkenlerinde anlamlı farklılık saptanmamıştır. Katılımcıların spor takımı evangelizmi düzeyleri ile sosyal medyada takımlarını takip etme motivasyonları arasında yüksek düzeyde pozitif yönlü bir ilişki olduğu sonucuna ulaşılmıştır. Katılımcıların spor takımı evangelizmi düzeyleri arttıkça sosyal medyada takımlarını takip etme motivasyonlarının da artacağı; spor takımı evangelizmi düzeyleri azaldıkça sosyal medyada takımlarını takip etme motivasyonlarının da azalacağı söylenebilir.
Anahtar kelimeler: Fanatizm, Evangelizm, Sosyal medya

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INTRODUCTION

Media, which progressed with the emergence of verbal communication, developed further with the invention of writing and the written form of media came into being (Özçağlayan, 2008). With the emergence of writing, news and information began to spread among the masses in the form of large texts (Arafah & Hasyim, 2023). Initially, news was transmitted by handwritten copying, but the media underwent significant development with the emergence of a new technological invention, the printing press, in the mid-15th century. The advent of the printing press made it possible to replicate written texts and disseminate them to the masses (Carroll, 2023; Irwin, 2024).

In the 18th century, industrialization accelerated, leading to significant developments in media and communication tools as they were influenced by and evolved alongside industrialization (Kivinen & Piiroinen, 2023). The coming together of modern media with large communities began in the late 18th century and the formation of modern media began during this time period (Friedman & Díaz, 2023). The intellectual movements that emerged in 18th century Europe significantly influenced the media, and the media that facilitated communication between communities gained importance (Kongar, 1995; Özçağlayan, 2008). In the 20th century, media was used as a word that encompassed mass communication tools such as printing, post, telegraph, radio, television, etc. In the 20th century, technological advances accelerated and led to changes in many things. The importance of mass has increased, media tools have allowed societies to defend their ideas and create a discussion environment (Balbi, 2024; Luther et al., 2024).

Sports has gained an important dimension with its development day by day and has had a significant impact on the emergence of sports media (Nuriddinov, 2023). Sports media in particular has been effective in the advancement and popularization of sports (Tamir & Lehman-Wilzig, 2023). With the developments in the 19th century, media and sports have shown a related development. The historical inclusion of sports-related activities in the media occurred when sports activities were transformed into nationwide festivals by the British Publishers Association (Hong & Li, 2023). In the first press area in the Turkish media, sports articles were included in the Servet-i Fünun magazine (Özsoy, 2009).

The increase in sports news in the European press also affected the Turkish press, and in 1911, news about sports such as football, athletics, boxing and horse racing began to appear in the Tasvir-i Efkar newspaper (Kılıç, 2019). In the 20th century, the relationship between media and football has increased. Football, which has a large number of fans, has also become a sport that creates its own media with the media that allows it to reach a large number of people instantly (Erol, 2012). With the expansion and advancement of mass media, football has become a serious economic gain for the media. The broadcasting of football by television channels has led to an increase in viewing rates and also in newspaper sales. With the development of the internet, sports content on websites has begun to provide economic benefits to the internet area (Orunbayev, 2023).

When the current Turkish sports media is examined, sports news in newspapers and television are mostly football based (Apsar, 2014). Football, which has a large number of fan groups, has

become attractive in the media due to its appeal to a wide community and rich content. Football news, which has a feature of interest rather than importance, is included in the soft news group (Deveci et al., 2023). New media tools that emerged with technological developments are seen as a very effective means of communication in organizing and bringing together the masses. Compared to traditional media, new media applications, which have a very high interaction rate, have a feature that can be provoked and distracted from its real purpose. Due to this structure, a movement that emerged with a correct and legal purpose can be distracted from its real purpose due to this ground of new media (Ergen & Aydeniz, 2020; Griffin, 2023).

Media language and discourses used in sports areas are gaining importance. Media is a communication tool that makes things that are different ordinary, normal and spreadable. New media tools, which are an environment where interaction is very fast, can be effective in sharing and spreading hate speech quickly (Apsar, 2014). It is known that the media, club managers and sports news anchors, who also have an impact on the violence in football, use expressions to normalize violence and ignore the incidents. The football language created among the public reaches large communities through the media and causes it to become widely used words (Fenton et al., 2023; Talimciler, 2014).

Evangelism, unlike a suggestion, is expressed as an effort to persuade and spread an idea or thought to other people (Green, 1984). In the Bible, it is a concept that has different meanings such as arousing curiosity in non-believers, encouraging them, convincing them and conveying good news. Evangelism is a term that is associated not only with written expressions but also with actions in the Bible and aims to convey these actions to society. Evangelism, which initially had a religious meaning, has started to be used in different areas over time. Especially in the context of marketing, it is defined as a concept that triggers a strong attachment to a brand and a desire to share this attachment with the people around them. In this context, evangelism refers to brands offering experiences to their users and encouraging them to share this experience with the people around them (Anggraini, 2018). Another area where the concept of evangelism comes into play is sports. The commitment to sports teams is not limited to just supporting them; it can also be defined as sports team evangelism, which includes promoting these teams, directing others to the teams they support, and introducing these teams (Aydın & Aydın, 2024).

Evangelism also conveys the meanings of promoting or encouraging an idea (Choudhury et al., 2019; Williams & Krisjanous, 2023). Martin Lindstrom found the concept of evangelism to be related to “the power to reach many places and find new followers”. When Google first launched Gmail, it influenced its users using cunning methods. Gmail, which made it possible to provide a service only through invitations, actively created a religious identity in the virtual environment. A Gmail user who sends a participation invitation to his friends will feel that he has contributed to the formation of a community that has continued for many years. Gmail initially reached 10 million users using this method and started to provide a service for everyone. Brands and religions act in a similar way by making people feel a sense of belonging and honor while accepting their customers (Lindistrom, 2009). When looking at the TDK, it is possible to see that the concept of fanaticism is evaluated within the framework of the meaning of "bigotry" (TDK, 2022). It is known that the roots of this word come from the Latin word “fanum”. In Latin, the word fanaticism is defined as “temple, sacred place of worship”. The

origin story of the word was inspired by people who devoted themselves to the temple to the point of madness and evolved into the concept of "fanaticus" by adjective. The English equivalent of the word fanatic is "fanatic" and its meaning expresses connotations such as being imaginative, irrational, following one's passions, and religiously crazy (Fuschillo, 2020; Koç, 2010; Miller, 2023).

Content shared in the media fuels fanaticism. The aim of the derby matches, which are called the eternal rivalry of two different teams in the same city, is to prepare the fanatic fans with a strong fan base for action with the broadcasts and content created before them (Jack, 2024; Önal & Aydin, 2024). The teams referred to as the big three in Istanbul, the statements of the managers who have a strict language between the managers of the teams before the matches in which they will compete against each other are frequently given in the media and they constantly make headlines with mutual challenges (Budak, 2004).

Fan accounts are one of the most important things that feed the phenomenon of fanaticism on social media. With the emergence of social media, people who are members of a team; by creating fan accounts, they display their support and loyalty to their team with the sharing feature that provides socialization opportunities on social media platforms. When examined in terms of its usage, the word fan represents a great deal of love and loyalty (Sveinson & Hoeber, 2023). Fan pages are also present in the fields of art and politics, apart from the field of sports. Fan pages formed on social media applications such as Instagram, Twitter and Facebook make their posts in a way that increases their followers and fans. Fan pages can be created by both ordinary people and official people. These groups formed under the name of fan are used to convey and spread hatred felt towards people or communities, in addition to showing admiration for something (Aydın & Belli, 2022; Sanderson & Truax, 2014; Yıkılmaz & Öçalan, 2021).

The enthusiastic ceremonial shows in football have the characteristics of an organization that provides an entertainment environment. Organizations are made not only by the parties but also by the clubs. Through organizations, fans have the opportunity to feel a sense of loyalty and belonging to their teams to a serious extent (Alver, 2008). Another element that fuels the sense of belonging among fans is the sharing of hatred towards the opposing formation through social media (Metin & Akkoyunlu, 2023). Fan page formations on social media use funny images and derogatory expressions, causing the formation of hate to accelerate. Fans create hate speech through fan accounts (Kearns et al., 2023; Miranda et al, 2024; Tokmak, 2022).

With the development of social media day by day, increasing social media platforms contribute to the development of social media fanaticism. Social media, where interaction is a very fast environment, plays an active role in the spread of fanatic discourses (Belli et al., 2020; Yıkılmaz & Öçalan, 2021). The social media environment, where shares circulate quickly, fuels the phenomenon of fanaticism with the increase of competitive discourses. Fan accounts created on social media are important in increasing the levels of fanaticism by bringing people belonging to the same group together (Archer & Wojtowicz, 2023).

It is important to understand the attitudes and behaviors of fans of a team in their social media usage (Steiner et al., 2023). In this context, examining the evangelistic attitude levels of individuals towards the team they support in their social media use emerges as another

important issue. It can be said that by revealing this relationship, it may be possible to make some inferences about the fanaticism levels of individuals. The aim of this study is to examine the relationship between sports team evangelism and media fanaticism levels of Atatürk University Faculty of Sports Sciences students.

METHOD

Research Model

In this study, a quantitative research method, the scanning method, was used to answer the research questions or test its hypotheses. Scanning methods are a type of approach that aims to describe a current situation, occurring today or in the past, as it is (Karasar, 2012). In this context, a one-time measurement (questionnaire/scale) was taken from the participants. In this respect, the study was conducted as a "cross-sectional study", which is one of the temporal scanning approaches.

Participants

In this study, the targeted sample size was reached by choosing the convenience sampling method and volunteering participants. Convenience sampling is a non-random sampling method that provides convenience to the researcher in terms of time and cost and allows the researcher to determine the sample from the universe according to their own opinion (Aaker et al., 2007; Malhotra, 2004). The universe of the research consists of undergraduate students registered in Atatürk University Faculty of Sports Sciences in the 2023-2024 academic year. The research process was carried out by reaching the sample group with the convenience sampling method from the universe in question, taking into account the principle of volunteering.

Data Collection Tools

In the study, the "Sports Team Evangelism Scale" (STES) developed by Dwyer et al. (2015) and adapted to Turkish after a reliability and validity study was conducted by Yüksekbilgili (2017) to determine the evangelistic attitudes of sports science faculty students towards their favorite teams; and the "Scale of Fans' Motivation to Follow Their Teams on Social Media" (SFMFTTSM) developed by Çelik (2022) was used to determine their motivation to follow their favorite teams on social media platforms. Both scales are in a 5-point Likert structure and are evaluated as "1=Strongly Disagree, 5=Strongly Agree". Both scales are calculated according to the average score. STES consists of 4 sub-dimensions (Lawyer, Advertisement, Provocation and Assimilation) and 12 items; SFMFTTSM consists of 5 sub-dimensions (News and Information, Advocacy, Promotion, Interaction and Entertainment) and 36 items.

Table 1. STES reliability Cronbach's alpha values

STES	Cronbach's Alpha	Number of Items
Advocate	.68	3
Advertise	.83	4
Antagonize	.85	3
Assimilate	.71	2
STES TOTAL	.90	12

Cronbach's Alpha reliability values for each of the STES sub-dimensions and the total (all items) are shown in Table 1. Accordingly, Cronbach's Alpha values for the STES sub-dimensions were determined as .68 for the Lawyer sub-dimension; .83 for the Advertisement sub-dimension; .85 for the Provocation sub-dimension and .71 for the Assimilation sub-dimension, respectively. The total Cronbach's Alpha value of all STES items was calculated as .90.

Table 2. SFMFTTSM reliability Cronbach's alpha values

SFMFTTSM	Cronbach's Alpha	Number of Items
News and Information	.97	13
Fandom	.95	6
Promotion	.93	6
Interaction	.95	8
Entertainment	.90	3
SFMFTTSM TOTAL	.98	36

Cronbach's Alpha reliability values for each of the SFMFTTSM factors and the total (all items) are shown in Table 2. Accordingly, Cronbach's Alpha values for the SFMFTTSM sub-dimensions were determined as .97 for the News and Information sub-dimension; .95 for the Fandom sub-dimension; .93 for the Promotion sub-dimension; .95 for the Interaction sub-dimension and .90 for the Entertainment sub-dimension, respectively. The total Cronbach's Alpha value of all items belonging to SFMFTTSM was calculated as .98.

Ethical Approval

Ethical rule approval was obtained for the research with the decision numbered 150 dated 02.10.2023 of Atatürk University Faculty of Sports Sciences Ethics Committee.

Data Collection

Before starting the data collection process, the necessary legal permissions were obtained and then the data collection process was started. As a data collection tool, the “Personal Information Form”, “Sports Team Effangelism Scale” and “Fans’ Motivation to Follow Their Teams on Social Media Scale” were shared with the participants online via Google forms and the data collection process was carried out. The participants in the study were included in the study on a completely voluntary basis and were informed about the purpose of the study and the scales used in the study before the relevant scales were applied.

Analysis of Data

Before the students filled out the survey forms, it was particularly emphasized that the forms were filled out completely, without errors and correctly. Since all data were obtained via Google Forms, it was ensured that each question was filled out completely. A total of 320 survey forms that were considered valid were included in the study. In order to analyze the data obtained within the scope of the study, these data were first transferred to the SPSS database. The SPSS v25 package program was used. When the data analysis phase was started, descriptive statistical analyses were first performed. Following these analyses, mode, median and mean values as well as Skewness and Kurtosis criteria were evaluated in order to determine whether the data showed a normal distribution.

FINDINGS

Tablo 3. Distribution of participants according to demographic characteristics

Variables		n	%
Gender	Male	219	68.4
	Female	101	31.6
Age	18 years	53	16.6
	19 years	51	15.9
	20 years	27	8.4
	21 years	55	17.2
	22 years	43	13.4
	23 years and above	91	28.5
Department	Coaching Education	135	42.1
	Physical Edu. and Sports Teach.	62	19.4
	Sports Management	78	24.4
	Recreation	45	14.1
Licensed Athlete	Yes	210	65.6
	No	110	34.4
Supported Team	Beşiktaş	49	15.3
	Fenerbahçe	98	30.6
	Galatasaray	136	42.5
	Other Teams	37	11.6
Most Frequently Used Social Media Platform	Facebook	8	2.5
	Instagram	272	85.0
	TikTok	8	2.5
	Twitter	22	6.9
	Youtube	3	0.9
	Others	7	2.2
	TOTAL	**320**	**100**

When the distribution of the participants in the study according to the gender variable is examined in Table 3, it is seen that 219 (68.4%) are male and 101 (31.6%) are female. When the distribution of age variable is examined, it is seen that 18-year-old participants consist of 53 (16.6%), 19-year-old participants consist of 51 (15.9%), 20-year-old participants consist of 27 (8.4%), 21-year-old participants consist of 55 (17.2%), 22-year-old participants consist of 43 (13.4%), and 23-year-old and above participants consist of 91 (28.5%). Another variable is the department. When the distribution of the department variable is examined, it is seen that 135 people (42.1%) are students studying in the Coach Education department, 62 people (19.4%) are students studying in the Physical Education and Sports Teaching department, 78 people (24.4%) are students studying in the Sports Management department, and 45 people (14.1%) are students studying in the Recreation department. In addition, it can be said that 210 participants (65.6%) are licensed athletes and 110 participants (34.4%) are non-licensed athletes. When the distribution of the team they support is examined, it is seen that 49 people (15.3%) are Beşiktaş fans, 98 people (30.6%) are Fenerbahçe fans, 136 people (42.5%) are Galatasaray fans, 37 people (11.6%) are one of the other teams. The last variable is the most frequently used social media platform. According to Table 3, 8 people (2.5%) prefer Facebook, 272 people (85%) prefer Instagram, 8 people (2.5%) prefer TikTok, 22 people (6.9%) prefer Twitter, 3 people (0.9%) prefer other social media platforms, and 7 people (2.2%) prefer other social media platforms.

Tablo 4. T-test results on the gender-based differentiation of sports team evangelism

Factors	Gender	n	x̄	Ss	t	p
Advocate	Male	219	3.61	1.02	4.76	**.000****
	Female	101	2.99	1.17		
Advertise	Male	219	3.02	1.28	4.15	**.000****
	Female	101	2.38	1.26		
Antagonize	Male	219	3.12	1.25	2.83	**.005****
	Female	101	2.68	1.35		
Assimilate	Male	219	3.48	1.27	3.45	**.001****
	Female	101	2.94	1.32		
STES TOTAL	Male	219	3.27	1.00	4.54	**.000****
	Female	101	2.70	1.10		

****p< .01**

When Table 4 is examined, it is seen that there are significant differences at the p< .01 level in the participants' sports team evangelism average scores according to the gender variable. According to Table 4, it is possible to say that male participants have a higher average score than female participants in the total and all sub-dimensions of the STES (Lawyer, Advertisement, Provocation, Assimilation).

Tablo 5. T-test results regarding the differences in the motivation of fans to follow their teams on social media according to gender

Factors	Gender	n	x̄	Ss	t	p
News and Information	Male	219	3.87	1.21	4.39	**.000****
	Female	101	3.22	1.25		
Fandom	Male	219	3.64	1.29	3.29	**.001****
	Female	101	3.12	1.35		
Promotion	Male	219	3.32	1.22	3.44	**.001****
	Female	101	2.80	1.26		
Interaction	Male	219	3.54	1.19	3.92	**.001****
	Female	101	2.97	1.25		
Entertainment	Male	219	3.20	1.30	4.06	**.000****
	Female	101	2.56	1.32		
SFMFTTSM TOTAL	Male	219	3.61	1.10	4.33	**.000****
	Female	101	3.02	1.17		

****p< .01**

When Table 5 is examined, it is seen that there are significant differences at the p< .01 level in the average scores of the participants' motivation to follow their teams on social media according to the gender variable. According to Table 5, it is possible to say that male participants have a higher average score than female participants in the total of SFMFTTSM and all its sub-dimensions (News and Information, Fandom, Promotion, Interaction, Entertainment).

Tablo 6. T-test results regarding the difference in the motivation of fans to follow their teams on social media according to the license status variable

Factors	License Status	n	x̄	Ss	t	p
News and Information	Yes	210	3.57	1.26	-1.83	.068
	No	110	3.84	1.23		
Fandom	Yes	210	3.38	1.34	-1.79	.073
	No	110	3.66	1.30		
Promotion	Yes	210	3.09	1.24	-1.34	.181
	No	110	3.28	1.27		
Interaction	Yes	210	3.30	1.21	-1.19	.233
	No	110	3.47	1.28		
Entertainment	Yes	210	2.84	1.28	-3.03	**.003***
	No	110	3.31	1.39		
SFMFTTSM TOTAL	Yes	210	3.33	1.13	-1.92	.055
	No	110	3.59	1.18		

***p< .05; **p< .01**

When Table 6 is examined, it is seen that there is no significant difference in the total average score of the participants according to the license status variable. Among all the sub-dimensions of the SFMFTTSM, a statistically significant difference was found only in the "Entertainment" sub-dimension. It was seen that the non-licensed participants had a higher average score in the "Entertainment" sub-dimension than the licensed participants.

Tablo 7. Anova test for differences between fans' motivation to follow their teams on social media and department variables

	Department	n	x̄	Ss	F	p	Post Hoc
News and Information	Coaching	135	3.59	1.20	.689	.559	
	Physical Education	62	3.78	1.19			
	Sports Management	78	3.59	1.44			
	Recreation	45	3.83	1.17			
Fandom	Coaching	135	3.34	1.35	1.858	.137	
	Physical Education	62	3.69	1.22			
	Sports Management	78	3.38	1.41			
	Recreation	45	3.77	1.22			
Promotion	Coaching	135	3.06	1.22	.463	.708	
	Physical Education	62	3.20	1.37			
	Sports Management	78	3.20	1.26			
	Recreation	45	3.28	1.21			
Interaction	Coaching	135	3.29	1.22	1.016	.386	
	Physical Education	62	3.46	1.27			
	Sports Management	78	3.26	1.24			
	Recreation	45	3.60	1.22			
Entertainment	[1]Coaching	135	2.83	1.30	2.646	**.049***	**4>1**
	[2]Physical Education	62	3.10	1.47			
	[3]Sports Management	78	2.95	1.29			
	[4]Recreation	45	3.45	1.24			
SFMFTTSM TOTAL	Coaching	135	3.33	1.12	1.167	.322	
	Physical Education	62	3.54	1.18			
	Sports Management	78	3.36	1.22			
	Recreation	45	3.65	1.11			

***p< .05**

When Table 7 is examined, it is determined that there is a significant difference in the participants' motivation to follow their teams on social media in the "Entertainment" sub-dimension according to the department variable. According to Table 7, it is seen that the students of the Recreation department have a higher average score than the students of the Coaching department in the entertainment sub-dimension.

Tablo 8. Anova test for differences between the motivation of fans to follow their teams on social media and the variable of the team they support

	Supported Team	**n**	**x̄**	**Ss**	**F**	**p**	**Post Hoc Tukey**
News and Information	Galatasaray	136	3.77	1.16	1.964	.119	
	Fenerbahçe	98	3.76	1.23			
	Beşiktaş	49	3.43	1.38			
	Other Teams	37	3.33	1.45			
Fandom	Galatasaray	136	3.54	1.27	.924	.429	
	Fenerbahçe	98	3.54	1.30			
	Beşiktaş	49	3.43	1.36			
	Other Teams	37	3.15	1.55			
Promotion	Galatasaray	136	3.22	1.20	.373	.773	
	Fenerbahçe	98	3.12	1.18			
	Beşiktaş	49	3.15	1.33			
	Other Teams	37	2.99	1.56			
Interaction	Galatasaray	136	3.37	1.20	.353	.787	
	Fenerbahçe	98	3.43	1.16			
	Beşiktaş	49	3.29	1.26			
	Other Teams	37	3.20	1.51			
Entertainment	[1]Galatasaray	136	3.10	1.31	2.762	**.042***	**1,2>4**
	[2]Fenerbahçe	98	3.14	1.36			
	[3]Beşiktaş	49	2.83	1.34			
	[4]Other Teams	37	2.48	1.24			
SFMFTTSM TOTAL	Galatasaray	136	3.50	1.09	1.208	.307	
	Fenerbahçe	98	3.49	1.09			
	Beşiktaş	49	3.30	1.24			
	Other Teams	37	3.14	1.40			

***p< .05**

When Table 8 is examined, it is determined that there is a significant difference in the participants' motivation to follow their teams on social media in the "Entertainment" sub-dimension according to the team variable. According to Table 8, it is seen that students who are Galatasaray and Fenerbahçe fans have higher average scores than students who are fans of other teams in the entertainment sub-dimension.

Tablo 9. The relationship between the STES and its sub-dimensions and the SFMFTTSM and its sub-dimensions

		STES TOTAL	Advocate	Advertise	Antagonize	Assimilate
SFMFTTSM TOTAL	**r**	.797**	.719**	.676**	.587**	.745**
	p	.000	.000	.000	.000	.000
News and Information	**r**	.740**	.710**	.578**	.568**	.706**
	p	.000	.000	.000	.000	.000
Fandom	**r**	.711**	.657**	.613**	.486**	.686**
	p	.000	.000	.000	.000	.000
Promotion	**r**	.693**	.566**	.626**	.536**	.612**
	p	.000	.000	.000	.000	.000
Interaction	**r**	.760**	.663**	.666**	.549**	.712**
	p	.000	.000	.000	.000	.000
Entertainment	**r**	.638**	.543**	.604**	.431**	.574**
	p	.000	.000	.000	.000	.000
	n			**320**		

****p< .01**

Table 9 shows the correlation matrix examining the relationship between the STES and its sub-dimensions and the SFMFTTSM and its sub-dimensions. According to the table, it was determined that there were statistically significant relationships between the STES and its sub-dimensions and the SFMFTTSM and all of its sub-dimensions. When Table 9 is examined, it is seen that there is a high level positive relationship between the STES and the SFMFTTSM (r= .797; p< .01). There is a high level positive relationship between the STES and the SFMFTTSM sub-dimensions in the News and Information sub dimension (r= .740; p< .01); a high level positive relationship in the Fandom sub-dimension (r= .711; p< .01); a moderate level positive relationship in the Promotion sub-dimension (r= .693; p< .01); It was determined that there was a high level positive relationship in the Interaction sub-dimension (r= .760; p< .01) and a moderate level positive relationship in the Entertainment sub-dimension (r= .638; p< .01). It was determined that there was a high level positive relationship in the Advocacy sub-dimension (r= .719; p< .01); a moderate level positive relationship in the Advertising sub-dimension (r= .676; p< .01); a moderate level positive relationship in the Provocation sub-dimension (r= .587; p< .01) and a high level positive relationship in the Assimilation sub-dimension (r= .745; p< .01) between the SFMFTTSM and the STES sub-dimensions, respectively.

DISCUSSION and CONCLUSION

This study was carried out with the voluntary participation of 320 students studying at Atatürk University Faculty of Sports Sciences. In this study, it is aimed to examine the relationship between the students' sports team evangelism levels and the motivation levels of following their teams on social media.

The students participating in the study had significant differences between genders in the total STES and all sub-dimensions. It was determined that male participants had a higher average

score than female participants in the total STES and all sub-dimensions. In parallel with the results of this study, in a study conducted by Atabaş-Güven (2019) on the fans of the three major teams (Galatasaray, Fenerbahçe, Beşiktaş), a statistically significant difference was found between genders in the total STES and the average scores of the Lawyer and Advertisement sub-dimensions of the STES. It was stated that male participants had a higher average score than female participants in the total STES and Lawyer and Advertisement sub-dimensions. Similarly, in a study conducted by Degirmencioğlu (2022) on students studying in Sports Management departments at universities in Turkey, significant differences were found between genders in the total STES and all sub-dimensions. It has been emphasized that male participants have a higher average score than female participants in the total STES and the Lawyer and Advertisement sub-dimensions. It is stated that similar results are found in many studies conducted on different sample groups in the literature, and that male participants exhibit a higher evangelistic attitude than female participants (Kandaz-Gelen et al., 2022; Pepur et al., 2023). There are also studies in which no statistically significant difference was observed in the total STES and sub-dimensions according to the gender variable (Göktaş & Tarakçı, 2020). In the study conducted by Karafil and Akgül (2022) on football fans, no statistically significant difference was found in the total STES and sub-dimensions according to the gender variable. In another study conducted by Park et al. (2023), no statistically significant difference was found in the total participants' efangilism levels according to the gender variable. When the results of this study and other studies conducted in the literature are considered in general, it is reported that the differentiation of sports team evangelism according to gender is higher in favor of male participants. The fact that men follow football more than women can be considered as one of the main reasons for the higher average scores of sports team evangelism (Walsh at al., 2021).

Similar to the STES results, significant differences were found between genders in the total and all sub-dimensions of SFMFTTSM. It was determined that male participants had a higher average score than female participants in the total and all sub-dimensions of SFMFTTSM. In the “Validity-Reliability Study of the Scale of Motivation of Sports Followers to Interact with Sports Clubs on Facebook and Instagram” conducted by Gönkek et al. (2023), it was observed that there was a significant difference in the average scores of sports followers' motivation to interact with sports teams on social media according to the gender variable. In the reward sub-dimension, it was found that male participants had a higher average score than female participants. In the study conducted by Şahin (2021), no statistically significant difference was found in the average scores of Demir Grup Sivasspor Club fans' motivation to follow the club's social media accounts according to the gender variable. It is natural that men follow football more than women and that their motivation to follow football teams is high in social media use.

It was concluded that there was no significant difference in the participants' total SFMFTTSM average score according to the license status variable. A statistically significant difference was found in the "Entertainment" sub-dimension of SFMFTTSM. It was concluded that the non-licensed participants had a higher average score in the "Entertainment" sub-dimension than the licensed participants. It is thought that the main reason for this situation may be that those who do sports under license are more meticulous, especially in their posts on social media. In this context, it is natural that those who are not licensed have a higher average score in the entertainment sub-dimension than those who are licensed.

It was concluded that there was no significant difference in the participants' total SFMFTTSM average score according to the department variable. Among all the sub-dimensions of SFMFTTSM, a statistically significant difference was found only in the "Entertainment" sub-dimension. It was concluded that the students of the Recreation department had a higher average score in the "Entertainment" sub-dimension than the students of the Coaching department. The main reason for this situation may be that the students of the Coaching department are more careful in their posts on social media platforms, especially since they are more elite athletes. The fact that the students of the Recreation department have fewer elite athletes compared to other departments may be attributed to the fact that these students share posts on social media for entertainment or use social media more for entertainment purposes at this point. In the study conducted by Şahin (2021), a statistically significant difference was found in the “Club Licensed Product Preference Tendency” and “Time Spending” sub-dimensions of the motivations for following Demir Grup Sivasspor Club’s social media accounts according to the participants’ educational background. It was stated that secondary school graduates had a higher average score in both of these sub-dimensions compared to university graduates.

It was concluded that there was no significant difference in the participants' total SFMFTTSM average score according to the team they support. Among all the sub-dimensions of SFMFTTSM, a statistically significant difference was found only in the "Entertainment" sub-dimension. It was concluded that students who were Galatasaray and Fenerbahçe fans had a higher average score in the "Entertainment" sub-dimension than students who were fans of other teams (except Beşiktaş). This situation may be due to the fact that Galatasaray and Fenerbahçe fans, who have been in eternal rivalry from past to present, share more content on social media due to this rivalry and that these contents are mostly based on angering and provoking the other party and entertaining themselves. Şahin (2021) found a statistically significant difference in all sub-dimensions of the "Social Media Usage Motivation Scale" in his study in which he tested whether the participants' social media motivations differed according to the duration they followed the social media accounts of Demir Grup Sivasspor Club. In the relevant study, it was stated that participants who had been following Demir Grup Sivasspor Club's social media accounts for less than 1 year had a lower average score in all of the sub-dimensions of "Club Licensed Product Preference Tendency, Perception of Supportership, Communication, Sharing, Obtaining Information and Spending Time" compared to participants who had been following for 1-2 years, 3-4 years, 5 years and more.

In the correlation analysis conducted between the participants' total and sub-dimensions of the STES and the mean scores of the total and sub-dimensions of the SFMFTTSM, it was concluded that there was a high level of positive relationship between the total of the STES and the total of the SFMFTTSM. It was concluded that there was a high level of positive relationship between the total of the STES and the News and Information, Fandom and Interaction sub-dimensions of the SFMFTTSM; and a moderate level of positive relationship in the Promotion and Entertainment sub-dimension. In the study conducted by Degirmencioğlu (2022) on the relationship between sports team evangelism and purchasing addiction, a high level of positive relationship was found between sports team evangelism and purchasing addiction. In the study conducted by Altın et al. (2020) on members of fan groups between the ages of 18-35 residing in Çorum, it was stated that there was a positive relationship between sports team evangelism and purchase intention and between sports team evangelism and the

level of identification of the fans with the team. Erdoğan et al. (2021) In the study examining the relationship between sports team evangelism and the spectator, fan and fanatic attitudes of football spectators, it was concluded that there is a positive relationship between sports team evangelism and the spectator attitude and football fan fanaticism sub-dimensions. In the study conducted by Göktaş and Tarakçı (2020), it was stated that there is a high level of positive relationship between sports team evangelism and purchase addiction, purchase intention and recommendation. In the study conducted by Dwyer et al. (2015), it was concluded that there is a positive relationship between sports team evangelism and purchasing products, increasing match attendance intentions and fans recommending match attendance to others. In the literature review conducted on sports team evangelism and fans' motivations to follow their teams on social media, it is seen that the relevant topics have increased as of 2020. This situation can be evaluated as an indicator that the study topics are being addressed up-to-date. It is seen that the concept of sports team evangelism was originally introduced to the literature based on the concept of evangelism (Coalter, 2021). Since the concept of evangelism is attributed to sports team evangelism in the sense of "conservatism at the level of bigotry", it is important at this point to reveal the degree of loyalty of sports team fans to their teams. It has been emphasized in many studies that there is a positive relationship between sports team evangelism and individuals' fanaticism levels (Dwyer at al., 2018; Erdoğan & Şirin, 2021; Genç & Yıldırım, 2022; Şirin, 2023). It is thought that sports team evangelism is effective in the motivation of individuals to follow their teams on social media according to their fanaticism levels (Green, 2023). Within the scope of this study, based on the result that there is a high-level positive relationship between sports team evangelism and the motivation of fans to follow their teams on social media; it can be said that as the level of sports team evangelism increases, the motivation of individuals to follow their teams on social media also increases, and as the level of sports team evangelism decreases, the motivation to follow their teams on social media decreases; similarly, as the motivation of fans to follow their teams on social media increases, their level of sports team evangelism also increases, and as the motivation of fans to follow their teams on social media decreases, their level of sports team evangelism also decreases. It is known that individuals with high levels of sports team evangelism have a very high level of commitment to the team they support (Dwyer et al., 2015). Therefore, these sports team evangelists follow and support their teams intensively in the stadium, on television and on social media. Considering today's fast-paced lifestyle, it may not always be possible to support their teams in the stadium. Similarly, since the matches broadcast on television are broadcast on paid channels or digital platforms, it is likely that sports team evangelists are more motivated to follow their teams on social media. The fact that they can follow their teams' current match results, pre-match and post-match interviews and comments, and current developments about their teams such as transfer news via social media and share these developments with their friends on social media allows sports team evangelists to see social media as a platform that fosters evangelistic attitudes. The aim of spreading, advertising and persuading an idea, which is at the root of evangelism, creates an opportunity for sports team evangelists to display their evangelistic attitudes thanks to social media being a platform that provides interaction. The results of this study show that sports team evangelists consider social media as an important platform for following their teams.

Recommendations

New studies can be designed to examine the relationship between the concept of sports team evangelism and other concepts such as fanaticism and hooliganism. New models can be created with other variables that can mediate the relationship between individuals' sports team evangelism and their motivation to follow their teams on social media. This study design can be re-applied to different sample groups and the results obtained can be interpreted comparatively. New marketing strategies can be created by sports clubs by considering the evangelistic attitudes of fan groups and their motivation to follow their teams on social media. Especially the official websites and social media accounts of sports teams should be managed professionally. Since it is assumed that sports team fans and evangelists use these channels quite actively, importance should be given to the design of these accounts and e-stores. In this way, both the increase in the income items of the teams and the satisfaction of the sports team fans and evangelists can be achieved.

Conflicts of Interest: There is no financial or personal conflict of interest among the authors of the article within the scope of the study.

Authors' Contribution: Research Design- MAK; GA, Data Collection- GA, Statistical Analysis- MAK; GA, Preparation of the Article- MAK; GA.

Ethical Approval

Ethics Committee: Sub-Ethics Committee of Atatürk University Faculty of Sports Sciences
Date/Protocol number: 02.10.2023/ 2023/150

Acknowledgments

This study was presented as a master's thesis at Atatürk University, Graduate School of Winter Sports and Sport Sciences. Moreover, it was presented as an oral presentation in 5. International Congress of Recreation and Sports Management 16-19 May 2024.

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Spor Bilimleri Araştırmaları Dergisi
Journal of Sport Sciences Research
Vol: 10, Issue: 1, 2025
E-ISSN: 2548-0723
URL: http://www.dergipark.org.tr/jssr

Participation of Physically Disabled Individuals in Sports in Türkiye: Barriers and Supports

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Research Article
DOI: 10.25307/jssr.1559713
Received: 01.10.2024 Accepted: 09.02.2025 Online Published: 28.02.2025

Abstract

This study aimed to reveal the participation processes of physically disabled athletes who gained success nationally and internationally and assessed what circumstances impeded and facilitated them in this process. The study used a qualitative research technique and interviewed individuals accordingly, which comprised 11 physically disabled athletes (19-32 years old) participating in professional sports competitions. In addition, semi-structured interviews were conducted with participants, and the corresponding data were subsequently evaluated by content analysis. The data analysis revealed that physically disabled individuals experienced issues that potentially fall under preventive and supportive categories during their participation in sports. In this context, the study identified the protective approach, restrictive social environment, physical barriers to engaging in sports, and cost- and success-oriented practices as impeding conditions. Yet, it also revealed that supportive family and sports environment, motivation, and socialization-based favorable aspects encouraged the participation of individuals in sports. Considering the positive outcomes of sports in the lives of disabled individuals, it is crucial to foster supportive attitudes and behaviors and to minimize impeding attitudes and conditions so that they can engage in sports activities and professional competitions.

Keywords: Athletes with physical disabilities, Barriers, Supports, Elite sport

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INTRODUCTION

Physically disabled individuals are unable to participate in sports on the same regular basis as individuals without disabilities. Approximately two-thirds of individuals with physical disabilities appeared to fail to engage in sports, whereas it was less common among individuals without any disability, according to a study conducted in the US (Department of Health and Human Services, 2000). These data are critical for individuals with special needs (ISNs) whose physical, psychological, and social health are adversely affected (Richardson et al., 2017) since sports activities provide psychosocial advantages such as promoting personal autonomy, social integration, and life satisfaction (Aitchison at al., 2022; Majnemer et al., 2008) for individuals with physical disabilities. Furthermore, such activities reportedly are favorable to lowering the risk of secondary health problems, including heart disease, type II diabetes, and obesity (Department of Health and Human Services, 2000).

There are numerous positive experiences that individuals attain during the process of participating in sports. These experiences, which hold great significance both physically and psychologically, can create opportunities not only for improving physical health but also for participating in social environments and becoming more independent individuals in daily life. With the increase in social integration, the sense of independence and self-confidence paves the way for different emotional experiences, helping individuals overcome potential barriers they may face (Chen et al., 2024; Ravesloot et al., 2022; Rimmer & Marques, 2012).

Increasing such positive experiences for those with physical disabilities is undoubtedly possible. Keskin et al. (2014) reportedly identified that sports activities affect socialization processes such as making friends, group membership, caring, and teamwork among individuals with physical disabilities. Correspondingly, Stephens et al. (2012) indicated that those who experienced spinal cord injury gain several advantages from participating in sports, including socialization, eliciting information from others, raising awareness on health and welfare, maintaining weight, functional development, and independence. Similarly, the biological, social, cultural, and economic characteristics of individuals with disabilities can influence their participation in sports and the benefits they experience from such participation. Several studies on this topic (Chen et al., 2024; Lobenius-Palmér et al., 2018; Valis & Gonzalez, 2017) have shown that variables such as gender, age, education level, economic status, type of disability, level of awareness, and social support can be significant factors in the participation of individuals with disabilities in sports and physical activities.

The involvement of ISNs in sports is a very complex phenomenon. Indeed, ISNs, their parents, and specialists studying in this field have reported various barriers to engaging in sports. From a broad perspective, it is reasonable to assert that ISNs, who require additional energy in their daily activities, find it physically extreme to participate in sports (Jaarsma et al., 2015). Jaarsma et al. (2014) reviewed 52 studies to identify barriers and supports in the participation of physically disabled individuals in sports. As a result, they specified that incompetencies and health concerns were the primary personal barriers that ISNs confronted during their participation in sports. They further listed the lack of facilities, transportation problems, and accessibility issues as environmental barriers, contrarily indicating entertainment and health

factors and social connections as personal and environmental facilitators, respectively. Nevertheless, they reported that the barriers and supports in participation in sports varied depending on age and disability type.

Stephens et al. (2012) identified that organizational (e.g., availability of facilities), medical (e.g., urinary tract infections), emotional (e.g., lack of confidence), lack of relevant information (e.g., medical advice), and the opinions of others (e.g., patronizing the views of others) were the main barriers averting individuals with spinal cord injury from engaging in sports. Tenenbaum and Eklund (2007) also asserted that the most significant hindrances preventing ISNs from engaging in sports were time constraints and lack of motivation.

In the axis of the given literature above, it is essential to identify what attributes encouraged or discouraged ISNs to engage in sports. Informing disabled individuals about barriers and supports in participating in sports might also provide opportunities to promote their engagement in sports (Jaarsma et al., 2014). Because nowadays, the sport has evolved into a professional level where ISNs potentially compete and perform at an advanced level, serving beyond its original purposes as before, such as rehabilitation, socialization, and enjoyable activity for individuals with physical disabilities (Yılmaz-Anatca & Yılmaz, 2019). In this sense, the current study aimed to reveal the participation processes of physically disabled athletes who achieved success nationally and internationally and assessed what circumstances impeded and facilitated them in this process.

METHOD

Research Model

The field of sports institutions is a significant area for investigating the challenges individuals with special needs (ISNs) face in social life and the support they can receive in response to these challenges, as well as for gathering data on this topic. In this regard, it is beneficial to examine lived experiences in depth. Consequently, the use of qualitative research designs is a highly preferred method to comprehensively understand this subject. In this study, the grounded theory design, one of the contemporary types of embedded theory studies, was employed as a qualitative research method. Charmaz (2006) emphasizes that the complexity, multidimensionality, and interconnectedness of situations, events, and phenomena can only be effectively studied if the researcher actively engages in the data collection and analysis processes, generating codes and categories from the data and continuously comparing them. In this process, researchers focus on theory construction rather than aiming for population representation in the sample.

Research Groups

In the study, interviews were conducted with 11 individuals with physical disabilities residing in different provinces of Turkey, who have adopted sports, allocated time to sports activities, participated in tournaments, and achieved success in national or international sports organizations. Seven of the interviewees were undergraduate students, two were undergraduate

graduates, and two were high school graduates. Considering the age groups of the participants, their ages ranged from 19 to 32. Every participant is actively engaged in regular sports training and attends competitions. To reach the participants, initial meetings were conducted with clubs within the researchers' close network. While trying to form the participant group in this way, the snowball sampling method was employed to identify new participants. Table 1 provides detailed information on the participants.

Table 1. Detailed information about the participants

Code Name	Age (G)	Educational Status	Disability Type	Sports Branch	Interview duration
Bülent	21 (M)	Undergraduate Student	Brachial plexus palsy	Athletics	65
Yusuf	21 (M)	Undergraduate Student	Cerebral Palsy	Wheelchair tennis	47
Dilek	21 (F)	Undergraduate	Two-leg amputations	Wheelchair archery	45
Suat	23 (M)	Undergraduate Student	Leg amputation	Athletics (sprinter)	50
Serdar	22 (M)	Undergraduate Student	Cerebral Palsy	High jump	70
Gamze	24 (F)	Undergraduate	Two-leg amputations	Wheelchair Basketball	55
Fatih	30 (M)	High-School Graduate	Hand amputation	Sitting Volleyball	48
Erkan	32 (M)	High-School Graduate	Hand amputation	Sitting Volleyball	57
Aydın	19 (M)	Undergraduate Student	Two-leg amputations	Wheelchair tennis	50
Osman	30 (M)	Undergraduate Student	Two-leg amputations	Wheelchair archery	48
Aysel	28 (F)	Undergraduate Student	Two-leg amputations	Shooting sports	68

Data Collection Tools

The study performed an in-depth interview design by employing a semi-structured interview form. The interview primarily focused on acquiring participants' relevant viewpoints and comprehending their perceptions on the subject of interest. The best way to ensure this goal was to foster a safe and secure setting where the participants freely and comfortably express themselves. The researchers, therefore, conducted semi-structured interviews to strike a balance among these aspects. The preference for the semi-structured interview technique has been influenced significantly by the subjective experiences of persons and the quality of their sporting experiences.

The initial section of the semi-structured interview form comprised queries regarding the personal information and experiences of the participants. The first set of questions also included queries about participants' sports lives. These queries specifically centered on challenges and barriers participants experienced while engaging in sports and the coping strategies they used against it. The questions further explored the dynamics that individuals receive support from and the roles of these dynamics in enabling participation in sports.

Ethics Approval

Approval for the study was received from Bolu Abant Izzet Baysal University Ethics Committee (Date/Protocol number: 07.06.2023/ 2023-248.) In addition, informed consent forms were obtained from the athletes' parents and coaches before participation.

Analysis of Data

During the interviews, audio recordings were made with the consent of participants to record the data properly. Subsequently, the audio-recorded data was converted into written texts. The acquired data were analyzed using content analysis. For the credibility and reliability of the study, two different authors first worked separately on the interview notes for the themes, and the coding and the resulting themes were mutually evaluated. The agreement between the co-researchers was determined using Miles and Huberman's (1994) formula, and the percentage of agreement was calculated. According to this formula, the percentage of agreement between the researchers was found to be 88%. During this process, an expert in both qualitative research and the field of the article was consulted, and their feedback was utilized. Additionally, one of the important factors affecting credibility and reliability in qualitative research is participant confirmation (Yıldırım & Şimşek, 2013). To ensure that the interview data accurately reflected their thoughts, the data was read by the participants and confirmed.

The study's two primary topics —the challenges faced and the support received— while engaging in sports were transformed into themes by the suitable conceptual framework by leveraging the most acceptable data among the information gathered from the participants. While analyzing the data, however, the data analysis procedure considered that the issues developed under the influence of various social dynamics; as a result, it attempted to evaluate their diverse dimensions, even though the current study centered on the challenges ISNs faced and the support they received. Furthermore, sub-themes from the coded data were identified and merged under the main themes based on their interrelationships to ensure that the data were expressed meaningfully during the analysis.

RESULTS AND DISCUSSIONS

The data acquired within the scope of the study revealed that physically disabled individuals experienced conditions that potentially fall under the categories of barriers and supporters (facilitators) during their involvement in sports. It appears that ISNs encounter some barriers while participating in sports, such as a protective approach, restrictive social environment, physical impediments to engaging in sports, and cost- and success-oriented practices. On the other hand, the study identified positive aspects such as a supportive family and sports environment, motivation, and socialization that facilitated the participation process in sports.

Table 2. Themes emerged from the analysis

Barriers	Supports
Protective Approach	Supportive Family and Social Environment
Restrictive Social Environment	Motivation
Physical Barriers	Socialization process
Transportation and Cost, Success Orientation	

Rimmer et al. (2004) reported a similar theme categorization. In their study performed among ISNs, fitness and recreation specialists, architects, city planners/green space managers, they explicitly discovered that numerous variables, such as physical condition/transportation, cost, economic conditions, equipment, accessibility to information, emotional and psychological factors, that influence the engagement of physically disabled individuals in sports might also become potential barriers and supporters in themselves for such individuals. Correspondingly, Stephens et al. (2012) emphasized the existence of some perceived barriers, such as lack of organization, medical barriers, and emotional barriers, as well as perceived benefits, such as socialization, self-dignification, physically challenging, and emotionally benefiting, in the participation of ISNs in sports.

Barriers

The literature review related to disabled individuals indicated that these entities frequently encountered social exclusion, stigmatization, marginalization, and many adverse behaviors, attitudes, and widespread opinions, signifying that such reflective aspects make them feel unequal to other members of society (Aslan & Şeker, 2011; Babaoğlu, 2018; Baffoe, 2013; Barnes, 1995; Çaha, 2016; Ersöz, 2020; Nazlı, 2012; Neufeldt & Mathieson, 1994; Saugeres, 2011). Furthermore, considering the perspective of the sports institution, a similar setting appears to exist in the sports environment, and ISNs face substantial barriers to reaching and performing sports activities. Such unfavorable behaviors might occasionally ensue intentionally, whereas they might also emerge as false behaviors, improper acts, and attitudes in the form of attempts to protect ISNs, pity them, and regard them as needy entities. As this way of thinking retained a historical background evolving since ancient times, it is also possible to recognize such perspectives in expressions that have been reassembled with new forms nowadays (Doğan, 2008; Yılmaz-Anatca & Yılmaz, 2019). This scenario is highlighted further by the fact that ISNs engage in physical exercise and sports at a lower rate than those without special needs (Healthy People, 2000; Rimmer, 1999; WHO, 2011).

Protective Approach

For various reasons, protecting or patronizing ISNs is a typical practice, and many ISNs conveyed this scenario in their statements (Stephens et al., 2012). Taub and Greer (2000) underlined that a protective strategy reduced potential opportunities, yielding fewer supportive outcomes for ISNs to participate in physical activities. In this sense, protective parenting approaches result in social isolation for children with special needs, making it difficult for them to participate in sports activities.

One of the indicators of the reproduction of disability is the discourses that exclude, protect, and denigrate it as inadequate. Some of the participants stated that they were under pressure from their families and other close circles at the juncture of the beginning or continuing their sports activities under the theme of the protective approach:

> At first, my family and social surroundings were upset with me and warned me; 'Do not! do not tire yourself, do not do this, do not do that, do not go anywhere alone,' which

> inevitably undermined my self-confidence. Naturally, I thought myself that it would really happen if I did this, and it lowered my motivation. Indeed, they believed that they cared about and supported me, but at the same time, they were causing me to close myself off unavoidably. (Suat)

Another participant, Serdar, observed that ISNs who had similar experiences went through the followings:

> Well, there are already many families. They do not allow their children to go out. So, they struggle with a lack of self-confidence in making friends and constantly try to lead themselves with difficulties and disappointments. Here, the responsibility of the families is to ask the children what they want… Hence, I could suggest that these families encourage their kids towards the things they like, the things that will make them happy, and the things they have a talent for. Of course, I would not overstep my limit and say things like this, but I still recommend that you may provide your children with a happy life so that they become successful. Sports promote communication, social interaction, self-assurance, moral inspiration, knowledge, study, and actually many other things. (Serdar)

Sports, by their very nature, have a structure that makes players more prone to injury and wounding, and consequently, players frequently require assistance and support due to such incidents. In the face of potential difficulties, this organizational structure remains ISNs more indecisive or hesitant in seeking social assistance, such as parental support or personal responsibility. As a result, this structure limits their ability to express their needs and seek assistance (Rimmer et al., 2004). The cumulative effect of all these negativities may lead to a sense of inadequacy and the obliteration of self-confidence among ISNs (Wickman, 2015).

Restrictive Social Environment

Another theme addressed under the title of Barriers is social environment-oriented barriers. One of the environmental barriers that ISNs confront in this process is pragmatic expectations (money, status, and fame), particularly in physical activity and sporting activities. The financial prospects and the anticipation of power, rank, and fame to be developed through cultural capital will explicitly motivate the players (Yılmaz-Anatca, & Yılmaz, 2019). However, setting an ultimate goal above physical activity and sports and a narrow success limit creates social pressure on the individual. Bülent, one of our participants, described the discourses of his close circle and their skepticism of this issue as follows:

> Well, I frequently heard from my close circles saying, 'This kid cannot succeed in anything... what will happen to him? What could he do? Or will you always take care of him?' Such comments just made me sad. I remember being offended at that young age. I was irritated… People around me were polite to me. No one was telling me anything. Well, they could not. Generally speaking, I would get angry, say inappropriate things, and poke them with my words. Their family would tell my parents like; 'What is he capable of doing in sports? What can he succeed in? What will he

> achieve? What will he accomplish? he merely attends and has a good time; nothing else happens. (Bülent)

Kumcağız and Avcı-Çayır (2018) specified in their study that the social environment puts pressure on individuals and that they adopt an obstructionist attitude with speech and expressions while participating in sports. The same study also reported that 83.33% of participants underlined the presence of social environment pressure.

Undoubtedly, the habitus concept by Bourdieu (2015) is one of the best definitions describing the difficulties experienced by ISNs in their social environment relations. As a result, habitus is effective in the perception, interpretation, and tendencies of ISNs. Habitus also refers to the social environment, particularly the family, to reproduce disability and limits the individual within certain codes (Yılmaz-Anatca & Yılmaz, 2019). The interviewed participants in the study shared the following statements about how they witnessed the social environment limited them:

> First of all, there is a perception among people: 'My son or my daughter is disabled, but I do not want him to sit in a wheelchair.' Well, there is no such thing. It is the reality of life that I have seen many times. I met two girls, and I wanted them to be athletes. I introduced them to the coaches, but their parents said, 'I will not put my daughter in a wheelchair.' It is a typical perception. I do not know why they think this way, but they should overcome such a perception. The disability of people becomes visible when they are put barriers! (Yusuf)

Another problem related to the restrictive social environment is the gender-related problems experienced by female participants. In this regard, Dilek, despite having a supportive family, expresses the barrier created by her family due to the fact that she is a woman in achieving her goals as follows:

> My family was with me in the hospital when I first met archery. My father gave me tremendous support when I tried the first shot. They supported me in this regard... We just can't agree on the transfer. There are transfer offers from other provinces but my family won't allow it. How can a disabled woman live in another province? They don't look at it positively. That's why I continue in the province where I am... When I work more forward-oriented, the problems related to womanhood come in front of me. As I said, I received very good offers. Istanbul Metropolitan Municipality, Bursa, Turkish Armed Forces Club, etc. These are all top lists in archery. When I told them to my family, they told me how couldI live in Bursa and Istanbul. That's why I couldn't transfer. (Dilek)

This situation emerges as the manifestation of the “gender regime”, which Connell (2013) refers to in relation to gender and which is seen in micro-relationships, in daily life. This conviction that women are weak and in need of help leads to the perpetuation of gender in this way and the realization of the role attributed to it in all areas of life (Burke, 1980). Additionally, in the study by Ascondo et al. (2023), it was found that, in terms of participants' gender, women

with disabilities perceived more barriers in sports practices compared to men. Another social barrier is the language imposed by the media. Media reporting language can be disturbing rather than making the disabled individuals who are involved in sports more visible:

> I was offended by something in the first place. It was a news published by Bolu Municipality. Something like a headline referring to 'they won by sitting down,' as if we were sitting and doing nothing. The game name has been sitting volleyball already, but the news implied that as if we just won while sitting down. We broke a sweat there, so I was slightly offended by the news giving a headline. (Erkan)

In this sense, the media, while covering sports news for ISNs, constructs a language that usually focuses on the virtue of physical integrity over the opposing idea, develops a vocabulary on the goodness of being disabled, and prefers to use a terminology legitimizing the 'ideal body' (Yılmaz-Anatca & Yılmaz, 2019).

Physical Barriers, Transportation and Cost

One of the primary reasons why ISNs retain an isolated life, are unable to engage in social activities, and fail to make themselves visible physically, emotionally, and socially is the lack of an efficient infrastructure and transportation network that places them at the center (Ives et al., 2021). This is also true in sporting events:

> It takes about 40-45 minutes to walk from my house to the training session. Well, there was no transportation at all at that time. So, I used to go on foot. If the schedule for training were at 5 o'clock, I would have to leave the house at 4 o'clock. I would go for a long walk, dreaming about playing with the racket in my hand. By the way, my first branch was badminton. That is why I had a racket. Aside from that, I was coming home at night. My training would end around 9-10 p.m. I have witnessed many things multiple times. Neighborhoods I passed, streets I crossed, and so forth. Sometimes it can get pretty dirty. I experienced several difficult moments. (Bülent)

Kirchner et al. (2008) revealed that only 19% of ISNs live in "accessible states/provinces" in their survey. Moreover, this rate was low in some states/provinces that expanded special needs services. The sidewalk, road, transportation network, and facility features were restrictive for disabled individuals, according to a study conducted with various groups such as athletes, city planners, and sports specialists (Rimmer et al., 2004).

In addition to factors such as roads and transportation, the cost is another significant variable among the barriers indicated by athletes with special needs (Berardi et al., 2021; Kumcağız & Avcı-Çayır, 2018; Stephens et al., 2012). Athletes with physical disabilities explicitly face serious economic problems, especially when sports-specific instrument/equipment costs are combined with costly expenses such as prostheses.

> Since the prosthesis is an imported instrument abroad, it really bothered me. Actually, I had planned to begin sports sooner, but I had to postpone this sport for a year and a half due to the lack of a sports prosthesis. I was supposed to have a sports prosthesis

> for my disability, but I had difficulties since I had financial problems and wasted time. Thus, I inevitably faced such barriers. I also could not find any source to provide me with financial aid. For example, I applied to some institutions, but they responded to me: 'Sports prosthesis is expensive, and we can not afford it.' Despite several written petitions, I could not find my actual addressee. (Suat)

Another participant, Aysel, expressed his dissatisfaction with the budgets and limited funds allocated by the federations for the organizations as follows:

> Even though the sport we engage in is portrayed as highly valuable in the media, in reality, the value given is not as significant. The resources provided by the federations are very inadequate. A significant portion of the costs, including transportation, equipment, and the overall expenses of our sport, falls on us. Alternatively, part of it is covered by supportive family members, coaches, or other mentors. (Aysel)

It is possible to articulate the primary barriers that prevent athletes with special needs from accessing sports organizations through political power relations. The cities, buildings, and facilities built with the hegemony of the 'strong' and 'powerful' ones, particularly over those with special needs, are a way of making ISNs feel weak constantly all the time in the face of the 'strong' ones.

Success Orientation

One of the issues limiting individuals and hindering the engagement of disadvantaged groups in sports institutions is the dominance of an achievement/peak/medal-oriented mentality. If institutions fail to manage such an attitude, it potentially leads to problems such as competition, aggressiveness, and violence in the sports environment, or it may lead to many individuals opting out of sports activities. The current study indicated that physically disabled individuals exclusively overcame the barriers they encountered in sports or physical activities by achieving remarkable success. Undoubtedly, the future sports life of a successful ISN becomes relatively comfortable. The fundamental issue here, however, is how many ISNs are discouraged from engaging in sports as a result of adverse attitudes they experienced while working toward peak/success and an achievement-centered approach:

> Just think about it! You practice every day while certain people at home say: 'Do not go, do not do, you cannot succeed, you cannot accomplish.' You may begin thinking about it after a while, wondering and asking yourself: 'What if I cannot really do it? What if I cannot succeed? What if I fail? Will I let it down? Will I falter in this? Will I remain unsuccessful in this too? Here, I can assure you that the family's reaction, their thoughts towards this occasion, and their supports are essential building blocks in a sportsman's career. Because, as I said, it is difficult without their support and motivation. Although this sport branch retains a physical dimension, it also has a psychological dimension. Even though people around you constantly say that you cannot do it, hearing such doubts from your family could worsen your psychology. (Aydın)

Allan et al. (2018) revealed that athletes, who launched objectives such as practicing quality sports, establishing equitable relationships with their counterparts, socializing, and adapting, turned into motivation for which competition is vitally critical when they reached a professional level. According to our findings, one difficulty related to this topic is that involvement in sports activities by athletes with special needs is a critical prerequisite for their potential to succeed. Indeed, Osman explicitly emphasized that the condition for continuing to engage in sports was not only for his social environment but also for his coach:

> Let me put it this way, everyone in my close circle initially told me this way: 'You are doing it for hobby purposes, excellent, lovely.' Nobody believed that my hobby could become as big as the national team. Yet, the fingers of athletes in archery sport should be strong. Athletes in archery sport do not necessarily use their feet or maybe do this sport branch in a wheelchair, but their fingers are always strong. When I first participated in the Turkish Championship in 2013, my biggest challenge was that; I was at the lowest rank in Türkiye. My coach said: 'You cannot do this sport, and you quit this branch. It would be encouraging if you were at least at the 4th or 5th, 6th intermediate level.' Yet, he said that I would be welcome If I continued to do so. He also said: 'Here is the equipment, and here I am. I give you all my support, and I am ready to share all my knowledge and skill mightily. Then I replied: 'If I am working one-fold now, I will work three-fold from now on. Because I got experienced, and I know my opponents.' At first, my coach did not believe in me. But I finished at second rank in the Turkish Championship in 2014. (Osman)

Supports

The existence of strong social support for individuals favorably improves their lives (Chao, 2011; Cohen & Wills, 1985; Rueger et al., 2016). The same situation may also become more advantageous for those who are physically disabled under the risk of isolation (Aykara, 2011). From the perspective of athletes with special needs, having a social support system, and thus a strong family bond and social environment, is of utmost significance for their engagement in physical activity (McKinnon at al., 2022), motivation (Ball & Mind, 2021), social identity (James et al., 2021), achieving success (Alizadeh & Cobuliev, 2021) and self-efficacy (Martin & Mushett, 1996). Hence, this section will focus on the supports that facilitate ISNs to engage in sports. In this context, the participants frequently emphasized the aspects that support and motivate individuals when they begin to practice sports and continue to do so.

Supportive Family and Social Environment

The previously indicated main theme focused on the barriers ISNs typically encountered when participating in social life and, as a result, in pursuits such as sporting activities. The widespread view is that, in addition to the barriers hindering them from social activities, sports-specific issues (cost, equipment, perspective, etc.) are also the primary impediments for physically disabled individuals. Despite all these adverse aspects, an individual may pursue their interest in sports and develop a sustainable sports adventure through the supportive attitudes of the environment that gives them strength, such as their family (Mckenzie et al., 2021).

> My family has already been my greatest supporter in every aspect of my success during my life. They never questioned me like, 'You cannot achieve it. Why are you doing this? or anything similar.' Quite the contrary, they consistently supported me with their words such as: 'Son, if you are doing this, you are doing the right thing, and you are doing the best.' They always supported and encouraged me in this way, in the decisions I made in my life, in the work I did, and in my sports activities. My family has become my biggest spirituality, my biggest supporter. (Osman)

Apart from the family, there are other critically supportive actors in the sports environment, such as coaches and administrators. Bülent emphasized the significance of the coach and manager's stance on this issue as follows:

> I decided which branch I would engage in the sports hall. I met with my elderly colleague in the hall. My father told my couch: 'If it is okay, let him engage in this branch for three months. Then we evaluate his improvement and proceed accordingly.' My first couch enthusiastically replied: 'Please do not say it that way. This child will be my precious already. Do not worry at all.' Then, he did as he said. He protected me all the time. He helped me on many occasions. Apart from that, there was a club chairman. He had been in an accident in 1994, returning from a funeral and rolling into the ditch. He got disabled from his back. Since he was also involved in sports in his past life, he now dedicates himself to athletes and disabled individuals. So, he retires and then opens a club. He also involves in pedlar's trade to keep the club alive. He invests all the money he earns from his occupation into the club. That is, he uses it for us like individuals. This man supported me a lot. He treated me like a son. Then, this attitude became very decisive in many of my failures and successes. (Bülent)

Participants explicitly emphasized the value of the people who make up the sporting environment. Kumcağız and Avcı-Çayır (2018) revealed the same findings. They accordingly contend that a person's support network, particularly their family, is critical in fostering self-confidence among physically disabled individuals.

Motivation

The favorable impact of sports and the quality it creates in individuals' lives extremely motivated disabled athletes during their physical activities. An exemplary attitude toward athletics and a high level of motivation are evident when considering physically disabled individuals (Güler et al., 2019; Tekkurşun-Demir & İlhan, 2020). The study participants elucidated how they coped with the barriers in their ways using their internal motivations:

> There have been many barriers on my way to success. I have had several difficulties. If you really want something to happen, never give up on what you want. Always fight! Fight whomever and whatever comes your way! Do not quit and keep doing it if you really want it. You should not overstate the barrier in your mind, face the challenge and keep on with your life accordingly. (Yusuf)

Such issues frequently develop as a confrontation among ISNs (Wickman, 2015). It has occasionally come to resemble an escape from distressing situations and a way of removing barriers from the center of life. Stephens et al. (2012) reported this state as one of the typically emphasized issues, thematizing it as an 'emotional exit.' In addition to the pleasant atmosphere it fosters for an individual's future, the feeling of approval and appreciation gained from the social surroundings is another benefit of participating in sports. Tekkurşun-Demir and İlhan (2020) indicated that successful athletes who have extended to the national level respond well to external motivation such as appreciation, approval, and rewards. Many physically disabled athletes used the appreciative statements proliferating in their lives as a significant inspiration source in advancing their sports life:

> People say: 'Are you an athlete? I had no idea you could play that well.' So it is really nice to hear things like that. Well, you may inspire yourself to play well just by hearing such encouraging words, to achieve success for your friends, and even to win medals. So, you can even play to hear lovely remarks. (Erkan)

In general terms, it is rational to indicate that factors such as the individuals' feeling of being equal with others and assuming that sports are the activities they desire and find beneficial are substantially critical inspirations in their internal motivation processes, in addition to the feelings such as struggle, sense of achievement, and eventually the appreciation it creates (Allan et al., 2018).

Socialization Process

Sharing, supporting, solidarity, and spending quality time are just a few of the many advantages of sports that positively impact social life. It is also possible to mention how sports facilitate socialization among ISNs and serve as a support mechanism for that process.

Serdar explicated the benefits of sports to the socialization process as follows:

> I was a kid, and then I went through adolescence. At first, the mindset and looks of people bothered me, but over time, after meeting friends and engaging in endlessly chatting, I realized that I had become a person content with who I was. On the contrary, the circumstance greatly inspired me. In other words, there was no difficulty in the process. I engage in physical activities, make friends in that branch and socialize with them, travel, discover new places, and then meet up with new people. In this way, I was able to learn more about myself as well as my friends and their immediate social networks. I eventually developed the ability to regulate my behavior in the future. (Serdar)

Physically disabled athletes have frequently referred to aspects such as socializing, having a shared objective, fostering an environment through sports activities, and developing a support system. Even in difficult situations where they encounter barriers to participating in sports, the significance of sports to their social relationships and socialization process remains constant and unaffected (Wickman, 2015).

> I actually feel considerably comfortable. I feel freer in this process. Because, as I said, life is silly at first. At the beginning of your disability, there is a period of questioning yourself, and you may totally ignore your disability with sporting activities. You begin to feel more relaxed. When you realize that you can achieve something, these thoughts are completely gone from your mind. So, you feel comfortable and become more social. I can claim that it significantly improved my mood, and I can say that training days are good days for me. Although I was not such a social person before I started sports activities, these activities enabled me to meet different people regularly. You are constantly in tournaments in different cities, meeting diverse people, players, and coaches… I can say that the world I live in has changed. My circle has expanded. I made different friends. (Aydın)

The above-mentioned phrases explicitly emphasized the changes in Aydın's life, such as being freer, feeling comfortable, and visiting new places and settlements during sports activities.

Considering the supportive aspects in general, sports activities specifically contributed to the socialization processes of physically disabled athletes by fostering their sense of belonging, teamwork, success and its conveniences, exploration, invention, and new social life. Furthermore, this situation positively affected their relationship with sports and supported their engagement with sporting activities.

CONCLUSION

Some barriers averting physically disabled individuals from engaging in sports activities are directly tied to the socio-cultural structure, whereas others are related to the behavior patterns of sports institutions. Yet again, it is possible to argue that the design of the institutional standards, which constitute significant barriers to involvement in sports, is based on disregardful or ignorant terms, thereby excluding ISNs. The current study revealed that the protective approach developed around the factors of the restrictive social environment themes related to cultural aspects. However, physical barriers are shaped by the lack of institutional and organizational efforts for ISNs, although the restrictions, such as cost, transportation, and success-oriented practices, were listed under the themes of physical barriers related to sports culture.

The current study also found that the supportive attitude of family and the close social sphere of ISNs is crucial while they struggle with the experienced problems. It also emphasized personal efforts exemplified by motivation and socialization processes in overcoming barriers to participation in sports. These efforts appear to improve the visibility of ISNs in the sports environment and enable them to succeed.

Practical Implications

It is critical to perform additional subject-related and Türkiye-specific scientific research, considering the experiences of ISNs, the significance of social networks they create via sports,

and the potential of such networks to become solutions to many problems. Institutions and organizations appear to be obligated to raise sociocultural awareness. In this context, sports institutions and managers should be more responsible for establishing the required conditions and infrastructures, given that sports activities are the fundamental rights of every individual.

Limitations

The research was solely limited to physically disabled athletes who perform sports activities at a professional level.

Conflicts of Interest: The authors hereby affirm that no conflict of interest, either financial or personal, has influenced the research and findings presented in this study. This declaration encompasses all potential conflicts that might impinge upon the integrity and objectivity of the research.

Authors' Contribution: Study Design- A.S. & E.Ç.; Data Collection- A.S.; Analysis- A.S. & E.Ç.; Manuscript Preparation- A.S. & E.Ç.

Ethical Approval

Ethics Committee: Bolu Abant Izzet Baysal University Ethics Committee
Date/Protocol number: 07.06.2023/ 2023-248

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Spor Bilimleri Araştırmaları Dergisi
Journal of Sport Sciences Research
Vol: 10, Issue: 1, 2025
E-ISSN: 2548-0723
URL: http://www.dergipark.org.tr/jssr

A Qualitative Research on National Athletes' Use of Ergogenic Aids: The Case of Combat Athletes

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Research Article **DOI: 10.25307/jssr.1512612**
Received: 12.07.2024 Accepted: 03.10.2024 Online Publishing: 28.02.2025

Abstract

The aim of the study is to examine the views of national athletes on the use of ergogenic aids. Qualitative research method was utilized in the study and phenomenology design was used. The study group of the research was determined by 'convenience sampling' technique within the framework of the purposeful sampling method. The study group consisted of students 36 studying at Manisa Celal Bayar University Faculty of Sports Sciences and national athletes in combat sports. As a result of the analysis of the data obtained, the codes for starting to use ergogenic support were obtained as individual research, friend recommendation, coach recommendation (trainer) and doctor. For the duration of using ergogenic support, short (less than 1 month), medium (1-5 months) and long (6 months and more) codes were obtained. In the reason for the use of ergogenic aids, the codes of weight loss, preparation for the competition and accelerating recovery were reached. As a result of the analysis of the data obtained, in Figure 4, the codes of psychological well-being, fat burning, weight loss, physiological recovery, fast recovery (after training after injury), performance increase were reached as positive in the contribution of ergogenic aids. Negatively, weight gain, kidney fatigue and abdominal pain codes were obtained. As a result of the analysis of the data obtained, in the emotions after the use of the product in Figure 5; psychologically, psychological well-being, motivated, anxious, ease of focusing and happy codes, and physiologically energetic/dynamic, tired, sleep comfort and gaining strength codes were reached.
Keywords: Ergogenic aids, Combat athletes, Sports

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INTRODUCTION

Nowadays, various research are being conducted to improve performance and some of these sttudies are focused on ergogenic aids. Ergogenic aids are categorized as mechanical or biomechanical, psychological, physiological, pharmacological and nutritional (Bala & Bhalla, 2022; Forbes et al., 2024; Kadwe, 2021). Nutritional ergogenic aids can be defined as substances or techniques that aim to improve performance by increasing energy production and utilization and delaying fatigue with nutrients that contribute to improve performance in addition to training and are not considered doping (De Oliveira et al., 2023). Substances or methods such as certain vitamins, minerals, amino acids, herbs, metabolites and different combinations are considered ergogenic aids. These substances or methods are used by many athletes as supplementary nutrients for purposes such as optimal energy supply, balance of energy systems and development of body tissue (especially the development of lean body mass or muscle tissue). They can also help to fill micronutrient deficiencies and meet energy and macronutrient needs that are difficult to obtain through food intake alone. Many studies show that these supplements also help maintain overall health by supporting the utilization of certain nutrients in the human body (Bhasin et al., 2001; Maughan et al., 2018).

Athletes are under great stress, both physically and mentally, when performing high-intensity sports with frequent training (Honceriu et al., 2021). As training programs become increasingly demanding, athletes are paying more attention to nutrition to gain an advantage over their competitors (Maughan et al., 2018), and the use of ergogenic supplementation is a common strategy among athletes (Garthe & Maughan, 2018). Individuals who are better able to adapt to high levels of training often experience greater gains over time, which can lead to improved performance (Kadwe, 2021). Ergogenic aids also help individuals become more resilient to heavy training by helping them recover faster or prevent injury during high-tempo training, helping them stay healthy (Kreider et al., 2017; Porrini & Del Bo', 2016).

Recent studies show that nutritional erogenic support products are widely used among athletes. Tabata et al. (2020) 63.9% of Japanese track and field athletes, Baltazar-Martins et al. (2019) 64% of elite Spanish athletes, Waller et al. (2019) 87% of Australian athletes, Wardenaar et al. (2017) reported that 84.7% of athletes, Dascombe et al. (2010) reported that 87.5% of elite athletes in seven different sports branches from the Western Australian sports institute, Braun et al. (2009) reported that 67% of elite German athletes used supplements. A conscious use of ergogenic supplements according to the physical and physiological characteristics required by the branch together with nutrition can have a significant effect on athletes. Improper use of ergogenic supplements may have negative effects on the health of the athlete or may cause accidental doping of nutritional supplements containing substances prohibited by the World Anti-Doping Agency (Oliveira et al., 2023).

Research on the use of ergogenic aids by national athletes is ongoing to learn more about their efficacy, safety, and health risks. Athletes, coaches, and health professionals should pay attention to obtaining information from reliable sources in order to make informed decisions regarding the use of ergogenic aids (Wickham & Spriet, 2024). Based on this, this study aimed

to examine the frequency of use of nutritional supplements in national combat athletes, which types of supplements are preferred, the reasons for their use and the sources of advice received in this regard.

METHOD

Research Model

In this qualitative research, it was aimed to examine the views of national athletes on the use of ergogenic aids. In this research, qualitative research method and phenomenology design was used. This approach was adopted because the common points of the events subject to the research were tried to be defined, understood, and described in depth.

Study Group

The study group of the current research was selected by purposive sampling method. In this direction, the study group of the research was determined by 'convenience sampling' technique within the framework of purposeful sampling method. According to Patton (1987), purposive sampling is the in-depth examination of situations that are thought to have rich information. Convenience sampling technique can be defined as the selection of situations that are close and easily accessible by the researcher in the research (Yıldırım & Şimşek, 2018). The study group of the research consists of 36 students studying at Manisa Celal Bayar University Faculty of Sports Sciences and who are national athletes in combat sports (judo, wushu, taekwondo, kick boxing, and karate).

Data Collection Tools

In the study, a demographic information form prepared by the researcher regarding personal information (gender, age, branch, and years of national sportsmanship) and an interview form including semi-structured interview questions were used as data collection tools.

Interview questions directed to the participants;

1. Do you use ergogenic aids? If yes, can you explain what they are?

2. How did you start using ergogenic aids and how long have you been using them (example: who suggested them?)?

3. Have you seen any benefit or harm from ergogenic aids? Could you explain?

4. How do you feel after using the products?

Ethical Approval

The scientific and ethical approval of the study was obtained from Manisa Celal Bayar University Faculty of Medicine Dean's Health Sciences Ethics Committee with the decision number 20.478.48/23339 dated 03.04.2024.

Data analysis

Descriptive and content analysis were used in the study. In the research, descriptive analysis was used to examine and compare the themes by creating codes from the data obtained through semi-structured interview questions determined by the researcher. Since new themes were

obtained from the answers given by the participants participating in the research, content analysis was used. In order to ensure the confidentiality of the participants during the analysis process, the participants were coded as "P1, P2, P3....P23" instead of their real names. In the analysis of the data, the data were first coded and themes were found by 3 academicians who are experts in the field and qualitative research. After the analysis, the codes and themes were modelled and the stage of defining and interpreting the findings was started. In addition, the raw data obtained within the scope of the research (file folders, computer folders, field notes) are carefully kept for examination when necessary.

Validity-Reliability

In order to ensure the internal validity of the study, the participants were interacted with during the data collection process. At the end of the interviews, the data were shown to academicians specialised in the field and qualitative research. In order to avoid inaccuracies and deficiencies, they were checked, and participant confirmation was obtained. Purposeful sample selection was made, and care was taken in the data collection process, and the processes and results of the research were described in detail to ensure external validity.

FINDINGS

Findings Related to Participants' Personal Information

There is some information about the participants who participated in the study. The study group of the research consists of 36 national athletes. It was seen that 23 of the participants used ergogenic support, and 13 participants did not use ergogenic support. Considering the gender of the participants whose age range was 18-34, 47.2% were female and 57.7% were male. When the departments of the participants who participated in the research are examined, it is seen that they vary between physical education and sports teaching, coaching education, sports management and recreation departments. When the findings related to the sports branches of the participants were examined, it was seen that judo, wushu, taekwondo, kick boxing, and karate.

Table 1. Ergogenic aids used

L-Carnitine	P1, P2, P3, P7, P16, P17, P18
Creatine	P3, P5, P6, P7, P14, P15, P17, P19, P21, P22
Branched-chain amino acid	P3, P4, P5, P6, P21
Magnesium	P3, P6, P9, P20
Collagen	P3, P4, P20
Protein Powder	P4, P5, P14, P15, P16, P17, P19, P21, P23
Vitamin C	P9, P16, P23
Vitamin D	P9, P23
Preworkout	P15, P19
Zma	P19
İzoplus	P6
Nitrite Oxide	P5
Bromeline	P9

Some of the participant opinions regarding the codes obtained from the participants regarding

the question "Do you use ergogenic aids? If yes, can you explain what they are?" and indicated in Table 1 are given below.

- *I used it for about 3 years, but I used it in the form of 2-week loads every 3 months. I used BCA and glutamine supplement (P11).*
- *Yes, I use BCA, protein powder, l carnitine, creatine, vitamin C and multivitamin (P16).*
- *Yes, I do. Protein powder, zma, bca, preworkout, caffeine pills. I actively use creatine and protein powder (P19).*
- *Yes, I use protein, creatine, bca, amino acids, I usually prefer these (P21).*

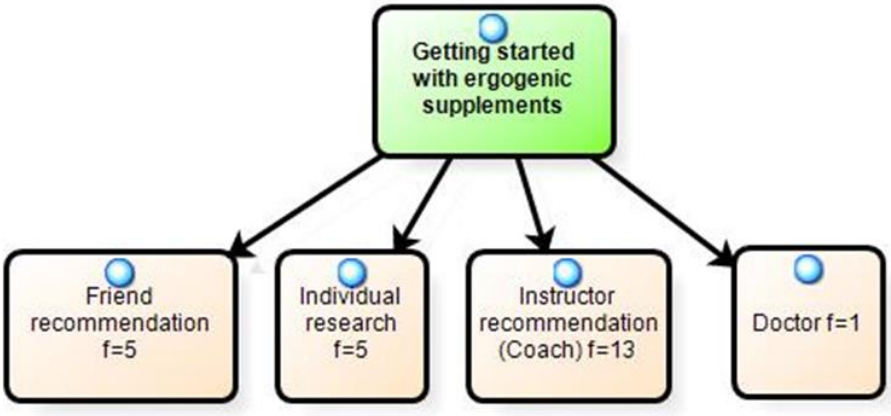

Figure 1. Getting started with ergogenic supplements

As a result of the analysis of the data obtained, the codes of starting to use ergogenic aids; individual research (P1, P9, P15, P21, P23), friend recommendation (P2, P5, P7, P8, P23), coach recommendation (coach) (P3, P4, P6, P10, P11, P12, P13, P14, P16, P17, P18, P21, P22), doctor (P20) were obtained in Figure 1.

Some of the participant opinions regarding the codes obtained from the participants regarding the question "How did you start using ergogenic aids and how long have you been using them (e.g. who suggested them?)" and indicated in Figure 1 are given below.

- *I actually started on my own research. How I started using it is that I realized that I could not lose weight while losing weight. After a while, I switched to l carnitine because the fat rate decreased and I switched to l carnitine to burn the remaining fat in the body. I actually used it for 2 weeks. I used it to equalize my weight while preparing for the national team camp. I did not use it in my normal life except for the 2-week period. I first used it when I was 18 years old (P1).*
- *When I went to the national team, our national team coaches recommended it so that we could do the load training more comfortably, and I used it at that time, but I don't use it now. I used it for 1 month in 1-month periods, there were camp breaks for 2 weeks, and then when we started camp again, I continued according to the frequency of the load training. (P6).*
- *I started using it after I became a national athlete. I usually use it close to the match periods. I started with the advice of our coaches in the national team (P17).*
- *I researched it, but my coach usually helped me, I have been fighting and doing sports for 13 years, I have been using it regularly for 13 years (P23).*

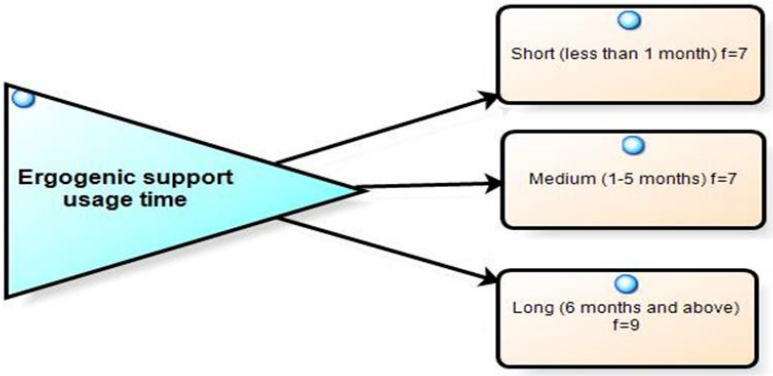

Figure 2. Ergogenic support using time

In Figure 2, the codes of short (less than 1 month) (P1, P2, P3, P7, P8, P13, P17), medium (1-5 months) (P4, P6, P10, P11, P12, P14, P18), long (6 months and more) (P5, P9, P15, P16, P19, P20, P21, P22, P23) were reached.

Some of the participant opinions regarding the codes obtained from the participants regarding the question "How did you start using ergogenic aids and how long have you been using them (e.g. who suggested them?)" and indicated in Figure 2 are given below.

- *When I was 17 years old, I had vitamin D deficiency at a doctor's appointment I went to, and that's when I started to use it. After that, I started to use it by researching myself, with the recommendation of my dietician, etc. because he said that I had the opportunity to lose weight more easily with these. Since the sport we do is a weight sport due to vitamin deficiency, I continued after that because it would make it easier. I have been using it for 4-5 years (P9).*
- *I started doing fitness before the pandemic, I discovered them myself at that time, I researched them on the internet, training science, etc. Since then, I have been using certain supplements regularly, although not very regularly. I have been using them for an average of 3-4 years (P15).*
- *I started with the advice of my teacher. I also saw international athletes in matches. I have been using it since I was 16 years old. I continue to use it actively except for some (P16).*
- *My coach recommended me to use it and I have been using it for about 2 years and I continue to use it actively (P22).*

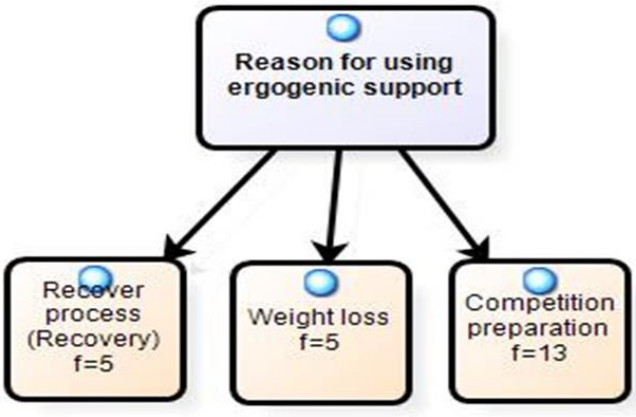

Figure 3. Reason for using ergogenic support

In Figure 3, the reason for using ergogenic aids; weight loss (P1, P7, P9, P2, P8) competition preparation (P3, P5, P6, P11, P12, P13, P14, P16, P17, P18, P21, P22, P19), accelerating recovery (P4, P20, P23, P10, P15) codes were reached.

Some of the participant opinions regarding the codes obtained from the participants regarding the question "How did you start using ergogenic aids and how long have you been using them (e.g. who suggested them?)" and indicated in Figure 3 are given below.

- *I used it at a time when I needed to lose weight, and I stopped after only 1 week. I knew that my friends were using it, and I preferred to use it because I thought it helped them too (P7).*
- *Since it is our weight sport, weight drops occur. When we lose weight, we feel a deficiency in our strength. Here, the importance of BCA and glutamine was recommended by our coaches, and this is how we started in the national team. We usually used it 1 month before the last 1 month and 2 weeks before the matches because we were overweight (P11).*
- *We needed it because we spent some energy while preparing for the matches. That's why we used it. My coach recommended it. I used it for 1 month (P18).*
- *I have been using it for 1 year. I started with the advice of a doctor to improve a chronic injury (P20).*

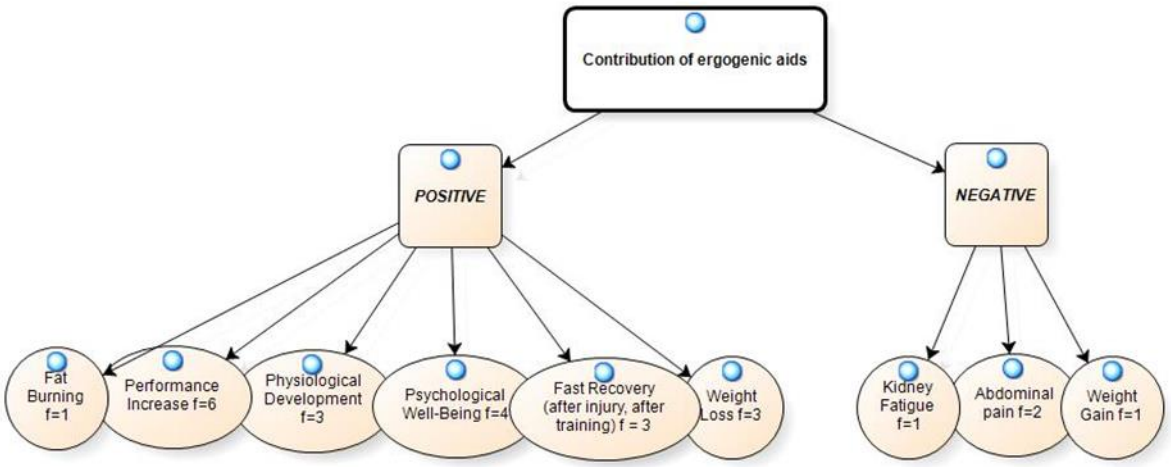

Figure 4. Contrubution of ergogenic aids

As a result of the analysis of the data obtained, in the contribution of ergogenic aids in Figure 4; positive; psychological well-being (P3, P6, P17, P23), fat burning (P1), weight loss (P7, P8, P13), physiological improvement (P12, P14, P15), fast recovery (after training after injury) (P4, P10, P11), performance increase (P5, P9, P16, P18, P19, P22), negative; weight gain (P3), kidney fatigue (P21); abdominal pain (P2, P20).

Some of the participant opinions regarding the codes obtained from the participants regarding the question "Have you seen any benefits or harms of ergogenic aids? Can you explain?" and indicated in Figure 4 are given below.

- *As a harm, sometimes the weight makes us gain weight in the weights because it is our weight judo branch, we may have stopped using it at that time. As I said, the benefit is*

psychologically, maybe it makes me feel good because I use it, but it feels good, that is, it makes me feel good as rested at that moment. Physiologically, muscle contractions are usually caused by muscle contraction after a hard workout, so I feel rested as I said after drinking them, whether it is magnesium or muscle tone (P3).

- *I didn't see any harm, but I saw the benefit of it in training like this, it gave energy, I was very focused, I was doing the movements more easily, I think it gave energy (P12).*
- *I didn't see any harm, but I saw a lot of benefits. It gave me more energy and definitely increased my performance (P18).*
- *I did not see any harm because I always used it in dosage. As for the benefit, of course, vitamins helped me to feel good in my body. Similarly with protein powder, it helped me to get stronger and increase my muscle strength, but I did not see any harm (P23).*

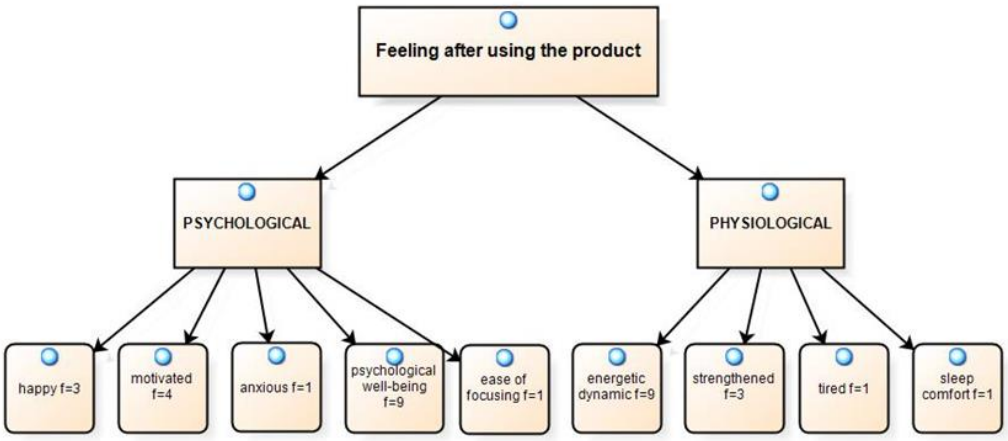

Figure 5. Feeling after using the product

As a result of the analysis of the data obtained, Figure 5 shows that in the feelings after product use; psychological; psychological well-being (P1, P2, P3, P4, P11, P13, P15, P16, P21), motivated (P6, P12, P14, P22), anxious (P7), ease of focusing (P14), happy (P5, P10, P20), physiological; energetic/dynamic (P2, P3, P5, P9, P10, P14, P18, P20, P23), tired (P8), sleep comfort (P9), gained strength (P16, P17, P23).

Some of the participant opinions regarding the codes obtained from the participants regarding the question "Can you explain how do you feel after using the products?" and indicated in Figure 5 are given below.

- *I feel good, nothing much, I just feel some effect, for example, I feel that some products give energy, I feel happy (P5).*
- *When I used the product, I felt very comfortable during the training, as if a power was coming (P12).*
- *I think after I used it, I felt a little bit energized and motivated ready for training because it was psychological. I can say that I was energetic, ambitious, focused on training (P14).*
- *As I said, because I used protein powder, I fed my muscles, so I felt stronger and more vigorous. Vitamins also made me feel better. It made me more energetic during the day, so I didn't suffer from pain (P23).*

DISCUSSION and CONCLUSION

This study aimed to examine the opinions of combat athletes regarding the use of nutritional ergogenic supplements. The results revealed that combat athletes generally use various ergogenic supplements with the coach's recommendation, mostly to improve performance. Dietary supplements are widely used among athletes to enhance performance and accelerate recovery. Although there are existing studies on supplement use rates in elite athletes, studies on a single branch are limited. In this study, it was found that combat athletes mostly used creatine, L carnitine, protein powder and vitamin and mineral preparations. Lun et al. (2012) reported that 87% of athletes used sports drinks, multivitamin and mineral preparations, carbohydrate bars and protein powder in a Canadian study of mostly strength-based athletes. Frączek et al. (2016) reported that athletes consumed isotonic drinks the most among nutritional supplements. Suzic-Lazic et al. (2011) reported that 74.6% of athletes used at least one product and 43.4% used multivitamins. Unlike our study, it has been reported that minerals and vitamins are the most commonly used nutritional ergogenic support products in athlete groups with an average age group of 18 years and younger (Barrack et al., 2022; Braun et al., 2009). Unlike our study, Braun et al. (2009) reported that the most commonly used nutritional ergogenic supplements in elite young athletes with a mean age of 16.6 ± 3.0 years were minerals, vitamins and sports drinks, and the least used nutritional supplements were protein/amino acids, creatine and other ergogenic supplements. In this study, the priorities of ergogenic supplements used varied due to the fact that the average age was below 18 years. In addition, ergogenic support products used according to the characteristics and requirements of the branch vary.

There are important differences between sports branches. Each sport has its own physiological characteristics and requirements, a variable that greatly influences the rate of use of dietary supplements (Baltazar-Martins et al., 2019). Each sport branch has its own physiological characteristics and requirements. When the use of nutritional ergogenic support in athletes is examined, it is seen that the studies were generally conducted on elite athletes competing in different branches in one country. Braun et al. (2009) studied nutritional ergogenic supplements in young German athletes competing nationally and internationally, Lun et al. (2012) in Canadian elite athletes, Oliveira et al. (2023) in Brazilian athletes competing at international levels and in various sports, Sousa et al. (2013) in Portuguese sports. Studies on a single branch are limited. The studies conducted for the branch usually consist of experimental studies. In our study, qualitative research method was utilized in national athletes competing in combat sports and 63.9% of the participants stated that they used ergogenic support products, while 36.1% stated that they did not use ergogenic support products. High percentages of nutritional ergogenic supplement use among athletes have also been reported in other countries mentioned above.

In our study, 54.1% of the athletes who used ergogenic supplements stated that the reasons for starting ergogenic supplements were coach's recommendation, 20.8% were friends' recommendation, 20.8% were individual research and 4.1% were doctor's recommendation. Similarly, in Karadagli's (2021) study on female teakwando athletes, 56.2% of the athletes

received advice from coaches, 6.7% from dieticians, 14.3% from social media, 9.5% from books and 13.3% from friends and relatives, Sousa et al. (2013) reported that 56% of the athletes received nutritional ergogenic support advice from doctors and 46% from coaches. In the study of Braun et al. (2009), since the age group was younger, family was the priority with 34% and advice from coaches with 26%. As mentioned above, coaches come to the forefront in the use of nutritional ergogenic supplements. Therefore, it is important for coaches to have knowledge about the benefits and risks of nutritional ergogenic supplements and to provide good advice and recommendations.

When we look at the frequency of use of nutritional ergogenic supplements, it is seen that 30% of the participants use nutritional ergogenic supplements for less than 1 month, 30% for 1-5 months and 39.1% for 6 months or more. Lun et al., (2012) found that 58% of the participants used daily, 21.6% used several times a week, 17% used weekly, 3.1% used monthly and 0.3% used rarely.

In the present study, when the reasons for the use of nutritional ergogenic support by athletes were examined, it was found that 56.5% used ergogenic support products to increase performance, 21.7% to lose weight, and 21.7% to accelerate recovery. In Sousa et al., (2013) study, 63% of the athletes used ergogenic supplements to accelerate recovery, 62% to increase sports performance and 60% to have more energy/reduce fatigue. In Olievera et al., (2023) study, 76% of the athletes used ergogenic supplements to increase exercise performance and 58.8% to increase muscle mass. In our study, unlike other studies, weight loss has an important place specific to the branch since combat athletes were addressed.

While 83.3% of the athletes participating in our study felt positive effects (psychological well-being, fat burning, weight loss, physiological improvement, rapid recovery, performance increase) after the use of ergogenic supplements, 16.6% felt negative effects (kidney fatigue, abdominal pain, weight gain) after the use of ergogenic supplements. Considering the perceived positive benefits, the reason for the high percentage of supplement use by athletes is evident. It is suggested that nutritional supplements are frequently used for their proposed benefits, while many athletes are largely unaware of the associated scientific research, apparent benefits, risks and side effects of these supplements (Dascombe et al., 2010).

As a result, in our study, it is seen that the national competition athletes use ergogenic support products especially with the recommendation of their coaches to increase their performance. This shows that these athletes do not have sufficient knowledge about ergogenic supplements and do not apply to health professionals in this regard. Therefore, it is important for coaches to have knowledge about the benefits and risks of nutritional ergogenic supplements and to provide good advice and recommendations. It is very important for athletes to choose dietary supplements especially for the physical parameters required by their branch and to receive reliable information about nutritional ergogenic supplements from people specialised in sports nutrition, dietitians, sports physicians. Since the effects of ergogenic supplements vary according to the characteristics of the sports branch, gender and fitness level of the athlete, it is necessary to increase the number of branch-based studies in this field.

Conflicts of Interest: There is no financial or personal conflict of interest on the part of the authors in this study.

Authors' Contribution: Research Design - ND and EAB, Data Collection – EAB, Statistical Analysis - ND and EAB, Manuscript Preparation – ND and EAB.

Ethical Approval
Ethics Committee: Manisa Celal Bayar University Faculty of Medicine Dean's Health Sciences.
Date: 03.04.2024
Decision No: 20.478.48/23339

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Spor Bilimleri Araştırmaları Dergisi
Journal of Sport Sciences Research
Vol: 10, Issue: 1, 2025
E-ISSN: 2548-0723
URL: http://www.dergipark.org.tr/jssr

Cognitive Flexibility and Sports Anxiety Among Turkish Sports High School Students: A Cross-sectional Study

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Research Article
DOI: 10.25307/jssr.1596687
Received: 05.12.2024 Accepted: 09.02.2025 Online Published: 28.02.2025

Abstract

The present study aimed to examine the cognitive flexibility and sports anxiety levels of students in a sports high school in Turkey according to the sports branch in which they were trained. The study sample comprised 240 athletes (male n=138; female n=102) from a sports high school in Osmaniye province, Turkey. Each athlete's cognitive flexibility and sports anxiety levels were examined using the Cognitive Flexibility Scale (CFS) and Sports Anxiety Scale (SAS-2), respectively. Descriptive statistics, nonparametric hypothesis tests (Mann-Whitney U and Kruskal-Wallis H tests), and correlation analysis (Spearman's Rank Difference Correlation Coefficient) were used for data analyses. One finding of the study was that there was no positive or negative association between student athletes' cognitive flexibility skills and sports anxiety levels. Second finding was student athletes' cognitive flexibility levels were statistically significantly different in terms of gender and branch of sports ($p<0.05$). The cognitive flexibility levels of female athletes were higher than those of male athletes. The mean value of the cognitive flexibility level was lowest in football players and highest in basketball players. One important finding of the study was that the sports anxiety levels of student athletes increased progressively as the school year increase from 1st grade to 4th grade. The sports anxiety is an important factor that negatively affects athletes' performance, especially in the adolescent athletes. Thus, it is crucial to develop new strategies to reduce sports anxiety among adolescent student athletes and increase their mental health.
Keywords: Cognitive flexibility, High school, Student, Sport anxiety

Spor Lisesi Öğrencilerinin Bilişsel Esneklik ve Spor Kaygı Düzeylerinin İncelenmesi: Kesitsel Bir Çalışma

Öz

Bu çalışmada, spor liselerinde öğrenim gören öğrencilerin bilişsel esneklik ve spor kaygı düzeylerinin eğitim gördükleri spor branşlarına göre incelenmesi amaçlanmıştır. Araştırmaya Osmaniye ili spor lisesi öğrencilerinden 138 erkek ve 102 kadın öğrenci olmak üzere toplamda 240 öğrenci katılmıştır. Çalışmada öğrencilerin bilişsel esneklik düzeylerinin belirlenmesi amacıyla Bilişsel Esneklik Ölçeği ve spor kaygı düzeylerinin belirlenmesi amacıyla Spor Kaygı Ölçeği kullanılmıştır. Verilerin istatistiksel analizi, tanımlayıcı istatistikler, parametrik olmayan hipotez testleri (Mann-Whitney U, Kruskal Wallis H testi) ve korelasyon analizleri (Spearman'ın Sıra Fark Korelasyon Katsayısı) ile gerçekleştirilmiştir. Çalışmanın bulgularından ilki olarak, öğrencilerin bilişsel esneklik becerileri ile spor kaygı düzeyleri arasında pozitif ya da negatif bir ilişki bulunmamıştır. İkinci bulgu olarak, öğrencilerin bilişsel esneklik düzeyleri cinsiyet ve spor branşı değişkenlerine göre istatistiksel olarak anlamlı farklık göstermektedir. Kız öğrencilerin bilişsel esneklik düzeyleri erkek öğrencilerde göre daha yüksektir. Bilişsel esneklik düzeyi ortalaması futbolcularda en düşük, basketbolcularda en yüksektir. Çalışmanın önemli bulgularından biri, öğrencilerin spor kaygı düzeyleri sınıf arttıkça 1. sınıftan 4. sınıfa doğru kademeli olarak artmaktadır. Spor kaygısı, özellikle ergenlik çağındaki sporcularda spor performansını olumsuz etkileyen önemli faktörlerden biridir. Bu nedenle özellikle ergenlik çağındaki sporcularda spor kaygısını azaltmak ve ruhsal sağlıklarını iyileştirmek için yeni stratejiler geliştirmek oldukça önemlidir.
Anahtar kelimeler: Bilişsel esneklik, Lise, Öğrenci, Sporda kaygı

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INTRODUCTION

Anxiety is one of the important factors that negatively impacts students' success and anxiety disorders are highly prevalent among adolescents and children during their development stage (Rabner et al., 2024). Studies have shown that, considering the worldwide student population, anxiety disorders account for 20% of total mental health problems (Kamberi et al., 2019).

Previous studies have reported that anxiety is related with factors such as gender, academic achievement, grade and sport participation. For instance, in their study Mahroon et al. (2018) reported that anxiety symptoms among medical students were associated with gender, grade and academic performance. In another study, Gao et al. (2020) concluded that anxiety was a serious issue among female college students. According to the results of the study conducted by Asfaw et al. (2021) female students living off-campus experienced higher levels of anxiety. In terms of academic achievement, in a recent study conducted by Neyazi et al. (2024) the results indicated that academic achievement was highly correlated with anxiety and anxiety symptoms were higher in female students. In terms of sport participation, Xiao et al. (2022) reported that participating in sports was negatively associated with anxiety and depression among Chinese adolescent students.

Cognitive flexibility refers to a person's awareness of the existence of options and alternatives in any situation, their willingness to be flexible and adapt to the situation, and their self-efficacy or belief that they have the ability to be flexible (Jiatong et al., 2021; Martin & Rubin, 1995). Cognitive flexibility have been studied in different contexts by researchers and numerous instruments have been developed to measure flexibility such as Cognitive Flexibility Scale (CFS) (Martin & Rubin, 1995), Behaviour Rating Inventory of Executive Function (BRIEF) (Gioia et al., 2002; Roth et al., 2013), Cognitive Flexibility Inventory (CFI) (Dennis & Vander Wal, 2010), Acceptance and Action Questionnaire–II (Bond et al., 2011) and The Flexibility Scale (FS) (Strang et al., 2017). Cognitive flexibility includes a person's tendency to adapt. If an individual can develop flexibility when faced with difficult situations and identify different options, he or she can overcome many of the difficulties in life; however, if that individual always tries to solve problems in the same way and does not consider different solutions, he or she cannot adapt to the flow of life (Toksöz & Kolburan, 2018).

In educational context, cognitive flexibility is an important psychological factor that plays a crucial role in students' academic achievement. Students with higher levels of cognitive flexibility tend to adapt diverse learning environments more easily, be more creative and be resilient when they encounter difficulties in their studies by developing new strategies (Nakhostin-Khayyat et al., 2024). Cognitive flexibility of students has been investigated in relation with different constructs. For instance, in their study with elementary school students examining the individual contributions of cognitive flexibility, inhibition and working memory to science problem solving performance, Schäfer et al. (2024) reported that cognitive flexibility is one of the main components of successful science problem solving. Similarly, the results of a recent cross-cultural study performed by Zheng et al. (2024) among 378087 adolescent students from 57 different countries investigating the relationship between cognitive flexibility and academic performance demonstrated that cognitive flexibility is positively associated with

academic performance. Another study conducted by Güner and Gökçe (2021) among elementary, middle and high school students have reported that cognitive flexibility had positive impact on math achievement.

Some researchers also investigated cognitive flexibility and anxiety constructs together. For instance, in their study, Toren et al. (2000) reported that children with anxiety disorders had lower cognitive flexibility compared to 14 age-matched control group. Similarly, Yu et al. (2020) in their study conducted among 447 Chinese university students reported that higher scores of anxiety was associated with lower scores of cognitive flexibility. The results of another study conducted by Kırca et al. (2024) among undergraduate university students demonstrated that cognitive flexibility acts as partial mediator on the relationship between fear of negative evaluation and interaction anxiety. They also suggested that improving cognitive flexibility skills of university students may prevent development of interaction anxiety.

From the sports point of view, some researchers also investigated cognitive flexibility and anxiety levels of students in terms of physical activity, sports participation and exercise. For instance, the results of the study by Ishihara et al. (2017) demonstrated that longer play of tennis in children and adolescents were associated with higher levels of cognitive flexibility. Ángel Latorre-Román et al. (2021) in their study among 114 students with ages ranging from 8 to 12 have reported that, after a 10-week active recess programme with physical exercise, the students in experiment group experienced significant improvement in cognitive flexibility. They also suggested that physical exercise may be a proper tool to improve student's cognitive flexibility. Additionally, Xiao et al. (2022) reported that engaging in sport participation was negatively associated with anxiety and depression among Chinese adolescents. Similarly, Li et al. (2024) reported that physical activity had negative association with social anxiety. They also suggest that physical activity may help students increase their psychological resilience, thus resulting a decrease in the social anxiety.

Cognitive flexibility and anxiety are two important factors closely linked with student's academic achievement and mental health development. However, despite the significant amount of progress in the cognitive flexibility and anxiety literature, the research of these two constructs in educational context, particularly focusing on adolescent students remains limited. Moreover, to the best of our knowledge no previous research, particularly in Türkiye, have been done considering both constructs together in physical education and sports teaching context among adolescent students. Therefore, to fill this gap in the research of cognitive flexibility and anxiety, in present study we aimed to assess the cognitive flexibility and anxiety levels of sport high school students.

Our goal is to investigate;

1) Whether cognitive flexibility and anxiety levels of sports high school students differ based on their gender.
2) Whether cognitive flexibility and anxiety levels of sports high school students differ based on their grade.
3) Whether cognitive flexibility and anxiety levels of sports high school students differ based

on their fear of injury.
4) If mastered sport branch have impact on students' cognitive flexibility skills and anxiety levels.
5) To what extend cognitive flexibility is associated with anxiety among sports high school students.

MATERIALS AND METHODS

Research Model

The present study's model was organized based on descriptive and relational survey and comparison models, which are among the quantitative research types. The main purpose of this model is to reveal the change in two or more variables related to each other. A preliminary literature review was conducted and previous studies discussing the relevant subjects were examined.

Study Population

The study population comprised of 240 volunteer students (male n = 138; female n = 102) from Samet Aybaba Sports High School in Osmaniye province of Turkey. No sampling selection method was used and all the students volunteered to participate in the study with a basic knowledge of the instruments are included. The study was conducted during the fall semester of 2024–25 academic year.

Data Collection Tools

Personal Information Form (PIF): PIF was developed by the researchers and included gender, grade, sports age, fear of injury, and sports branch as the independent variables.

Cognitive Flexibility Scale (CFS): The CFS scale was used to measure the cognitive flexibility levels of students. The scale is originally developed by Martin and Rubin (1995) and adapted to Turkish by Çelikkaleli (2014). The scale consists of 12 items rated on 6-point Likert-type scale ranging from in which responses range from 1 (strongly disagree), to 6 (strongly agree). In present study we used Cronbach alpha statistics to examine the internal consistency of the CFS scale and the Cronbach's alpha was 0.816.

Sports Anxiety Scale-2 (SAS-2): In present study we used SAS-2 scale to measure the anxiety levels of students. The scale was originally developed by Smith et al. (2006) for the measurement of multidimensional sport performance anxiety both in children and adults. The Turkish adaptation of SAS-2 was conducted by Karadağ and Aşçı (2020). SAS-2 scale consists of three subdimensions of sport performance anxiety named respectively as; somatic trait anxiety, worry and concentration disruption. The items of scale are rated on 4-point Likert type scale ranging from 1 (Not at all) to 4 (Very much). In present study we used Cronbach alpha statistics to examine the internal consistency of the SAS-2 scale and the Cronbach's alpha was 0.837.

Ethical Approval

Approvals to conduct the present study were obtained from the Osmaniye Korkut Ata University Ethics Committee (Number: E.202808) and the Ministry of National Education (Application No: MEB.TT.2024.007154).

Data Collection

A written consent form was obtained from the parents of the athletes who agreed to participate in the study, and the participating athletes were informed about the importance and purpose of the study. Data were collected by the researcher in face-to-face interviews in a classroom environment outside of class hours and in the presence of the teacher in charge.

Data Analyses

The data were analysed using SPSS 26.0 (IBM Corp., Armonk, NY, USA). The study was conducted using data obtained from the 240 athletes in the study; any missing data from the dataset were excluded. The Kolmogorov Smirnov test was used to determine whether the data were normally distributed. Additionally, histograms and Q-Q plots were analysed in order to check the normality of the data. The Kolmogorov Smirnov test indicated that the data did not meet the assumption of normal distribution; therefore, nonparametric tests (i.e., Mann-Whitney U and Kruskal-Wallis H test) were used. Significant differences in multiple groups were investigated using Dunn-Bonferroni post hoc test. A p-value < 0.05 was accepted as a significance level. The Spearman Rank Correlation test was conducted for correlation analyses.

FINDINGS

The data obtained from SAS-2 and CFS were not normally distributed. The athletes' cognitive flexibility level was above average (M = 42.60), somatic trait anxiety levels were average (M = 9.00), anxiety levels were average (M = 10.08), concentration disruption levels were below average (M = 7.66), and total anxiety levels were below average (M = 26.75).

Table 1. Descriptive statistics for the scales

Sub-scales	Cronbach's α	X	S	Kurtosis	Skewness
Cognitive flexibility	.816	42.60	10.95	.100	-.486
Somatic trait anxiety	.688	9.00	2.72	1.946	1.205
Worry	.796	10.08	3.27	.711	.853
Concentration disruption	.662	7.66	2.13	.756	.866
Total anxiety	.837	26.75	6.55	.747	.893

The examination of CFS and SAS-2 scores of the athletes based on the gender variable revealed no statistically significant difference between the subdimensions of SAS-2 and total scores ($p>0.05$) (Table 2). When the cognitive flexibility scores of the athletes were analysed according to the gender variable, a statistically significant difference ($p<0.05$) was found. The mean cognitive flexibility scores of male student athletes were higher than female student athletes.

Table 2. Comparison of student athletes' anxiety and cognitive flexibility levels by gender

Sub-scales	Gender	N	Mean	Total	*U*	p
Cognitive flexibility	Male	138	108.74	15006.50	5415.500	**.002***
	Female	102	136.41	13913.50		
Somatic trait anxiety	Male	138	115.54	15944.00	6353.000	.193
	Female	102	127.22	12976.00		
Worry	Male	138	121.54	16772.50	6894.500	.786
	Female	102	119.09	12147.50		
Concentration disruption	Male	138	124.03	17116.00	6551.00	.354
	Female	102	115.73	11804.00		
Total anxiety	Male	138	119.94	16551.50	6960.500	.884
	Female	102	121.26	12368.50		

***p<0.05**

Table 3 compares sports anxiety and cognitive flexibility according to sports branches. As indicated in the table, there was no statistically significant difference among all subdimensions of SAS-2 ($p>0.05$); however, there was a statistically significant difference ($p<0.05$) in cognitive flexibility levels. The result of the post hoc test to determine from which group the difference originated showed that it was from the football-basketball group. The mean cognitive flexibility scores of student athletes in basketball branch were significantly higher than student athletes in football branch.

Table 3. Comparison of student athletes' sport anxiety and cognitive flexibility levels by sport branch

Sub-scales	Sport Branch	N	Mean	χ^2	S	p	Post-hoc
Cognitive flexibility	Volleyball	32	126.56	17.898	6	**.006***	Football-Basketball
	Basketball	31	146.42				
	Handball	30	133.08				
	Tennis	31	128.27				
	Football	48	94.38				
	Taekwondo	36	132.46				
	Athletics	32	95.23				
Somatic trait anxiety	Volleyball	32	103.02	11.918	6	.064	
	Basketball	31	152.26				
	Handball	30	122.17				
	Tennis	31	129.23				
	Football	48	122.19				
	Taekwondo	36	114.29				
	Athletics	32	101.66				
Worry	Volleyball	32	106.83	4.669	6	.587	
	Basketball	31	139.55				
	Handball	30	126.02				
	Tennis	31	127.58				
	Football	48	115.19				
	Taekwondo	36	116.82				
	Athletics	32	115.80				

Table 3 Continue. Comparison of student athletes' sport anxiety and cognitive flexibility levels by sport branch

Sub-scales	Sport Branch	N	Mean Rank	χ^2	S	p	Post-hoc
Concentration disruption	Volleyball	32	122.00	10.818	6	.094	
	Basketball	31	141.24				
	Handball	30	125.22				
	Tennis	31	132.08				
	Football	48	121.22				
	Taekwondo	36	114.19				
	Athletics	32	89.28				
Total anxiety	Volleyball	32	108.05	11.734	6	.068	
	Basketball	31	150.35				
	Handball	30	126.70				
	Tennis	31	132.61				
	Football	48	119.00				
	Taekwondo	36	111.60				
	Athletics	32	98.75				

***p<0.05**

There was a statistically significant difference among all subdimensions of SAS-2 and CFS according to grade level ($p<0.05$) (Table 4). The post hoc test revealed that the difference was in the 1st-3rd, 1st-4th, and 1st-2nd grade groups in the subdimensions of somatic trait anxiety, worry, concentration disruption, and total anxiety; however, there was no statistically significant difference in cognitive flexibility levels based on grade level ($p>0.05$).

Table 4. Comparison of student athletes' sports anxiety and cognitive flexibility levels by grade

Sub-scales	Grade	N	Mean Rank	χ^2	S	p	Post hoc
Cognitive flexibility	1	58	118.21	3.241	3	.356	
	2	77	110.88				
	3	63	131.22				
	4	42	125.21				
Somatic trait anxiety	1	58	89.92	18.591	3	**.000***	1-2
	2	77	121.48				1-3
	3	63	130.40				1-4
	4	42	146.07				
Worry	1	58	93.62	13.352	3	**.004***	1-3
	2	77	124.54				
	3	63	138.37				
	4	42	123.42				
Concentration disruption	1	58	95.96	14.853	3	**.002***	1-2
	2	77	118.99				1-3
	3	63	126.37				1-4
	4	42	148.35				
Total anxiety	1	58	85.13	21.532	3	**.000***	1-2
	2	77	124.37				1-3
	3	63	135.45				1-4
	4	42	139.82				

***p<0.05**

When the cognitive flexibility and sports anxiety scores of the athletes were examined based on the fear of injury, a statistically significant difference was observed in the subdimension of sports anxiety "anxiety" and "total anxiety" scores ($p<0.05$) (Table 5). When the athletes' cognitive flexibility scores and the subdimensions of sports "somatic anxiety" and "impaired concentration" were analysed based on the fear-of-injury variable, no statistically significant difference ($p>0.05$) was found.

Table 5. Comparison of student athletes' sports anxiety and cognitive flexibility levels based on fear of injury

Sub-scales	Fear of injury	N	Mean	Sum of	*U*	p
Cognitive flexibility	Yes	149	123.87	18456.50	6277.500	.336
	No	91	114.98	10463.50		
Somatic trait anxiety	Yes	149	117.19	17462.00	6287.000	.341
	No	91	125.91	11458.00		
Worry	Yes	149	112.51	16764.50	5589.500	**.022***
	No	91	133.58	12155.50		
Concentration disruption	Yes	149	115.18	17162.00	5987.000	.124
	No	91	129.21	11758.00		
Total anxiety	Yes	149	112.20	16717.50	5542.500	**.018***
	No	91	134.09	12202.50		

***p<0.05**

As Table 6 shows, significant positive and negative correlations were found between cognitive flexibility and gender (r=.-198, p=.002), cognitive flexibility and sports branch (r=-165, p=010), somatic trait anxiety and worry (r=.473, p=.000), somatic trait anxiety and concentration disruption (r=.402, p=.000), somatic trait anxiety and total anxiety (r=.763, p=.000), somatic trait anxiety and grade (r=.268, p=.000), worry and concentration disruption (r=.443, p=.000), worry and total anxiety (r=858, p=.000), worry and grade (r=.180, p=.005), worry and fear of sports injury (r=.148, p=.022), concentration disruption and total anxiety (r=.719, p=.000), concentration disruption and grade (r=.242, p=.000), concentration disruption and sports branch (r=.-160, p=.013), total anxiety and grade (r=.274, p=.000), total anxiety and fear of sports injury (r=.154, p=.017), grade and sports age (r=.310, p=.000), and gender and sports branch (r=.206, p=.001). No significant relationship was found between cognitive flexibility and all SAS-2 subdimensions.

Table 6. Results of Spearman Correlation analysis for cognitive flexibility and anxiety

		Cognitive flexibility	**Somatic trait anxiety**	**Worry**	**Concentration disruption**	**Total anxiety**	**Grade**	**Gender**	**Sports branch**	**Sports age**	**Sports injury**
Cognitive flexibility	Correlation	1									
	Sig. (2-tailed)	.									
Somatic trait anxiety	Correlation	-.011	1								
	Sig. (2-tailed)	.868	.								
Worry	Correlation	.049	**.473****	1							
	Sig. (2-tailed)	.446	.000	.							
Concentration disruption	Correlation	-.069	**.402****	**.443****	1						
	Sig. (2-tailed)	.284	.000	.000	.						
Total anxiety	Correlation	-.002	**.763****	**.858****	**.719****	1					
	Sig. (2-tailed)	.979	.000	.000	.000	.					
Grade	Correlation	.073	**.268****	**.180****	**.242****	**.274****	1				
	Sig. (2-tailed)	.263	.000	.005	.000	.000	.				
Gender	Correlation	**-.198****	-.084	.018	.060	-.009	.059	1			
	Sig. (2-tailed)	.002	.194	.787	.355	.884	.361	.			
Sports branch	Correlation	**-.165***	-.084	-.034	**-.160***	-.118	.069	**.206****	1		
	Sig. (2-tailed)	.010	.196	.597	.013	.067	.290	.001	.		
Sports age	Correlation	.022	.038	-.076	-.026	-.017	**.310****	.022	.077	1	
	Sig. (2-tailed)	.733	.556	.238	.693	.790	.000	.738	.234	.	
Fear of injury	Correlation	-.062	.062	**.148***	.099	**.154***	.093	-.093	-.104	-.095	1
	Sig. (2-tailed)	.337	.342	.022	.124	.017	.149	.153	.108	.140	.

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

DISCUSSION and CONCLUSION

In this study we aimed to examine if cognitive flexibility and anxiety levels of sports high school athlete students differ in terms of sociodemographic variables such as gender, grade, fear of injury and sports branch. Additionally, we investigate if cognitive flexibility is associated with sports performance anxiety dimensions among the athlete students. The examination of the student athletes' cognitive flexibility levels based on gender showed a significant difference, and the data found that the female athletes had higher cognitive flexibility scores. Similar results were reported in a recent study by Kovačević et al. (2024) where female youth water polo players had higher cognitive flexibility than male youth water polo players. Unlike the results of the present study, Kuloğlu and Orhan (2021) have reported that the cognitive flexibility scores of male athletes who were preparing for a university exam were higher than those of the female athletes. Additionally, some researchers found no significant difference between cognitive flexibility and gender (Aslan et al., 2021; Bayram et al., 2021 Menteş et al., 2019; Wu et al., 2024) The difference between the findings of the present study related to cognitive flexibility scores based on gender and the aforementioned results from the literature is most likely due to the use of different scales in determining cognitive flexibility levels, differences in the age groups of the samples, and cultural differences. There was no significant difference among all SAS-2 subdimensions in terms of gender. Similar results have been reported by previous studies (Bingöl et al., 2012; Ramis et al., 2015; Rawat et al., 2023; Tomczak et al., 2022). These data support the results of the present study. In their study based on gender in different sport types, Correia and Rosado (2019) found that female athletes had higher levels of somatic trait anxiety and concentration disruption. This result does not overlap with that of the present study. Thus, regarding our first research goal, "*cognitive flexibility and anxiety levels of sports high school students differ based on their gender",* the results indicated that student athletes' cognitive flexibility levels significantly differed based on gender and anxiety levels across all subdimensions did not differ based on gender.

A significant difference was found in athletes' cognitive flexibility based on the comparisons in terms of their sports branches, and the post hoc test revealed that this significant difference was in the football-basketball group. When the mean cognitive flexibility scores of the athletes were examined, the basketball group had the highest, and the football group had the lowest scores. Within this context, it can be argued that the basketball players can manage their cognitive flexibility skills better than those involved in other sports. Aslan (2018) has found that athletes in a team sport had better cognitive flexibility than those who compete as individuals and attributed this to the fact that team athletes encounter more unexpected situations in team sports than those in individual sports. The present study found no significant differences in athletes' sports anxiety levels when comparing athletes based on sports branches. Thus, regarding our fourth research goal "*mastered sport branch has impact on students' cognitive flexibility skills and anxiety levels"* the results indicated that, while student athletes' anxiety levels did not differ based on sports branch, cognitive flexibility levels significantly differed based on sports branch and the students in basketball branch had the highest cognitive flexibility.

The results of the present study also found that although the cognitive flexibility levels of the athletes were not significantly different based on grade level, there was a significant difference among all SAS-2 subdimensions. The post hoc test conducted determined that the difference was in the 1st-3rd, 1st-4th, and 1st-2nd grade groups in all subdimensions. In addition, the first-grade students had the lowest mean anxiety scores of all athletes. This result indicates that the sports anxiety of the athletes was lower in their first year of the sports high school and that the anxiety increased over time. This increase in anxiety according to grade level can be attributed to when the athletes understand the main purpose of a sports school and their responsibilities as athletes. Regarding our second research goal, "*cognitive flexibility and anxiety levels of sports high school students differ based on their grade"*, the results indicated that while student athletes' cognitive flexibility levels did not significantly differ based on grade, the anxiety levels of students significantly differed based on grade and among student athletes, total anxiety significantly increase from 1st grade to 4th grade. Fear of injury, which is one of the determinants of sports anxiety, is considered as demoralization, loss of time, suffering, and financial loss (Ergün, 2006).

The present study has found a significant difference in the worry SAS-2 subdimension and in the total anxiety scores of the athletes according to the fear of injury. When the mean scores of the athletes were analysed, those who answered "no" to the fear of injury had higher worry and total anxiety scores related with their self-performance on sport than those who answered "yes". This result suggests that sports high school athletes are not very much concerned about the fear of injury and that they accept that sports injuries can be a normal part of the sport during practice or a match. This finding coincides with those of Yalçınkaya et al. (2020) and Tanyeri (2019). Regarding our third research goal, "*cognitive flexibility and anxiety levels of sports high school students differ based on their fear of injury"* the results indicated that while student athletes' cognitive flexibility levels did not significantly differ based on fear of injury, the anxiety levels of student athletes significantly differed in SAS-2 "worry" subdimension and in SAS-2 total anxiety based on fear of injury.

The results of the present study found no significant correlation between anxiety and cognitive flexibility in sports; however, there was a negative significant relationship between cognitive flexibility and sports branch, cognitive flexibility and gender, and concentration disruption and sports branch. In addition, the results of the present study found a significant positive relationship between somatic trait anxiety and grade level, worry and grade level, worry and fear of sports injury, concentration disruption and grade level, total anxiety and grade level, total anxiety and fear of sports injury, grade level and sports age, and gender and sports branch. Regarding our final research goal as "*to what extend cognitive flexibility is associated with anxiety among sports high school students." the* results showed no relationship between cognitive flexibility and anxiety levels of sports high school athletes. The cognitive flexibility of sports high school athletes was above average; however, their total anxiety was below average. The cognitive flexibility mean scores were highest in female athletes and lowest within the football branch. According to the grade level, the first-grade students had the lowest mean score in all subdimensions of SAS-2 and fourth-grade students had the highest. This result shows that athletes' anxiety levels increase as their grade level increases. When the scores of the athletes in the SAS-2 worry subdimension were analysed according to the fear of

injury, the worry scores of the athletes who answered "no" to the fear of injury were higher. This result suggests that sports high school athletes consider sports injuries in their sports field as normal. Lastly, there was no significant relationship between cognitive flexibility and sports anxiety scores of the athletes in the sports high school.

Sports high schools in Türkiye are important educational institutions, which act as qualified human resource in the field of physical education and sports. Sports high schools provide students basic knowledge and skills in the field of physical education and sports and discover talented athletes and direct them to sports at an early age, train moral and successful athletes within their sports branches. Since the middle adolescent stage falls within high school period which is one of the most important stages in adolescents' personal development, at this stage, protection of mental health is crucial for sports high students' healthy growth and success in their future life. Cognitive flexibility and anxiety are two important factors closely linked with mental health. In this study, we investigated the cognitive flexibility and anxiety levels of sports high school students. The findings of our study indicated that, cognitive flexibility levels of sports high school students were not significantly associated with anxiety levels. The female students had higher cognitive flexibility compared to male students. Finally, sports anxiety levels (somatic, worry and concentration disruption) of sports high school students increase progressively as the school year increase from 1st grade to 4th grade.

Practical Implications

Increasing level of anxiety in sports can affect sports success, so it is recommended for educational administratives to provide training programs and seminars for students in order to reduce the anxiety levels of sports high school students. Additionally, injuries in the sports fields and in sports competitions can be considered normal; however, training programs should be provided to these athletes to raise their awareness about injuries because serious injuries can prevent the athlete from competing in sports, cause pain and suffering, and lead to financial losses.

Limitations and Future Research

There are two major limitations of the present study. First, the participants of this study were limited to a single sports high school, thus the findings can not be generalized for all sports high schools in Türkiye. Second, since this research was designed as a cross-sectional study which the data was collected at a single point in time, it does not provide long term results as the cognitive flexibility levels of the students and prevalence of anxiety among the students may change overtime. Therefore, for the future, longitudinal studies are recommended in order to examine the cognitive flexibility and anxiety levels of the students and the relationship between cognitive flexibility and anxiety.

Conflicts of Interest: The authors declare that they have no conflicts of interest.

Authorship Contribution Statement: Study Design-DÖÇ, Data Collection-DÖ, Statistical Analysis-DÖÇ, Manuscript Preparation-DÖÇ; DÖ. All authors read and approved the final manuscript.

Ethical Approval
Ethics Committee: Osmaniye Korkut Ata University Ethics Committee
Date/Protocol number: 18.10.2024/E.202808

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Spor Bilimleri Araştırmaları Dergisi
Journal of Sport Sciences Research
Vol: 10, Issue: 1, 2025
E-ISSN: 2548-0723
URL: http://www.dergipark.org.tr/jssr

The Effect of Risk Management on Sustainable Marketing Orientations in Fitness Businesses

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Research Article
DOI: 10.25307/jssr.1601271
Received: 13.12.2024 Accepted: 13.02.2025 Online Published: 28.02.2025

Abstract

This study examines the effects of risk management on sustainable marketing orientation in fitness businesses. The sample of the research consists of 234 (X age=31.36±6.77) employees (81 female and 153 male) working in private fitness businesses in Ağrı and Van provinces. In the data collection part of the study, the 'Personal Information Form' prepared by the researcher, 'Risk Management Scale in Health and Fitness Facilities' developed by Eraslan and Çimen (2022) and 'Sustainable Marketing Orientation Scale' developed by Lučić (2020) and adapted into Turkish by Kara et al. (2023) were used. Pearson correlation coefficient was used to examine the relationship between risk management in fitness businesses and sustainable marketing orientations, and a regression test was used to determine the effect. As a result of the study, a strong positive correlation was found between RMSHFF and SMOS (r=.695, p=<0.001). A strong positive significant relationship was found between RMSHFF and strategic integration (r=.582, p=<0.001), social participation (r=.721, p=<0.001) and ethical abilities (r=.574, p=<0.001) which are sub-dimensions of SMOS. The regression analysis conducted to determine the effect of RMSHFF and SMOS showed that RMSHFF had a significant positive effect on SMOS (R^2=.823; p<0.001). In this case, it can be said that effective risk management to be put forward by fitness businesses for structure design, policy, and member services can pave the way for sustainable marketing orientation by leading to strategic integration and supporting customer participation.
Keywords: Fitness businesses, Risk management, Sustainable marketing

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INTRODUCTION

Fitness businesses, which are among the important institutions that allow individuals to increase their physical health, help stress management, strengthen their social interactions (Heaphy & Dutton, 2008), help individuals improve their social skills, and group classes and activities bring people together and strengthen social ties (Chelladurai & Kim, 2022). Such social interactions increase individuals' motivation and contribute to maintaining their exercise habits (Anshel, 2014). Fitness businesses provide individuals with information about proper nutrition and lifestyle changes (Kiss et al., 2020). Training programs offered by expert trainers and dietitians raise awareness of healthy living and enable individuals to make informed choices (Singh et al., 2022; Thompson, 2024). Although people in Turkey have a more sedentary lifestyle in terms of sports and physical activity compared to those in Europe, it has been observed that participation in fitness centers has started to increase in recent years by raising awareness about health, fitness, and sports mobility (Yildiz et al., 2021).

Risk management, which enables businesses and organizations to effectively identify and manage the uncertainties and potential threats they may face (Miller & Waller, 2003), is of vital importance for both preventing financial losses and protecting organizational reputation (Cardona, 2013). Organizations that have a risk management process provide advantages in terms of sustainability, and businesses that can identify and effectively manage potential risks can achieve long-term success by preventing financial losses (Foerstl, 2010). In sports businesses, risk management is the process of identifying, evaluating, and managing potential threats that organizations may face (Bostock & Breese, 2023). Risks encountered in sports organizations include financial losses, injuries, loss of reputation, natural disasters, and legal problems (Tsai, 2016). While the probability and potential effects of the identified risks are evaluated, determining which risks require more urgent intervention provides a more effective allocation of resources for sports organizations (Caine, 2008). In the last stage, it is argued that the risk management process should be carried out in a continuous cycle and regular reports should be prepared to monitor the effects of identified risks and update strategies when necessary (Tupa et al., 2017). The effectiveness of methods applied with periodic audits should be evaluated and corrective steps should be taken when necessary (Van Greuning & Bratanovic, 2020). In this context, considering their environmental and social responsibilities, businesses' long-term success targets have led to the emergence of a sustainable marketing approach (Rondinelli & Berry, 2000).

Sustainable marketing is a critical strategy that supports the long-term success of sports businesses by bringing together elements such as environmental responsibility, consumer demand, competitive advantage, cost savings, and reputation management (Székely & Knirsch, 2005). Sustainable marketing practices provide sports businesses with a competitive advantage, making environmentally conscious brands more valuable to consumers and positively affecting sales (Walker & Kent, 2009). While sports businesses develop sustainable marketing strategies to reduce their environmental and social impacts, they also identify the risks they may face during this process (Doppelt, 2017). For example, sports equipment manufacturers may offer products made from recycled materials to fitness businesses (Szto & Wilson, 2023). However, the risks they may face in this process include material quality and

safety (Jain et al., 2018). As poor-quality materials can lead to customer dissatisfaction and loss of reputation, it is necessary to develop close cooperation and quality control processes with material suppliers (McAdam & McCormack, 2001).

Consumer interest in environment-friendly and healthy lifestyles is constantly changing. Fitness businesses must respond quickly to such changes (Lockie et al., 2002). However, because making incorrect predictions or ignoring market trends can lead to financial losses, regular market research and customer feedback are important for risk management (Christopher & Lee, 2004). In addition, sustainability risks in fitness businesses include economic fluctuations, high competition, seasonal changes, technological innovations, and personnel problems that affect the success of businesses (Fiksel & Fiksel, 2015). Following the 2008 global economic crisis, it was concluded that the revenues of fitness centers decreased significantly (Jurak et al., 2014), and the increasing popularity of digital platforms has affected the physical memberships of traditional fitness centers (Mathew & George, 2022). In this context, it is thought that fitness businesses should consider the effects of risk management in all aspects in order to create a sustainable market environment. From this perspective, this study examines the effect of risk management on sustainable marketing orientation in fitness businesses.

METHOD

Research Model

In this study, the relational survey model (Karasar, 2006) aims to reflect the rate of difference between two or more variables in quantitative descriptive models. If there was a change, steps were taken to demonstrate its emergence. This study deals with the relationship between variables within the framework of causality and uses multiple regression analysis to determine the level of influence (Tabachnick & Fidell, 2013). This approach is expected to provide a better understanding of the interactions between variables.

Research groups

The sample of the study was obtained from 252 data points in the first stage from personnel (managers, coaches and workers) working in private fitness businesses in the Ağrı and Van provinces. However, since 18 data points were inconsistent and inaccurate, it was deemed appropriate to remove them from the study, and 81 female and 153 male 234 (X age=31.36±6.77) were collected using a convenience sampling method (Büyüköztürk et al., 2011). This study contributes to our understanding of voluntariness.

Data Collection Tools

In this study, the “Personal Information Form,” “Risk Management Scale in Health and Fitness Facilities, and “Sustainable Marketing Orientation Scale” Sustainable Marketing Orientation Scale were utilized.

Risk Management Scale in Health and Fitness Facilities

The 'Risk Management Scale in Health and Fitness Facilities' developed by Eraslan and Çimen (2022) consists of 24 items in three sub-dimensions: Structure and Design (1,2,3,4,5,6,7,8), Policy (9,10,11,12,13,14,15,16) and Member Services (17,18,19,20,21,22,23,24). The scale is graded according to 5-point Likert-type statements, such as 'strongly disagree, disagree, undecided, agree, and strongly agree.' Cronbach Alpha value of the scale was calculated as 0.91 (Eraslan & Çimen, 2022).

Sustainable Marketing Orientation Scale

The Sustainable Marketing Orientation Scale developed by Lučić (2020) and adapted to Turkish by Kara et al. (2023) was applied between '1 - Strongly Disagree and 5 - Strongly Agree'. As the scores obtained from the scale increased, employees' sustainable marketing orientation increased. The original scale had three dimensions. These were strategic integration (six items), community involvement (five items), and ethical capabilities (four items). There was no reverse coding of this scale. Cronbach's alpha values of the scale sub-dimensions were between 0.82 and 0.85. As the scores obtained from the scale increased, they were interpreted as participants' sustainable marketing orientation (Lučić, 2020).

Ethics Approval

It was decided to be ethically appropriate based on the decision of the Ağrı İbrahim Çeçen University Scientific Research Ethics Committee dated 31/10/2024 and numbered 380.

Collection of Data

The data were administered to the participants online, but 18 were deemed appropriate for removal from the study due to inconsistent and inaccurate data.

Analysis of Data

In this study, gender, age, and educational status of personnel working in private fitness establishments were determined as independent variables, and descriptive statistics, percentages, and frequencies were given in the form of tables. The normality of the distribution of risk management scores of fitness businesses, sustainable marketing orientation scale sub-dimensions, and total scores was analyzed using Skewness and Kurtosis coefficients. The internal consistency coefficients of the scales were determined using the Cronbach's alpha reliability analysis. As the research showed a normal distribution, the Pearson's correlation test was applied to reveal the relationship level of the scores obtained from the scales for each sub-dimension. In this study, regression analysis was used to determine the effect of risk management and sustainable marketing orientation of fitness businesses. All data analyses were performed using SPSS version 24.

FINDINGS

Table 1. Distribution of participants according to demographic characteristics

		f	%	N	X̄	S	Min.	Max.
Gender	Female	81	34.6	234				
	Male	153	65.4	234				
Educational Background	Associate Degree	94	40.2	234				
	Undergraduate	129	55.1	234				
	Master's degree	11	4.7	234				
Age				234	31.36	6.77		
Risk Management Scale in Health and Fitness Facilities				234	107.20	15.92	24.00	120.00
Structure and Design				234	35.96	5.14	8.00	40.00
Politics				234	35.44	5.59	8.00	40.00
Member Services				234	35.79	5.70	8.00	40.00
Sustainable Marketing Orientation Scale				234	67.67	10.05	15.00	75.00
Strategic Integration				234	26.90	4.13	6.00	30.00
Community Engagement				234	22.26	3.64	5.00	25.00
Ethical Capabilities				234	18.50	2.73	4.00	20.00

When the participants were asked the question ‘What is your gender?’ years; 34.6 % were female and 65.4 % were male. When asked about their educational level, 40.2% of the participants stated that they had graduated with an associate degree, 55.1% had an undergraduate degree, and 4.7% had a master’s degree. When asked about their age, the mean age (Xyear=31.36±6.77) was found (Table 1).

Table 2. Internal consistency and normality distribution values of the scales

Variables	Skewness	Kurtosis	Cronbach Alpha
RMSHFF	1.54	0.147	0.973
Structure and Design	1.61	0.165	0.921
Politics	1.03	0.111	0.924
Member Services	1.46	0.129	0.929
SMOS	1.43	0.143	0.965
Strategic Integration	1.26	0.129	0.908
Community Engagement	1.02	0.102	0.905
Ethical Capabilities	1.42	0.147	0.930

RMSHFF: Risk Management Scale in Health and Fitness Facilities; SMOS: Sustainable Marketing Orientation Scale

According to the data above, the Cronbach’s alpha values calculated for the internal consistency coefficient of all scales and sub-dimensions were above 0.60 and at an acceptable level. The analysis performed to determine the normality distribution revealed that the data were normally distributed because the Skewness and Kurtosis coefficients were between -2 and +2 (Tabachnick & Fidell, 2013) (Table 2).

Table 3. Correlation and significance values between Risk Management and Sustainable Marketing Orientation in Fitness Facilities

		SMOS	Strategic Integration	Community Engagement	Ethical Capabilities
	r	0.695	0.582	0.721	0.574
RMSHFF	p	**0.000*** **	**0.000*** **	**0.000*** **	**0.000*** **
	r	0.626	0.547	0.569	0.584
Structure and Design	p	**0.000*** **	**0.000*** **	**0.000*** **	**0.000*** **
	r	0.647	0.529	0.734	0.487
Politics	p	**0.000*** **	**0.000*** **	**0.000*** **	**0.000*** **
	r	0.661	0.554	0.697	0.537
Member Services	p	**0.000*** **	**0.000*** **	**0.000*** **	**0.000*** **

***p<0.05, **p<0.01, ***p<0.001;** Weak correlation: |r|<0.3; Moderate correlation: 0.3≤|r|<0.5; Strong correlation: |r|≥0.5 (Tabachnick & Fidell, 2013).

According to the Pearson correlation test results, a strong positive significant relationship was found between RMSHFF and SMOS (r=.695, p<0.001). A strong positive correlation was found between the RMSHFF and the SMOS sub-dimensions of strategic integration (r=.582, p<0.001), social participation (r=.721, p<0.001), and ethical capabilities (r=.574, p<0.001). A strong positive significant relationship was found between structural design, one of the sub-dimensions of the RMSHFF, and strategic integration (r=.547, p<0.001), social participation (r=.569, p<0.001), and ethical capabilities (r=.584, p<0.001). A strong positive significant relationship was found between policy, one of the RMSHFF sub-dimensions, strategic integration (r=.529, p=<0.001), community involvement (r=.734, p=<0.001), and ethical capabilities (r=.487, p=<0.001). A strong positive significant relationship was found between member services, one of the sub-dimensions of the RMSHFF, and strategic integration (r=.554, p<0.001), community involvement (r=.697, p<0.001), and ethical capabilities (r=.537, p<0.001) (Table 3).

Table 4. Regression and significance values of risk management and sustainable marketing orientation in fitness facilities

Independent Variable	Dependent Variable	R^2	ß	Ss	t	p
RMSHFF	**SMOS**	.823	.907	1.89	3.32	**.000****
RMSHFF	Strategic Integration	.790	.889	.845	2.58	**.000****
	Community Engagement	.770	.877	.781	.971	**.000****
	Ethical Capabilities	.677	.823	.696	4.80	**.000****
Structure and Design	Strategic Integration	.747	.864	.963	2.03	**.000****
	Community Engagement	.722	.850	.889	.723	**.000****
	Ethical Capabilities	.715	.845	.678	3.43	**.000****
Politics	Strategic Integration	.722	.850	.917	5.09	**.000****
	Community Engagement	.753	.868	.761	2.95	**.000****
	Ethical Capabilities	.592	.769	.736	7.00	**.000****
Member Services	Strategic Integration	.754	.868	.855	5.14	**.000****
	Community Engagement	.691	.831	.845	3.87	**.000****
	Ethical Capabilities	.607	.779	.716	7.14	**.000****

***p<0.05, **p<0.01, ***p<0.001**; RMSHFF: Risk Management Scale in Health and Fitness Facilities, SMOS: Sustainable Marketing Orientation Scale

The According to the results of the regression test, as a result of the regression analysis performed to determine the effect between RMSHFF and SMOS, it was seen that the regression

model established at 5% significance level was significant at p<.05. It was determined that RMSHFF has a significantly positive, high-level effect on the SMOS. The R^2 value, expressed as the explanatory power of the model, was calculated as .823 (R^2=.823; p<0.001). This value shows that 82.3% of the SMOS variable (variance in) was explained by the independent variable in the RMSHFF model. Accordingly, RMSHFF had a significant effect on the SMOS (p<.05. RMSHFF total score (R^2=.790; p<0.001), structural design (R^2=.747; p<0.001), policy (R^2=.722; p<0.001), and member services (R^2=.754; p<0.001) dimensions had significant positive effects on the strategic integration sub-dimension of SMOS. RMSHFF total score (R^2=.770; p<0.001), structural design (R^2=.722; p<0.001), policy (R^2=.753; p<0.001), and member services (R^2=.691; p<0.001) subdimensions were found to have a strong positive significant effect on the social participation subdimension of SMOS. RMSHFF total score (R^2=.677; p<0.001), structural design subdimension (R^2=.715; p<0.001), policy (R^2=.592; p<0.001), and member services (R^2=.607; p<0.001) had significant positive effects on the ethical ability subdimension of the SMOS (Table 4).

DISCUSSION AND CONCLUSIONS

The relationship and impact between risk management and sustainable marketing orientations in fitness businesses were analyzed. A strong positive significant relationship was found between the RMSHFF and SMOS (r=.695, p<0.001) (Table 3). Accordingly, as the level of risk management in health and fitness facilities increases, sustainable marketing orientations also increase. A strong significant positive relationship was found between the RMSHFF and the SMOS sub-dimensions of strategic integration (r=.582, p<0.001), community involvement (r=.721, p<0.001), and ethical capabilities (r=.574, p<0.001) (Table 3). Accordingly, as the level of risk management in health and fitness facilities increases, sustainable marketing orientations based on strategic integration, community involvement, and ethical capabilities increase. A strong positive significant relationship was found between structural design, one of the sub-dimensions of the RMSHFF, and strategic integration (r=.547, p<0.001), community involvement (r=.569, p<0.001), and ethical capabilities (r=.584, p<0.001). A strong positive significant relationship was found between the RMSHFF sub-dimensions of policy and strategic integration (r=.529, p<0.001), community involvement (r=.734, p<0.001), and ethical capabilities (r=.487, p<0.001). A strong positive relationship was found between member services, one of the sub-dimensions of the RMSHFF, and strategic integration (r=.554, p<0.001), community involvement (r=.697, p<0.001), and ethical capabilities (r=.537, p<0.001) (Table 3). According to these results, it can be stated that an increase in the risks taken in terms of building design, policy, and member services increases sustainable marketing orientation in terms of strategic integration, community involvement, and ethical capabilities. In general, it can be concluded that effective risk management in health and fitness facilities strengthens sustainable marketing strategies Research on the subject states that the fulfilment of legal obligations of fitness facilities positively affects the public image, and a good risk management practice increases the reputation of the business by preventing legal problems (Eraslan & Çimen, 2022; Rakipi & D'Onza, 2024). When the negative results are evaluated, it

is stated that implementing risk management strategies may incur high costs; expenditures such as training, equipment updates, and insurance can be challenging, especially for small businesses (Duong & Hai Thi Thanh, 2022); risk management processes may be complex and may take the time of business owners; and stages such as identifying, evaluating, and monitoring risks require careful planning (Ganesh & Kalpana, 2022).

Regression analysis results showed that 82.3% of the SMOS variable (variance in) was explained by the independent variable in the RMSHFF model (Table 4). Accordingly, this reveals that if the sustainable marketing orientations of fitness businesses are satisfied, their risk management levels are positively affected. RMSHFF total score (R^2=.790; p<0.001), structural design (R^2=.747; p<0.001), policy (R^2=.722; p<0.001), and member services (R^2=.754; p<0.001) subdimensions were found to have a strong positive significant effect on the strategic integration subdimension of SMOS. RMSHFF total score (R^2=.770; p<0.001), structural design (R^2=.722; p<0.001), policy (R^2=.753; p<0.001), and member services (R^2=.691; p<0.001) sub-dimensions were found to have a strong positive significant effect on the social participation sub-dimension of SMOS. RMSHFF total score (R^2=.677; p<0.001), structure design sub-dimension (R^2=.715; p<0.001), policy (R^2=.592; p<0.001), and member services (R^2=.607; p<0.001) were found to have a strong positive significant effect on the ethical abilities sub-dimension of the SMOS (Table 4). It can be concluded that, as fitness businesses increase their risk management levels, elements such as strategic integration, social participation, and ethical capabilities also improve. This may allow businesses to make their internal processes and marketing strategies more sustainable. It can also be emphasized that fitness businesses should strengthen their risk management practices to increase their sustainable marketing orientation. It can be said that this approach will both increase the competitiveness of businesses and support social benefit. Research on the subject states that effective risk management increases customer safety in fitness facilities, providing a safe environment increases customer satisfaction and leads to customer loyalty (Aznan et al., 2023; Ocakoğlu, 2019), and that customers feeling safe positively affect the reputation of the business (Çobanoğlu & Sevil, 2013; Sadgrove, 2016). Proactive management of risks prevents financial losses and supports long-term success, as fitness businesses can develop a more sustainable business model by controlling costs (Yurtseven, 2021; Wasserbaur et al., 2022). A good risk-management strategy provides businesses with a competitive advantage (Agustian, 2023) and effective risk management strengthens the position of the business in the market and enables the evaluation of new opportunities (Alkaraan et al., 2023). Effective risk-management practices may be misperceived. If businesses exaggerate or ignore risks, both financial losses and losses in customer confidence may occur (Blake, 2022). Constant changes in market conditions and consumer expectations may reduce the effectiveness of risk-management strategies (Ikevuje et al., 2024). It has been revealed that if businesses cannot quickly adapt to these changes, they may lose their competitive advantage (Farida & Setiawan, 2022; Karataş et al., 2017).

In conclusion, the impact of risk management on sustainable marketing trends in fitness businesses includes both positive and negative effects. The positive aspects include customer safety, financial stability, and competitive advantage, whereas the negative aspects include costs and complexity. Successful establishment of this balance is critical for the long-term

sustainability of businesses. The effective integration of risk management practices plays a significant role in increasing customer satisfaction, ensuring financial stability, and gaining competitive advantage. Organizations that can achieve this balance can adapt more easily to changes in the sector and reinforce their long-term success. Increased risk management enables facilities to be more effective in areas such as strategic integration, community engagement, and ethical capabilities, leading to increased orientation towards sustainable marketing. This in turn supports the evolution of the fitness industry, benefiting both businesses and society. In the future, fitness businesses can make their risk-management processes more effective by increasing the use of digitalization and technology. Innovative solutions such as data analytics and artificial intelligence can help assess risks more accurately. Taking into account the traditional lifestyles and habits in the region, fitness centers can be offered for family oriented group workouts and local sports activities. It is thought that improving service quality by considering customer feedback will contribute to strengthening sustainable marketing orientation. In this process, it can be stated that the continuous review and adaptation of sustainability-oriented marketing strategies will support the long-term success of fitness businesses by fulfilling both environmental and social responsibilities.

Conflicts of Interest: There are no personal or financial conflicts of interest to declare within the scope of this study.

Authors' Contribution: Research Design-ÜS, Data Collection- ÜS; MÖ, statistical analysis-ÜS; Preparation of the article-ÜS; MÖ.

Ethical Approval
Ethics Committee: Ağrı İbrahim Çeçen University Scientific Research Ethics Committee
Date: 31.10.2024
Protocol number: 380

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Spor Bilimleri Araştırmaları Dergisi
Journal of Sport Sciences Research
Vol: 10, Issue: 1, 2025
E-ISSN: 2548-0723
URL: http://www.dergipark.org.tr/jssr

The Effects of Imagery Interventions on Track Start Performance in 14–16-Year-Old Swimmers: A Pilot Study

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Research Article
DOI: 10.25307/jssr.1614763
Received: 07.01.2025 Accepted: 23.01.2025 Online Published: 28.02.2025

Abstract

This study aimed to determine the effects of a four-week imagery intervention on track start performance and imagery levels in swimmers. A total of 20 licensed athletes, consisting of 10 girls (mean age 15.6 ± 0.7 years) and 10 boys' swimmers (mean age 15.8 ± 0.5 years), who train for 120 minutes per day, five days per week, voluntarily participated in the research. Prior to the imagery intervention, the athletes' track start performances were recorded as a pre-test using a GoPro Hero5 camera (GoPro, Inc., San Mateo, CA). The athletes' imagery levels were measured with the Sport Imagery Questionnaire for Children (SIQ-C) developed by Hall et al. (2009) and adapted to Turkish by Kafkas (2011). Subsequently, athletes were guided through 15-minute imagery sessions, focusing on both internal and external perspectives, with the support of expert trainers before their daily training sessions for four weeks. In these sessions, video footage of freestyle world record holder Caeleb Dressel's track starts was utilised as an imagery tool. Based on these examples, the athletes were instructed to perform internal and external imagery exercises. Following the intervention, the pre-test protocol was repeated as a post-test. The data were analyzed using a paired-sample t-test and independent sample t-test in SPSS 26. The results revealed a statistically significant improvement in the distance measurements of the athletes' track start performances and imagery levels.
Keywords: Swimming, Imagery, Track start, Performance, Athlete

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INTRODUCTION

Swimming is defined as one of the primary sports disciplines performed against water resistance, requiring all muscles to work in harmony and balance while providing both physiological and psychological benefits to the body (Gökhan et al., 2011; Işıldak et al., 2020). Examples of these benefits include skills such as endurance, coordination, mobility, and speed, as well as psychological effects like self-confidence, competitiveness, relaxation, and happiness (Deck et al., 2023). Particularly for children, swimming promotes self-development by fostering responsibility, rule compliance, social adaptation, and cooperation (Özyürek et al., 2015). Despite these numerous benefits, swimming in Türkiye does not receive the attention and importance it deserves. Although significant investments have been made in recent years, the number of elite swimmers remains insufficient, as evidenced by the limited participation of national swimmers in the Tokyo 2020 Olympics (Akgün, 2021). Physiologically, improving swimming performance requires maintaining regular training both in water and on land (Lin, 2024). To tolerate the fatigue caused by such training loads, proper rest, balanced nutrition, and adherence to pre-competition programs are crucial (Surala et al., 2023). In addition to these factors, psychological methods and techniques serve as complementary elements supporting athletes on their path to success. The literature includes many psychological concepts that positively influence performance, such as self-confidence, motivation, concentration, and mental toughness (Sagar & Patil, 2024). Mental training methods have gained attention among the practices that enhance psychological performance (Toth et al., 2020). One such method frequently mentioned in the literature is imagery (Lindsay et al., 2023).

In general, imagery is defined as mental visualisation, rehearsal, or simulation. It involves performing a visual rehearsal of a specific training scenario in sport using all sensory modalities (Çil & Kayışoğlu, 2022). The literature suggests various approaches to imagery. Athletes may visualise a skill from their perspective as if performing it flawlessly or from an external viewpoint, as if observing themselves from someone else's perspective (Murphy et al., 2008). Additionally, imagery can be employed by mentally rehearsing the successful performances of others (Weinberg & Gould, 2023).

Orlick and Partington (1987) revealed that 99% of Canadian Olympic athletes used imagery as a preparatory tactic. Greg Louganis, who won multiple gold medals in the 1980s and 1990s, consistently reported using imagery before every dive. World-renowned athletes like Rafael Nadal also use imagery to enhance their performance (Uludağ, 2021). Imagery allows athletes to visualise their past successful performances, boosting motivation and enabling them to analyse which movements were executed optimally and which physical strategies were most effective (Vashisht et al., 2024). Furthermore, Lin et al. (2021) reported that strategic and technical imagery training with fin swimmers can help them achieve higher levels of performance and increase their overall satisfaction with their performance. Rhodes et al. (2024) conducted functional imagery training with 27 athletes with weak imagery skills and identified significant improvements in overall imagery ability. In imagery exercises, it is essential to

stimulate the central nervous system to send activation signals to the muscles and replace negative visuals with positive ones (Karageorghis & Terry, 2011).

In swimming, repetitive skills, focus, and mental resilience are key to success (Miguel-Ortega et al., 2024). Imagery can support these elements by fostering strong and dominant feelings, allowing athletes to mentally recreate the sensations of taste, smell, sound, and movement, activating their muscles in a real-life scenario (Janjigian, 2024). The initial phase of swimming competitions, the track start, involves sequential steps: assuming the starting position, pulling oneself forward, launching off the block, flight, and water entry (Veiga et al., 2024). Each step must be executed flawlessly for sprint events, where races are completed quickly, and differences between competitors are measured in milliseconds. Evidence from major international competitions indicates a significant relationship between faster start times and overall race times (Mason et al., 2006).

When entering the water, maintaining an angle of approximately 30–35 degrees between the body and the water surface is essential as it reduces surface tension and helps the swimmer maintain the correct depth (Cortesi & Gatta, 2015). Therefore, the more standardised a swimmer's launch from the block, the better their performance will likely be. However, the preparation position, pulling, launching, flight, and water entry are instantaneous actions that occur in very short durations, making it nearly impossible for coaches to provide feedback for each step individually. By repeatedly visualising a correct example through imagery, athletes receive feedback for each step, which can lead to performance improvements. In light of this information, raising awareness of imagery practices among swimmers and promoting the regular application of these practices as part of mental training could contribute significantly to the literature. This research aims to investigate the effectiveness of regularly imagery training in improving a crucial aspect of swimming performance, while also considering the specific age group and performance criteria.

METHOD

Research Model

The study employed a quasi-experimental design using a single-group pre-test and post-test design. The scarcity of clubs and performance athletes aged 14-16 in the city where the study was conducted posed challenges in recruiting participants. Consequently, instead of establishing a control group, a pilot study was designed in which all participants were included in the experimental group, and the results were compared with those of similar groups.

Research Groups

The study involved 20 licensed swimmers aged 14–16 years who have participated in competitions organized by the Turkish Swimming Federation for at least four years and currently train five days a week for 120 minutes daily. Based on Simonsmeier et al.'s (2020) meta-analysis on imagery interventions in sports, a G*Power analysis (3.1.9.7) with ηp^2 =

0.934, $\alpha = 0.05$, and $1-\beta = 0.95$ determined the required sample size to be 17. A convenience sampling method was used to select the study group.

Table 1. Participants according to demographic characteristics

	Gender	N	$\bar{X}$	S
Height (cm)	Girls	10	161.1	3.38
	Boys	10	168.2	4.10
Weight (kg)	Girls	10	52.40	5.77
	Boys	10	63.00	2.53
Age (years)	Girls	10	15.60	0.71
	Boys	10	15.80	0.52
Sport Experience (years)	Girls	10	5.10	1.19
	Boys	10	6.10	0.73

Table 1 indicates the participant's (mean ± SD) characteristics are boys (n = 10, age: 15.8± 0.5 years, height: 168.2± 4.10 cm, weight: 63.0± 2.53 kg, sport experience: 6.1± 0.7 years) and girls (n = 10, age: 15.6± 0.7 years, height: 161.1± 3.38 cm, weight: 52.4± 5.77 kg, sport experience: 5.1± 1.2 years).

Inclusion Criteria: Participants aged 14-16 must possess a minimum of four years of competitive swimming experience, engage consistently in track starts, and be enrolled in a systematic swim training regimen (at least thrice weekly), while also being free from injuries or medical conditions that may impede their participation; furthermore, any prior structured imagery training is prohibited to guarantee the precise evaluation of the intervention's outcomes.

Exclusion Criteria: Participants who fail to comply with the intervention schedule or did not complete the required assessments excluded from the study.

Data Collection Tools

Descriptive Information Form: This form, prepared by the researchers, consists of seven questions designed to collect descriptive data about the participants, such as gender, age, education level, and years of sporting experience.

The Sport Imagery Questionnaire for Children (SIQ-C): The Sport Imagery Questionnaire for Children (SIQ-C) was developed by Hall et al. (2009) and adapted into Turkish by Kafkas (2011). While the original scale consists of 21 items and five subdimensions, the adapted version includes 15 items across three subdimensions: Cognitive-Motivational Specific, Cognitive General, and Motivational General Mastery. The scale does not contain any reverse-scored items and is structured using a 5-point Likert scale. The total possible score ranges from a minimum of 11 to a maximum of 75. The score ranges for each subdimension are as follows: *Cognitive-Motivational Specific*: 8–40; *Cognitive General*: 3–15; *Motivational General Mastery*: 4–20

Track Start Performance Measurement: Measurements were taken in lane one of a semi-Olympic pool measuring 12.5 meters by 25 meters. Reflective markers were strategically placed at the pool edges, where the 5-meter markers intersected with the pool. A GoPro Hero5 (GoPro, Inc, San Mateo, CA) camera was positioned 2.5 meters behind the short and long edges of the pool and 60 centimetres height from the floor to ensure capture of all markers at a resolution of 1080p and a frame rate of 120 frames per second. Using the Kinovea (Opensource software version 1.2), a 12.5 by 5-meter perspective grid was established and calibrated to analyze the data. The horizontal distance between the point of the hand's farthest contact with the water surface and the starting point of the movement was measured as the movement length. The entry angle was determined as the articular angle formed by the hip joint and the water surface when the hand first made contact with the water surface.

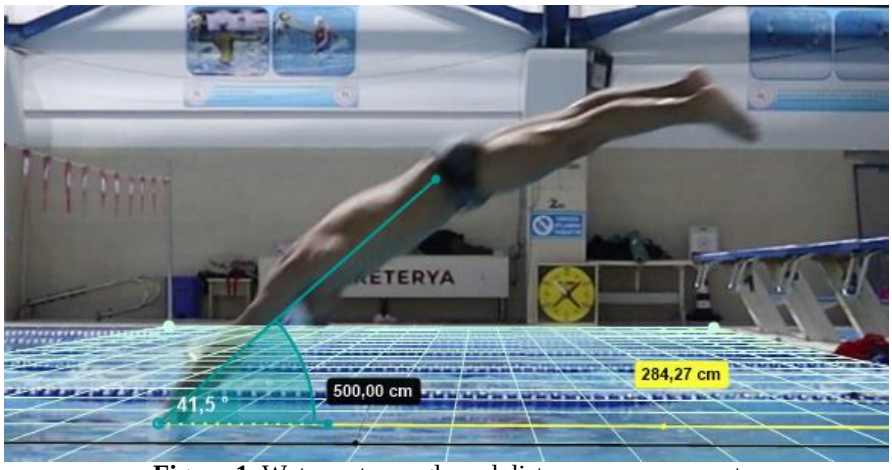

Figure 1. Water entry angle and distance measurement

Ethics Approval

The study was approved by the Ethics Committee for Medicine and Health Sciences-2 (Sports and Health) at Mugla Sıtkı Kocman University (Approval No: 129, Date: 29 October 2024).

Collection of Data

Participants and their families were contacted through club coaches, and a brief introductory meeting was held to explain the study's content and process. Voluntary consent forms were signed. Participant height was determined using a Seca model HR-222 stadiometer (SECA GMBH & Co., Hamburg, Germany), with measurements accurate to 0.1 cm. Weight was assessed using a calibrated Seca 901 scale (SECA GMBH & Co., Hamburg, Germany), with measurements recorded to the nearest 0.1 kg. Before the pre-test, all participants underwent the same warm-up procedure and were asked to perform three jumps each. Full rest periods were provided between jumps to ensure participants felt ready. Based on the longest water entry distance, the best performance was used for analysis. The camera position remained consistent for all measurements. After the pre-test jump measurements were taken, the participants completed the SIQ-C, and their imagery levels were assessed.

After the pre-test, imagery sessions were conducted in a quiet swimming pool meeting room for 15 minutes before each training session over four weeks. Considering the age-specific characteristics of the participants, video footage of world record holder Caeleb Dressel's

freestyle start performance (link) was used as a visual tool for imagery exercises. Two experts supported the sessions, using internal and external imagery techniques to enhance skill execution and routine movement patterns. In swimming, start performance was assessed by separately evaluating the three phases: departure from the starting block, flight, and water entry skills. Participants were also encouraged to practice imagery exercises at home (Schuster et al., 2011; Wood &Wilson, 2011).

Imagery Exercise Intervention Phases

Phase1: Starting Block

As you look forward, you can see the target lane in the 50-metre pool. Breathe in the familiar scent of the pool, which helps you feel calm and relaxed. Approach the starting block and gently tap it a few times as part of your preparation. Then, take a deep breath, allowing yourself to feel relaxed and ready for the dive. Step onto the starting block. Lean forward and let your arms hang freely in front of you. Position one foot at the front of the block with the heel firmly in contact while placing the other foot back on the wedge with the heel lifted. Ensure there is a 30–50 cm gap between your feet. Shift your weight forward and position your hands on the edges of the starting block. Firmly grip the block with your front toes. Your hips should be placed higher than your head. Use your hands to slightly lift your hips upwards while keeping your head relaxed at this stage.

Phase 2: Take-off Command

Upon hearing the take-off command, push off forcefully using your hands and feet. Ensure your feet point as they leave the block and maintain a 40–50 cm gap between your legs. Quickly kick back with your rear foot. Simultaneously, lift your head and look forward, bringing your hands together in front of your head. While airborne, hold a streamlined position and extend as far as possible towards the furthest point.

Phase 3: Water Entry

Enter the water with your hands first, then your head, and lastly, your torso at an angle of approximately 30–40 degrees. Feel the water's temperature and focus on the sensation it creates in your body. Maintain your position underwater and continue swimming with dolphin kicks. Exit the water and perform with clarity and confidence. As you execute your strokes, maintain the same level of focus and calmness, performing each one deliberately. Conclude the activity by acknowledging and embracing your strong performance. At the end of four weeks, post-test measurements were taken following the same protocol as the pre-test.

Analysis of Data

For parametric tests to be valid, data must exhibit normal distribution, and the sample size should ideally exceed 10 participants (Alpar, 2016). The skewness and kurtosis values for the dataset obtained from the 20 participants ranged between -2 and +2, indicating acceptable levels of normal distribution (Hatem et al., 2022). Data were analyzed using SPSS 26.0 software. Descriptive statistics were calculated, paired samples t-tests were performed to compare pre-test and post-test results and independent sample t-test was performed to analyze the differences between girls and boys.

FINDINGS

Table 2. Comparison of pre-test and post-test scores of the SIQ-C

SIQ-C Dimension	Group	N	$\bar{X}$	S	t	p
Cognitive-Motivational Spesific	Pre-test	20	30.250	5.838	-11.300	**.000*** **
	Post-test	20	34.500	4.957		
Cognitive General	Pre-test	20	11.500	2.164	-6.941	**.000*** **
	Post-test	20	13.050	1.731		
Motivational General Mastery	Pre-test	20	15.900	3.416	-6.760	**.000*** **
	Post-test	20	17.950	2.605		

***p < 0.001**

According to Table 2 the post-test mean score in the cognitive-motivational specific sub-dimension ($\bar{X}$=34.500±4.957) was significantly higher than the pre-test mean score ($\bar{X}$=30.250±5.838), with a statistically significant difference (p<.001). A significant increase was also observed in cognitive general sub-dimension, where the post-test mean ($\bar{X}$=13.050±1.731) was higher than the pre-test mean ($\bar{X}$=11.500±2.164), indicating a meaningful improvement (p<.001). Similarly, post-test scores in Motivational General Mastery ($\bar{X}$=17.950± 2.605) were significantly higher than pre-test scores ($\bar{X}$=15.900±3.416), with a statistically significant difference (p<.001). These findings suggest that the 4-week imagery training program had a significant positive impact on participants' imagery abilities across all three dimensions.

Table 3. Comparison of pre-test scores of the SIQ-C by gender

SIQ-C Dimension	Group	N	$\bar{X}$	S	t	p
Cognitive-Motivational Spesific	Girls	10	32.900	4.458	-2.232	**.039***
	Boys	10	27.600	6.040		
Cognitive General	Girls	10	11.600	1.837	-.201	.843
	Boys	10	11.400	2.547		
Motivational General Mastery	Girls	10	16.800	2.616	-1.191	.249
	Boys	10	15.000	4.000		

***p < 0.05**

Before the imagery practice, girls and boys were compared in terms of their imagery levels across the subdimensions of Cognitive-Motivational Specific, Cognitive General, and Motivational General Mastery. A statistically significant difference was found only in the Cognitive-Motivational Specific subdimension (p < 0.05).

Table 4. Comparison of post-test scores of the SIQ-C by gender

SIQ-C Dimension	Group	N	$\bar{X}$	S	t	p
Cognitive-Motivational Spesific	Girls	10	36.900	3.381	-2.428	**.026***
	Boys	10	32.100	5.258		
Cognitive General	Girls	10	13.600	1.429	-1.463	.161
	Boys	10	12.500	1.900		
Motivational General Mastery	Girls	10	18.700	1.418	-1.312	.206
	Boys	10	17.200	3.326		

***p < 0.05**

After the 4-week practice program, girls and boys were compared again in terms of imagery, and once again, a statistically significant difference was found only in the Cognitive-Motivational Specific subdimension ($p < 0.05$).

Table 5. T-test results for girls' pre-test and post-test performance scores in starts

Performance Measure	Group	N	X̄	S	t	p
Distance (cm)	Pre-test	10	281.95	45.34	-5.473	**.000*** **
	Post-test	10	287.32	47.35		
Angle (º)	Pre-test	10	39.86	3.68	3.020	**.014***
	Post-test	10	39.20	3.47		

*****p < 0.001, *p<0.05**

Table 5 presents pre-and post-test scores for distance and angle measurements. A statistically significant difference was observed for the distance variable, with post-test measurements demonstrating an increase compared to pre-test measurements ($p < .001$). This result suggests that the intervention positively impacted performance by enhancing jump distance. Furthermore, a statistically significant difference was also found for the angle variable, with post-test measurements indicating a decrease compared to pre-test measurements ($p < .05$). As increased distance and decreased angle are potentially indicative of improved performance, these findings suggest that the implemented intervention contributed to performance enhancement.

Table 6. T-test results for boys' pre-test and post-test performance scores in starts

Performance Measure	Group	N	X̄	S	t	p
Distance (cm)	Pre-test	10	304.06	37.16	-2.792	**.021***
	Post-test	10	306.78	38.63		
Angle (º)	Pre-test	10	39.49	2.81	.486	.639
	Post-test	10	39.40	2.90		

*****p < 0.001, *p<0.05**

Table 6 presents pre-and post-test scores for distance and angle measurements in male participants. A statistically significant difference was observed for the distance variable, with post-test measurements demonstrating a statistically significant increase compared to pre-test measurements ($p < .05$). This result suggests that the intervention had a positive, albeit modest, effect on performance by enhancing jump distance. Conversely, no statistically significant difference was found for the angle variable, as pre- and post-test measurements remained relatively consistent ($p = .639$). This indicates that the intervention did not elicit a statistically significant change in angle.

Table 7. T-test table according to the gender of the participants' pre-test and post-test performance scores in starts

Performance Measure	Group	N	X̄	S	t	df	p
Distance Pre-Test (cm)	Girl	10	281.95	45.34			
	Boy	10	304.05	37.16	-1.192	18	.249
Distance Post-Test (cm)	Girl	10	287.32	47.35			
	Boy	10	306.78	38.63	-1.007	18	.327
Angle Pre-Test (º)	Girl	10	39.860	3.68			
	Boy	10	39.490	2.81	.252	18	.804
Angle Post-Test (º)	Girl	10	39.205	3.47			
	Boy	10	39.400	2.90	-.136	18	.893

p>0.05

Table 7 indicates no statistically significant difference between groups in pre-test distance scores and angle values. Post-test distance scores showed a slight increase in the mean score for both girls and boys, but this difference was not statistically significant. Similarly, while post-test angle scores showed a slight decrease in the mean score for both groups, no statistically significant difference was observed.

DISCUSSION and CONCLUSION

The findings from the pilot study on the effect of imagery interventions on track start performance in 14–16-year-old swimmers reveal significant improvements in performance metrics, specifically in distance and angle measurements from the dives. The statistically significant differences between pre-test and post-test scores for both girls and boys ($p < .05$) indicate that the imagery interventions had a measurable impact on the swimmers' performance. The increase in post-test distance measurements suggests that the swimmers could execute their dives more effectively, likely due to enhanced mental rehearsal and visualization techniques employed during the imagery training sessions. Optimising performance output can improve a swimmer's speed and efficiency by reducing water resistance (Qiao et al., 2023). This study aligns with previous research indicating that imagery techniques can improve athletic performance (Simonsmeier et al., 2017; Wakefield et al., 2009; Vashisht et al., 2024). In swimming, the coordination of movements, such as the timing of the dive and the transition to swimming strokes, plays a crucial role in optimising performance (Khatkar et al., 2024). Consequently, the entry angle into the water influences the distance covered underwater and the frictional force exerted on the swimmer (Collings et al., 2024). In the study by Van Dijk et al. (2020), which involved athletes from the same age group as in our study, the swimmers' entry angles ranged from 35 to 39 degrees. Similarly, the entry angles for girls were measured at 39.86±3.68 degrees, while the entry angles for boys were measured at 39.49±2.81 degrees within our participant group. The entry angle is a critical factor in determining the efficiency of the swimming start. Van Dijk et al. (2020) found that a flatter entry angle, closer to horizontal, significantly reduced start times, with a one-degree flatter entry angle improving the swimming start by 0.5 seconds. In our study, the imagery training reduced the entry angle for girls from 39.86 degrees to 39.20 degrees, resulting in a statistically significant change. In

contrast, the entry angle for boys decreased from 39.49 degrees to 39.40 degrees, which was not statistically significant.

In our study, the imagery training resulted in a statistically significant reduction in the entry angle for girls, decreasing from 39.86 degrees to 39.20 degrees. This finding, supported by a paired sample t-test, indicates that the imagery training was effective in enhancing the technical execution of the girls. In contrast, while boys experienced a decrease in their entry angle from 39.49 degrees to 39.40 degrees, this change was not statistically significant; suggesting that the imagery training may not have influenced their performance to the same extent.

These results highlight the potential for imagery training to positively affect girls' sports performance, while also indicating the need for further exploration into the factors influencing boys' responses to similar interventions. Future research could investigate tailored imagery techniques that may better support boys in achieving statistically significant improvements in their performance. Additionally, the fact that girls have a larger entry angle can be seen as an indication of greater openness to development. The cognitive-specific component of the Motivational-Cognitive Specific imagery dimension aids an athlete in skill acquisition and development while working on skill execution. In contrast, the Motivational Specific component focuses on enhancing motivation through goal setting and achieving those goals. When examining imagery levels, it is notable that girls scored significantly higher than boys in Motivational-Cognitive Specific imagery. Therefore, the improvement observed in girls can be regarded as an expected outcome. In the study by Doğaner et al. (2020), which examined the perception of imagination in children in terms of sports activities, it was found that girls had significantly higher scores in cognition- specific, motivation- specific, and motivational-general-arousal compared to boys. In the literature, there are various studies indicating that the use of imagery and imagery skills vary by gender or that there are no differences between genders (Mendes et al., 2015; Veraksa et al., 2014).

In another aspect, imagery training led to swimmers entering the water at a greater distance. Imagery, which involves mentally visualising a skill with all related senses without physical practice, has been shown to have a significant effect on performance. In a study by Robin et al. (2024), the effects of motor imagery training focused on movement and target achievement on tennis performance in young athletes were assessed. They found that success-oriented motor imagery, applied after errors, positively impacted shot quality, reducing the number of mistakes made by tennis players without exerting undue effort. In this context, athletes can gain awareness of technical errors and perform better with imagery exercises. In the study conducted by Uyaroğlu (2024), it was observed that imagery exercises performed prior to training the non-dominant leg contributed to various football skills involving the dominant leg in young football players. Furthermore, it was found that the effects of video-based imagery exercises were more pronounced. Similarly, in our study, images of freestyle swimming world record holder Caeleb Dressel's exit performance were used as a video-based imagery exercise. Conversely, the decrease in angle measurements may reflect a more streamlined and efficient diving technique, as athletes often aim for a more horizontal entry into the water to minimize

resistance and maximize speed, which is crucial in competitive swimming (Simonsmeier et al., 2020).

The results align with existing literature that emphasizes the efficacy of imagery interventions in enhancing athletic performance. Studies have shown that imagery can significantly improve motor performance across various sports, including swimming, by allowing athletes to visualize and mentally rehearse their movements, refining their technique and execution (Isar et al., 2022; Simonsmeier et al., 2020). The medium effect size reported in meta-analyses of imagery interventions ($d = 0.431$) supports the notion that mental practice can substantially improve physical performance, particularly when combined with physical training (Simonsmeier et al., 2020). Furthermore, the specific application of imagery techniques, such as the PETTLEP model, which emphasizes the importance of physical context and emotional engagement during imagery practice, may have contributed to the positive outcomes observed in this study (Wright et al., 2014).

Interestingly, the study also found no significant differences in start performance based on gender ($p > .05$). This finding suggests that the imagery interventions were equally effective for both male and female participants, which is consistent with previous research indicating that imagery skills do not significantly differ between genders in athletic contexts (Schuster et al., 2011). This lack of gender disparity in response to imagery training underscores the universal applicability of psychological skills training across diverse athlete populations. Moreover, it highlights the importance of focusing on the individual athlete's psychological readiness and skill development rather than preconceived notions about gender differences in performance (Volgemute et al., 2024).

The implications of these findings extend beyond the immediate context of swimming. The positive effects of imagery interventions on performance metrics can be generalized to other sports and athletic disciplines, as evidenced by studies demonstrating similar outcomes in archery, golf, and resistance training (Richlan, 2023; Simonsmeier et al., 2020). Integrating psychological skills training, including imagery, into regular training regimens can enhance athletes' self-efficacy, reduce competitive anxiety, and improve performance outcomes (Ndakotsu, 2023). The motivational general mastery (MG-M) imagery within the PETTLEP Model significantly predicts self-confidence and self-efficacy in recreational and competitive athletes. These findings suggest that if a young athlete wishes to enhance their self-confidence or self-efficacy through imagery, regardless of their level of competition, the MG-M function should be emphasized (Munroe-Chandler et al., 2008). For instance, enhanced self-efficacy through imagery has been documented to correlate with better performance in various sports, suggesting that athletes who engage in mental rehearsal are more likely to experience increased confidence in their abilities (Hammond et al., 2012).

Furthermore, the study's results contribute to the growing evidence supporting using imagery as a critical component of athlete training programs. The systematic incorporation of imagery techniques can facilitate not only performance improvements but also the development of

coping strategies for competition-related stress and anxiety (Ndakotsu, 2023; Williams & Cumming, 2015). As athletes learn to visualize successful performances and rehearse their techniques mentally, they may also cultivate a more resilient mindset, which is essential for navigating competitive environments' pressures (Hammond et al., 2012; Isar et al., 2022).

CONCLUSION AND RECOMMENDATION

In conclusion, the findings from this pilot study strongly support the efficacy of imagery interventions in enhancing track start performance in young swimmers. The significant improvements in performance metrics, including distance and angle measurements, demonstrate the potential of mental rehearsal and visualization techniques in optimising athletic performance. These results align with existing literature highlighting imagery interventions' positive impact across various sports disciplines. Furthermore, the absence of gender-based performance differences suggests that these psychological strategies are universally applicable, making them valuable tools for athletes of all backgrounds. To effectively enhance swimmer performance, coaches and sports psychologists should consistently provide feedback, video analysis, and performance evaluations while implementing imagery techniques into training programs. The findings suggest that imagery training significantly enhanced performance in this age group. This can be attributed to factors such as adolescents' ability to learn new skills more rapidly. However, the results of this study are limited to the 14-16 age group. Further research is needed to examine the generalizability of imagery techniques across different age groups and sports. Additionally, future studies should include a control group to more clearly demonstrate the effectiveness of imagery training.

Conflicts of Interest: There are no personal or financial conflicts of interest related to this study.

Authorship Contribution Statement: Research Design – SUU; LYÇ, Data Collection – US; İÜ, Statistical Analysis – MC; SUU, Manuscript Preparation US; LYÇ; MC. All authors read and approved the final manuscript.

Ethics Approval
Ethics Committee: Muğla Sıtkı Koçman University Medical and Health Sciences Ethics Committee-2
Date/Protocol number: 29.10.2024 / 129

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Spor Bilimleri Araştırmaları Dergisi
Journal of Sport Sciences Research
Cilt: 10, Sayı: 1, 2025
E-ISSN: 2548-0723
URL: http://www.dergipark.org.tr/jssr

The Effect of Game on Peer Bullying and Emotions in Physical Education and Game Lesson*

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Research Article
Received: 02.12.2024 Accepted: 19.02.2025 **DOI: 10.25307/jssr.1594712**
Online Published: 28.02.2025

Abstract

The aim of this study is to examine the effect of educational games on peer bullying and emotion in physical education and game lessons. The study group consisted of 19 4th-grade primary school students (9 girls and 10 boys) from the 2023-2024 academic year, selected through criterion sampling. A game-based activity was implemented in physical education and game lessons for eight weeks. The Games and Emotions Scale for Children and the Peer Bullying Scale were used for data collection. The study followed a within-group experimental design, with pretest, posttest, and follow-up measurements. In data analysis, one-way ANOVA for repeated measures, one-way ANOVA for independent samples, and independent samples t-test were applied. The findings revealed that playing games in physical education and game lessons reduced peer bullying among children but did not have a significant impact on their emotional states. This effect was sustained in the retention measurements. Furthermore, no significant differences were found in peer bullying and emotional states based on gender and participation in sports courses outside school. Except for the bully sub-scale, no significant difference was observed in peer bullying concerning time spent on the internet. As a result, the study highlights the importance of educational games in reducing and preventing peer bullying. Additionally, integrating traditional games into the curriculum may help decrease peer bullying while improving students' social skills and empathy levels.
Keywords: Peer bullying, Emotions, Educational games, Physical education and games

*This study is derived from the master's thesis titled "The effect of play on peer bullying and mood in physical education and game lessons" (Thesis number 897524), completed in August 2024 under the supervision of Assist. Prof. Zarife TAŞTAN by Bahar İPEK.

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INTRODUCTION

In addition to providing children with fun time, digital games contain elements of violence, negatively affect children's behaviour and children can access these games more easily every day. In studies, it has been observed that as a result of the problematic use of technology, the elements of violence in virtual games and social media cause negativities such as insensitivity to violence, less empathy and aggressive thoughts, increased bullying behaviours and psychological adjustment problems among students, negative effects on students' development and socialisation, and decreased social sensitivity (Çetin, 2023; Erdener et al., 2019; Funk et al., 2004). Similarly, teachers have stated that they have witnessed various negative behaviors in children, such as difficulty communicating with peers, inability to participate in games and groups, inability to express their emotions in a healthy way, inability to accept their mistakes, lack of empathy, screen addiction, and bullying their peers (Koç, 2022). Bullying or victimisation is defined as aggressive behaviours that occur repeatedly and over time by a person or group (bully) against a single person or group (victim) physically, socially or verbally by intentionally abusing power to hurt, injure or disturb another person (Lee, 2004; Olweus, 1993). Bullying includes behaviours such as name-calling, hitting, threatening, mocking and excluding. In general, bullying behaviours at school occur more frequently in corridors and washrooms where adult supervision is limited (Andreou et al., 2015).

Peer bullying causes students to feel insecure in school, to feel worthless and inadequate in social relationships, to have difficulty in revealing their own capacity, behaviours such as anger, anxiety and anxious behaviour are observed in students, it damages their self-confidence and self-esteem, and can lead people to depression (Gümüş-Selek et al., 2022; Yaman et al., 2011; Yelboğa & Koçak, 2019). According to Gökler (2009), bullying behaviours should be considered as a problem that hinders the development of self-regulation, the control of emotional states, the progress of human relations, the development of empathy skills, and the learning of skills such as problem solving and strategising.

High levels of depression, hyperactivity/ inattention and emotional behaviours are observed in individuals who are subjected to peer bullying in schools compared to other individuals (Berchiatti et al., 2022). According to Rigby (2003), children with low self-esteem attract the attention of the bully, and the resulting bullying further reduces the self-esteem of the victim student. It is seen that negative behaviours such as teasing, gossiping, hitting, fighting, intimidating and threatening, which are frequently encountered in schools, adversely affect the social interaction of the student with his/her environment (Kalkan et al., 2019). Since even just witnessing bullying behaviours can cause long-lasting negative effects on the person, it should definitely be noticed early and negativities should be reduced by using appropriate methods and plans (Gökler, 2009). In order to reduce bullying behaviours, it is extremely important for families and educators to receive training on these issues so that aggression can be identified and understood from an early age, and behaviours can be developed to improve students' social skills and create safe environments (Jansen et al., 2011; Repo & Sajaniemi, 2015; Rose et al., 2014). Some measures taken to prevent peer bullying include methods such as organising seminars for students, parents and teachers, and directing potential bullies and victims to social-cultural activities (Aksoy, 2019).There are studies in which school-based intervention programs

containing games have been developed to prevent peer bullying behaviors (Clarkson et al., 2016; Kartal & Bilgin, 2007; Midgett & Doumas, 2016; Takış, 2006). In their study, Toraman et al. (2021) conducted a systematic review of school-based intervention programs for preventing peer bullying and concluded that education programs implemented in schools across different cultures and educational systems have been effective in preventing bullying behaviors. In their study, Karatas and Ozturk (2020) evaluated the effectiveness of a bullying prevention program developed in primary schools and concluded that the program was effective in reducing the proportion of students who were either bullies or victims of bullying. In this context, educational game activities implemented in schools are among the studies carried out to prevent peer bullying. Play is the most natural learning method with or without a specific purpose, with or without a specific purpose, with or without certain rules, affecting all areas of development of the child, involving the person willingly and with pleasure, with or without tools (Koçyiğit et al., 2007).

Children develop language skills by communicating with their peers, relax emotionally, control their emotional reactions, get away from their problems, develop feelings such as trust, love and admiration (MEB, 2020), relax both physically and spiritually, and thus develop psychologically as well as physically (Küçükibiş et al., 2022; Ulutaş, 2011). The fact that there is no grade anxiety in the physical education and game lesson enables the student to be more active in the lessons and to reveal his/her simplest form. In this way, the teacher has the opportunity to observe behaviours such as shyness, anger control, aggressive behaviours in the student and make the necessary intervention (Yücekaya et al., 2023). With the intervention programmes aimed to be implemented in physical education and game lessons, it is aimed to improve students' feelings and behaviours such as respecting other individuals, helping, developing self-control and leader skills, feeling belonging to their environment, being fair, etc., and to reduce and eliminate negative feelings and behaviours such as being stressed, anxious, swearing, resorting to violence, harassment and similar negative feelings and behaviours (Yücekaya et al., 2023).

Participation in sportive activities in physical education and game lessons improves cooperation and solidarity among children and increases awareness of obeying rules, sharing, helpfulness, and tolerance (Karafil et al., 2017). The physical education and game lesson aims to develop primary school students' physical, mental, personal, emotional, and social skills through play and participation in physical activities (MEB, 2020). The program contributes to the improvement of students' fundamental movement skills, healthy living habits, and social skills. In terms of the future mental health of the society, emotional sharing of children during play is of great importance (Koçyiğit et al., 2007). The age range of 6-12 years is considered a period in which emotionally significant relationships are formed, cognitive and emotional development reaches a certain level, emotions and behaviors are regulated, and peer groups are established (Kadim, 2023). Since children in this age group have not yet entered the complexities of adolescence, the effects of interventions such as play can be observed, and strategies for preventing peer bullying can be developed. During play, children experience situations such as decision-making, social interaction with other students and get to know themselves (Ayrancı & Aydın, 2022). One of the obstacles in front of the child's self-knowledge during play is peer bullying. Bullying behaviours affect the future of the student as well as shaping the future of the society. For this reason, it is important to increase studies to reduce peer bullying and contribute to the field. In general,

studies on preventing peer bullying have been carried out at kindergarten and high school levels, and studies at primary school level are limited. Studies conducted in the preschool period (Özen & Aslan, 2024; Yıldız et al., 2023) indicate that bullying behaviors are more physical and direct due to children's underdeveloped social skills. In middle school and high school, however, bullying (Aslan & Polat, 2023; Çakır, 2017; Polat & Sohbet, 2020) can manifest in more complex and relational forms. These differences necessitate the development of distinct intervention strategies for each age group. This study examined the effects of play on emotional states and peer bullying at the elementary school level.

In the light of this information, the aim of the study is to determine whether the game played in physical education and game lessons reduces peer bullying and to what extent it affects positive or negative emotional states in children. The study will seek to answer the question, "What is the effect of the games played in physical education and game lessons on peer bullying and emotional state in children?". Answers will also be sought for the sub-problems: “Is there a significant difference in students' pretest, posttest, and retention test scores on peer bullying and emotional state based on gender, participation in sports courses out side of school, and time spent on the internet?" As a result of the study, it is aimed to contribute to the studies to be carried out in schools to prevent peer bullying and to improve emotional states.

METHOD

Research Model

In this study, since the effect of the game played in physical education and game lessons on peer bullying and emotions in primary school students was examined, the research was designed in within-group experimental design. Within-group experimental design is also known as repeated measures design. These are the designs in which the same subjects are compared under different experimental conditions (Büyüköztürk et al., 2011).

Research Groups

The study group of the research consists of 4th grade students studying in primary schools affiliated to the Ministry of National Education in Tokat in the 2023-2024 academic year. The study group consists of a total of 19 students, 9 (47%) of whom are girls and 10 (53%) of whom are boys, determined by criterion sampling, one of the purposeful sampling methods. As the criteria for inclusion in the study group, it was taken into consideration that the participants were students at the specified age and grade level, that they volunteered to participate in the 8-week game activity and that the informed consent form was signed by their parents, that they did not have any physical or psychological health problems that would prevent them from participating in the game activity, and that they were capable of understanding and correctly Buffer in the peer bullying, game and emotion scales used in the study. As the criteria for exclusion of the participants from the study group; the presence of serious physical health problems (for example, serious musculoskeletal system problems) that may prevent them from participating in the game activity, the presence of psychological health problems at a level that cannot fulfil the mental and physical activities required by the game activity (for example, severe depression, anxiety disorder), not meeting the minimum participation rate determined during the game activity (for example 75%) were taken into consideration. While determining the sampling, since there was

no reference study in the literature for the study, the effect size was defined as medium level (0.50) according to Cohen et al. (2018), the power of the measurement tool was defined as the minimum reference value of 0.80 and the margin of error was defined as 0.05, and power analysis was performed with the Gpower 3.1 programme. Demographic findings about the participants are given in Table1.

Table 1. Demographic findings of the participants

Variables	Categories	N	%
Gender	Girl	9	47.4
	Boy	10	52.6
Participation in Sports Course Status	No Sport Course	10	52.6
	Sport Course Available	9	47.4
Online Time Spent	One Hour	9	47.4
	More than One Hour	10	52.6

Data Collection Tools

Personal Information Form, Peer Bullying Scale and Games and Emotions Scale for Childrenwere used to collect the data related to the study. Information about the measurement tools applied in the study is given under their titles.

Personal Information Form

In the personal information form, questions requiring a decision on whether the student should be included in the study, aside from demographic information (age, gender, etc.) such as serious musculoskeletal problems, psychological health issues that prevent fulfilling the mental and physical activities required by the game activity, etc., were answered by the student's guardian.

Peer bullying scale

The scale developed by Kutlu and Aydın (2010) to determine the bullying behaviours observed in children and adolescents' relationships with their peers consists of 19 items in 5-point Likert type. These 19 items are grouped into 3 subscales as neutral (buffer) items (4 items), victim items (8 items), bully items (6 items). Cronbach's alpha reliability coefficients of the subscales are .83, .86, and .70 for bully, victim, and buffer, respectively. In our study, Cronbach's alpha internal consistency coefficients of the subscales were calculated as .77 for buffer, .75 for victim, and .87 for bully. Examples of itemsforthesubdimensions of thescaleareprovidedbelow.

Neutral (buffer): *I like to sing.*
I like to participate in class activities.
Victim: *Other kids get angry/angry with me.*
Other kids spoil my game.
Bully: *I punch/hit other kids.*
I threaten other kids to do what I want.

Games and emotions scale for children

Ayrancı and Aydın (2022) adapted the "Games and Emotions Scale for Children (GES-C)" developed by Alcaraz-Muñoz et al. (2022) to Turkish culture in order to determine the emotional intensity and emotional experiences of students after the games they played. The measurement tool is capable of contributing to researchers, practitioners and teachers who investigate cognitive, affective and psychomotor skills of children aged 8-12 years in gamified learning

environments to determine the emotional intensity and experiences of students after learning and play activities. The scale consists of a total of 9 items rated on a 5-point Likert scale and two factors. When examining the distribution of the items according to the factors, the first factor consists of 4 items related to positive emotions (cheerful, happy, enjoyable, and passionate/enthusiastic), while the second factor consists of 5 items related to negative emotions (scared, sad, excluded, ashamed, and angry). When calculating the scale score, the average for each of the subscales is taken. After reliability and validity analyses, Cronbach's alpha internal consistency values of the scale consisting of9 items were calculated as .81 for the first factor including positive emotions and .76 for the second factor consisting of five items and including negative emotions. In our study, Cronbach's alpha internal consistency coefficients of the sub-scales were calculated as .71 for the positive emotion sub-scale and .77 for the negative emotion sub-scale.

The game applied to children in our research

The game played by children in the research is "Rusty Tag," one of the traditional children's games. The game was played during one lesson hour of physical education and games class every week. Before starting the game, the children were instructed to do warm-up exercises for 5-10 minutes. "Rusty Tag" is an offense game. The game was played in groups of 8-9 people, divided into two different playing fields (one group in one half of the carpet field, and the other group in the other half). Two "taggers" were selected from each group, and all students, except the taggers, wore vests. The taggers passed the ball between themselves and tried to touch the ball to their friends wearing vests. The student who was touched by the ball removed their vest and joined the taggers, and the game continued until the last student who was not touched by the ball remained. The tagger can take a maximum of three steps with the ball and must then throw the ball to the other tagger. Taggers using wheelchairs can hold the ball in their laps for a longer period. Initially, a basketball was used in the game. After playing with the same ball for two weeks, the game switched to a smaller ball, a soccer ball, and the game became more difficult by switching to a smaller ball every two weeks. After playing the game each week, the game was evaluated, and tactics related to the game were developed. Various rules, such as "the player who steps on the line or goes out of the line becomes the tagger" and "the student who wins the game becomes the tagger in the next game," were added to the game by the students. The "Rusty Tag" game helps students develop their motor skills by performing movements that require speed and agility, strengthening basic movement skills such as balance, quick direction changes, and running. It can also aid in the development of social skills like cooperation, teamwork, and role-sharing. The game enhances students' decision-making and strategic thinking abilities. By facing situations of success and failure in the game, students can improve their ability to manage emotional reactions and cope with stress.

Ethical Approval

Before the data collection process, permission was obtained from the ethics committee of Istanbul Topkapı University with number 2024/2 and date 05/03/2024. Informed consent was obtained from the school administration and parents before starting the research to include the students in the study. The purpose of the research was explained to the parents, data confidentiality was guaranteed, and it was clarified that participation in the study was voluntary. The students were informed that they could leave the activity at any time they wished.

Collection of Data

In the first stage, the Personal Information Form to be applied to the students was prepared. Necessary information was given to the parents and consent forms were obtained from the parents. The students were given the necessary information before the application, and before the game activities, the Personal Information Form and the Peer Bullying Scale were applied and pretest application was made and preliminary measurements were taken. In order to protect personal information, the students assigned themselves pseudonyms consisting of fruits and vegetables and filled in the scales with their pseudonyms throughout the measurements. After the preliminary measurements were taken, the "Rusty Tag" game was played with the students in the physical education and game lesson for eight weeks. After the game activity in the first week, the Games and Emotions Scale for Childrenwas administered. After the eight-week game activity was completed, the Peer Bullying Scale and the Games and Emotions Scale for Children were administered and posttest measurements were recorded. Four months after the end of the play activity, the Peer Bullying Scale and the Games and Emotions Scale for Childrenwere administered again to determine the Retention Test of the results of the experimental process and to understand whether there was a change in peer bullying and emotional states. The data obtained were transferred to SPSS programme.

Analysis of Data

Before the dataanalysis, the data were made ready for analysis. Firstly, missing data and erroneous data were checked for outliers. Then, the suitability of the data for normal distribution was analysed. Whether the data were normally distributed or not was analysed by considering the criterion of kurtosis-skewness coefficients being between -1 and +1 and it was determined that the data were normally distributed. Homogeneity of variance between groups was tested. After all the assumptions required for the analysis were met, one-way ANOVA for repeated measures, one-way ANOVA for independent samples and independent sample T test were applied in the data analysis.

FINDINGS

The results obtained as a result of one-way ANOVA for repeated measures in order to answer whether there is a significant difference between the pretest, posttest and retention test peer bullying scores of the game in physical education and game lesson are given in Table 2.

Table 2. ANOVA test results of students' pretest, posttest and retention test scores for peer bullying scale sub-scale scores

Sub-scales	Variance Source	Sum of Squares	Sd	Squares Mean	F	p	η^2	Significant Difference
Victim	Measurements	13.19	2	6.59	20.99	**.001***	.54	Pretest> Posttest
	Error	11.31	36	.31				
	Total	24.5	38	6.91				
Bully	Measurements	7.11	2	3.55	8.22	**.001***	.31	Pretest>Retention> Posttest
	Error	15.56	36	.43				
	Total	22.67	38	3.9				
Neutral (Buffer)	Measurements	1.91	2	.96	4.65	**.016***	.21	Posttest>Pretest
	Error	7.42	36	.21				
	Total	9.33	38	1.16				

***p<0.05**

According to the results of the analysis of whether the applied game changed the peer bullying sub-scale scores of the students, a statistically significant difference was found between the averages obtained from the victim sub-scale ($F_{(2,36)}$ = 20.99, p<.05, η^2= .54). When the eta square value is analysed, it is seen that the effect size is high. According to the results of multiple comparisons regarding the measurement of the differentiation, it was seen that there was a significant difference between the posttest and the pretest. Mean posttest score of being a victim (M=1.65) than the mean pretest score (M=2.49) was lower. This finding shows that there was a significant decrease in the first calculated victimisation scores of the students as a result of the game played.

A statistically significant difference was found between the averages obtained from the bully sub-scale ($F_{(2,36)}$ = 8.22, p<.05, η^2= .31). When the eta square value is analysed, it is seen that the effect size is high. According to the and retention test. Bully sub-scalepretest scores (M=2.33) posttest (M=1.15) and retention test scores (M=1.81) was higher; at the same time, it was concluded that the retention test scores were higher than the posttest scores. It is seen that the mean pretest score of being a bully is higher than the mean posttest score. This finding shows that there was a significant decrease in the first calculated bullying scores of the students as a result of the game played. At the same time, the fact that the mean score of the retention test was higher than the mean score of the posttest showed that the effect of the game decreased over time and the bullying behaviour increased again. Multiple comparison results, there was a significant difference between the pretest, posttest.

A statistically significant difference was found between the averages obtained from the neutral (buffer) sub-scale ($F_{(2,36)}$ = 4.65, p<.05, η^2= .21). When the eta square value is analysed, it is seen that the effect size is high. According to the results of multiple comparisons on which measurement the differentiation originated from, it was seen that there was a significant difference between the posttest and the pretest. The mean pretest score of being neutral (M=4.04) than the mean posttest score (M=4.47) was lower. This finding shows that there was a significant increase in the first calculated neutrality scores of the students as a result of the game played.

The results obtained at the end of the one-way ANOVA for repeated measures, which was conducted to find out whether there was a significant difference between the pretest, posttest and retention test scores for the sub-scale scores of the game and emotions scale, are given in Table3.

Table 3. ANOVA test results of pretest, posttest and retention test scores of students' games and emotions scale sub-scale scores

Sub-scales	**Variance Source**	**Sum of Squares**	**Sd**	**Squares Mean**	**F**	**p**	η^2
Positive	Measurements	.04	2	.02	.078	.93	.004
	Error	8.05	36	.22			
	Total	24.5	38	6.91			
Negative	Measurements	.31	2	.15	.467	.63	.025
	Error	11.85	36	.33			
	Total	22.67	38	3.99			

***p<0.05**

According to the results of the analysis of whether the applied game changed the sub-scale scores of the games and emotions scale of the students, no statistically significant difference was found between the averages obtained from the positive emotion sub-scale ($F_{(2,36)}$ =.078, p>.05, η^2= .004). When the eta square value is analysed, it is seen that the effect size is low. No statistically significant difference was found between the averages obtained from the negative emotion sub-scale ($F_{(2,36)}$ =.467, p>.05, η^2= .025). When the eta squared value is analysed, it is seen that the effect size is at a moderate level. This finding suggests that, as a result of the game-based intervention, there was no significant change in the initially measured positive and negative emotional states of the students over time.

The results obtained as a result of the independent sample T test, which was conducted to find out whether there was a significant difference between the students' peer bullying pretest - posttest - retention test scores according to gender, are given in Table 4.

Table 4. Independent sample T test results of peer bullying scale scores according to gender variable

Sub-scales	**Gender**	**N**	$\bar{\chi}$	**S**	**Sd**	**t**	**p**
Victim Pretest	Girl	9	2.42	.96	17	-.36	.72
	Boy	10	2.55	.64			
Victim Posttest	Girl	9	1.38	.44	17	-1.49	.15
	Boy	10	1.89	.94			
Victim Retention Test	Girls	9	2.31	.95	17	.30	.77
	Boy	10	2.18	.93			
Bully Pretest	Girl	9	2.02	1.18	17	-1.23	.24
	Boy	10	2.60	.87			
Bully Posttest	Girl	9	1.00	.00	17	-1.56	.14
	Boy	10	1.28	.55			
Bully Retention Test	Girl	9	1.67	.89	17	-.83	.44
	Boy	10	1.93	.46			
Buffer Pretest	Girl	9	4.06	.90	17	.08	.94
	Boy	10	4.03	.70			
Buffer Posttest	Girl	9	4.64	.59	17	1.14	.27
	Boy	10	4.33	.61			
Buffer Retention Test	Girl	9	4.50	.87	17	.77	.45
	Boy	10	4.23	.68			

***p<0.05**

As a result of the examination of the students' peer bullying scale sub-scales pretest, posttest and retention test scores according to gender, no statistically significant difference was found between the averages of girls and boys (p>.05).

The results obtained as a result of the independent sample T test, which was conducted to find out whether there was a significant difference between the students' games and emotions scale sub-scalepretest-posttest-retention test scores according to gender, are given in Table 5.

Table 5. Independent sample T test results of game and emotion scale subscale scores according to gender variable

Sub-scales	Gender	N	$\bar{\chi}$	S	Sd	t	p
Positive Pretest	Girl	9	4.28	.81	17	-.76	.46
	Boy	10	4.50	.44			
Positive Posttest	Girl	9	4.64	.49	17	1.12	.28
	Boy	10	4.28	.86			
Positive Retention Test	Girl	9	4.56	.583	17	.91	.38
	Boy	10	4.25	.84			
Negative Pretest	Girl	9	1.42	.52	17	-1.44	.17
	Boy	10	1.92	.91			
Negative Posttest	Girl	9	1.56	.62	17	-.15	.89
	Boy	10	1.60	.70			
Negative Retention Test	Girl	9	1.62	.78	17	-.69	.50
	Boy	10	1.88	.84			

***p<0.05**

As a result of the examination of the pretest, posttest and retention test scores of the students' games and emotions scale sub-scales according to gender, no statistically significant difference was found between the averages of girls and boys (p>.05).

The results obtained as a result of the independent sample T test conducted to find an answer to whether there is a significant difference between the pretest, posttest and retention test scores of the students' peer bullying sub-scales according to their participation in out-of-school sports courses are given in Table 6.

Table 6. Independent sample T test results of peer bullying scale scores according to the variable of participation in sports courses outside school

Sub-scales	Sport Course	N	$\bar{\chi}$	S	Sd	t	p
Victim Pretest	None	10	2.34	.78	17	-.87	.40
	There is	9	2.65	.79			
Victim Posttest	None	10	1.56	.67	17	-.48	.64
	There is	9	1.74	.91			
Victim Retention Test	None	10	2.01	.92	17	-1.14	.27
	There is	9	2.49	.89			
Bully Pretest	None	10	2.08	1.10	17	-1.07	.30
	There is	9	2.59	.97			
Bully Posttest	None	10	1.22	.53	17	.75	.47
	There is	9	1.07	.22			
Bully Retention Test	None	10	1.72	.73	17	-.59	.57
	There is	9	1.91	.68			
Buffer Pretest	None	10	2.34	.78	17	-.67	.52
	There is	9	2.65	.79			
Buffer Posttest	None	10	1.56	.67	17	-.36	.72
	There is	9	1.74	.91			
Buffer Retention Test	None	10	2.01	.92	17	-1.42	.17
	There is	9	2.49	.89			

***p<0.05**

As a result of examining the pretest, posttest and retention test scores of the students' peer bullying scale sub-scales according to the variable of participation in out-of-school sports courses, no statistically significant difference was found between the averages of students who participated in out-of-school sports and those who did not (p>.05).

The results obtained as a result of the independent sample T test conducted to find an answer to whether there is a significant difference between the pretest - posttest - retention test scores of the students' games and emotions scale sub-scales according to their participation in a sports course outside the school are given in Table 7.

Table 7. Independent sample T test results of games and emotions scale sub-scale scores according to the variable of participation in sports courses outside school

Sub-scales	Sport Course	N	$\bar{\chi}$	S	Sd	t	p
Positive Pretest	None	10	4.30	.76	17	-.68	.51
	There is	9	4.50	.47			
Positive Posttest	None	10	4.20	.81	17	-1.67	.12
	There is	9	4.72	.49			
Positive Retention Test	None	10	4.20	.86	17	-1.25	.23
	There is	9	4.61	.50			
Negative Pretest	None	10	2.04	.90	17	2.37	**.03***
	There is	9	1.29	.32			
Negative Posttest	None	10	1.80	.78	17	1.66	.12
	There is	9	1.33	.35			
Negative Retention Test	None	10	1.84	.86	17	.46	.65
	There is	9	1.67	.77			

***p<0.05**

As a result of examining the pretest, posttest and retention test scores of the students' games and emotions scale sub-scales according to the variable of participation in out-of-school sports courses, no statistically significant difference was found between the averages of the students who participated and did not participate in out-of-school sports, except for the negative emotion pretest mean score (t= 2.372, p<.05).

The results obtained as a result of the independent sample T test, which was conducted to find out whether there was a significant difference between the students' peer bullying pretest - posttest - retention test scores according to the daily time spent on the Internet, are given in Table 8.

Table 8. Independent sample T test results of peer bullying scale sub-scales scores according to the variable of daily time spent on the internet

Sub-scales	Daily Time Spent on the Internet	N	$\bar{\chi}$	S	Sd	t	p
Victim Pretest	One Hour	9	2.38	.90	17	-.58	.57
	More than One Hour	10	2.59	.69			
Victim Posttest	One Hour	9	1.56	,47	17	-.47	.65
	More than One Hour	10	1.73	.99			
Victim Retention Test	One Hour	9	2.14	.78	17	-.43	.67
	More than One Hour	10	2.33	1.06			
Bully Pretest	One Hour	9	1.63	.63	17	-3.52	**.00***
	More than One Hour	10	2.95	.95			
Bully Posttest	One Hour	9	1.06	.17	17	-.94	.36
	More than One Hour	10	1.23	.55			
Bully Retention Test	One Hour	9	1.56	.51	17	-1.56	.14
	More than One Hour	10	2.03	.78			
Buffer Pretest	One Hour	9	3.78	.87	17	-1.43	.17
	More than One Hour	10	4.28	.64			
Buffer Posttest	One Hour	9	4.39	.57	17	-.57	.58
	More than One Hour	10	4.55	.65			
Buffer Retention Test	One Hour	9	4.11	.84	17	-1.35	.20
	More than One Hour	10	4.58	.66			

***p<0.05**

As a result of examining the pretest, posttest and retention test scores of the students' peer bullying sub-scales according to the variable of time spent on the internet per day, no statistically significant difference was found between the averages of the students who spent one hour or more on the internet in the victim and neutral (buffer) sub-scales (p >.05). However, in the sub-scale of being a bully, it was concluded that there was a significant difference in favour of the students who spent more than one hour on the internet daily in the pretest measurements (t= -3.52, p< .05). It is seen that the bullying levels of the students who spend more than one hour on the internet daily before the game are higher than the students who game for one hour a day, and the bullying levels after the game do not differ according to the time spent on the internet in the posttest and retention measurements. In other words, it is seen that the game reduces peer bullying in individuals who spend more time on the internet (p>.05).

The results obtained as a result of the independent sample T test conducted to find an answer to whether there is a significant difference between the pretest, posttest and retention test scores of the sub-scales of the game and emotion scale according to the daily time spent on the internet are given in Table 9.

Table 9. Independent sample T test results of game and emotion scale sub-scales scores according to the daily time spent on the internet variable

Sub-scales	Daily Time Spent on the Internet	N	$\bar{\chi}$	S	Sd	t	p
Positive Pretest	One Hour	9	4.22	.78	17	1.14	.27
	More than One Hour	10	4.55	.45			
Positive Posttest	One Hour	9	4.33	.70	17	-.65	.53
	More than One Hour	10	4.55	.75			
Positive Retention Test	One Hour	9	4.19	.65	17	1.15	.27
	More than One Hour	10	4.57	.78			
Negative Pretest	One Hour	9	1.64	.68	17	-.21	.84
	More than One Hour	10	1.72	.88			
Negative Posttest	One Hour	9	1.62	.71	17	.27	.79
	More than One Hour	10	1.54	.61			
Negative Retention Test	One Hour	9	1.64	.75	17	-.58	.57
	More than One Hour	10	1.86	.86			

***p<0.05**

As a result of examining the pretest, posttest and retention test scores of the students' sub-scales of the game and emotion scale according to the time spent on the internet per day variable, no statistically significant difference was found between the averages of the students who spent one hour or more on the internet (p>.05).

DISCUSSION and CONCLUSION

When the findings obtained in the study were examined, there was a significant difference between pretest, posttest and retention test in the sub-scales of peer bullying. According to the measurements, being a bully was high in the pretest measurement, being a bully was low in the posttest measurement, low in the follow-up measurement, but slightly higher than the posttest measurement. It was concluded that there was a significant decrease in peer bullying as a result of the 8-week educational game activity after the pretest measurement. However, an increase in

peer bullying was observed again in the four months after the educational game activity. The effect of the game on reducing peer bullying decreased. Based on the findings, it can be said that playing games reduces children's tendency to show bullying behaviour. In the victimisation sub-scale, while the students' victimisation levels were high before the game, it was observed that the level of victimisation decreased in the post-game measurements. In the neutral (buffer) sub-scale, the average of the students who were neutral before the game increased after the game. When the literature is examined, Arslan and Akın (2016) found a significant difference between the mean scores of peer bullying in the pretest, posttest and follow-up measurements in the experimental and control groups. These findings coincide with the findings of our study. Mancilla-Caceres et al. (2014) developed a new computer game-based method to examine peer aggression and victimisation in classrooms and revealed that aggressive individuals use various strategies in the game with different levels of success. Moazen and Zarech (2016), in their study to design educational games based on the concept of respect and to examine the effectiveness of these games in reducing physical bullying levels of primary school students, revealed that respect-based games are an effective strategy in preventing physical bullying in students. Kriglstein et al. (2020), in their study in which they developed two educational game prototypes that put them in the role of an observer in order to raise awareness about the consequences of bullying among adolescents, concluded that students who were victims of bullying were willing to talk about their feelings, share their experiences and were not afraid to seek help after the game. Different from the findings of our study, Kolic-Vehovec (2019) conducted an experimental study with 345 students between the ages of 12 and 14 to improve bystanders' helping behaviours in bullying situations. In an experimental study consisting of one experimental group and two control groups, no difference was observed in students' bullying situations after playing the game. This information shows that the initial success of educational games in changing children's bullying behaviors faces challenges in terms of sustainability after a certain period. It can be said that educational games are effective in the short term in reducing bullying and victimization, but it is uncertain whether this effect continues in the long term.

When the other findings of the study were analysed, it was concluded that negative and positive emotional states did not differ before and after the game. Game learning is an innovative strategy that encourages students to actively participate and develop their emotions (Jabbar & Felicia, 2015) and the reason for this is stated to be reward and feedback (Sadler et al., 2013). Positive emotions can encourage effort and Retention Test in the game, while negative emotions such as sadness, anxiety, frustration, and boredom can reduce engagement in the game (Pekrun et al., 2007). In addition, game and task difficulties may be perceived differently by each student. Excessive difficulty in the game may create a preventive effect instead of encouraging participation (Ke & Abras, 2013). Students may be disappointed when they make mistakes in the game or rejoice when they succeed. Therefore, it can be said that students experience distinctly positive and negative emotions with games. Students' emotions may change over time as the novelty of the game decreases and after playing a few games, or the effect may decrease. Therefore, it is important to consider whether the games actually maintain their effects and results over time (Jabbar & Felicia, 2015). In the light of this information, in our study, it can be said that the fact that the students played the same game for a long time due to their developmental periods caused them to get bored. In addition, it can be said that the game is not at a level of difficulty that will change the emotional states of the students. Çil and Sefer (2021) concluded in

their research that children get bored when they play the same games all the time and want to play different types of games.

As another finding of our study, when peer bullying was analysed according to gender, no significant difference was found between the averages of boy and girl students. Gender norms are defined by society as social expectations for appropriate behaviours for men and women (Hellström & Beckman, 2020). These gender norms often guide actions in society, school, sports clubs, or any other environment where young girls and boys are present. Boys and girls worry, react and experience differently when they face problems with the norms of society (Hellström & Beckman, 2020). When bullying is considered as a strong social control process, bullies may seek power and leadership in the peer group. In the sample of our study, it can be said that girls and boys have similar experiences and leadership characteristics against peer bullying. When the literature is examined, similar to the findings of our study, Kshirsagar et al. (2007) found no significant difference in the bullying of girl students compared to boys students. Hartati et al. (2020), in their study, stated that although there was no relationship between bullying behaviours and gender, boys were more likely to engage in physical bullying. There are other studies that support the findings of our study (Ural et al., 2022). Unlike the findings of our study, there are studies indicating that boys students are more likely to be bullies and victims than girl students (Totan & Kabakçı, 2010). Craig et al. (2009) compared the rates of bullying and victimisation by age between boys and girls in 40 countries and concluded that boys are bullied more than girls. Casper and Card (2017) revealed in their study that boys were more significantly victimised (directly, physically) than girls. In a meta-analysis study conducted by Cook et al. (2010), it was found that boys were more likely to be bullies than girls in gender and bully, victim and bully/victim roles. Gender norms may play an important role in the formation and transmission of bullying behaviors, but these findings indicate that gender alone is not a decisive factor in determining the intensity or frequency of bullying. This suggests that bullying is influenced by many other factors, such as social pressures, group dynamics, and individual characteristics, independent of gender. The impact of gender should be considered within a broader social context, interacting with other societal factors. Therefore, although differences may exist in the bullying experiences of boys and girl students, these differences are generally shaped by specific social structures and norms.

As another finding of our study, it was concluded that the pretest, posttest and retention test scores of students' emotional states did not differ according to gender. Regardless of gender, it is stated that regulation of emotions is related to social competence and students with social competence are children who can control emotions during play (Fabes et al., 1999). It has been stated that students who cannot cope with their negative and intense emotions exhibit more aggressive behaviours (Eisenberg, 2000). In our study, it can be said that the game did not make a difference in the social competences of the students to regulate their emotions and they were able to control their emotions in a similar way. Unlike the findings of our study, there is a predominance in boys in terms of negative relationship with peers, lack of sharing their feelings and tendency to bullying (Uğurlu et al., 2020). In Turkish culture, boys are supported in exhibiting more aggressive behaviours, while girls are more often left behind and passive. This causes boys students to exhibit the violent behaviours they have learned from their role models during socialisation against their peers (Atik & Kemer, 2008). The results obtained indicate that

emotional regulation is associated with social competence, and that students, regardless of gender, are able to control their emotions in a similar way. This suggests that the development of students' social and emotional skills shapes in similar ways, independent of gender norms and societal expectations. Additionally, in Turkish culture, the tendency for boys to display more aggressive behaviors reflects how socialization processes reinforce these behaviors, indicating that boys may be more prone to peer bullying in this context. These findings highlight that bullying is not solely a gender-related issue but should be considered within a broader societal framework.

It was found that peer bullying and emotional states of students did not differ according to their participation in sports outside of school. In sports environments, peer bullying levels vary according to the type of sport and participant role. High competition environments in sports, negative effects of coaches, lack of supportive club culture and problems in locker rooms may create more favourable conditions for bullying. In our study, the fact that the participation of the students in a sports course outside of school did not cause a change in peer bullying and emotional state can be explained by the continuation of the level of being a bully or victim in the course environment. When the literature is examined, it has been observed that team athletes have less depressive findings compared to individual athletes and individuals who do not do sports. In addition, thanks to team games, it is observed that multidimensional thinking, problem solving ability, positive interaction capacity increase benefits (Canan & Ataoğlu, 2010). There are studies indicating that games played in physical education and games lessons give happiness and develop positive emotions (Temel & Güllü, 2016; Yılmaz & Güven, 2015). Different from the findings of our study, Kazancı and İlci (2018) examined peer bullying in primary school second level students and found that peer bullying was higher in favour of those who were not licensed athletes according to the students' sporting status. Similarly, Coşkungönül (2020), in his study investigating the effect of sports participation on peer bullying, concluded that sedentary people were more likely to be bullied than active athletes. The literature indicates that team sports lead to more positive social and emotional outcomes compared to individual sports and those who do not participate in sports. However, it appears that extracurricular sports classes do not have a sufficiently strong impact in terms of social interaction and group dynamics. This suggests that the positive effects of sports may depend not only on the type of sport but also on the context of participation and environmental factors.

According to peer bullying and emotional state, no statistically significant difference was found between the averages of the students who spent one hour or more on the Internet in the sub-scales of victim, neutral (buffer), positive emotion and negative emotion, but in the sub-scale of being a bully, it is seen that the students who spent more than one hour on the Internet daily were more bullying before the game, and their bullying levels decreased in the posttest and retention measurements after the game. Regardless of the time spent on the Internet, it can be said that even the short time students spend on the Internet causes bullying. According to the findings obtained from some studies, a significant relationship was found between peer bullying and virtual addiction (Hazar & Ekici, 2021; Hesapçıoğlu & Yeşilova, 2020). Sipahi et al. (2019) concluded in their study that there is an increase in bullying behaviours in students who spend excessive time on the internet and computer games. It was observed that excessive use of social media affects aggression, and it was stated that children who spend most of their time with virtual

games and social media face problems in their social/emotional development (Harman et al., 2005). Excessive use of social media, which has an impact on the development and socialisation of children, can become harmful habits in the following years and affect the daily lives and behaviours of children and young people (Adelantado -Renau et al., 2019). It has been reported that students who spend excessive time on computer games have retarded social development, low school grades, low self-confidence, increased bullying behaviours, and increased anxiety levels (Sipahi et al., 2019). Peker (2015), in his study to analyse the risk factors predicting the cyberbullying status of secondary school students, stated that as the time the child spends on the internet increases, the risk of being a bully increases. Similarly, Gísladóttir (2016) found that adolescents who use the internet for 8 hours or more per week are more likely to be bullies. The literature indicates that excessive internet use and virtual addiction are linked to an increase in bullying behaviors (Hazar & Ekici, 2021; Hesapçıoğlu & Yeşilova, 2020; Sipahi et al., 2019). This suggests that virtual worlds may negatively impact students' social development, and that limiting internet use could be an important factor in reducing its negative effects on social and emotional development. Therefore, it can be inferred that educational policies and family support aimed at monitoring and guiding students' internet usage should be strengthened.

Recommendations

In accordance with the findings of the study, it can be concluded that educational games implemented in schools can be effective in reducing peer bullying in the short term; however, the sustainability of these effects in the long term may be weak. Therefore, to enhance the effectiveness of educational games, it is recommended to focus more on the content and frequency of game implementation. Additionally, integrating more specific strategies within the games aimed at developing students' emotional and social skills could yield more lasting results in preventing bullying behaviors.

It is important for games organized in schools to support students in developing empathy, enhancing emotional regulation skills, and engaging in healthy social interactions. In this context, providing awareness-raising training for teachers and educators regarding bullying prevention can increase the effectiveness of game-based interventions. Furthermore, the games should be planned not only as teacher-directed activities but also as group games in which students actively participate.

The findings suggest that internet usage may increase peer bullying and negatively affect students' social and emotional development. Therefore, greater control over students' internet usage by families and teachers could help limit the time students spend in the virtual world and allow for the development of their social skills. Providing digital literacy education in schools could help students navigate their internet use in a healthier way.

Moreover, it appears that game-based intervention programs should be customized to each student's developmental level and age. It should be emphasized that while games can be an effective tool at the elementary school level, they need to be diversified in accordance with students' developmental stages. Future studies could compare the effectiveness of similar educational game applications for different age groups, providing more comprehensive data.

Finally, adopting an approach that supports children's emotional and social development in both schools and families can create long-term effects in reducing peer bullying. Developing a conscious attitude toward peer bullying will not only be possible through game-based interventions but also through broader social-psychological education programs implemented in schools.

Conflicts of interest: There is no financial or personal conflict of interest within the scope of the research.

Authors' Contribution: Research Design-ZT, Bİ; Data Collection- Bİ; statistical analysis-ZT, Bİ; Preparation of the article, ZT,Bİ.

Ethical Approval
Ethics Committee: İstanbul Topkapı Scientific Research and Publication Ethics Committee
Date/Protocol number:05.03.2024, 2024/2

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Spor Bilimleri Araştırmaları Dergisi
Journal of Sport Sciences Research
Vol: 10, Issue: 1, 2025
E-ISSN: 2548-0723
URL: http://www.dergipark.org.tr/jssr

Children with Autism Spectrum Disorders' Use of Mobile Applications and Potential Interest in Digital Games

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Research Article
Received: 01.11.2024 Accepted: 28.02.2025 **DOI: 10.25307/jssr.1577685**
Online Published: 28.02.2025

Abstract

This study aims to examine the impact of these tools on children with Autism Spectrum Disorder (ASD) from the perspectives of parents and sports educators by examining in depth the use and purposes of mobile applications and digital games by children diagnosed with ASD. This study was conducted using phenomenology design, one of the qualitative research methods. The participants, determined by criterion sampling method from the purposive sampling method, consisted of parents of children with ASD and sports educators. Data was collected through semi-structured interviews, and data saturation was reached with eight parents and nine sports educators. The data were analyzed by constant comparative content analysis. The findings of the study show that children with ASD have a high interest in digital games and that this interest should be directed in a positive direction. While parents stated that their children generally use general-purpose applications, sports educators emphasized that the interest of children with ASD in digital games has increased with the impact of the digital age. All participants stated that digital games should be individualized and educationally focused. The importance of controlled use of digital games while contributing to social, academic and motor skills was emphasized. As a conclusion, the interest of children with ASD in digital games should be carefully guided. Individualized designs can support their development. Mobile platforms are becoming critical with ease of access and education-oriented content. Therefore, it is recommended to develop strategies for safe and controlled use.
Keywords: Autism Spectrum disorder, Digital games, Mobile application

Otizm Spektrum Bozukluğu Tanısı Almış Çocukların Mobil Uygulama Kullanımı ve Dijital Oyunlara İlgi Potansiyeli

Öz

Otizm Spektrum Bozukluğu (OSB), sosyal iletişimde bozulmalar ve tekrarlayıcı davranışlarla karakterize edilen nörogelişimsel bir bozukluktur. OSB'li bireylerin gelişimlerini desteklemek amacıyla eğitim ve terapi süreçlerinde dijital oyunlar ve mobil uygulamalar giderek daha fazla kullanılmaktadır. Bu teknolojiler, özellikle sosyal, bilişsel ve motor becerileri destekleme potansiyeline sahiptir. Bu çalışmanın amacı, OSB tanısı almış çocukların mobil uygulama ve dijital oyunları kullanım durumlarını ve amaçlarını derinlemesine inceleyerek, bu araçların OSB'li çocuklar üzerindeki etkisini veliler ve spor eğitimcilerinin bakış açısıyla incelemektir. Bu çalışma, nitel araştırma yöntemlerinden fenomenoloji deseni kullanılarak gerçekleştirilmiştir. Amaçlı örnekleme yönteminden ölçüt örnekleme yöntemi ile belirlenen katılımcılar, OSB'li çocuklara sahip veliler ve en az iki yıl OSB'li çocuklarla çalışan spor eğitimcilerinden oluşmaktadır. Veriler, yarı yapılandırılmış görüşmelerle toplanmış, 8 veli ve 9 spor eğitimcisi ile veri doygunluğuna ulaşılmıştır. Sürekli karşılaştırmalı içerik analizi ile incelenmiştir. Araştırma bulguları, OSB'li çocukların dijital oyunlara olan ilgisinin oldukça yüksek olduğunu ve bu ilginin olumlu yönde yönlendirilmesi gerektiğini göstermektedir. Veliler, çocuklarının genellikle genel amaçlı uygulamalar kullandığını belirtirken, spor eğitimcileri OSB'li çocukların dijital oyunlara ilgisinin dijital çağın etkisiyle arttığını vurgulamıştır. Tüm katılımcılar, dijital oyunların bireyselleştirilmiş ve eğitim odaklı olması gerektiğini belirtmiştir. Dijital oyunların sosyal, akademik ve motor becerilere katkı sağlarken kontrollü kullanılmasının önemi vurgulanmıştır. Sonuç olarak, OSB'li çocukların dijital oyunlara ilgisi dikkatle yönlendirilmelidir. Bireyselleştirilmiş tasarımlar gelişimlerini destekleyebilir. Mobil platformlar, erişim kolaylığı ve eğitim odaklı içerikleriyle önemli bir ihtiyaç haline gelmektedir. Bu nedenle, güvenli ve kontrollü kullanım için stratejiler geliştirilmesi önerilmektedir.
Anahtar kelimeler: Otizm, Spektrum bozukluğu, Dijital oyunlar, Mobil uygulama

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INTRODUCTION

Autism Spectrum Disorder (ASD) is a neurodevelopmental disorder for which there is currently no effective treatment and is characterized by impairments in social communication and repetitive behaviors (Lord et al., 2020). This growth begins with changes in social permissions and prolonged changes in language characteristics (Lord et al., 2020). According to research, the time, experience, and money that families of children with ASD spend on it over the years indicate a severe financial burden on both families and society (Liu & Shen, 2023). For example, the estimated total (personal and societal) lifetime cost of supporting an autistic person without an intellectual disability is 1.4 million US dollars (Rogge & Janssen, 2019). Recent studies show that the global prevalence of ASD is significantly increasing. In the United States (US), according to the 2020 system of the Centers for Disease Control and Prevention, approximately 1.68% of children are estimated to have an ASD diagnosis (Centers Disease Control and Prevention, 2022; Hodges et al., 2020). Recent studies reveal that the prevalence of ASD has increased by 0.6% globally (Salari et al., 2022). With this increase, technological procedures and (Çakıl & Piyal, 2023) digital games (Atherton & Cross, 2021; Tsikinas & Xinogalos, 2019) are increasingly preferred by researchers and experts as an effective intervention for the prevention and treatment of ASD. In the literature, the high prices of traditional education methods and the inability of ASD patients to gain the necessary storage in this region have become critical in the education and daily lives of these countries in the technological country. Especially during the COVID-19 pandemic, access to technological education options such as tablets, has become inevitable (Cebeci & Yenen, 2022; Chen et al., 2020). While the pandemic process has seriously affected the living order all over the world, the closure of many educational centers for children with ASD has led to these children being deprived of the educational programs and exercises they regularly attend (Chen et al., 2020). This has increased the risk of diabetes, obesity and heart disease in individuals with ASD, as physical activity levels remain low (Parsons et al., 2024; Van Lerberghe, 2008). In addition, the gap created for students who stayed away from the traditional education environment was rapidly filled with distance education and online education processes came into play (Yılmaz et al., 2022). For this reason, digital game programs have been developed that minimize face-to-face intervention. For example, The Ministry of National Education offers a total of 55 game activities under 11 main categories in its mobile application named 'Özelim Eğitimdeyim' to support students and parents in the field of special education (Milli Eğitim Bakanlığı, 2020).

In literature, many researchers have given importance to web-based physical activity interventions that offer advantages such as high efficiency, easy applicability, low cost, and no regional limitations (Esentürk & Yarımkaya, 2021; Lindgren et al., 2016; Liu & Shen, 2023; Yarımkaya et al., 2023), and various types of gamified education via mobile applications. For example, Hanaylı et al. (2015) designed an “Android Application for Improving Social Skills of Children with Autism”. The authors reported that the burden of individuals caring for children with ASD was also relieved through the application. Yaman (2018) also developed a mobile application for teaching mathematics to children with ASD and concluded that the mobile application was influential in developing mathematics skills in children with ASD. Papoutsi et al. (2018) examined mobile applications to improve emotional intelligence in ASD, and the authors stated that mobile applications can create new options and opportunities for programmers to create innovative teaching content suitable for different student groups and

learning styles. Özcan et al. (2022) addressed fundamental issues, including first aid, within the scope of a game-based augmented reality application. They reported that a single type of approach is not suitable for children with ASD. Penev et al. (2021) developed a mobile game platform to improve social communication among autistic children. The study results showed that the mobile game "GuessWhat" offers a feasible approach to the effective treatment of autism and supports the possibility of using the game in natural environments to increase access to treatment, especially when there are barriers to care. Recent studies have also shown that mobile applications have increased and offer various suggestions on how these applications can be used more effectively for individuals with ASD. Rehman et al. (2021) suggested developing mobile applications with progress tracking, personalized content presentation, automatic reasoning, image recognition, and natural language processing technologies. They also stated that application accessibility and individualized support are key elements supporting the development of children with ASD. In this regard, Jaramillo-Alcázar et al. (2022) proposed a mobile application method for individuals with ASD; they reported that applications for various areas such as communication and language, emotions and social behaviors, games and entertainment, and support tools have great potential for children with ASD and can make significant contributions to their education and development processes. In addition, Moraiti et al. (2023) argue that such applications can potentially strengthen areas where autistic individuals are lagging.

Looking at the sample applications in the literature review studies, it is seen that various applications developed for communication, education and emotional development aim to support the skills of individuals with autism. Proloquy4Text and Proloquo2Go enable text-based and visually supported communication, while Assistive Express facilitates communication with symbols. Avaz FreeSpeech enables individuals with speech difficulties to form grammatically appropriate sentences. Apps such as Keeble, which supports social skills development, and Choiceworks, which facilitates planning daily routines, encourage individuals to lead a structured life. Miracle Mode improves cognitive and motor skills by offering therapeutic support. FlummoxVision and Injini, targeting visual processing difficulties, are digital storytelling apps that develop creative expression skills. Pictello supports activities of daily living. Emergency Chat, which provides fast communication in emergencies, and Autism Apps, which brings together various autism-related applications, offer digital resources that users need (Moraiti et al., 2023). Vale-Emotions (Olmedo-Vizueta et al., 2017), which improves emotional recognition skills, and BUITTIS, Numbers and Counting, Learn with Rufus and Mental Imagery Therapy for Autism (MITA) applications that support cognitive development aim to increase the academic and cognitive skills of individuals with autism (Aziz et, al., 2019). In addition, robot-assisted therapy studies improve the cognitive and social skills of individuals with autism on mobile and web-based platforms (Ilijoski et al., 2022).

In order to effectively develop educational and therapy strategies for ASD, it is of great importance to understand and support how children with ASD can learn and develop through digital tools and games, especially considering the culture they live in. The opinions of parents and sports educators about these technologies can determine their roles and participation in their children's use of technology. The aim of this study is to examine in depth the use of mobile applications and digital games by children diagnosed with ASD and to explore the

effects of these tools on children with ASD from the perspective of parents and sports educators. The findings may help parents and educators understand how to use technology more efficiently in the education of children with ASD. This may contribute to the development of more effective strategies for the overall development of children with ASD.

METHOD

Research Model

In this study, phenomenological design, one of the qualitative research methods, was used to examine the experiences of parents and sports educators regarding the use of mobile applications and interest in digital games of children with ASD in detail and depth. In this way, it will enable us to understand what mobile applications and digital games mean to children with ASD from the perspective of families and sports educators of children with ASD, the reactions of children with ASD to digital games and mobile applications, their usage habits, the difficulties they experience and their positive and negative experiences (Yıldırım & Şimşek, 2013, pp. 78-79).

Study Group

In phenomenological studies, the most valid source of information about reality is individuals who directly experience the experience. For this reason, the criterion sampling method, one of the purposeful sampling methods, was used in the selection of the study group of the research (Yıldırım & Şimşek, 2013, p.140). The criteria for being selected as a participant are being a parent of a child with autism, and their child is between the ages of 6-12 (when the literature is examined, it was seen that digital technologies are applied between the ages of 6-12). Another data source is sports educators. Sports educators should have provided sports education to children with ASD for at least 2 years, actively work in an institution, and work with the 6-10 age group with ASD (Barrios-Fernández et al., 2022; Macoun et al., 2022; Rafiei-Milajerdi et al., 2020). The names of the parents (8 parent participants) and sports educators (9 participants, sports education experts) participating in the research were concealed, and code names were given to the participants according to ethical rules. The parents' ages participating in the research ranged from 35 to 58. Their educational backgrounds are primary school (2), high school (3), and undergraduate (3). Family incomes are middle (5) and upper level (3). Children with ASD receive sports education for at least 2 years and a maximum of 10 years. The ages of sports educators vary between 30 and 45. Their working periods are 3 to 15 years. Their education level is undergraduate.

Data Collection Tools

This study used a semi-structured interview form to collect data from parents and sports trainers. In this way, the participants' perspectives, experiences, and opinions were presented in detail (Yıldırım & Şimşek, 2013, p. 155). First, a literature review was conducted on the subject, and a semi-structured interview form was created based on the information obtained. To ensure the content and scope validity of the form, the prepared form was presented to three experts for their opinions. Then, three pilot interviews were conducted, with each data source, and the semi-structured interview forms were finalized. Sample questions for parents are as follows: Do you use technology tools to support your child's development? What do you think

about your child's interest in technology, and their ability to use technology? (Is there a digital game or similar activity they use?) How do you think your child benefits from existing digital games, and applications? What types of games or applications interest them? What kinds of applications do you think your child can benefit from to support their physical, cognitive, and emotional development? Sample questions for sports educators are as follows: What are your observations about children's interest in digital games? What are the behaviors that children exhibit while playing games, do you believe that these applications are suitable for children's physical activities? Why? Do you think offering digital games through a mobile application would be beneficial?

Data Collection

Data was collected by two researchers in this research. Special education and rehabilitation centers in different cities in Turkey were reached via e-mail, and information about the research was provided. In addition, a special children's festival was held in Istanbul, and volunteer parents of children with ASD and sports education experts (suitable for criterion sampling) were interviewed. Individual interviews lasted an average of 45-55 minutes and were recorded with the parents' approval. Data saturation was reached with eight parents and 9 sports trainers.

Data Analysis

The responsible researcher transferred the raw data obtained to the electronic environment. Two researchers deciphered the data and read until familiarity with it was gained, then coded and categorized it. Codings between experts showed 0.85 agreement. Accordingly, 0.70 and above is accepted as indicating excellent agreement and acceptable reliability (Yıldırım & Şimşek, 2013, p. 265). It was analyzed using the constant comparative content analysis method. Because the themes were created by comparing the opinions of parents and sports trainers (Yıldırım & Şimşek, 2013, p. 260), in this direction, three main themes emerged: (1) Child's use of mobile applications and interest in digital games, (2) Expectations and observed behaviors regarding children's gains from digital games, (3) Necessity of a mobile application including a digital game program.

FINDINGS

Children's Mobile Application Use and Interest in Digital Games

Findings Obtained from Parents

According to the data obtained, all participating parents stated that their children with ASD are highly interested in and enjoy digital games. However, they said that there is no specific application suitable for children with ASD and that they generally use general-purpose applications. Parents indicated that their children use technology on platforms such as YouTube for cartoons, Keloğlan, Pepe, Fox, Mario, football manager games, sports-themed games, jumping games, puzzles, songs, music, dance, two-player games, and video recording. Parents stated that their children also enjoy watching the TRT-Çocuk channel. They also said they support their children using technology for reasons such as the pandemic, limited access to sports education, fatigue, inability to spare time for themselves, saving time, keeping their children entertained, and supporting their education. Some parent opinions are as follows:

P1: There is no application specific to individuals with autism that is game-oriented and has customizable features, or if there is, I don't know about it. Since schools were closed during the pandemic, my child uses his phone a little more. He usually plays games on his phone and also uses YouTube. He enjoys it.

P2: I noticed for the first time that my child saves his subscriptions on YouTube and creates a list for himself; I didn't know that. He watches content like Keloğlan on TRT Çocuk. We can find it on web browsers like YouTube, Google, Google Play Store, and the App Store.

P4: He figured out some things independently, like making videos. He plays games and prefers sports-oriented games because of some activities we do together. He likes Mario-style jumping games, and he also plays puzzle-solving games. He has difficulty with two-player games, but I help him. No application specific to my child can adjust the difficulty level and give him feedback, but there definitely should be such an application, right?

P8: My child has no friends; I am his only friend. I care for him 24 hours a day, and he gets tired too. Sometimes, we give him the phone or tablet so he can get away from me for a bit, and we can both rest.

P7: He also learned to think strategically, thanks to puzzle games. These games support his education, and we don't have any problems as long as he doesn't overdo it.

Findings Obtained from Sports Educators

According to educators, children with ASD show great interest in digital games, regardless of their type, at school or in the educational environment. Educators explain this situation as the influence of children's social environment, families, and living in a digital age. The game features that attract the most children's attention include violent content, characters, sound effects, cyclical games that follow each other, colorful and animated scenes, lots of music, and fast-changing images. According to sports educators, families support their children's use of technology. However, educators state that some platforms offer digital games, but they think that these platforms are not entirely suitable for the characteristics of ASD and state that their negative aspects outweigh their positive aspects. Some educators' opinions are as follows:

P3: Children are very interested in digital games because we live in a digital age. Games that involve shouting and violence are among the types that attract their attention the most.

P4: If families allow, children are interested in games that revolve around and follow each other.

P9: Our children's addiction to digital environments has increased. The factors that encourage this situation include advertisements, friends, and similar reasons. In addition, the preparation of games with colorful themes also increases this interest.

P8: While these games can be used as a free time activity, parents often avoid dealing with their children's behavioral problems and push them into the lap of digital games.

P6: Children are interested in digital games like all other children; however, it is debatable how suitable these games are for the characteristics of ASD. These children are unique individuals and each child with ASD has different individual needs.

Expectations and Observed Behaviors Regarding Children's Gains from Digital Games

Findings Obtained from Parents

According to the opinions of the parents, children with ASD should participate in sports-related activities to develop their communication skills, social interaction, emotional regulation, and motor skills. In addition, it is essential to provide these children with self-care skills, support their daily life skills, and teach them how to cope with sensory stress. In this context, it is emphasized that especially artificial intelligence-supported games and individualized cognitive exercise programs should be used for children with ASD. These programs can contribute to the multifaceted development of children by being designed according to their individual needs. Therefore, the parents stated that digital transformation is essential. The parents stated that digital games can be helpful for language development, social development, and motor skills development. Some parent opinions are as follows:

P2: I used to take them to swimming and language therapies, but we have been unable to do these activities for the last two years due to financial reasons. Rehabilitation classes generally focus on language, speech, matching, and line studies. I want to support these activities with digital games at home, which could effectively develop my child's language skills.

P8: The gains regarding communication, social interaction, emotional regulation, and motor skills development can be achieved through cartoons.

P6. I want my child's self-care and daily life skills to be supported.

P3: It would be nice to be able to correct behavioral problems with cognitive individualized exercise programs.

P4: I encourage my children; they also have fun. Artificial intelligence and technology are increasingly at the forefront today. If these applications are specific to my child, they can improve their academic skills. This is important for education, and I advocate that such applications be available everywhere.

Findings Obtained from Sports Educators

Sports educators stated that children with ASD who play digital games that their families allow without control exhibit negative behaviors. They noted that these children's aggressive behaviors increase, mood disorders occur, and stereotypical behaviors become more frequent. Six participants stated they use digital game applications for educational purposes when working with children with autism. However, most participants said they want to use digital platforms in a controlled manner. Three participants said that they do not use such games because they think that learning will occur through experience and will not contribute positively to children with ASD. Some educator opinions are as follows:

P1: I use digital game applications in a controlled manner; when I am going to teach something, I first show a video of that subject. This method reduces learning anxiety and helps the child understand learning. For example, we watch a video teaching how to shoot a basketball. I do not want the child to trigger certain stereotypical behaviors.

P3: There were times when I used digital games. For example, I played these games with children with poor balance and coordination. They had fun and did physical activities without getting bored.

P9: The child's willingness to be in the environment or the game, being curious, and constantly thinking and searching for solutions during the game contribute to education. However, aggressive behaviors

increase in children who use digital games uncontrollably and without limits. The quality of the games is essential; such games with harmful content should not be used.

P8: Digital games and applications can have an important place in the development of individuals with ASD. However, it is necessary to consider whether they are suitable for the child's age, gender, language development, social relations, intelligence, and creativity or whether they will develop these characteristics. For example, we can use games and applications to teach essential life skills such as numbers, colors, and shapes to individuals with ASD. In addition, if the child with ASD can express themself, gap-filling, and dialogue applications can be used. While doing attention studies, we can target skills such as object tracking, finding the differences between two pictures, or designing clothes.

P7: Yes, I use digital games and have received positive contributions. For example, using the Wordbit application for English helped me learn words quickly and helped me gain speaking practice.

P6: I don't use it. The child will learn by doing, not by watching.

Findings Obtained from Parents:

According to the findings obtained from parents, it is seen as a necessity to present digital games to children with ASD through a mobile application. However, these digital games should target social and physical development and include educational and cognitive exercises. In this direction, digital game content should consist of the following: educational games, storytelling, games that can be imitated, programs that support language development, rhythmic dance with music, matching games, reading activities, colors and numbers, and features that can be adjusted according to the level of difficulty.

In addition, football manager games, English learning applications (e.g. Duolingo), strategic games, and puzzles that can be adapted to their daily lives, as well as movement-oriented games, should be designed as strategic games that encourage children to understand and react to the visuals on the screen. Some parent opinions are as follows:

P1: Such applications can be beneficial for support purposes, especially when we cannot participate in sports or other activities. For example, when I try to dress my child in the morning, he cannot put on his T-shirt and pants correctly; he can put his T-shirt on inside out. He cannot distinguish between front and back. It isn't easy to teach him with instructions, but he can learn faster with visual methods and applications, such as cartoons. Some children can comb their hair and brush their teeth on their own. Therefore, applications supported by artificial intelligence can be pretty helpful. However, it would be logical to set limits, such as 15 minutes, to keep the usage time short and to prevent the applications from creating addiction.

P8: My child can dance with him when he says, "Let's dance together." He especially likes exciting and lively songs. For example, he has memorized the song Kukuli and loves it very much. He likes fast things; he laughs and enjoys it when the car goes fast. If there were an application supported by artificial intelligence, I would love a program to help my child learn and adapt to his movements.

P2: Instead of working with cards in language therapy, it would be more effective to provide education with speech and instructions through the application. While my child used to watch folk tales such as Keloğlan and the Fox, he has now started to turn to music and rhythm. He accompanies lively rhythms and shows interest in dancing. Listening to music has become an essential activity for him. My wife and I thought of something useful, but since my child does not use headphones, we did not have the opportunity to try this application.

P5: Instead of my child watching cartoons until the evening, I would like him to do something interactive. For example, an application that includes speaking, matching, reading activities, colors, and numbers could be helpful. For instance, if Keloğlan danced and my child imitated him, he would like it because his imitation skills are pretty high. If we can adjust the difficulty level in such an application, we can provide my child with an appropriate level of learning.

P4: Puzzle games have become an essential tool for developing strategic thinking. For example, he learned to develop strategies and imitation skills in football manager games here. Therefore, watching and following my child on a platform-specific to him and supporting his development would be precious. Puzzle-oriented, movement-oriented games should be designed so that he can understand and react to the visuals on the screen. Such games can provide support in daily life and replace aggressive games. A mobile application with digital games or exercises specific to ASD would be handy.

P3: My child already spends time on the phone. These types of applications can at least be a more favorable alternative. Would this application be helpful for us? What should we do better? If you guide us in this regard, we can be more productive for my child. The safety and educational value of digital applications for children are significant to me. Music-based programs like TikTok can be dangerous for children. That's why I make the content educational and instructive. I see how compelling characters like Pepee, Kukuli, and Caillou are in helping children gain habits like toilet training.

Findings Obtained from Sports Educators

According to the findings obtained from the educators, digital games to be offered to children with autism can be given via a mobile application. However, the content of these digital games, how they are used, and personal data privacy, are essential for all participants. Some educator opinions are as follows:

P9: If we use these applications for our intended use, they can be helpful. It will benefit an individual who wants to do sports to use a 30-day sports program application. However, the most important thing here is that everyone should be made by considering parameters such as age and physical condition. Technology serves our purpose. First of all, we should be aware of this. Of course, it is an excellent situation to offer valuable things to us.

P6: It will be fine if used in a limited and correct way because, under supervision, it would be good for them to play games that are at least more educationally controlled and explicitly designed for them in their lives. However, even if the child has their profile and password, the family should be supervised. This would be good; real-time data can be collected during the game, and the games should be adjusted from easy to difficult according to the child.

P7: Since they play digital games so much, it would be productive to implement more educational games through mobile applications and under supervision. Privacy should be a priority in mobile applications. Privacy of personal data is essential.

DISCUSSION AND CONCLUSION

The aim of this study is to examine in depth the use of mobile applications and digital games by children diagnosed with ASD and to explore the effects of these tools on children with ASD from the perspective of parents and sports educators. The data obtained show that children with ASD show a high interest in digital games and that this interest should be directed positively. Digital games developed with individualized designs can support the development of socio-communication, academic, and physical skills. Sports educators emphasize the careful use of such applications and observe the characteristics of children with ASD. Mobile platforms are becoming a great need with the advantages of ease of access and providing education-oriented content. These applications support the development of children and provide an effective monitoring and intervention tool for parents and educators.

The literature indicates that analog and digital gamified interventions developed for individuals with ASD to support their educational process target three main areas: socio-communication skills, academic skills, and physical skills (Atherton & Cross, 2021). This situation is also supported by studies in this field (Esentürk & Yarımkaya, 2021; Lindgren et al., 2016; Liu & Shen, 2023; Yarımkaya et al., 2023). The literature provides other examples, such as Çattık (2016), who used the graduated assistance method on a smart board to develop the digital game skills of children with ASD and demonstrated that this method contributed to their learning of digital game skills. Aydemir and Sani-Bozkurt (2021) and Ergün-Elverici and Taymaz-Sarı (2021) reported that computer-aided applications positively affect the education of children with ASD, primarily to support the development of communication, game, and social skills. Keskin (2023) emphasized that teaching imitation skills with models presented in the digital environment is effective in children with ASD. Çakıl and Piyal (2023) supported these findings by stating that innovative technologies can potentially improve the quality of life of individuals with ASD.

Parents recommend that children with ASD benefit from digital games and individualized cognitive exercise programs to support communication, social interaction, emotional regulation, motor skill development, self-care skills, daily living skills, and ways to cope with sensory stress. In this context, game and exercise contents should be adjusted according to difficulty levels, such as educational games, storytelling, games they can imitate, programs that support language development, rhythmic dance with music, matching games, reading types, colors, and numbers. In addition, football manager games, English learning applications (e.g., Duolingo), strategic games, and puzzle and movement-oriented games should be offered by adapting them to their daily lives. It is emphasized in the literature that digital games produce promising results for individuals with ASD (Atherton & Cross, 2021; Tsikinas & Xinogalos, 2019). For example, the Collaborative Puzzle Game by Battocchi et al. (2009), and the imitation game performed by Wainer et al. (2014) with the robot KASPAR are examples of developing game interventions on digital platforms for individuals with ASD. These games demonstrate the potential of technology to stimulate the imagination of players with ASD and offer the advantage of creating social experiences compared to more ordinary gaming platforms (Atherton & Cross, 2021). Sports educators in this study reported that parents of children with ASD are uncontrolled in terms of technological methods and digital game use. It was stated that children are interested in games that include aggression, which leads to increased problem

behaviors. Therefore, according to the participants, it is emphasized that some limitations should be imposed on the use of digital games for individuals with ASD. In this context, it is recommended that they are not exposed to sensory stress; factors such as light, color, and sound should be adaptable, aggressive games should be avoided, they should be played under supervision, and time limits should be applied. The views of sports educators in this study are supported in the literature. According to Craig et al. (2021), internal (gender, attention, and oppositional behavior problems) and external factors (social factors, access, video playing time, parental rules, and game type) are essential determinants of problematic video game use by children with ASD. According to Saeedi et al. (2022), although digital games have positive effects on language and speech skills, feelings of frustration, low self-esteem due to failures while playing games, environmental noise, conflict between game levels and the needs of the target group, and problems with speech recognition may also be experienced. Therefore, obstacles and difficulties should be considered before designing these tools, and solutions should be suggested. In their systematic review, Eltahir et al. (2025) stated that digital games pose a risk for children with ASD and that the variables predicting this risk include being male, puberty, co-occurring Attention Deficit Hyperactivity Disorder (ADHD) symptoms, lack of parental rules, parent-child conflict, and high parental stress. However, due to methodological limitations in these studies, clinical studies are needed that distinguish excessive gaming and internet use behaviors from impaired control (i.e., addiction) or autism characteristics (i.e., limited interests) (Eltahir et al., 2025).

Both parents and sports educators emphasize that designing a mobile application that will offer programs for children with ASD can solve limited sports opportunities, especially for parents. The usability of this application, ease of access, time limitation, security, and privacy are essential requirements. In addition, the games are expected to be organized specifically for the child by collecting real-time data during the game. Various studies in the literature on gamified education types via mobile applications exist. For example, Hanaylı et al. (2015) focused on improving the social skills of children with ASD, while Yaman (2018) conducted studies on teaching math to children with ASD. The findings show that the interest of children with ASD in digital games should be directed positively. In this direction, it may be possible to support socio-communication, academic and physical skills through digital game applications developed with individualized designs. In this context, mobile applications developed for children in need of special education also have an important place. For example, the Ministry of National Education offers a total of 55 game activities under 11 main categories in its mobile application named 'Özelim Eğitimdeyim' to support students and parents in the field of special education (Milli Eğitim Bakanlığı, 2020)."However, some critical points should be considered in the development of such applications. As a matter of fact, it was determined that many criteria such as age, type of disability, adaptation and duration were not sufficiently taken into account during the design process of the “Özelim Eğitimdeyim” application (Yılmaz et al., 2022). This situation reveals that a more inclusive approach that emphasizes special needs more in the design of digital games should be adopted. As emphasized in the literature, some basic elements should be taken into consideration in the design of digital games developed through mobile applications. The guidelines prepared in this direction reveal that multimedia elements (text, visuals and sounds) and application features (interface, navigation, customization and interaction) should be tailored to children with ASD. It is stated that the texts used in the applications should be simple and understandable, the visuals should be appropriate and close

to real life, and the sounds should be familiar and comforting to the user (Gallardo-Montes et al., 2021; Stathopoulou et al., 2019; Zamry et al., 2022).

In conclusion, the appropriate design of multimedia elements and application features in mobile platforms for children with ASD can become an important tool that supports children's development by providing easy access, individualized support and educational content. However, this study has some limitations. ASD is a heterogeneous group; therefore, a larger sample group is needed. The findings may not be fully representative of the ASD population and it was assumed that the participants answered the semi-structured questions to the best of their ability. To confirm the findings and support the conclusions, experimental studies are needed to determine the positive and negative aspects of mobile applications that include individualized digital games for children with ASD. It is also recommended that designs and applications developed for children with ASD should be tested with larger groups.

Conflict of Interest: There is no personal or financial conflict of interest within the scope of this study.

Authors' Contribution: Study Design- SA; YEE; EBY, Data Collection- SA; RD; EBY, Statistical Analysis and Manuscript Preparation- SA; RD; YEE; EBY, All authors read and approved of the final manuscript.

Ethical Approval
Ethics Committee: Rumeli University
Date: 05.06.2024
Decision No: E-53938333-050-39343

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Spor Bilimleri Araştırmaları Dergisi
Journal of Sport Sciences Research
Vol: 10, Issue: 1, 2025
E-ISSN: 2548-0723
URL: http://www.dergipark.org.tr/jssr

Olympism through the Eyes of Coaches: Metaphorical Texture and Colors of Sport

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Erratum
Received: 01.01.2025 Accepted: 28.02.2025 Online Published: 28.02.2025

Abstract

In the third issue of the ninth volume of the Journal of Sport Sciences Research, the article "Makaracı, M., Ceylan Acar, G., & Bayrakdar, A. (2024). Olympism through the Eyes of Coaches: Metaphorical Texture and Colors of Sport. Journal of Sport Sciences Research, 9(3), 389-402. https://doi.org/10.25307/jssr.1543444", the authors identified an issue after publication. It was determined that a specific sentence and its corresponding reference (Smith & Smoll, 2011) should be removed from both the in-text citations and the bibliography. This is because the statements in the "Discussion and Conclusion" section (p. 399) were not sufficiently supported by the cited reference in terms of its interpretation within the literature. Corrections have been made to address this error and to ensure clarity. The authors apologize for the error. We thank our readers for their understanding.
Keywords: Erratum, Olympism, Olympics, Coach, Metaphor, Qualitative research method

ERRATUM

In the article "Makaracı, M., Ceylan Acar, G., & Bayrakdar, A. (2024). Olympism through the Eyes of Coaches: Metaphorical Texture and Colors of Sport. Journal of Sport Sciences Research, 9(3), 389-402. https://doi.org/10.25307/jssr.1543444", the authors identified an issue after publication. Specifically, the statements in the "Discussion and Conclusion" section (p. 399) were found to be unsupported by the citation of Smith & Smoll (2011), particularly in terms of their interpretation within the literature. As a result, the relevant paragraph has been revised, and the reference in question has been removed from the bibliography.

Revised version:

In the *"Culture and Social Connections"* category, 14 metaphors were produced, including "culture, friendship, road, intellectuality, modernity, interaction, inequality, socialization, roof, friend." Bach (2023) highlights that the Olympics foster a global community by uniting diverse cultures, thus supporting their cultural and social dimensions. UNESCO (2016) notes that the Olympics "strengthen social bonds by celebrating cultural diversity," illustrating how sports enhance social cohesion and cultural connections. Goldblatt (2016) refers to Olympism as an "ocean of ideals," emphasizing its role in merging various cultural and social elements. Goldblatt (2014) also describes Olympism as a platform that "supports international harmony and social cohesion." Yuting (2013) characterizes Olympism as a "cultural feast," celebrating diverse cultural expressions and traditions. Similarly, Tomlinson (2005) describes Olympism as a global network, showcasing its extensive international influence and cultural amalgamation. Hobsbawm (1995) suggests that Olympism contributes to the internationalization of sports as part of the modernization process, highlighting its connection to global development. These metaphors illustrate how Olympism fosters cultural exchange, social cohesion, and modernization through the global celebration of diverse cultural values.

Extracted Reference:

Smith, R. E., & Smoll, F. L. (2011). Cognitive–behavioral coach training: A translational approach to theory, research, and intervention. In J. K. Luiselli & D. D. Reed (Eds.), *Behavioral sport psychology: Evidence-based approaches to performance enhancement* (pp. 227-248). Springer. https://doi.org/10.1007/978-1-4614-0070-7_14

Original Article URL: https://dergipark.org.tr/en/pub/jssr/issue/87546/1543444