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REVIEW BOARD REVIEW BOARD



	İÇİNDEKİLER- ARTICLE CONTENTS							
1.	The Effect of Sports Recreation Activities on Continuous Anxiety and Life Satisfaction Levels of	1-7						
	Inmates							
	Hüseyin Öztürk							
	(Research Article)							
2.	The Effect of Corrective Exercises on Lordosis and Kyphosis Angles and the Functional Ability of	8-19						
	Elderly Men							
	Levla Alızadehebadi , Merve Uca , Gıvasettin Bavdas							
	(Research Article)							
3.	Successful Reflection of Technical Director Changes on Sportive Management in Football	20-27						
	Taner Karaman , Damla Özsov , Oktav Akvüz							
	(Research Article)							
4	Investigating The Relationship Between Athlete Value Orientation And Sportsmanship Levels Of	28-39						
	Elite Judoka	20 07						
	HaBurcu Yentürk Mihrac Köroğlu, Nuri Muhammet Celik, Amel Mekic							
	(Research Article)							
5	The Effects of Var Implementation in The Turkish Football Super League	40-46						
	Enes Sucular, Kemal Göral	10 10						
	(Research Article)							
6	The Mediating Role of Citizenship Fatigue in The Effect of Job Stress on Burnout: A Research on	47-64						
0.	Private Sports Center Employees	11 01						
	Muhammet Vapur , Güven Dere							
	(Research Article)							
7	Investigation of the Effect of Exercise Addiction Levels of Physical Education and Sports School	65.76						
7.	Students on Problem Solving Skills: Kilis Province Example	03-70						
	Ali Vildirim M Hakan Mayda							
	(Peccarch Article)							
8	Development Validity and Poliability of The Social Capital Scale for Adulte	77.94						
0.	Faik Ardahan Vusuf Kitir	77-94						
	(Research Article)							
0	Laigure Time Interests of Master Handball Players	95 102						
9.	Ciil Vağar, Camzo Dorvabanoğlu, Mustafa Arici	95-102						
	(Research Article)							
10	(Research Andree)	102 111						
10.	Exercise-induced hypoalgesia Aner Static Low-Angle Squat Exercise in Fatients with Knee	105-111						
	Marya Karaninan Tuha İnca Parnugu Fordi Baskurt Zaliha Baskurt							
	(Pocoarch Articlo)							
11	(Research Andre)	110 117						
11.	Investigation on the Effect of Virtual Reality Training on Reaction Time in Football Goalkeepers	112-117						
	(Paccarch Articla)							
10	(Research Andre)	110 100						
12.	A Review of Artificial Intelligence Studies in Sports Sciences	118-132						
10	Inian Gozen (Newley)	100 145						
13.	Karate Attitude Scale Development: Validity and Keliability Study	133-145						
14	(Research Arnicle)	146 156						
14.	Investigation of the Relationship Between Anxiety in Sport and Psychological Resilience in	146-156						
	Oznur Akpınar , Yeliz Şirin , Mehmet Metin , Taytun Şirin							
15	(Kesearch Article)							
15.	Development Process of Fencing Sport in Türkiye and Factors Affecting Success	157-166						
	Yusut Barsbuğa, Bekir Furkan Tüzer							
<u> </u>	(Kesearch Article)							
16.	Health Literacy, Healthy Lifestyle Behaviours and Physical Activity in Sports Sciences Faculty	167-176						
	Students: A Mediation Analysis							
	Emrah Yılmaz, Murat Çimen							
	(Research Article)							

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The Effect of Sports Recreation Activities on Continuous Anxiety and Life Satisfaction Levels of Inmates

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Abstract

This research was carried out to determine continuous anxiety and life satisfaction levels of inmates who participate in sportive recreation activities. The population of the research consists of the inmates within the scope of probation and the sample of research consists of the inmates within the probation directorate of Gaziantep province. Totally 112 (62 experimental, 50 control) inmates participated in the study voluntarily. Sportive recreation activities (Basketball, Volleyball and Educational Games) were applied regularly for 36 weeks to the experimental group who participated in the research, no study was applied in the control group by researchers. Continuous anxiety and life satisfaction scales were used in the study. As a result of the research, sportive recreation activities made a positive contribution to inmates by reducing the continuous anxiety of the inmates and increasing their life satisfaction. According to this result, it can be said that sportive recreation activities make an important contribution to the reintegration of inmates into society.

Keywords: Recreation, Inmates, Continuous Anxiety, Life Satisfaction.

Sportif Rekreasyon Aktivitelerinin Mahkûmların Sürekli Kaygı ve Yaşam Doyumu Düzeylerine Etkisi

Özet

Bu araştırma, Gaziantep ili denetimli serbestlik müdürlüğünde sportif rekreasyon aktiviteleri katılım sağlayan mahkûmların, sportif rekreasyon aktivitelerinin sürekli kaygı ve yaşam doyumu düzeylerine etkisinin belirlenmesi amacıyla yapılmış bir bilimsel çalışmadır. Araştırmanın evreni denetimli serbestlik müdürlüğünde mahkûmlar oluşturmakta olup, örneklemini ise Gaziantep ili denetimli serbestlik müdürlüğü bünyesindeki mahkûm olan kişiler oluşturmaktadır. Araştırmaya gönüllü olarak çalışmaya katılım sağlayan toplam 112 (62 deney, 50 kontrol) mahkûmdan oluşmaktadır. Araştırmaya katılan bireyler deney ve kontrol gurubu olarak incelenmeye çalışılmış, deney gurubuna 36 hafta düzenli olarak sportif rekreasyon aktivitesi yapılmış (Basketbol, Voleybol ve Eğitsel oyunlar), kontrol gurubuna ise hiçbir bilimsel bir çalışma yapılmamıştır. Araştırmada geçerlilik ve güvenirlilik analizi daha daha önce bilimsel çaışmalarda kullanılan sürekli kaygı ve yaşam doyumu ölçekleri kullanılmış olup, İstatistiksel analizler için SPSS 23.0 paket programı kullanılmıştır. Sürekli değişkenlerin normal dağılıma uygunluk kontrolünde Kolmogorov Smirnov testi kullanılmıştır.Tanıtıcı istatistik olarak, yüzde ve ortalama değerleri verilmiştir. Ön test ve son testler t-testinden yararlanılmış ve sayısal değişkenler arasındaki ilişkiler bivariate korelasyon analizi ile test edilmiş ve P<0.05 istatistiksel olarak anlamlı kabul edilmiştir. Bilimsel araştırma sonucunda sportif rekreasyon aktivitelerin mahkumların sürekli kaygılarında azalma olurken, yaşam doyumlarında ise artış olarak olumlu katkı sağladığı sonucuna varılmıştır.

Bu sonuca göre sportif rekreasyon aktivitelerinin mahkumların topluma kazandırılmasında sürekli kaygılarını azaltarak, yaşam doyumlarına olumlu katkılar sağladığı söylenebilir.

Anahtar Kelimeler: Rekreasyon, Mahkûm, Sürekli kaygı, Yaşam doyumu.

INTRODUCTION

Sport which contributes to the physical, mental and spiritual development of individuals is a social phenomenon that regulates social behavior of individuals (40). Although sport is a phenomenon that directs and positively affects human behaviors and attitudes in daily life, it has a direct or indirect relationship with many concepts. Sports have very important effects on physical health.

However, it is also known to have benefits in terms of mental health (20). Sport ensures the most appropriate development for the benefit of society without harming its spiritual and social integrity besides that it is known that sports is being healthy, happy and strong, gaining personality, character and values, acculturation and socialization education (16).

Anxiety is a circumstance of excitement in which fear and hope are often replaced(24). High levels of anxiety often cause a performance which is below as compared to usual standards of people who in a performance area (19). Continuous anxiety is the perception of the stressful situation as dangerous situation and it is the increase and persistence of state emotional reactions to these threats (26). Anxiety is a feeling of uneasiness and kind of fear in the face of events and situations that people do not know the reason for and see as threatening and dangerous (30). Continuous anxiety is gaining continuity of state emotional reactions with increasing intensity and frequency to threats perceived as dangerous or threatening in stressful situations (28).

Life satisfaction is generally pleasure that get from one's own life(37). Life satisfaction is one of the most important factors affecting an individual's mental health and social relations. Life satisfaction generally includes one's entire life and all aspects of that life. Life satisfaction is not a satisfaction with a particular situation, it is a satisfaction with all experiences in general(21). On the other hand, life satisfaction constitutes the cognitive or judgmental dimension of subjective well-being (10). It refers to a cognitive or judgmental process and it is a general assessment of individuals' quality of life according to self-selected criteria(36,9). It is the comparison of the individual's conditions that have with appropriate standards.

The fact that the positive evaluations relating with individual's life are higher than the negative valuations show that the quality of individual's life is also higher (25).Life satisfaction is some of the concepts such as stress, burnout, health, quality of life (31,15). It can be also defined as degree of achievement of one's goals (14). It is believed that life satisfaction has a significant psychological variability, especially during adolescence (22).

In this context, the present study is important in terms of determining the level of effect of sportive recreation activities on the inmate's continuous anxiety and life satisfaction and understanding how it relates to the attitude towards sports and life satisfaction. Based on these considerations, the aim of the study is to examine the relationship between the inmate's attitudes towards sports and their life satisfaction. In addition, the results of the study will be a source for the literature.

METHOD

At the meeting of the Humanities Ethics Committee, dated 12.04.2022 and numbered 06, it was seen that this study could be carried out as a scientific research study, with the decision of the ethics committee numbered 174246.

In this section, it can be seen that explanations model, research group, data collection and analysis processes used in the research are given.

Participants

A total of 112 inmates who within the Gaziantep probation directorate were included to study with the principle of voluntariness and 62 people were regularly applied 36 weeks of sportive recreation activities (Basketball, Volleyball and Educational Games). Continuous anxiety and life satisfaction scales were applied to all participants before and after the study without any study being applied on 50 people.

In this study, sportive recreation activities were applied on 62 people 2 days a week and 90 minutes a day.

Collection of Data

Before the research, necessary permissions were taken from the provincial directorate of probation. In the study, quasi-experimental method was used for pre-test, post-test and experimental-control groups. According to the results obtained from the pre-tests and post-tests applied in the experimental studies, the effect of the technique used on the experimental group can be investigated(4). Because of this feature, the experimental method stands out as the most suitable method for the purpose of the research. The data collection tool used in the research consists of three parts. In the first part, personal information was obtained from the participants. In the second part, continuous anxiety scale which consist of 20 questions that developed by Spielberger and his friends and translated into Turkish, reliability and validity studies were made by Oner and Le Compte was used. In the third part, "Life Satisfaction Scale" that validity and reliability studies were made by Daglı and Baysal in Turkey and developed by Diener, Emmons, Larsen, and Griffin was used.

Analysis of Data

SPSS 23 program was used for data analysis. Percentage and mean values are given as introductory statistics. Paired samples t-test was used for pre-test and post-test and relationships between numerical variables were tested with bivariate correlation analysis and (P<0.05) was accepted statistically significant.

FINDINGS

Table 1. Personal info	rmation table of the par	ticipants			
	Variable	Experimental Group Sayı (62) Percentage		Control Gr	oup
		Sayı (62)	Percentage	Sayı (50)	Percentage
Marital Status	Married	40	64.5	34	68.0
	Single	22	35.5	16	32.0
	18-24	14	22.6	7	14.0
Age	25-31	15	24.2	13	26.0
	32 and more	33	53.2	30	60.0
Education Level	Primary,	39	61.9	33	66.0
	secondary sc.				
	High school	23	36.5	17	34.0
Occupation	Worker	26	41.3	24	48.0
	Retired	3	4.8	3	6.0
	Unemployed	33	52.4	23	46.0
Smoking	Yes	46	73.0	37	74.0
	No	16	25.4	13	26.0
	1-3 years	33	53.2	24	48.0
Conviction Time	4-6 years	18	29.0	16	32.0
	7 years and more	11	17.7	10	20.0

When Table one is examined; Personal information (Marital status, Age, Educational level, Occupation, Smoking, Conviction time) for the participants of the research was included into the table.

	Control Group (N=62)							Experiment Group (N=62)				
	Pre test Post test			Pre test Post test		st						
	Avg.	S.S	Avg.	S.S	t	р	Avg.	S.S	Avg.	S.S	t	р
Cont. anxiety	2.49	0.61	2.49	0.62	0.42	0.68	2.82	0.60	2.87	0.77	-2.59	0.01×
Life satisf.	3.19	1.30	2.33	0.30	1.32	0.19	3.27	1.19	3.80	1.34	-4.50	0.00×

Table 2. Continuous anxiety and life satisfaction pre-test and post-test table for the participants of the study (Control and Experiment)

When table two is examined; There was no significant difference between continuous anxiety and life satisfaction pretest and posttest in the control group participating in the study (Respectively p=0.678 and p=0.192), However, there was a significant difference between continuous anxiety and life satisfaction level in pretest and posttest in the experimental group participating in the research (Respectively=0.012 and p=0.000).

According to this result, it can be said that the continuous anxiety of the inmates participating in sports recreation activities decreased and their life satisfaction increased.

Table 3. Correlation table of continuous anxiety test post test and continuous anxiety test pretest,								
anxiety control pretest and post test scale scores								
Variable	n	r	р					
Anxiety exp. pre test	62	0.001	-0.956 ^{xx}					
Anxiety control pre test	50	0.020	-0.294×					
Anxiety control post test	50	0.082	-0.223×					

When Table three is examined; A significant negative correlation was observed between the post-test of the continuous anxiety test and the pre-test of the continuous anxiety test (r=0.001, p=-0.956), A weak negative correlation was observed between continuous anxiety control pretest and posttest (Respectivelyile r=0.020, p=-0.294 and r=0.082, p=-0.223).

According to this result, It can be said that the anxiety levels of the inmates who participated in the sportive recreation activities were high before and at the same time, the sportive recreation activities contributed positively to their anxiety levels even it was weak compared to inmates who are not participated.

Table 4. Correlation table of the life	e satisfacti	on test post test ar	id life satisfaction test pretest, life						
satisfaction control pretest and post test of the scale scores									
	n	r	р						
Life satisfaction experiment post test	62	0.000	0.863 ^{xx}						

0.000

0.000

50

50

T 11 4 C 1 .. . 11 6 .1 1.0 1 1.0 1. 1.0

When Table for is	examined; a significantly	positive high	correlation wa	as observed	between life
satisfaction post-test and	life satisfaction experime	ental group pre	e-test (r=0.001,	p=0.863), a l	high positive
correlation was observed	between life satisfaction of	control pretest a	ind posttest(Re	espectively=0.	000, p=-0.925
and r=0.000, p=-0.223).					

According to this result, it can be said that the life satisfaction of the inmates who participated in sportive recreation activities increased significantly compared to the inmates who did not participate in the study and before the study.

Life satisfaction control pre testi

Life satisfaction control post testi

0.925xx

0.735^{xx}

DISCUSSION AND CONCLUSION

It is seen that the continuous anxiety of the inmates who participated in the sportive recreation activities decreased and their life satisfaction increased.

Looking at some studies in the literature; in Ogut's study, it was determined that those who do sports have lower continuous anxiety levels than those who do not (27). In the study of Sarıkabak and his friends, it is seen that the continuous anxiety level scores of and U-21 age group karate national team athletes decreased after the competition (34). As a result of the research conducted by Karabulut and his friends that applied to football players, they concluded that sports age does not make a significant difference in continuous anxiety levels (17). In the study conducted by Bedir, in which he examined the anxiety scores according to the degree of competition, no statistically significant difference was found between the state anxiety scores of the older women before the competition and the state anxiety scores after the competition (1). In a study conducted by Coksevim and his friends, a significant difference was found in the continuous anxiety states of kickboxers before and after the match (6). In the study conducted by Groff and his friends that applied to physically disabled people over the age of 18. It was concluded that individuals participating in sports activities have a positive effect on social and psychological conditions such as enjoying life, feeling good, and performing daily life activities(13). In the study of Dogan and Eygu named "Examination of competition anxiety levels of athletes who do winter sports", no significant difference was determined (11). In Ozgul's study, no significant difference was found between the continuous anxiety levels of athletes and non-athletes (30).

It can be said that the anxiety levels of the inmates who participated in the sportive recreation activities were high before and at the same time, the sportive recreation activities contributed positively to their anxiety levels even it was weak compared to inmates who are not participated. Looking at some studies in the literature; In Berger and Owen's study, an inversely proportional relationship was found between sports and physical activities with the level of stress, anxiety and depression (2). In a study conducted by Spielberger and his friends, examining the relationship between student's test anxiety level and school success, it was observed that there was a significantly negative relationship between the two variables and individuals with high anxiety had lower efficiency in cognitive activities such as school success and learning (35). In the study conducted by Dalkıran, it was found that the test anxiety levels of the students studying in the private teaching institution have significantly difference according to their participation status in physical activity (8). As a result of Oznur's study, it was determined that students who were physically active had significantly lower test anxiety levels (32). In study conducted by Canan and Ataoglu, it is stated that doing sports regularly has a positive effect on anxiety (5). In the study of Coskun and his friends in which they examined the effect of university student's level of doing sports on continuous anxiety, as a result of the study, It was concluded that the group, which was determined to have a high level of doing sports, had a low level of continuous anxiety (12).

It can be said that the life satisfaction of the inmates who participated in the sportive recreation activities increased at a higher rate compared to the inmates who did not participated in the study and before the study. In the study conducted by Mr. Karademir and his friends it is stated that the positive reflection of their perceptions towards the society with the confidence of belonging to a group and having themselves accepted by the group because they do sports, creates a source of happiness for the disabled individuals who do sports (18). It is stated that the life satisfaction and quality of life of disabled individuals who participate in sports are higher in the study conducted by Yazıcıoglu and his friends that is a comparing the physically disabled individuals who participated in sports with the disabled individuals who did not participate in sports (39). Brown and Frankel said that mid-level correlation was found between physical activities and life satisfaction in the study was applied to 685 people between the ages of 18 and 70(3). He found that leisure satisfaction and quality of life had a decreasing relationship with participation in recreation and stated that leisure satisfaction would increase the quality of life (38). In the studies of Lu and Hu; they are stated that people who show a certain seriousness, order and voluntariness in leisure activities are more satisfied than others(23). In the study conducted by Yazıcıoglu, it was found that the total test anxiety scores of the students did not differ significantly according to their perceived academic achievement levels. This result does not differ from the result of the research (39).

CONCLUSION AND RECOMMENDATIONS

As a result; It can be said that the continuous anxiety of the inmates who participated in sports and recreation activities decreased and their life satisfaction increased. It can be said that the anxiety levels of the inmates who participated in the sportive recreation activities were high before and at the same time, the sportive recreation activities contributed positively to their anxiety levels even it was weak compared to inmates who are not participated, the life satisfaction of the inmates who participated in sportive recreation activities increased at a higher rate than before the study and compared to the inmates who did not participate in the study. It is recommended to compare this study by applying it in different provinces and different countries.

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The Effect of Corrective Exercises on Lordosis and Kyphosis Angles and the Functional Ability of Elderly Men

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Abstract

An important consideration in maintaining and improving the elderly's health and quality of life is preserving their independence in performing daily activities and making it possible for them to live actively and independently. The purpose of this study was to investigate the effects of NASM (National Academy of Sports Medicine) -based hybrid exercise on the functional ability, lordosis, and kyphosis angles of elderly people. Out of the population of elderly men in Istanbul, 40 participants were selected using the convenience sampling technique and were randomly divided into an experimental group that received NASM-based exercises and a control group with no treatment (each group containing 20 participants). The entry criteria were absence of any particular illness, lack of taking particular medications, and being 65-85. The experimental group performed the hybrid NASM-exercises for 8 weeks, whereas the control group did not receive a special training program. Static and dynamic forms of balance were evaluated using Romberg's test (with open and closed eyes) and the Timed Up and Go Test, respectively. Data analysis was conducted using repeated measures covariance analysis at p<0.05. The statistical findings showed that the scores of the experimental group in terms of static balance with open eyes and dynamic balance improved after receiving the intervention (p<0.05), whereas no such improvement was observed in the control group. A significant difference was observed in the participants' functional ability according to the indicators of static and dynamic balance. It seems that the NASM-based hybrid exercise program that included several posture-control factors is an effective program to improve the elderly's functional ability; thus, the program is recommended to be implemented for the rehabilitation of the elderly at home and particularly in elderly rehabilitation centers due to its effectiveness and the fact that costly equipment is not needed for them.

Keywords: Corrective exercises, functional ability, lordosis and kyphosis angles, static and dynamic balance.

Düzeltici Egzersizlerin Yaşlı Erkeklerde Lordoz ve Kifoz Açıları ile Fonksiyonel Yeteneğe Etkisi

Özet

Yaşlıların sağlığının ve yaşam kalitesinin korunmasında ve geliştirilmesinde önemli bir husus, onların günlük yaşam aktivitelerini yerine getirirken bağımsızlıklarını korumak, aktif ve bağımsız yaşamalarını mümkün kılmaktır. Bu çalışmanın amacı, NASM temelli hibrit egzersizin İstanbul'daki yaşlılarda fonksiyonel yetenek ile lordoz ve kifoz açıları üzerine etkilerini araştırmak. İstanbul'daki yaşlı erkek popülasyonundan kolayda örnekleme tekniği kullanılarak 40 katılımcı seçildi ve rastgele olarak NASM tabanlı egzersizler alan bir deney grubu ve herhangi bir tedavi uygulanmayan bir kontrol grubu (her grup 20 katılımcıdan oluşuyor) olarak ayrıldı. Giriş kriterleri herhangi bir haştalığın bulunmamaşı, belirli ilaçları almamak ve 65-85 yaş arasında olmaktı. Deney grubu 8 hafta boyunca hibrit NASM egzersizlerini gerçekleştirirken, kontrol grubunun özel bir eğitim programı yoktu. Dengenin statik ve dinamik formları sırasıyla Romberg Testi (açık ve kapalı gözlerle) ve Zamanlı Kalkma ve Yürüme Testi kullanılarak değerlendirildi. Veri analizi, p<0,05'te tekrarlanan ölçümler kovaryans analizi kullanılarak yapıldı. İstatistiksel bulgular, deney grubunun açık gözlerle statik denge ve dinamik denge açısından skorlarının müdahale sonrasında arttığını gösterdi (p<0,05), ancak kontrol grubunda böyle bir gelişme gözlenmedi. Ayrıca katılımcıların fonksiyonel yeteneklerinde statik ve dinamik denge göstergelerine göre anlamlı bir farklılık gözlendi. Çeşitli duruş kontrol faktörlerini içeren NASM tabanlı hibrit egzersiz programının, yaşlıların fonksiyonel yeteneğini geliştirmede etkili bir program olduğu görülmektedir; bu nedenle programın etkinliği ve pahalı ekipmanlara ihtiyac duyulmaması nedeniyle yaslıların evde rehabilitasyonunda ve özellikle yaşlı rehabilitasyon merkezlerinde uygulanması önerilmektedir.

Anahtar Kelimeler: Düzeltici egzersizler, fonksiyonel yetenek, lordoz ve kifoz açıları, statik ve dinamik denge.

INTRODUCTION

An important consideration in maintaining and improving the elderly's health and quality of life is preserving their independence in performing daily activities of life and making it possible for them to live actively and independently (19). One of the best ways to evaluate the elderly's health is investigating their functional status in their daily lives to provide healthcare workers with the sufficient information to make convenient planning according to their needs (6). Convenient posture is guaranteed when the body is placed in an appropriate direction to the line of gravity (45). As the number of disorders among the elderly – particularly in developing countries - was increasing, the WHO developed the 2020 global program with the slogan "seeing is everybody's right" and obliged all governments to execute preventive and rehabilitation programs to control and minimize the issues and their consequences (34). The results indicating the significant reduction of lumbar lordosis angle, the improved timing for the static balance, and the achievement distance in the dynamic balance, perhaps the NASM exercises (America's National Academy of Sport Medicine) are effective in enhancing the coherent performance of muscles and the reduction of the lumbar lordosis angle and can be implemented by athletes to improve examinees' balance (25). Body posture, its direction to the line of gravity, and the effects that changing it has on different body organs like the respiratory system, blood circulation, and the nervous system need considerable attention. The elderly significantly use their heads, necks, and faces to transfer concepts and communicate with others and their surroundings, and this leads to skeletal-muscular malformations (1).

Human spinal column naturally has two convex and concave curves shown as letter S, though it has been frequently observed that the muscles bearing one's stature suffer from the lack of balance in terms of strength and length around the spinal column. In such situations, some muscles become atrophied and weak, while others get shortened. Thus, the balance of the spinal column curves gets disturbed, and unnatural curves like lordosis, kyphosis, and scoliosis appear in that region (47). The term "posture" refers to the way of standing or the placement of different body organs. Convenient posture helps the appropriate and natural function of internal organs, the nervous system, and the respiratory system and increases people's self-confidence, security, and attractiveness (26). As the nervous efficiency of muscles is maintained by a convenient combination of correct posture (static/dynamic) and stability strength, any failure in the direction of the body and the lumbar-pelvic-femoral belt can change various parts or even the function of certain systems and organs related to the motor system by changing the mechanical function and coupled relationships of all muscles (46). Balance is a complicated process that relies on the coordination of several sensory and motor components (29). Balance disorders can arise due to sensory-somesthetic, visual, auricular, muscular, muscular-skeletal, or cognitive problems (27). Various studies including Rogers et al. (36), Salar et al. (38), and Valizadeh et al. (50) have shown that the elderly's children perform weaker in static and dynamic balance

tasks compared to their other children. Weakness of the muscles that bear the spinal column may disturb the static and dynamic balance of one's stature, and this is typically called skeletal malformations. Various protocols have been proposed for the treatment of such malformations, but the U.S. National Academy of Sports Medicine proposed a new set of corrective exercises in 2010 that included four levels of inhibition, lengthening, activation, and integration. According to the protocol, it is better to first perform inhibition and then lengthening exercises on a muscle instead of merely lengthening a shortened or stiffened one (5). In addition, as Mahdavinejad and Badihi (25) found a significant reduction of the lumbar lordosis angle and improved balance time in terms of the static balance and enhanced achievement distance in the dynamic one, the NASM exercises are probably effective in improving the integrated function of one's muscles and recuing their lumbar lordosis angle. The exercises can be implemented by athletes to improve their balance conditions (25). As another study to investigate the effects of various exercises and intervention on the increased lumbar lordosis, Okhli et al. (30) studied the effects of the NASM corrective exercises (Pilates) on the disorder. The reported findings showed the positive and more significant effects of the NASM exercises on reducing the lumbar lordosis (30). The effects of the NASM corrective exercises on the elderly's functional abilities and lordosis and kyphosis angles have not been investigated, and few studies have focused on the nature of preventing and reducing skeletal-muscular disorders among patients with sensory disabilities. Thus, the current study aimed to investigate the effects of an 8-week intervention consisting of the NASM exercises on the elderly's functional abilities and lordosis and kyphosis angles. Body posture, its direction to the line of gravity, and the effects of changing it on various organs of the body like the respiratory system, blood circulation, and the nervous system are significant matters. Typically, ignoring structural weaknesses like inadequate functional abilities and lordosis/kyphosis angles can bring about irreversible issues in later periods of one's life (particularly during old ages), and this can disturb the natural function of the body and even reduce the length of one's life. Moreover, investigating the related literature revealed no study exactly focusing on the effects of the NASM exercises on the elderly's functional abilities and lordosis and kyphosis angles. As the old age and inappropriate lifestyles among the elderly make them prone to such malformations, it seems necessary to prevent the emergence and development of such issues in that group of society by proposing convenient solutions via performing corrective exercises. Thus, the present study aimed to investigate the effects of corrective exercises on the male elderly's functional abilities (static and dynamic balance) and lordosis and kyphosis angles.

METHOD

Participants and procedure

The examinees participating in the present study were the elderly people, and all interfering factors were controlled in non-absolute manner. Thus, the present study was considered a quasi-experimental one according to the specified goals and content. The examinees were selected according to the purposive sampling technique and the entry and exit criteria, and the effects of physical activities on their functional abilities and lordosis and kyphosis angles were investigated. An assumption was that performing exercises that involved muscular receptors helped the elderly and people with balance problems maintain balance. Out of the population of the male elderly in Istanbul, 40 people were selected for the sample using the convenience sampling technique. The elderly who had no particular illness, did not take any medications, and were 65-85 years old were selected for the study and were randomly divided into an experimental group that received the NASM intervention and a control group that was provided with no intervention (each group consisted of 20 members). A summary of the research design was provided for the examinees, and their preliminary screening was performed according to the entry and exit criteria. Then, the participants who were willing to cooperate received the informed written consent forms. After identifying the participants who were qualified to participate in the study, the examinees visited the relevant laboratories and gymnasiums according to a prespecified schedule.

Ethical approval and institutional permission

In order to conduct the research, ethical approval was received from İstanbul Esenyurt University Ethics Committee (Decision number: 2023/11-7, Meeting Date: 05.12.2023).

Table 1. The stages of the study

1. Presenting the introduction letter of the provincial welfare organization to the elderly rehabilitation center

2. Receiving an introduction letter from the deputy-manager and presenting it to the clinical ward of the center to gain the approval of the doctor in charge of the ward

3. Receiving an introduction letter from the nursing and physiotherapy wards and presenting it to the manager of the gym to start the required procedures

4. When the questionnaires were returned and the medical files were investigated by the collaboration of the experience doctors in the clinical ward of the center, the eligible people who could participate in the study according to the entry criteria were identified according to their medical and sport histories.

5. The examinees were introduced to the procedures of the study, and provided written informed consent forms to participate in the intervention.

6. The pretest was given before starting the intervention, and the posttest was given after it.

Table 2. Th	he entry and exit criteria of the study
	Being 65-85 years old
	The lack of any cardiac disorders or high blood pressure
	The presence of kyphosis
	The presence of lordosis
Entry	The lack of consuming tobacco products during the intervention
critoria	Informed consent to participate in the study
cinteria	The lack of any surgical history in the spinal column or lower limbs, the lack of serious injuries in the
	spinal columns, ligament damages, or a torn meniscus over the past year
	The lack of any visible skeletal-muscular malformation in the lower limbs
	Not consuming any drugs that influence the central nervous system (e.g., tranquilizers) on the day of the
	test
	Participants' lack of voluntary consent
	The emergence of pain in part of the examinees' bodies in a way they cannot continue to cooperate
Exit	The researchers' conclusion that a certain examinee does not cooperative conveniently during the
EXIL	intervention
Cinteria	Cardiac problems in the examinees
	Being absent for more than two sessions
	The examinees' lack of willingness to continue

The examinees' background information including their height, weight, age, sport histories, and the name of the sport were recorded in the data collection form after they filled the informed written consent forms on the day of the test. When the examinees' height, weight, and foot length were measured, the following procedures were performed as pretest measures of both groups: the lordosis and kyphosis angles using a flexible ruler, Romberg's test to investigate functional abilities in the static mode, and the Times Up and Go test for the dynamic mode. When the NASM exercises were performed by the experimental group, the examinees (experimental and control groups) were re-evaluated using the same procedures implemented in the pretest stage to measure the above variables.

Instrumentation

Kyphosis and lordosis

A 60cm flexible ruler was implemented to measure the examinees' kyphosis and lordosis angles. The instrument was considered a valid and non-aggressive tool compared to X-ray (42). de Oliveira and et al. (31) determined the reliability of the instrument at 97 and 84, respectively. Measuring the kyphosis and lordosis curves were performed in the following manner: the examinees stood having naked upper bodied with their feet shoulder-width apart. Then, the examiner specified and marked the spinous processes of the second thoracic vertebra (T2), twelfth thoracic vertebra (T12), second lumbar vertebra (L2), and second sacral vertebra (S2). When the vertebrae were marked, the ruler was placed on the examinees' spinous processes between the

T2 and T12 vertebrae and also between the L2 and S2 vertebrae so that the instrument could take the shame of their kyphosis and lordosis curves.

Then, the ruler was placed carefully and without the slightest change in its form on white paper to draw the shape of the curves. The spinous processes of the T2, T12, L2, and S2 vertebrae that had been specified on the ruler were marked on the paper. Then, the points indicating the T2 and T12 vertebrae and the ones indicating the L2 and S2 vertebrae were connected using a straight line. The line is indicated with letter L in the formula. Then, the curve perpendicular bisector line (indicated with letter h in the formula) was drawn to obtain the forms of the kyphosis and lordosis curves. Following that, the kyphosis and lordosis angles were calculated according to the following formula (14) (Figure 1).

θ =4rctan2H/L

In the above formula, h indicated the distance from the deepest point of the curve to the line L, and L was the distance between two landmarks (the distance between T2 and T12 in kyphosis, and the distance between L2 and S2 in lordosis) 13(20).



Figure 1. Measuring the kyphosis and lordosis curves

Static balance: Romberg's test (reliability coefficients to measure static balance with open and closed eyes determined at 0.90 and 0.91, respectively) was implemented to measure static balance. The examinees were supposed to stand with naked legs in a way that their dominant foot was placed in front of the non-dominant one, and the arms were crossed on the chest. The time each examinee could maintain this position with open and closed eyes was recorded as their scores. Errors included displacing one's feet, extreme tremor, and stretching one's arms. Moreover, opening the eyes in the closed-eye section was also considered an error (49).

Dynamic balance: The times up and go test (TUG) was implemented to measure dynamic balance with a reliability coefficient determined at 0.99. The examinees were asked to get up from a chair without using their hands, walk for three meters, and sit again. Using hands to get up from the chair was considered an error (39).

The NASM corrective exercises

The protocol (Tale 3) consisted of four stages that included inhibit, lengthen, activate, and integrate (10). The examinees were asked to perform warm-up exercises and then participate in the main program that included the above four sections.

Table 3. The protocol of the NASM exercises								
NASM techniques		Number	Rounds	Repetition	Duration			
Inhibition		Daily (unless in special situations)	1	Not necessary	30-90s on the trigger points (depending on the intensity of the application			
	Static	Daily (unless in special situations)	Not necessary	1-4	20-30s			
lengthening	PNF	Daily (unless in special situations)	Not necessary	1-3	Contraction: 7-15s Stretch: 20-30s Intensity: submaximal up to 20-25% Maximal contraction			
	Separate strengthening	3-5 days a week	1-2	10-15	Maintaining the isometric contraction at the end of the motion range for 2 seconds and maintaining the eccentric contraction for 4 seconds			
Activation	Conditional isometric	To the extent that is necessary	1	4	Maintaining the isometric contraction for 4 seconds at 25%, 50%, 75%, and 100 intensities Maximal voluntary contraction			
Integration		3-5 days a week, Voluntary and controlled	1-3	10-15	Taking a rests for 2 seconds between the contractions			

Inhibition: The technique is implemented to release the tension or reduce the extreme activity of the neuro-myofascial tissues in the body. The solid foam roller was used in this section to increase pressure on the structures of the soft tissues and gain access to the more profound layers of the fascia. In this protocol, the examinees were supposed to rub the foam roller on the intended area for 30 seconds (10).

Lengthening: The technique is used to increase the elasticity, length, and range of the movements of the neuro-myofascial tissues in the body. The strain on the first point of resistance was maintained for 30 seconds (10).

Activation: It was implemented to retrain or increase the activity of the less-active tissues. The exercises were performed in 10 to 15 iterations where each iteration lasted for 1 to 2 seconds. In addition, the isometric contraction was maintained at the end of the ranges of motion with four seconds of eccentric contraction (10).

Integration: The technique is used to retrain and coordinate the performance of the nerves and muscles via progressive functional motions. They included the use of dynamic physical exercises that focused on the coordination of the stabilizing and motor muscles in the body (10).

FINDINGS

The descriptive statistics and the measures of central tendency and dispersion were implemented to analyze the findings of the study. Then, the difference between the pretest and posttest scores of the examinees was calculated using inferential statistics and the analysis of variance.

The measures of central tendency and dispersion concerning the examinees' age, weight, and height are presented in Table 4.

height (N=40)							
Variable	Age		Weight (kg)		Height (cm)		
Statistic	Moon	٩D	Moon	٢D	Moon	CD	
Group	wiean	50	Mean	50	Mean	50	
Experimental (20)	69.36	11.01	74.18	8.91	175.27	8.06	
Control (20)	68.57	12.91	71.40	7.53	172.80	3.79	
M= mean, SD= standard deviation							

Table 4. The measures of central tendency and dispersion concerning the examinees' age, weight, and height (N=40)

First, the normality of all variables was investigated using the Kolmogorov-Smirnov test. Then, the analysis of variance (ANOVA) was implemented to investigate intra- and inter-group differences in terms of the mean scores of the two groups. By controlling the effects of the pretest, a significant difference was observed between the experimental and control groups in terms of static and dynamic balance after 8 weeks of NASM exercises at p<0.05 (Table 5).

Table 5 illustrates the mean and standard deviation of the two groups in terms of balance in various modes. Thus, it was found that static balance with open eyes was improved in the control group after the intervention, and the improvement was significant at p<0.05. Moreover, significant improvements were recorded in terms of static balance with closed eyes and dynamic balance (p<0.05). However, the improvement in the measures of the static and dynamic balance with open and closed eyes in the control group was not significant (p<0.05).

Table 5. The pretest and posttest scores of the experimental and control groups in terms of balance									
Variables	Groups	Test	M ±SD	Intergroup df	F(P) interaction df	Intra-group df			
	Experimental	Pre test	39.3 ±59.36						
Static balance	Experimental	Post test	100.2 ± 62.76	0.002 (0.062)	25 55 (0.001)	11.04(0.002)			
with open eyes	Combral	Pre test	39.1±59.65	0.002 (0.962)	55.55 (0.001)	11.04 (0.002)			
	Control	Post test	38.4 ±78.32	_					
0	Experimental	Pre test	23.2 ± 50.07		6.926 (0.014)	4.80 (0.037)			
Static balance		Post test	36.3 ±40.10						
with closed	control	Pre test	22.3 ±83.26	- 0.009 (0.925)					
eyes		Post test	22.2 ±89.02	_					
	E	Pre test	34.6 ±2.68						
D	Experimental	Post test	48.7 ±36.05						
Dynamic		Pre test	34.5 ±63.56	0.011 (0.902)	31.25 (0.001)	14.02 (0.032)			
balance	Control	Post test	33.5 ±68.15			· · · · ·			
		Post test	38.5 ±25.15	-					
M= mean_df= (degree of freedon	n P= signific	ance E= coefficie	nt F_SD= standard de	eviation				

Table 6 presents the man and SD values obtained for the examinees' kyphosis and lordosis angles in addition to the results of the ANOVA for the repeated data. Statistical analyses indicated the significance of the interactive effects of the changes in both groups. In other words, a significant reduction was observed in the mean kyphosis and lordosis angles of the examinees in the experimental groups by comparing their pretest and posttest scores. On the other hand, such a reduction was not observed in the control group (p<0.05). In addition, the results of the statistical analyses related to the interaction of intragroup effects were significant concerning the changes of kyphosis and lordosis, and the kyphosis angle of the examinees in the control group increased according to the posttest scores. However, the examinees in the experimental group showed a significant reduction in this respect, and the malformation was improved in them.

Variables	Groups	Test	M ±SD	Intergroup df	F(P) interaction df	Intra-group df
Lordosis	Experimental	Pretest	37.2 ±12.58	0.025 (0.812)	35.25 (0.001)	13.58 (0.042)
		Posttest	34.2 ±3.10			
	Control	Pretest	35.3±50.29			
		Posttest	36.2±57.58			
Kyphosis	Experimental	Pretest	48.2 ±16.36	0.009 (0.925)	6.926 (0.014)	4.80 (0.037)
		Posttest	45.3 ± 20.14			
	Control	Pretest	49.4 ±32.21			
		Posttest	49.1 ±72.56			
M= mean, df=	degree of freedor	n, P= signific	ance, F= coefficie	nt F, SD= standard	deviation	

Table 6. The pretest and posttest results of the experimental and control groups concerning lordosis and kyphosis

DISCUSSION AND CONCLUSION

The present study aimed to investigate the effect of physical activities on functional performance and the kyphosis and lordosis angles in elderly men. The findings showed that performing the NASM exercises resulted in a significant difference in the posttest scores of the experimental group compared to that of the control group in terms of balance, functional performance, and the reduction of lordosis and kyphosis angles. As no intervention was implemented in the control group, the increased balance and reduced lordosis and kyphosis angles in the elderly men could be attributed to the effects of the exercises. The present work was the first research study the effects of the NASM exercises on this area.

Corrective exercises have been reported to be among the most effective methods of retaining one's functions (2). Performing corrective exercises for 8 weeks introduces balance to the muscles and modifies skeletal-muscular malfunction in the upper-body areas (3). Hajihosseini et al. (17) found that hybrid exercises were more effective to separate stretch and endurance exercises and recommended combining the stretch exercises of the shortened anterior muscles of shoulders with the strengthening of the weak posterior muscles, simultaneously attending to the changes in the upper quarter of the body, and considering corrective exercises to simultaneously modify the three malformations (17). In the resent study, four-stage exercises based on the NASM principles simultaneously focused on the three malformations involved in the UCS, and this was in line with Janda's chain reaction mechanism and Bragger's cogwheel mechanism (32).

Sahrmann et al. (37) published an overview of the motion impairment syndromes of the body. He investigated the alignment or the conditions related to one's stature as measures that could predict variations in the length of muscles. He also investigated the alignment of the muscles that needed to be modified to achieve convenient motion ranges and found the significant relationship of kyphosis and the forward head posture with the shoulder impingement syndrome via constraints in the elevation mechanism. Increased posterior kyphosis results in more significant protraction of the shoulder and rotates it downward. This increases pressure below the acromion and its tissues including the bursae and rotator cuff tendons as the forward head posture is correlated with the increased kyphosis angle and the forward shoulders. Such position relatively increase the elevation, protraction, downward rotation, and anterior tilt of shoulders (37). Thus, motions selected in the first stage of activation according to the NASM principles focused on these muscles. Individuals are forced to perform special motions on their joints and keep their bodies in certain condition due to the inconvenient condition of the body and its skeletal malformations, and performing such repetitive motions and the manner of keeping one's body mutually plays a significant role in the intensification of the skeletal-muscular malformations. Consequently, it is believed that correcting such malformations need to be conducted based on functional performance using integrated activities to influence the whole body. Thus, the activation stage that included a hybrid set of integrated activities could play a significant role in improving such malformations. In addition, the muscles that bend the neck were found to have a significant role in maintaining the condition of the neck (23).

The findings of the present study were in line with the findings of Shumway et al. (44) that showed implementing a multidimensional exercise program had significant effects on the elderly's balance and

mobility and reduced the risk of falling in them (44). Moreover, Madureira et al. (24) investigated the effects of balance exercises on improving the functional performance and reducing the risk of falling among the elderly women with osteoporosis and showed that the elderly's balance could improve using the training intervention using Berg's balance scale (24). Gunendi et al. (16) investigated the effects of a 4-week aerobics program on the posture balance of the menopausal women with osteoporosis and showed the significant effects of using the intervention on the examinees' posture balance according to Berg's balance scale (16).

Hessari et al. (18) compared the effects of core stability exercises on elderly women's Berg balance scores. They showed that the examinees' balance improved as a result of the exercises, and the risk of falling got reduced among them (18). Moreover, Jacobson et al. (22) investigated the effectiveness of static balance exercises on increasing stability and functional performance among the elderly people and showed that the participants' Berg balance scores significantly increased after 12 weeks (22). Clemson et al. (11) showed that performing endurance and balance exercises for 12 months beside the routine activities reduced the risk of falling in the elderly's by 31% and improved their balance performance (11). On the other hand, Sauvage et al. (40) reported a 5-10% improvement in the elderly's balance and walking ability after 12 weeks of endurance and aerobic exercises, which was not significant. Buchner et al. (8) found that the effect of a 6-month strength and endurance training program (at 60-70% the max heart rate) on the elderly's abilities and balance capacity was not significant. The reason for the discrepancy between the results of the present study and the one conducted by Buchner et al. 8(37) can be justified on the grounds of the types of exercises implemented in the two studies (8).

The results of the present study showed that performing physical education exercises by elderly men for 16 weeks significantly increased the duration of the static balance test with open eyes in them. As examinees were supposed to maintain their balance using their visual, auricular, and somesthetic systems, it was concluded that performing functional exercises could improve and facilitate the input to each of those systems to maintain balance. Moreover, the NASM exercises significantly increased the duration of the static balance test with closed eyes. In the test, the input to the visual system was cut as the examinees closed their eyes. Then, they needed to rely only on their auricular and somesthetic systems to maintain their balance (28). Thus, as the examinees' duration of static balance with closed eyes significantly increased after the 16-week intervention, it was concluded that the NASM exercises facilitated the transmission of messages from one or both of the above senses to high-order nervous centers to maintain balance. Improved balance can be achieved when attention is conveniently divided between the intended motor tasks. Indeed, performing exercises based on special tasks can increase concentration on such tasks.

The findings of the present study showed that the kyphosis and lordosis angles in the experimental group significantly decreased after the 16-week intervention. This was in line with Mahdiavinejad and Badihi (25) who reported the improvement of the spinal column by performing physical activities. It appears that strength exercises influence the length of tendons in muscles, displace various skeletal components, and add to the stability and strength of ligaments. On the other hand, stretching exercises act as the coordinators of the protagonist and antagonist muscles. Thus, such exercises increase the length of muscles in their concave sides, increase their strength and power in their convex sides, and reduce the rates of malformations (35). In the present study, a significant reduction was observed in the participants' kyphosis angles after performing the NASM exercises. This was similar to the results of Sayari et al. (41) that investigated and compared the effects of two sets of exercises (i.e., corrective-structural and corrective-aerobic) on the participants' kyphosis angles and concluded that performing either set had positive effects on reducing the kyphosis angles. Moreover, they showed that performing a hybrid set of exercises including the corrective-structural exercises followed by aerobic running made a more significant impact on the reduction of the kyphosis angle (41). As it was mentioned in the theoretical background of the study, there is a direct link between abdominal obesity and backache. Thus, a main reason for the reduced backache in the experimental group can be the reduction of their abdominal obesity. Being aware of body parts, using muscles smartly, being informed of the messages that muscles send, and the motion ranges of the joints that comprise the fundamental principles of sports exercises prevent the damages of overusing, stretching, and pressuring muscles. The principle of stretch in exercises combines one's physical concentration and the convenient direction of the body so that muscles can be stretched up to their full motion ranges necessary to maintain the muscular balance and contract at the same by the support of the body (4). On the other hand, the results of the present study showed a reduction

in the examinees' abdominal obesity that led to the significant reduction of their backache, and this was in line with the findings of Shavandi et al. (43)

Moreover, the improvement observed in terms of maintaining balance and functional abilities was line with the findings of Cao et al. (9) and Iwamato et al. (21) though it contradicted some of the findings of Irez et al. (20) who argued that performing land-based endurance exercises had no significant impact on the functional ability of walking. Though the nature of the interventions implemented in the studies is the same, the differences in the obtained results can be attributed to ignoring factors like the examinees' readiness, their bodily activity, motivation, gender, age, height, and weight. Moreover, the variations can be justified on the grounds of the implemented methodologies and other variables. Though muscular strength gets reduced as people undergo ageing, the trend can be modified in the elderly (12). Performing physical exercises compensates the functional changes that emerge as a result of ageing and maintain the elderly's independence for longer periods. The findings of the related studies show that performing regular physical activities reduces the fat reserves of the body and increases' people muscular strength and endurance and ability to perform daily activities (12). In this regard, Trueblood et al. (48) investigated the effects of performing an 8-week fallproof exercise program on people with high and low functional levels. In the study, 52 elderly people at the age of 53-91 were divided into the high and low functional groups. The results showed that performing the 8week program of multidimensional fall-proof exercises reduced the elderly's risk of falling, and this was in line with the results of the present study (48). This can be attributed to the implementation of the similar exercises and components in the protocol of the present study. In a study by Park (33) to investigate the effects on a 10-week eyeball and functional exercises on the balance and falling risk of the elderly people with a history of falling, it was shown that the eyeball exercises had more significant impacts on improving the balance and reducing the risk of falling among the elderly 33(48). Moreover, Bjerk et al. (7) found that the Otago exercise program had a significant impact on the balance and life quality of the elderly under care services (7). In addition, (Kusuma Wati) Wati et al. (51) investigated the effects of Lafiska exercises on the elderly's risk of falling, balance, and health and showed that the exercises had significant effects on reducing the risk of falling and increasing balance and health among the participants (51). In addition, muscular atrophy that emerges as people's ages increase can be delayed or reverted by performing physical exercises that are convenient for the elderly (15). As sports like Pilates or NASM are new to our country and can be performed using a few tools everywhere imaginable, they are recommended to be implemented by people – particularly the elderly - to increase the features of their functional readiness like the speed and balance of functional abilities and reduce physical pains related to the backache.

CONCLUSION

It can be argued that regularly performing the NASM-based corrective exercises by the elderly can improve malformations in their spinal columns and enhance their balance and walking speed. Thus, participating constantly in physical activities like the NASM exercises can reduce the rates of malformations and increase the quality of maintaining balance and functional abilities among the elderly. The exercises align the gravity line of the body with its natural direction by strengthening the central organs of the body and its nervous-muscular system and maintains the balance of the body in a convenient mode. Consequently, such exercises should be implemented along other rehabilitation and routine programs for the elderly.

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Successful Reflection of Technical Director Changes on Sportive Management in Football

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Abstract

This study aims to examine the effects of managerial changes on in-season performance in the leading football leagues of Europe. The research evaluates the impact of managerial changes on end-of-season performance in seven different leagues including the Turkish Süper Lig, English Premier League, Italian Serie A, Spanish La Liga, French Ligue 1, German Bundesliga, and Portuguese Primeira Liga. Utilizing data spanning from the 2018-2019 to 2022-2023 seasons, the study employs sample sizes based on the number of managerial changes observed in each league. Paired sample tests are conducted in our analyses to assess the effects of managerial changes on end-of-season performance. This test enables us to statistically evaluate differences in team performance before and after managerial changes. Our findings indicate a significant effect of managerial changes on end-of-season performance. Analyses conducted in leagues such as the English Premier League, Spanish La Liga, and Portuguese Primeira Liga reveal statistically significant differences in average points per match before and after managerial changes. The results underscore the strategic importance of managerial changes in football club management. In this context, football clubs and managers should adopt a more cautious approach when planning and implementing managerial changes.

Keywords: Technical Director Change, Sports Management, Success in Football

Özet

Futbolda Teknik Direktör Değişimlerinin Sportif Yönetime Başarı Yansıması

Bu araştırma, Avrupa'nın önde gelen futbol liglerinde teknik direktör değişikliklerinin sezon içi performans üzerindeki etkilerini incelemeyi amaçlamaktadır. Araştırma, Türkiye Süper Lig, İngiltere Premier Lig, İtalya Serie A, İspanya La Liga, Fransa Ligue 1, Almanya Bundesliga ve Portekiz Primeira Liga gibi yedi farklı ligdeki teknik direktör değişikliklerinin sezon sonu performansına olan etkilerini değerlendirmiştir. Araştırma, 2018-2019 ile 2022-2023 sezonları arasındaki dönemi kapsayan verileri kullanmıştır. Örneklem büyüklüğü, incelenen her ligdeki teknik direktör değişikliklerinin sayısına dayanmaktadır. Analizlerimizde, teknik direktör değişikliklerinin sezon sonu performans üzerindeki etkilerini değerlendirmek için paired sample testi kullanılmıştır. Bu test, teknik direktör değişikliği öncesinde ve sonrasında takımların performansı arasındaki farklılıkları istatistiksel olarak değerlendirmemize olanak tanımıştır. Sonuçlarımız, teknik direktör değişikliklerinin sezon sonu performansı üzerinde belirgin bir etkisinin olduğunu göstermektedir. İngiltere Premier Ligi, İspanya La Liga ve Portekiz Primeira Liga gibi liglerde yapılan analizler, teknik direktör değişikliklerinin öncesinde ve sonrasında maç başı puan ortalamaları arasında istatistiksel olarak anlamlı bir farklılık olduğunu ortaya koymuştur. Araştırmanın sonuçları, futbol kulüplerinin yönetiminde teknik direktör değişikliklerinin stratejik bir öneme sahip olduğunu vurgulamaktadır. Bu bağlamda, futbol kulüpleri ve yöneticilerinin teknik direktör değişikliklerini planlarken ve uygularken daha dikkatli bir yaklaşım benimsemeleri gerekmektedir.

Anahtar Kelimeler: Teknik Direktör Değişimi, Spor Yöneticiliği, Futbolda Başarı

INTRODUCTION

Football, one of the most popular sports in the world (7), has been one of the most influential and popular sports for more than a century. The game has gone far beyond being just a sporting event and has become a cultural phenomenon (11; 13). Success is possible for an athlete or a team not only through talent and hard work, but also through proper guidance, technical and tactical development. By combining theoretical knowledge with practical experience, coaches guide and train athletes in accordance with their abilities, prepare them for competitions and assume a leadership role. In this context, coaches not only have a significant impact on the success of athletes, but are also an indispensable source of guidance and support for athletes (5). Success in the world of sport is often closely related to performance. Performance generally refers to the effectiveness and efficiency in performing a specific action or task. In the field of sport, performance usually includes the performance of an individual or a team in a particular competition or training. The importance of performance in sport is based on many factors. For example, the performance of an athlete or team can be influenced by many factors such as physical abilities, technical skills, tactical intelligence, mental toughness and motivation, athletes' nutrition, healthy lifestyle behaviors, etc. The combination of these factors usually determines the success of an athlete or team (14; 2; 3).

In the literature, one of the most important conditions for achieving success in performance sport is the establishment of a healthy coach-athlete relationship. The focus of the coach is usually the athlete or the team, and these relationships generally involve interactions between an individual or a group (4; 12). In soccer, coaches are forced to work with higher expectations and under constant pressure to perform (9). Technical directors are generally held largely responsible for the performance of the team they work for. The team's technical director plays a key role in determining the team's ranking and influences the team's position in the league while directing the training team. He or she also plays an important role in determining which footballers work how hard and which footballers are put on the transfer list, functioning as one of the club's managers. In this context, coaches are important figures who shape not only the performance on the pitch, but also the overall strategy of the club and the future of the team. In addition to their sporting achievements, they contribute to the success of the club by focusing on the development of the players, creating a team identity and determining appropriate strategies (10). Many soccer teams tend to change the manager as a first step when they experience failure. After this change, it is generally hoped that the unsuccessful period will end and positive results will be obtained in a short time (8). The technical director is a factor that greatly affects the performance of the football team. In this study, it is aimed to help us understand the impact of coaching changes on league success and to evaluate how decisive these changes are. In all these contexts, this research is intended to provide information on setting strategy, supporting management decisions and understanding the success of football clubs in general in the football world, and this information is intended to help clubs shape their future decisions and compete more effectively in the football industry. A systematic analysis of the impact of coaching changes on league success will shed light on decision-making processes in the football industry by providing a strategic perspective to football clubs and contributing to the use of these analyses in future coaching appointments and performance evaluations of clubs.

METHOD

In this study, retrospective survey model and relational survey model, which are quantitative research methods, were used. For the research, firstly, the conceptual framework of the research was examined and the literature review of the study was conducted.

In this study, the top-level men's football leagues of Türkiye, England, Italy, Spain, France, Germany and Portugal, which are the 7 most valuable football leagues in Europe according to Transfermarkt, the international football data provider, within the scope of the 2018-2019, 2019-2020, 2019-2020, 2020-2021, 2021-2022 and 2022-2023 seasons, were included in the study and the coaching changes made during the season of the football teams playing in these leagues in the specified seasons constituted the study group. The data obtained through Transfermarkt.com and news agencies between the specified dates were analyzed and turned into documents. SPSS 23 package program was used for data analysis. Before making comparisons between variables, normality analysis was performed. Since the skewness and kurtosis (skewness and

kurtosis) values were between -2 and +2, it was assumed that the variables were normally distributed (6). Since the variables in the study showed normal distribution, comparison analyzes were made with Paired Sample T-Test, one of the parametric tests. Descriptive and descriptive statistics tables were created for the statistical representation of the data obtained.

Ethical approval and institutional permission

The scope of the research was found ethically appropriate for the study with the permission decision of Istanbul Aydın University Ethics Committee meeting dated 15/02/2024 with the number and meeting number 2024/02.

FINDINGS

In this section, the results of the data collected within the scope of the research are presented in tables.

Table 1. Countries Total Number of Technical Director Changes by Season								
Langua								
League	2018-19	2019-20	2020-21	2021-22	2022-23	Toplam		
Turkey Super League	17	24	26	19	14	100		
England Premier League	7	6	4	10	12	39		
Germany Bundesliga	6	7	10	3	10	36		
France Ligue 1	5	5	10	3	14	37		
Spain La Liga	11	9	7	11	10	48		
Italy Serie A	12	12	7	7	8	46		
Portugal Primeira Liga	9	13	13	12	10	57		

When Table 1 is examined, it is seen that in the leagues of the 5 seasons in which the top-level men's football teams of the countries are included, Türkiye Super League is the league with the most coaching changes, while Germany Bundesliga is the league with the least changes. When analyzed according to the seasons, it is observed that there was the least number of coaching changes in 2021-2022, while there was the most number of coaching changes in 2022-2023. The reason for this situation can be said to be the effect of the pandemic in 2020.

Table 2. The Effect of the Change of Coach on the Team's Average Points Per Match									
League	Season		Ν	Mean	Standard Deviation	sd	t	р	
	2018 2010	Before	- 17 -	1,1176	,40917		066	0.19	
	2018-2019	After	- 17 -	1,1088	,41194	-	,000	,940	
	2010 2020	Before	- 24 -	1,0129	,50515	22	1 200	010	
	2019-2020	After	- 24 -	1,2083	,66906	23	-1,200	,213	
Türkiye Super	2020-2021	Before	26	1,0158	,41849	25	152	870	
League		After	20	1,0369	,59345	23	-,155	,079	
	2021-2022	Before	10	1,0716	,50501	19	1.025	210	
	2021-2022	After	19	1,2263	,75133	10	-1,023	,517	
	2022-2023 -	Before	14	1,0750	,42846	12	1 647	124	
		After	14	1,3307	,54815	15	-1,047	,124	
	2018-2019	Before	_ 7 _	,9271	,46006	6	270	700	
		After	7	1,0157	1,02326	0	-,219	,790	
	2010 2020	Before	_ 6 _	1,0717	,24490	5	016	088	
	2019-2020	After	0	1,0667	,70073	5	,010	,900	
England	2020 2021	Before		1,0325	,59214	3	6 8 2 6	006*	
Premier League	2020-2021	After	4	1,4150	,67791	5	-0,820	,000	
	2021 2022	Before	10	,8880	,37446	Q	861	412	
	2021-2022	After	10	1,0270	,66642	2	-,001	,412	
	2022 2023	Before	12	1,0150	,40455	11	258	801	
	2022-2023	After	12	,9392	,83106	11	,230	,801	
	2018 2010	Before	12	,8967	,56274	11	820	420	
Italy Serie A	2018-2019 —	After		1,0608	,59488	11	-,820	,430	
<u> </u>	2019-2020	Before	12	,9125	,32012	11	-,841	,418	

Turkish Journal of Sport and Exercise /Türk Spor ve Egzersiz Dergisi 2025 27(1):20-27 2025 Faculty of Sport Sciences, Selcuk University

		After		1,0350	,56725			
	2020 2021	Before	7	,7571	,23514	(1 (05	155
	2020-2021 -	After		1,0457	,38078	6	-1,625	,155
	0001 0000	Before	7	,6700	,22121		=01	(24
	2021-2022 —	After		,7443	,49467	6	-,501	,634
	2022 2022	Before	8	,4725	,33234	-	4 (4 4	4 = 4
	2022-2023 —	After		1,0750	,97108	7	-1,614	,151
		Before		1,1364	,59080	1.0		
	2018-2019 -	After	- 11 -	1,4236	,64899	10	-1,293	,225
		Before		1.0989	.62762	_		
	2019-2020 -	After	9 -	1,1667	,66398	8	-,228	,826
		Before		.9429	.38169			
Spain La Liga	2020-2021 —	After	- 7 -	1.3357	.46173	6	-1,747	,131
		Before		.7609	.36476			
	2021-2022 —	After	- 11 -	1.0873	.31090	10	-2,237	,049*
		Before		.9880	.41055			
	2022-2023 —	After	- 10 -	1.2270	.55550	9	-1,383	,200
		Before		.9060	.25472			
	2018-2019 —	After	<u> </u>	8940	60760	4	,047	,965
		Before		9720	44712			
	2019-2020 —	After	- 5 -	8680	64068	4	,463	,667
France Ligue 1		Before		1 1960	65107			
	2020-2021 -	After	- 10 -	1,1570	66488	9	,165	,873
	2021-2022 — 2022-2023 —	Before		8233	09866			
		After	- 3 -	3700	64086	2	1,334	,314
		Before		9243	42140			
		After	- 14 -	1 0779	59790	13	-,885	,392
		Bafara		8450	31425			
	2018-2019 -	After	<u> </u>	1 1583	54763	5	-2,365	,064
		Bafara		1,1305	39113			
	2019-2020 —	After	- 7 -	1,5314	60672	6	-,970	,369
Cormony		Bafara		0840	,00073			
Bundosliga	2020-2021 -	After	- 10 -	,9840	,47917	9	,555	,592
Dundesinga		Pafara		,0000	,07030			
	2021-2022 -	After	- 3 -	7200	,59573	2	,951	,442
		Bafara		,7300	,23239			
	2022-2023 —	After	- 10 -	,9430	,73972	9	-1,335	,215
		Alter		1,2920	,00013			
	2018-2019 -	Defore	<u> </u>	1,2200	,51761	8	-,637	,542
		Atter		1,4400	1,00344			
	2019-2020 -	Before	- 13 -	1,2900	,49578	12	-,502	,625
		After		1,3785	,82829			
Portugal	2020-2021 -	Before	- 13 -	,9623	,20389	12	,295	,773
Primeira Liga		After		,9192	,44765		,295	
	2021-2022 -	Before	- 12 -	,8050	,23635	11	-3,545	,005*
		After		1,1317	,38690			
	2022-2023	Before	<u> </u>	,6170	,49607	9	-,602	,562
		After		,7210	,64633	-	-,002	,

When Table 2 is examined, as a result of the Paired Sample test analysis of the average points per match of the relevant seasons according to the average points per match before and after the change of manager; It is seen that the average points per match of the English Premier League before the change of manager in the 2020-2021 season is 1.0325, 1.4150 after the change; the average points per match of the Spanish La Liga before the change of manager in the 2021-2022 season is 0.7609, 1.0873 after the change; the average points per match of the Portuguese Primeira Liga before the change of manager in the 2021-2022 season is 0.8050, 1.1317 after the change.

In this case, it is seen that there is a statistically significant difference between the average points per match before the change of manager and the average points per match after the change of manager in the English Premier League in the 2020-2021 season, Spanish La Liga and Portuguese Primeira Liga in the 2021-2022 season (p<.05). We can say that this difference is due to the positive reflection of the coaching changes made in the mentioned seasons on the points per match obtained and the success of the teams.

In addition, although no statistically significant results were obtained in 35 different seasons, it was observed that the average points of the teams increased in 25 seasons and decreased in 10 seasons compared to the previous values.

Table 3. Effect of Changes by Country on Overall Point											
Country		N	Maan	Standard	ad	4					
Country		1	Mean	Deviation	su	ι	Р				
Türlino	Before	100	1,0513	,45016	1 757	00	002				
Turkiye	After	100	1,1674	,61021	-1,737	99	,082				
England	Before	- 20	,9772	,39283	EE0	38	E91				
Eligialiu	After		1,0438	,76785	-,552		,364				
Germany	Before	36	1,0283	,54366	1 100	35	238				
	After	- 50	1,1558	,64182	-1,199	55	,230				
Eronco	Before	- 27	,9935	,46568	47	36	062*				
France	After	- 37	,9886	,62863	,47		,903				
Smain	Before	- 19	,9842	,49027	2 802	45	007*				
Span	After	40	1,2446	,53599	-2,803	47	,007				
Italy	Before		,7713	,40068	2 411	45	020*				
Italy	After	40	1,0061	,61366	-2,411	43	,020*				
Portugal	Before	- E7	,9840	,46053	1 600	٢/	112				
	After	- 57	1,1161	,70718	-1,609	36	,113				

When Table 3 is examined, as a result of the Paired Sample test analysis of the average points per match of all seasons of the football leagues of 7 countries according to the average points per match before and after the change of technical director; it is seen that the average points per match of Spain La Liga and Italy Serie A before the change is 0.9842, the average points per match of Spain Serie A is 0.7713, the average points per match of Spain La Liga and Italy Serie A after the change is 1.2446 and 1.0061 respectively.

In this case, it is seen that there is a statistically significant difference between the scores before the change and the scores after the change (p<.05) in the analysis of the coaching change in the top football leagues of Spain and Italy according to the average points per match.

We can say that this difference is due to the positive effect of the changes of managers in the Italian and Spanish football leagues on the clubs' points per match.

Standing at th	e End of the Seaso	n after the Change		0		-		
League	Season		Ν	Mean	Standard Deviation	sd	t	р
	2018 2010	Before	17	13,882	3,6208	16	021	271
	2018-2019 —	After	17	13,000	4,1982	16	,921	,371
	2019-2020 —	Before	24	12,625	4,8077	23	,861	200
Türkiye		After		12,125	4,9984			,390
Super	2020 2021	Before	26	15,577	5,7003	25	,000,	1,000
League	2020-2021	After	20	15,577	4,9004			
0	2021 2022	Before	10	14,421	4,8456	10	1 014	072
	2021-2022	After	- 19 -	12,789	6,4168	18	1,914	,072
	2022-2023	Before	14	12,500	4,6202	13	1,467	,166

Table 4. Results of the Analysis of the Team's Standing in the League on the Date of the Coach's Departure and the New Standing at the End of the Season after the Change

Turkish Journal of Sport and Exercise /Türk Spor ve Egzersiz Dergisi 2025 27(1):20-27 2025 Faculty of Sport Sciences, Selcuk University

		After		11,571	4,6029			
	2018 2019	Before	7 -	14,429	6,3733	6	1 5/0	172
	2018-2019	After	7	14,143	6,3095	0	1,049	,172
	2010 2020	Before	6	15,667	4,2269	F	720	E04
F 1 1	2019-2020	After	0	14,500	5,2440	5	,720	,504
England	2020 2021	Before	4	14,000	6,4807	2	1,000	,391
Premier	2020-2021	After	4	12,500	8,1854	3		
League	0001 0000	Before	10	15,700	4,2960	0	(10)	
	2021-2022	After	10	15,200	5,5936	9	,643	,537
		Before		14.417	4,9992			
	2022-2023	After	12 -	14,750	4,1588	11	-,402	,695
		Before	12	15.750	4.3719			
	2018-2019	After		15.500	4.2747	11	,243	,813
		Before	12	15.583	4.6015			
	2019-2020	After		14.750	4.9566	11	,969	,353
		Before	7	17,000	2,8868		893	406
Italy Serie A	2020-2021	After	,	15 857	3 1320	6	,070	,100
		Before	7	18 286	2 2147			
	2021-2022	After	1	18,000	2,2147	6	,444	,673
		Before	8	18,000	2,0000			
	2022-2023	After	0	16,000	2,0000	7	1,469	,185
		Poforo		16,230	5,9100			
	2018-2019	After	11 -	14,273	5,7461		1,469	,173
		After		12,545	6,2508			
	2019-2020	Before	9 -	15,000	6,5765	8	-1,835	,104
<u> </u>		After		15,444	6,2071		1.005	
Spain La Liga	2020-2021	Before	7 -	16,286	3,8173	6	1,307	,239
		After		14,429	4,1975			
	2021-2022	Before	11 -	17,091	3,3001	10	,766	,461
	2022-2023 —	After		16,636	3,2333		,	
		Before	10 -	16,000	3,8006	9	.887	.398
		After		15,300	4,7621	-	,	,
	2018-2019 —	Before	5 -	16,600	2,8810	4	1.129	.322
		After		14,800	4,0866			,
	2019-2020	Before	5 -	15,400	5,1284	4	609	576
	2017 2020	After	0	14,400	5,9833	1	,005	,070
France Ligue	2020-2021	Before	10 -	12,100	6,0083	9	1,000	,343
1	2020 2021	After	10	11,500	6,3640	,		
	2021-2022	Before	3 -	18,000	2,6458	2	-1.000	123
	2021-2022	After	5	18,330	2,8868	2	-1,000	,425
	2022 2023	Before	1/	15,714	3,6040	12	1 963	071
	2022-2023	After	14	14,571	3,8773	15	1,905	,071
	2018 2010	Before	6	14,833	3,1885	F	1 000	262
	2018-2019	After	0	14,000	5,0990	5	1,000	,303
	2010 2020	Before	-	12,142	4,8795	(2.000	004
	2019-2020	After	/	11,000	5,5076	6	2,066	,084
Germany	2022 2021	Before	10	14,100	4,7481	0	1,000	,343
Bundesliga	2020-2021	After	10 -	13,900	4,7246	9		
0		Before		16,000	1,7321			(07
	2021-2022	After	3 -	16,667	,5774	2	-,555	,635
		Before		14.980	5,0067			
	2022-2023	After	10	12.600	6.7528	9	1,695	,124
		Before		12,333	5,7009			
	2018-2019	After	9 -	11 222	6 1197	8	1,512	,169
Portugal		Before		10 385	5 6501			
Primeira	2019-2020	After	13	9.615	5 9/194	12	1,059	,310
Liga		Refore		13 15/	4 6699		601	502
	2020-2021	Aftor	13	10,104	1 1650	12	,071	,505
		Alter		12,402	±,±000			

Turkish Journal of Sport and Exercise /Türk Spor ve Egzersiz Dergisi 2025 27(1):20-27 2025 Faculty of Sport Sciences. Selcuk University

	2021-2022	Before	12 -	14,667	4,0973	11	1,715	114
		After		12,750	4,9932	11		,114
	2022-2023	Before	- 10 -	16,200	1,5492	- 9	1,029	,331
		After		15,300	3,3682			

When Table 4 is examined, no statistically significant difference was found between the ranking in the league at the time of the coaches' departure and the new ranking at the end of the season after the change in the 2018-2019, 2019-2020, 2019-2020, 2020-2021, 2021-2022 and 2022-2023 seasons (p>.05). However, although there was no statistically significant result, it was determined that the ranking of the teams increased to a more successful ranking in 30 of the total 35 season evaluations.

DISCUSSION AND CONCLUSION

This study analyzed the effects of manager changes on in-season performance in Europe's leading football leagues. The findings clearly show how manager changes in the Turkish Super League, English Premier League, Italian Serie A, Spanish La Liga, French Ligue 1, French Ligue 1, German Bundesliga and Portuguese Primeira Liga between the 2018-2019 and 2022-2023 seasons are reflected on the end-of-season performance. First of all, it is observed that the Turkish Super League had the highest number of manager changes during the five seasons analyzed. However, the German Bundesliga had the least number of such changes. This provides an important perspective on the coaching change policies or intra-league dynamics of different leagues.

The results show that managerial changes have a significant impact on end-of-season performance. In leagues such as the English Premier League, Spanish La Liga and Portuguese Primeira Liga, a statistically significant difference was found between the average points per match before and after the coaching changes. This suggests that the right timing and an appropriate change strategy can improve the performance of teams. This study has revealed that coaching changes have a strategic importance in the management of football clubs. In this context, future research could further investigate the reasons behind coaching changes and evaluate the effectiveness of different change strategies.

Furthermore, football clubs and managers should adopt a more careful approach when planning and implementing coaching changes. This approach can enable clubs to assess their current performance and identify situations where changes are truly necessary.

Finally, stakeholders in the football industry should develop data-driven strategies to better understand the impact of coaching changes on end-of-season success. These strategies can improve the way clubs evaluate their performance and allow them to make more informed future decisions.

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Investigating The Relationship Between Athlete Value Orientation and Sportsmanship Levels of Elite Judoka

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Abstract

This study aims to examine the relationship between athlete value orientation and sportsmanship levels of elite judoka. A total of 181 elite judokas from Konya Metropolitan Municipality Sports Club, Seydişehir Sports Club, Selçuklu Judo Sports Club, Kahramanmaraş Sports Club, and Yenidoğan Youth Sports Club, competing in the categories of junior, juvenile and seniors, participated in the study. This study was conducted in a relational survey model. As a data collection tool, a personal information form prepared to obtain demographic information about the athletes was used in the first part. In the second part, the Athlete Value Orientation Scale developed and validated by Yıldız and Güven (22), and in the third part, the Sportsmanship Scale developed by Gümüş et al. (4) was used. SPSS 25 package program was used for data analysis. Since the data were normally distributed, t-test, One-Way ANOVA, and Bonferroni test were applied in case of significant results. Besides, correlation analysis was used to measure the relationship between the two scales. Significant differences were found in the value orientations of athletes in the variables of gender, age, educational background, sports age, and sport category, while no significant difference was found in the variables of age, educational background, sports age, and sport category, while no significant difference was found in the gender variable. Athletes with higher educational background and older age have more sportsman behaviors and value orientations. A moderately positive (r=0.431) and significant (p<0.05) relationship was found between the Athlete Value Orientation Scale and Sportsmanship Scale.

Keywords: judo, athlete value orientation, sportsmanship.

Özet

Elit Judocuların Sporcu Değer Yönelimi ve Sportmenlik Düzeyleri Arasındaki İlişkinin İncelenmesi

Bu çalışmanın amacı elit judocuların sporcu değer yönelimi ve sportmenlik düzeyleri arasındaki ilişkinin incelenmesidir. Çalışmaya Konya Büyükşehir Belediyesi Spor Kulübü, Seydişehir Spor Kulübü, Selçuklu Judo Spor Kulübü, Kahramanmaraş Spor Kulübü ve Yenidoğan Gençlik Spor Kulübünde spor yapan ümit, genç ve büyükler kategorisinde yarışan 181 elit judocu katılmıştır. Araştırma ilişkisel tarama modeliyle gerçekleştirilmiştir. Veri toplama aracı olarak ilk bölümde sporcuların demografik bilgilerini elde etmek için hazırlanan kişisel bilgi formu kullanılmıştır.

İkinci bölümde Yıldız ve Güven (22) tarafından geliştirilerek, geçerlilik ve güvenirliği yapılan Sporcu Değer Yönelim Ölçeği, üçüncü bölümde ise Gümüş ve arkadaşları (4) tarafından geliştirilen Sportmenlik Ölçeği kullanılmıştır. Verilerin analizinde SPSS 25 paket programı kullanılmıştır. Verilerin normal dağılım göstermesinden dolayı t-testi, One-Way ANOVA ve anlamlı sonuç çıkması durumunda Bonferroni testi uygulanmıştır. Ayrıca iki ölçek arasındaki ilişkiyi ölçmek için korelasyon analizi kullanılmıştır. Çalışmanın bulgularında sporcuların değer yönelimlerinde cinsiyet, yaş, eğitim seviyesi, spor yaşı, spor kategorisi değişkenlerinde anlamlı farklılıklar tespit edilmiştir. Sportmenlik ölçeğinde ise yaş, eğitim seviyesi, spor yaşı, spor kategorisi değişkenlerinde anlamlı farklılıklar tespit edilirken cinsiyet değişkeninde anlamlı bir farklılık tespit edilememiştir. Eğitim seviyesi yüksek, yaşı büyük sporcuların sportmen davranışlarının ve değer yönelimlerinin daha fazla olduğu söylenebilir. Sporcu Değer Yönelim Ölçeği ve Sportmenlik Ölçeği arasında orta düzeyde pozitif (r=0,431) ve anlamlı (p<0,05) bir ilişki bulunmuştur.

Anahtar Kelimeler: judo, sporcu değer yönelimi, sportmenlik

INTRODUCTION

Judo is a martial art created by Professor Jigoro Kano in Japan in the late 19th century. Judo techniques were developed by Kano from various Japanese jujitsu schools. Judo means "gentle way" in Japanese (3).

Kano based the educational and developmental values of judo on the fundamental principles of Seiryoku-Zenyo (Maximum efficiency) and Jita Kyoei (Mutual Progress for Self and Others) (19). Kano began to teach this principle to his students, using it for physical exercise and learning of judo technique, but also as an effective tool for the development of self-control and the development of human moral qualities (14). Of the educational qualities, Kano taught that everything from concentration, self-control, respect, ethical behavior, and all the other physical benefits can be effectively applied in everyday life (15). All of these demonstrate how much importance Kano places on both physical development and moral and ethical ideals.

The judo code of ethics was created by Bernard Midan who wanted to raise awareness about education through judo and the judo code of conduct program was officially launched in 1985. This code of ethics includes eight values and translations of their French definitions: Courtesy, Courage, Honesty, Honor, Humility, Respect, Self-Control, and Friendship (1).

Courtesy; it means being kind to others. To remind you again, the shortest definition of Judo is the way of courtesy. Courage is a value that is instilled in Judo practitioners from the first day they enter the Dojo. It means facing any challenge. Sincerity and honesty, which should be present in all social and sociological structures and which are one of the foundations of a better society, are among the values of Judo. Whatever you do, you have to be sincere. An important value that every judoka and indeed all individuals in society should have is honor. It is an effort to do the right thing to adopt principles and live our lives in line with these principles. Humility means to be humble and to design our thoughts and actions without ego. Respect is one of the most important values of Judo that we need to learn and realize both as a judoka and as an individual in our social life. Respect is basically accepting and appreciating others. Self-control is described both as keeping your emotions under control and as avoiding extreme emotional states. Friendship, the judo environment is where you can make a good friendship almost anywhere in the world. The important thing here is that while you are looking for a good friend, you should also be a good friend model (2).

A prevalent issue in contemporary sports is the prioritization of achievement by sportsmen over sportsmanship and ethical principles. Judo is a discipline that emphasizes ethical principles and seeks to train each athlete within this framework. This study aims to investigate the correlation between athlete value orientations and the degrees of sportsmanship among contemporary successful judokas.

METHOD

Participants

This study adopted the "relational screening model" to examine the correlation between the elite judo athletes' value orientation and their degrees of sportsmanship. The athletes involved in the study were chosen by the convenience sampling method. Besides, the consent form was signed by the parents of the athletes younger than 18 years of age and the voluntary consent form was signed by the athletes older than 18 years of age.

A total of 181 elite judokas from Konya Metropolitan Municipality Sports Club, Seydişehir Sports Club, Selçuklu Judo Sports Club, Kahramanmaraş Sports Club and Yenidoğan Youth Sports Club participated in the study. Attention was paid to the fact that the athletes participating in the training should have participated in the national team camp by ranking in the top 7 in national competitions in the categories of hopefuls, juniors, and seniors.

Table 1. Demographic Characteristics of Athletes							
	n	%					
Gender							
Female	93	51.4					
Male	88	48.6					
Age							
15-17 years old	71	39.2					
18-20 years old	57	31.5					
21 and above	53	29.3					
Educational background							
Secondary Education	33	18.2					
High school	77	42.5					
Bachelor's degree	71	39.2					
Sport age							
1-5 years	56	30.9					
6-10 years	67	37.0					
11 years and above	58	32.0					
Sport Category							
Junior	71	39.2					
Juvenile	56	30.9					
Seniors	54	29.8					

Data Collection Instruments

In the present study, the personal information form, Athlete Value Orientation Scale, and Sportsmanship Scale were used to define the demographic information of the athletes. The Athlete Value Orientation Scale was developed by Yıldız and Güven in 2021 and a validity and reliability study was conducted. The Cronbach Alpha reliability coefficient of the scale was determined as 0.814. In this research, the Cronbach Alpha values were found to be .775. It has 22 items and a 4-factor structure with the sub-dimensions of competitiveness, sportsmanship, responsibility, and following the rules. The Sportsmanship Scale, developed by Gümüş et al. in 2020, is a five-point Likert-type scale consisting of 27 items and sub-dimensions of rules, intentional behavior, opponent, attitude towards the game, and sportsman behavior. The Cronbach Alpha reliability coefficient of the scale was determined as 0.944. In this research, the Cronbach Alpha values were found to be .915. Research data was collected employing a survey technique, utilizing surveys completed electronically.

Statistical Analysis

In this study, the SPSS 25 package program was used for statistical analysis. Numbers, percentages, mean and standard deviation were used in the evaluation of the data. Normality tests of the scores obtained from Athlete Value Orientation Scale and Sportsmanship Scale were performed and it was determined that Skewness and Kurtosis values were between ±1.5. In this case, it is accepted that the data are normally distributed (20). Independent samples T-test and One-Way ANOVA tests were used to analyze the data. The tests of the data that were significant as a result of One-Way ANOVA were obtained by the Bonferroni test. Correlation analysis was used to measure the relationship between athletes' value orientations and sportsmanship.

Ethical approval and institutional permission

The necessary permissions for this study were obtained from the ethics committee with the decision of "Batman University Scientific Research and Publication Ethics Committee" dated 31/01/2024 and numbered 2024/01-51.

FINDINGS

Scale	Sub-Dimension	Gender	n	x	sd	t	Р
cale	Competitiveness	Female	93	3.72	0.40	2.14	.03*
entation So		Male	88	3.58	0.44		
	Sportsmanship	Female	93	3.00	0.38	2.50	.01*
		Male	88	2.87	0.35	_	
)Li	Responsibility	Female	93	4.29	0.43	2.97	.00*
le (Male	88	4.08	0.50	_	
alt	Following the rules	Female	93	3.04	0.44	92	.35
Athlete V	-	Male	88	3.10	0.41		
	Total Scale	Female	93	3.50	0.27	2.76	.00*
		Male	88	3.38	0.29	_	

Table 2. T-Test Results of Athlete Value Orientation Scale Sub-Dimensions According to Gender Variables of Participants

Table 2 shows that when the sub-dimensions of the athlete value orientation scale were examined according to the gender variable of the participants, significant differences were found in of competitiveness (t=2.14; p>.05), sportsmanship (t=2.50; p<.05), responsibility (t=2.97; p<.05) and total scale (t=2.76; p<.05) scores. However, no significant difference was found in the sub-dimensions following rules (t=-.92; p>.05).

Participa	nts				0		
Scale	Sub-Dimension	Gender	n	x	sd	t	р
	Rules	Female	93	4.14	0.58	27	.78
		Male	88	4.17	0.64		
e	Intentional Behavior	Female	93	3.45	0.78	-1.83	.06
p Scal		Male	88	3.65	0.69		
	Opponent	Female	93	3.68	0.81	87	.38
ihi		Male	88	3.79	0.94		
าลท	Attitude Towards The Game	Female	93	3.24	0.64	-1.88	.06
tsn		Male	88	3.44	0.76		
IOD	Sportsman Behavior	Female	93	3.71	0.50	79	.06
SI		Male	88	3.78	0.60		
	Total Scale	Female	93	3.69	0.50	-1.36	.18
		Male	88	3.79	0.57		

Table 3. T-Test Results of Sportsmanship Scale Sub-Dimensions According to Gender Variables of

Table 3 shows that when the sub-dimensions of the sportsmanship scale were examined according to the gender variable of the participants, no significant difference was found in the sub-dimensions of rules (t=-0,27; p>.05), intentional behavior (t=-1,83; p>.05), opponent (t=-0,87; p>.05), attitude towards the game (t=-1,88; p>.05), sportsmanlike behavior (t=-0,79; p>.05) and total scale (t=-1,36; p>.05).
Scale	Sub-dimensions	Age	n	X	sd	F	р	Bonferroni
	Competitiveness	15-17 years old	71	3.61	0.47	0.60	.60	
		18-20 years old	57	3.69	0.36	_		
		21 years and	53	3.67	0.42			
		above						
e	Sportsmanship	15-17 years old	71	2.87	0.40	1.98	.14	
cal		18-20 years old	57	3.00	0.36			
n S		21 years and	53	2.97	0.34			
ntatio		above						
	Responsibility	15-17 years old	71	4.03	0.52	6.89	.00*	1-2
)rie		18-20 years old	57	4.28	0.43			1-3
e C		21 years and	53	4.31	0.41			
alu		above						
e V	Following the rules	15-17 years old	71	3.01	0.49	2.13	.12	
ılet		18-20 years old	57	3.16	0.36			
Ath		21 years and	53	3.04	0.39			
		above						
	Total Scale	15-17 years old	71	3.36	0.30	4.60	.01*	1-2
		18-20 years old	57	3.50	0.26			
		21 years and	53	3.48	0.28			
		above						
p<0.0	5 * 1- 15-17 years old, 2-18-20) years old, 3- 21 years	s old and	l above				

Table 4. Anova Results of Athlete Value Orientation Scale Sub-Dimensions According to Age Variables of Participants

Table 4 shows that when the sub-dimensions of the athlete value orientation scale were examined according to the age variable of the participants, significant differences were found in the responsibility (F=6.89; p<.05) and total scale (F=3.57; p<.05) scores. However, no significant difference was found in the sub-dimensions of contest-loving (F=0.60; p>.05), sportsmanship (F=1.98; p>.05) and following the rules (F=02.13; p>.05).

Scale	Sub-dimensions	Age	n	x	sd	F	р	Bonferroni
	Rules	15-17 years old	71	4.09	0.70	0.61	0.54	
		18-20 years old	57	4.20	0.56	_		
		21 years and above	53	4.19	0.54	_		
	Intentional Behavior	15-17 years old	71	3.34	0.79	6.15	.00*	1-2
		18-20 years old	57	3.80	0.68			
ship Scale		21 years and above	53	3.55	0.67			
	Opponent	15-17 years old	71	3.41	1.08	8.83	.00*	1-2
	••	18-20 years old	57	3.95	0.76	_		1-3
		21 years and above	53	3.94	0.46			
าลท	Attitude Towards The	15-17 years old	71	3.46	0.84	1.79	0.16	
tsn	Game	18-20 years old	57	3.26	0.68			
por		21 years and above	53	3.25	0.50			
S	Sportsman Behavior	15-17 years old	71	3.53	0.66	9.96	.00*	1-2
		18-20 years old	57	3.86	0.46			1-3
		21 years and above	53	3.91	0.37			
	Total Scale	15-17 years old	71	3.59	0.64	4.21	.01*	1-2
		18-20 years old	57	3.85	0.47			
		21 years and above	53	3.81	0.39	_		

Table 5 shows that when the sub-dimensions of the sportsmanship scale were examined according to the age variable of the participants, significant differences were found in the sub-dimensions of intentional behavior (f=6.15; p<.05), opponent (f=8.83; p<.05), sportsmanlike behavior (f=9.96; p<.05) and total scale (f=4.21; p<.05). However, no significant difference was found in the sub-dimensions of rules (f=0.61; p>.05) and attitude towards the game (f=1.79; p>.05).

Scale	Sub-dimensions	Educational background	n	x	sd	F	р	Bonferron
	Competitiveness	Secondary	33	3.61	0.38	0.96	.38	
	compension	Education	00	0101	0.00	0.00	100	
		High school	77	3.40	0.30			
		Bachelor's degree	71	3.54	0.24	_		
ntation Scale	Sportsmanship	Secondary	33	2.90	0.41	1.02	.36	
		Education						
		High school	77	2.91	0.38			
		Bachelor's degree	71	2.99	0.33			
	Responsibility	Secondary	33	3.92	0.45	18.96	.00*	1-3
Drie		Education						
e C		High school	77	4.08	0.47	_		
alu		Bachelor's degree	71	4.43	0.39			
e V	Following the rules	Secondary	33	2.90	0.38	3.28	.40	
let		Education						
Ath		High school	77	3.08	0.47			
7		Bachelor's degree	71	3.13	0.38	_		
	Total Scale	Secondary	33	3.33	0.27	7.79	.00*	1-3
		Education						2-3
		High school	77	3.40	0.30			
		Bachelor's degree	71	3.54	0.24			

Table 6. ANOVA results of the sub-dimensions of the athlete value orientation scale according to the participants' educational background variable

Table 6 shows that when the sub-dimensions of the athlete value orientation scale were examined according to the participants' educational background variable, a significant difference was found in the sub-dimensions of responsibility (f=18.96; p<.05) and total scale (f=7.79; p<.05), whereas no significant difference was found in the sub-dimensions of love of competition (f=0.96; p>.05), sportsmanship (f=1.02; p>.05) and following the rules (f=3.28; p>.05). It can be said that this difference is in favor of bachelor's degree athletes.

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Scale	Sub-dimensions	Educational	n	X	sd	F	р	Bonferroni
		background					_	
	Rules	Secondary	33	3.96	0.68	4.06	.01*	1-3
		Education						
		High school	77	4.10	0.60			
		Bachelor's degree	71	4.30	0.56	_		
	Intentional Behavior	Secondary	33	3.38	0.71	2.78	.06	
		Education						
		High school	77	3.47	0.78			
p Scale		Bachelor's degree	71	3.70	0.69			
	Opponent	Secondary	33	3.37	0.99	7.84	.00*	1-3
		Education						2-3
		High school	77	3.63	1.00			
ids		Bachelor's degree	71	4.02	0.52	_		
าลท	Attitude Towards The	Secondary	33	3.12	0.70	1.86	.15	
tsn	Game	Education						
lod		High school	77	3.38	0.80			
Ś		Bachelor's degree	71	3.40	0.59	_		
	Sportsman Behavior	Secondary	33	3.56	0.59	6.21	.00*	1-2
		Education						2-3
		High school	77	3.66	0.62			
		Bachelor's degree	71	3.92	0.40	_		
	Total Scale	Secondary	33	3.53	0.55	6.24	.00*	1-3
		Education						2-3
		High school	77	3.58	0.58	_		
		Bachelor's degree	71	3.90	0.43	_		
p<0.05*	1- Secondary Education 2-	High School, 3- Bachel	or's des	rree				

Table 7. Anova Results of Sportsmanship Scale Sub-Dimensions According to Education Level Variables
of Participants

Table 7 shows that when the sub-dimensions of the sportsmanship scale were examined according to the educational background of the participants, a significant difference was found in the sub-dimensions of rules (f=4,06; p<.05), opponent (f=47,84 p<.05), sportsman behavior (f=6,21; p<.05) and total scale (f=6,24; p<.05). However, no significant difference was found in the sub-dimensions of intentional behavior (f=2.78; p>.05) and attitude towards the game (f=1.86; p>.05).

Scale	Sub-dimensions	Sport Age	n	X	sd	F	p	Bonferroni
	Competitiveness	1-5 years	56	3.66	0.48	0.02	.97	
		6-10 years	67	3.65	0.37	_		
		11 years and above	58	3.65	0.42			
e	Sportsmanship	1-5 years	56	2.91	0.41	.20	.81	
Scal		6-10 years	67	2.94	0.37			
ation 9		11 years and above	58	2.96	0.33	_		
ente	Responsibility	1-5 years	56	4.28	0.46	3.90	.02*	1-2
Oric		6-10 years	67	4.06	0.49			
alue (11 years and above	58	4.25	0.45	_		
e S	Following the rules	1-5 years	56	3.16	0.46	1.74	.17	
nlet	-	6-10 years	67	3.02	0.43			
Atl		11 years and above	58	3.03	0.38	_		
	Total Scale	1-5 years	56	3.47	0.30	0.93	.39	
		6-10 years	67	3.40	0.27			
		11 years and above	58	3.45	0.29			
p<0.05* 1	1- 1-5 years, 2- 6-10 years, 3- 1	1 years and above						

Table 8. Anova Results of Athlete Value Orientation Scale Sub-Dimensions According	to Sport A	Age
Variables of Participants		

Table 8 shows that when the sub-dimensions of the athlete value orientation scale were examined according to the participants' sport age variable, a significant difference was found in the sub-dimension of responsibility (F=3,90; p<.05), while no significant difference was found in the sub-dimensions of competition (F=0,02; p>.05), sportsmanship (F=0,20; p>.05), following the rules (F=1,74; p>.05) and total scale (F=0,93; p<.05).

Table 9. Anova Results of Sportsmanship Scale Sub-Dimensions According to Sport Age Variables of Participants

Scale	Sub-dimensions	Sport Age	n	X	sd	F	р	Bonferroni
	Rules	1-5 years	56	4.36	0.60	6.27	.00*	1-2
		6-10 years	67	3.98	0.64	_		
		11 years and above	58	4.15	0.53			
	Intentional Behavior	1-5 years	56	3.79	0.83	5.28	.00*	1-2
		6-10 years	67	3.36	0.68			
e		11 years and above	58	3.53	0.67			
òcal	Opponent	1-5 years	56	3.90	0.96	6.03	.00*	1-2
Iship S		6-10 years	67	3.45	0.99			2-3
		11 years and above	58	3.91	0.48			
nan	Attitude Towards The	1-5 years	56	3.54	0.82	3.31	.03*	1-2
rtsr	Game	6-10 years	67	3.24	0.71			
rod		11 years and above	58	3.26	0.54			
ŝ	Sportsman Behavior	1-5 years	56	3.82	0.62	6.75	.00*	1-2
		6-10 years	67	3.55	0.57			2-3
		11 years and above	58	3.89	0.37			
	Total Scale	1-5 years	56	3.90	0.62	7.20	.00*	1-2
		6-10 years	67	3.55	0.53			2-3
		11 years and above	58	3.79	0.39	_		
p<0.05* 1-	- 1-5 years, 2- 6-10 years, 3-	11 years and above						

Turkish Journal of Sport and Exercise /Türk Spor ve Egzersiz Dergisi 2025 27(1):28-39 2025 Faculty of Sport Sciences, Selcuk University

Table 9 shows that when the sub-dimensions of the sportsmanship scale were examined according to the participants' sport age variable, significant differences were found in the sub-dimensions of rules (f=6,27; p<.05), intentional behavior (f=5,28; p<.05), opponent (f=6,03; p<.05), view of the game (f=3,31; p<.05), sportsmanlike behavior (f=6,75; p<.05) and total scale (f=7,20; p<.05).

Scale	Sub-dimensions	Sport Category	n	x	sd	F	р	Bonferroni
	Competitiveness	Junior	71	3.61	0.47	.49	.60	
		Juvenile	56	3.68	0.36			
lle		Seniors	54	3.67	0.42			
Sca	Sportsmanship	Junior	71	2.87	0.40	1.93	.14	
uo		Juvenile	56	2.99	0.36			
tati		Seniors	54	2.97	0.34			
ent	Responsibility	Junior	71	4.03	0.52	6.84	.00*	1-2
0 Li		Juvenile	56	4.28	0.43			1-3
ue		Seniors	54	4.30	0.41			
Val	Following the rules	Junior	71	3.01	0.49	2.21	.11	
ite		Juvenile	56	3.16	0.36	_		
thle		Seniors	54	3.04	0.39			
At	Total Scale	Junior	71	3.36	0.30	4.60	.01*	1-2
		Juvenile	56	3.50	0.26	_		
		Seniors	54	3.48	0.48			
p<0.05* 1	- Junior, 2- Juvenile, 3- Ser	niors						

Table 10. Anova Results of Athlete Value Orientation Scale Sub-Dimensions According to Sport Category Variables of Participants

Table 10 shows that when the sub-dimensions of the athlete value orientation scale are examined according to the participants' sport category variable, significant differences were found in the dimensions of responsibility (f=6.84; p<.05) and total scale (f=4.60; p<.05). However, significant differences were detected in the sub-dimensions of competitiveness (f=0.49; p>.05), sportsmanship (f=1.93; p>.05) and following the rules (f=2.21; p>.05).

Table 11. Anova Results of Sportsmanship Scale Sub-Dimensions According to Sport Category Variables of Participants

Scale	Sub-dimensions	Sport Category	n	x	sd	F	р	Bonferroni
		Junior	71	4.09	0.70			
	Rules	Juvenile	56	4.22	0.56	.67	.51	
		Seniors	54	4.17	0.54			
		Junior	71	3.34	0.79			
	Intentional Behavior	Juvenile	56	3.81	0.67	6.51	.00*	1-2 1-2 1-3 1-2 1-3 1-2
e		Seniors	54	3.54	0.67			
ship Scale		Junior	71	3.41	1.08			1.0
	Opponent	Juvenile	56	3.97	0.76	8.86	.00*	1-2
		Seniors	54	3.93	0.46			1-3
nan		Junior	71	3.46	0.84			
tsn	Attitude Towards	Juvenile	56	3.29	0.67	1.87	.15	
pot	The Game	Seniors	54	3.23	0.52			
Ś		Junior	71	3.53	0.66			1.0
	Sportsman Behavior	Juvenile	56	3.87	0.47	9.92	.00*	1-2
	-	Seniors	54	3.90	0.37			1-3
		Junior	71	3.59	0.64			
	Total Scale	Juvenile	56	3.86	0.47	4.35	.01*	1-2
		Seniors	54	3.80	0.39	_		
n<0.05*1	- Junior 2- Juvenile 3- Se	niors						

Table 11 shows that when the sub-dimensions of the sportsmanship scale were examined according to the sports category variable of the participants, significant differences were found in the sub-dimensions of intentional behavior (f=6.51; p<.05), opponent (f=8.86; p<.05), sportsmanlike behavior (f=9.92; p<.05) and total scale (f=4.35; p<.05). However, no significant difference was found in the sub-dimensions of rules (f=0.67; p>.05) and attitude towards the game (f=1.87; p>.05).

Table 12. The Relationship Between Athlete Value Orientation Scale and Sportsmanship Scale							
	Sportsmanship Scale						
Athlete Value Orientation Scale	Pearson r	.431**					
	p	0.00					
n 266							

Table 12 shows that there was a moderately positive (r=0.431) and significant (p<0.05) relationship between the athlete value orientation scale and sportsmanship scale.

DISCUSSION AND CONCLUSION

This study aims to examine the relationship between athlete value orientation and sportsmanship levels of elite judoka. A total of 181 elite judokas from Konya Metropolitan Municipality Sports Club, Seydişehir Sports Club, Selçuklu Judo Sports Club, Kahramanmaraş Sports Club and Yenidoğan Youth Sports Club participated in the study. The sub-dimensions of athletes' sport value orientations and sportsmanship levels were examined in terms of gender, age, educational background, sport age, and sport category variables.

It was observed in the present study that there was a significant difference in the sub-dimensions of athletes' athlete value orientations according to the gender variable. It was observed that there was a significant difference in the mean scores of sportsmanship, responsibility, and total scale scores from the value orientation sub-dimension and this difference was in favor of females. Similarly, Lyson (13) reported in his study that females have higher moral values than males.

In the present study, there was no significant difference in the sportsmanship level and sub-dimensions of the athletes according to the gender variable. Similarly, Gürpınar and Kurşun (9) reported that there was no significant difference between the sportsmanship scores of football and basketball players. Furthermore, according to the study conducted by Kayışoğlu et al. (12), it was seen that the sportsmanship behavior scores of secondary school students did not make a significant difference according to gender. On the contrary, Gümüş (8) reported that there was a significant difference in the sub-dimension of respect for rules and management in the sportsmanship orientation of individuals in Generation X according to gender. Güllü and Şahin (7) reported that there was a difference in favor of males in the respect for opponent sub-dimension of sportsmanship orientation of compliance with social norms and respect for the opponent sub-dimension of sportsmanship orientations of athletes. Tsai and Fung (21) also reported that the sportsmanship level of females was higher than that of males. Sportsmanship level is affected by many variables. In general, age, gender, and educational background are the main determinants. Besides, differences between branches are also observed in the sportsmanship level, which is also influenced by the educational background.

It was observed in the present study that there was a significant difference in the sub-dimensions of athletes' value orientations according to the age variable. This difference was found to be in favor of athletes aged 21 years and over in the responsibility sub-dimension and in favor of athletes aged 18-20 years in the total scale mean scores. Proios and Doganis (17) also reported a significant difference in favor of athletes aged 20-23 years.

It was observed that there was a significant difference in the mean scores of intentional behavior, opponent, sportsman behavior, and total scale in the comparison made according to the age variable in the sub-dimensions of sportsmanship level in the study we conducted. It was observed that the sub-dimensions of intentional behavior, opponent, and total scale were in favor of athletes aged 18-20, while the sub-dimension of sportsmanlike behavior was in favor of athletes aged 21 and over. Gürpınar and Kurşun (9) also found that the sportsmanship values of athletes aged 22 and over were higher in their study. Özsarı et al. found significant

differences in favor of athletes aged 14-17 years. Tsai and Fung (21) reported that senior players had lower attitudes towards sportsmanship than juvenile players.

The results of our study showed that athletes in the older age group had higher mean scores in both sportsmanship and athletic value orientations than athletes in the younger age group. The reason for this is thought to be that people in the older age group have a more established personality and character and probably have more experience.

It was observed in the present study that there was a significant difference in the sub-dimensions of athletes' value orientations according to the educational background variable. This difference in responsibility and total scale sub-dimensions was found to be in favor of undergraduate athletes. Similarly, in the study conducted by Proios and Doganis (17), it was reported that the highest mean score according to the educational background of the participants in team sports belonged to those with postgraduate education and that this mean score created a significant difference.

It is observed in our study that there is a significant difference in the mean scores of rules, opponent, sportsman behavior, and total scale scores according to the educational background variable in the subdimensions of sportsmanship level and this difference is in favor of undergraduate athletes. Güllü and Şahin (7) reported that there was a significant difference in favor of the participants with associate and bachelor's degrees in the social responsibilities in sports sub-dimension of the sportsmanship orientation levels of national wrestlers. On the contrary, Gümüş (8) reported that the sportsmanship orientation of individuals in Generation X did not differ according to the educational background.

It is thought that the fact that both sportsmanship and value orientation scores of undergraduate athletes are higher than the other groups in our study is due to their maturation levels and the fact that they are more conscious individuals than others. In this direction, increasing the educational background of all athletes in general is thought to increase fair play, sportsmanship, and value orientations in sports.

It was observed in the present study that there was a significant difference in the sub-dimensions of athletes' value orientations according to the sport age variable. It was observed that this difference in the responsibility sub-dimension was in favor of the athletes whose sports age was between 1 and 5 years. However, in contrast to our study, Proios et al. (18) reported that the ethical levels of soccer, handball, and basketball players did not differ according to sports age in their study in which they evaluated sport ethics depending on participation type, sport type, and sport experience.

It was observed in the present study that there was a significant difference in the sub-dimensions of sportsmanship level according to the sport age variable. This difference was found to be in favor of athletes with a sporting age between 1-5 years in the sub-dimensions of rules, intentional behavior, opponent, view of the game, and total scale, while the difference in the sub-dimension of sportsmanlike behavior was in favor of athletes with a sporting age of 11 years and above. Güllü (6) also reported that there was a significant difference in the sub-dimension of respect for rules and management, and the sub-dimension of respect for the opponent according to the duration of the athletes' current sports and that this difference was in favor of individuals who have been doing sports between 1-5 years. Similarly, Özsarı et al. (16) reported in their study on female basketball players that sports age had an effect on sportsmanship level and that the effect was generally in favor of those with less sports experience. Contrary to these studies, Gürpınar and Kurşun (9) reported that the sportsmanship values of football and basketball players did not differ according to their sporting age. Assessment of the sports age is an important indicator in all branches and all studies. Sport age, which is as important as the physiological age of the athlete, determines the level of both the athlete's sporting characteristics and many values, especially sportsmanship, over time.

It was observed in the present study that there was a significant difference in the sub-dimensions of athletes' value orientations according to the sport variable. It was observed that this difference in the responsibility sub-dimension was in favor of senior athletes, and the difference in the total scale sub-dimension was in favor of juvenile athletes.

It was observed in the present study that there was a significant difference in the sub-dimensions of sportsmanship level according to the sports category variable. This difference in the sub-dimensions of intentional behavior, opponent, and total scale was in favor of juvenile athletes, while the difference in the sub-dimensions of sportsmanlike behavior was in favor of senior athletes. As a result of the literature review, no research on the sport category variable was found.

It is also recommended that future studies be conducted on sports categories in different branches to contribute to the literature.

Moral rules and sportsmanship should be taken more into consideration by coaches and not only physical training of athletes but also values education should be included.

In conclusion, it can be said that athletes with higher educational background and older age have higher athlete value orientations and sportsmanship levels. It is recommended that players in the younger age group and with lower educational attainment receive mandatory training on ethical values and sportsmanship, as required by sports federations. Moreover, it can be said that there is a moderate positive relationship between athletes' sportsmanship level and athlete value orientations.

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The Effects of Var Implementation in The Turkish Football Super League

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Abstract

Technological advances have significantly impacted the field of sport, revolutionizing various aspects of training, performance analysis and supporter participation. The development of data analysis systems, especially in football, has been particularly influential in recent times. One of the latest technologies to enter our lives in football is the Video Assistant Referee (VAR) system. The implementation of technologies such as the VAR system has aimed to reduce errors and increase the accuracy of referees' decisions, emphasizing the importance of their role in the application of the rules of the game. For this reason, according to the variable of being the home team; when the first decisions made by the referee before the VAR system was activated and the decisions made after the VAR system was activated in the positions where the VAR system was activated; Would there be an advantage to the home team in the decisions made by the referee if there was no VAR system? As a result of the analysis related to this question; in 243 positions (49.7%), the home team had an advantage while in 246 positions (50.3%) the away team had an advantage. There was no statistically significant difference (p>0.05) when it was analyzed whether the advantage given to the home team or the advantage given to the away team was dependent on the season variable. In 489 positions where the VAR system was activated, it was observed that without VAR, full stands, pitch advantage or noise did not provide an advantage to the home team in wrong refereeing decisions.

Keywords: Video assistant referee. Home ownership in football, Turkish football super league.

Türkiye Futbol Süper Ligi'nde Var Uygulamasının Etkileri

Özet

Teknolojik gelişmeler spor alanını önemli ölçüde etkilemiş, antrenman, performans analizi ve taraftar katılımının çeşitli yönlerinde devrim yaratmıştır. Özellikle futboldaki veri analiz sistemlerinin gelişimi son zamanlarda etkisini göstermektedir. Futbolda hayatımıza girmiş son teknolojilerden bir tanesi de Video Yardımcı Hakem (VAR) sistemidir. VAR sistemi gibi teknolojilerin uygulanması, hataları azaltmayı ve hakemlerin kararlarının doğruluğunu artırmayı amaçlamış ve oyun kurallarının uygulanmasındaki rollerinin önemini vurgulamıştır. Bu sebeple ev sahibi olma değişkenine göre; VAR sistemini devreye girdiği pozisyonlarda, hakemin VAR sistemi devreye girmeden önce ilk verdiği kararlar ve VAR sistemi devreye girdikten sonra verdiği kararlar incelendiğinde; VAR sistemi olmasaydı hakem tarafından verilen kararlarda ev sahibi takıma bir avantaj oluşacak mıydı?' sorusuna cevap aranmaktadır. Bu soru ile ilişkili yapılan analiz sonucunda; 243 pozisyonda (%49,7) ev sahibi takıma avantaj sağlarken 246 pozisyonda (%50,3) deplasman takımına avantaj sağlamıştır. Ev sahibi takıma sağlanan avantaj ya da deplasman takımına sağlanan avantajın sezon değişkenine bağımlı olup olmadığına bakıldığında istatistiksel olarak anlamlı bir farklılık bulunamamıştır (p>0,05). VAR sistemi devreye girdiği 489 pozisyonda VAR olmasaydı tribünlerin dolu olması, saha avantajı ya da gürültünün yanlış hakem kararlarında ev sahibi takıma karşı bir avantaj sağlamadığı görülmüştür.

Anahtar Kelimeler: Video yardımcı hakem. Futbolda ev sahibi olma, Türkiye futbol süper ligi.

INTRODUCTION

Technological advances have significantly impacted the field of sport, revolutionizing various aspects of training, performance analysis and supporter participation. Video systems have been integrated into sports such as football, water polo and tennis, increasing the ability to study and analyze player performance (39).

The development of data analysis systems, especially in football, has been particularly impressive in recent times. The need for more dynamic and complex systems to effectively improve match performance has increased (32). The importance of data analysis in understanding patterns and performance in football matches, especially in achieving victories, has also been demonstrated in the literature (30, 7). Advanced and dynamic approaches in data analysis have gained a lot of importance in order to increase match performance, attract supporters' attention and improve training methodologies and tactics in football.

In addition, the fact that football matches are presented to the public with images recorded in higher resolution and from different angles through audiovisual technologies has led to more discussion of the decisions made during the game (1). The fact that football is structurally characterized by fast-moving actions has required decisions to be made quickly and the flow of the game to be maintained uninterrupted. However, this short period of time has also brought the risk of making wrong decisions (26). In parallel with the development of football, the referee's responsibilities are also increasing and in this context, incorrect decisions can significantly affect the performance of the players and the outcome of the match (5).

It is only possible to prevent controversies about goal positions and fouls in football matches by combining developing technology opportunities with football rules and ensuring that referees make more accurate and fair decisions. With the introduction of digital media technologies into football, the decision-making situation regarding critical and challenging positions during the match has become clearer and more comfortable (38).

The decisions of referees also affect the outcome and fairness of a match, which is of great importance for the points that teams will earn. Research has emphasized the importance of referees making impartial and correct decisions and has revealed the existence of refereeing bias, especially towards home teams (3). The correct positioning and judgment of referees is crucial for maintaining the rules of the game and ensuring fair competition (27). The implementation of technologies such as the VAR system has aimed to reduce errors and improve the accuracy of referees' decisions, emphasizing the importance of their role in enforcing the rules of the game (40).

Different video replay technologies have been previously used in sports such as golf, rugby and baseball to evaluate controversial decisions (11). The positive contributions provided by the technology applied in these sports have led to the idea that similar technologies should be applied in football. In today's world, where football is undergoing a major transformation, the use of digital technologies to minimise referee errors and reduce the influence of referee decisions on the outcome of the game stands out as a rational solution (34).

The VAR system, which was developed to prevent the positions that football referees missed during the match, allows replaying the positions that occurred during the match (18). It also allows the replay of unfavourable situations that develop on the field (16).

The Video Assistant Referee (VAR) system is used in football to assist match referees in making critical decisions during a match. The VAR system is typically used in situations where important positions need to be reviewed, such as goals, penalty decisions, red card violations and cards given to the wrong player. The VAR system is a crucial component that improves the accuracy and fairness of decision-making in modern football matches. The technology gives referees access to video replays and additional angles, ensuring that key decisions are made correctly. This reduces errors and improves the overall accuracy of refereeing. The implementation of the VAR system has significantly impacted the game by increasing the impartiality of decision-making processes. The VAR system has enhanced transparency in refereeing by allowing both supporters and players to witness the review process and understand the logic behind key decisions. Referees now have the support of advanced video technology to review controversial situations and ensure the accuracy of decisions. This reduces the likelihood of errors by the referee and increases the fair administration of football matches (29, 33). VAR is only used after the referee has made an (initial) decision or if a serious

incident is missed and not seen by the match officials. The referee's original decision is not changed unless there is a 'clear and obvious error' (28).

Studies have shown that there is a bias in referees' decision-making in favor of the home team (4, 8). Whether conscious or unconscious, this bias has been linked to factors such as crowd influence, home crowd noise and social pressure (6, 15, 19). Referees can be influenced by the home stadium environment, supporter and crowd noise, potentially leading to a perceived bias in favor of the home team (15).

Research shows that this bias towards home teams can affect match outcomes and disciplinary decisions, with away teams generally facing more challenges and sanctions than home teams (8). The presence of referee bias contributes to the home advantage phenomenon observed in football and other team sports (10). Furthermore, studies suggest that the implementation of technologies such as the Video Assistant Referee (VAR) system can help reduce home advantage and referee bias to some extent (21).

It is clearly mentioned in the literature that the referee has a bias in favor of the home teams. For this reason, the decisions made by the referee in the positions where the VAR system is activated will be analyzed according to the variable of being the home team. While every point is so important for the ranking of the teams in the league; It is very important to evaluate the effect of the VAR system in the Turkish men's football super league.

METHOD

In this study, retrospective study model, which is one of the subheadings of observational study, was used. The results of the matches played in the last 3 seasons (2020-2023) in the Turkish men's football super league were analysed. In these matches, the decisions made by football referees in positions where the video assistant referee (VAR) system was activated were analysed.

The data of the study were collected by watching the game summaries of the Turkish men's football super league, which is open access via the internet. The positions where the VAR system was activated in all published super league competitions were analysed. In these positions, the first decisions of the referees before the VAR system was activated and the decisions made after the VAR system was activated were recorded using the paper-and-pencil method.

According to the seasons, the number of decisions before and after the VAR system was activated, the number of decisions in favour of or against the home team, whether there is an effect of being the home or away team on the referee's decisions without the VAR system, and in which of the positions specified in the VAR system the VAR referee intervened more, were calculated by frequency, percentage values and chi-square test in the SPSS program.

Ethical approval and institutional permission

Before starting the study, ethical approval was obtained from Muğla Sıtkı Koçman University Medical and Health Sciences Ethics Committee (Sports, Health) with the decision dated 30.01.2024 and numbered 20.

Table 1. Distribution of the Var system according to seasons									
Season	Number of matches (n)	Number of matches with VAR actived (n)	Number of positions where VAR intervened (n)						
2020/2021	420	172	206						
2021/2022	380	129	166						
2022/2023	342	119	152						
Total	1142	420	524						

FINDINGS

In the 3 seasons evaluated, 1142 matches were played and the VAR system was activated in 420 matches (36.7%). In 420 matches where the VAR system was activated, 524 positions were reviewed. Turkish Jaurnal of Sport and Exercise /Türk Spor ve Egzersiz Dergisi 2025 27(1):40-46 42 2025 Faculty of Sport Sciences, Selcuk University

C			Positio	V 2	L.				
Seasons		Goal	Penalty	Offside	Card	Total	- X ²	sa	р
2020/2021	n	35	92	55	24	206	4.019	6	0.674
2020/2021	%	17	44,7	26,7	11,7	100			
2021/2022	n	23	80	46	17	166			
2021/2022	%	13,9	48,2	27,7	10,2	100			
2022/2022	n	18	66	45	23	152			
2022/2023	%	11,8	43,4	29,6	15,1	100			
Tetel	n	76	238	146	64	524			
Total	%	145	45,4	279	12,2	100			
p<0.05									

Table 2. Positions where the Var system was activated according to seasons

As a result of the chi-square test conducted to determine whether the positions evaluated within the scope of VAR are dependent on the seasons played variable, the dependency between the variables was not found statistically significant (X2 = 4,019; p>0,05).

Table 3. Ad	lvantage of the Var system	acco	ording to seasons					
C	VAR system and the		If there was no VAR, who would have benefited from the decision?				ad	
Seasons	same		Advantage to the home team	Advantage for the away team	Total	Λ-	su	Ρ
2020/2021	15	n	92	99	191	0.495	2	0.781
	15	%	48,2	51,8	100			
2021/2022	8	n	82	76	158			
2021/2022	8	%	51,9	48,1	100			
2022/2022	8	n	69	71	140			
2022/2023	8	%	49,3	50,7	100			
	25	n	243	246	489			
Total	35		49,7	50,3	100			
p<0.05								

In the evaluation made by excluding the positions in which the decisions of the VAR system and the referees were the same, that is, the positions in which the referee did not change his decision despite the use of the VAR system (n:35); as a result of the chi -square test was conducted to determine whether the question "Who would have an advantage if there was no VAR system?" was dependent on the seasons played. The dependence between the variables was not found to be statistically significant (X2=0,495; p>0,05).

DISCUSSION AND CONCLUSION

Technological referee assistants are increasingly being used in football. The VAR system has emerged as the latest innovation and is thought to be helpful in ensuring justice in football. In a study involving football players, coaches, fans and referees, it was reported that the VAR system was an important factor in ensuring justice as a common opinion of all participant groups (9). In another study, it was determined that the VAR system is an important factor in ensuring in-game justice by reducing the pressure and stress on referees (13). In this study, the decisions made by football referees in the positions where the VAR system was activated were analysed by considering the competitions played in the last 3 seasons (2020-2023) in Turkey men's football super league. An answer to the question 'Would there be an advantage to the home team in the decisions made by the referee without the VAR system?

In the last 3 seasons (2020-2023), 1142 matches were played and VAR was activated in 420 matches (36.7%). In his study looking at the effects of the VAR system in the champions league, Işın (2023) mentioned that the VAR system was activated in approximately 25% of the matches. In another study conducted in La Liga, the top league in Spain, it was mentioned that the VAR system was activated in 27% of the matches (14). We think that the difference here is related to referee performance. Champions League matches are officiated by the

world's most elite referees and error rates are low. According to the International Federation of Football History and Statistics (23), the referee performance in La Liga, the 3rd largest league in the world, is also at a high level. The high level of referee performance reduces the number of errors made by the referee, thus reducing the chances of the VAR system being activated.

In 420 matches where the VAR system was activated, 524 positions were analyzed. Out of 524 positions, 76 (14,5%) were goal positions, 238 (45,4%) were penalty positions, 146 (27,9%) were offside positions and 64 (12,2%) were card positions. In the 524 positions where the VAR system was activated, the referees changed 489 (93,3%) of their decisions, while they did not change their decisions in 35 (6,7%) of them. When it was analyzed whether the positions evaluated within the scope of VAR were dependent on the season variable, no statistically significant difference was found (p>0.05). There is no significant change in the positions that the referees went to VAR according to the seasons. Although VAR is a new system, the types of positions that the referees went to VAR remained almost the same in terms of percentage according to the seasons.

Considering that the referees did not make a mistake in the positions where the decisions they made before the VAR system was activated remained the same after the VAR system was activated, i.e. in the positions where they did not change their decisions, in the remaining 489 positions, when analyzed as 'Whom would the wrong decision of the referee give advantage to if there was no VAR?', 243 positions (49.7%) gave advantage to the home team and 246 positions (50.3%) gave advantage to the away team. When it was analyzed whether the advantage given to the home team or the advantage given to the away team was dependent on the season variable, no statistically significant difference was found (p>0.05). There are many studies reporting that the VAR system ensures fairness (9, 12, 13, 20, 25, 31, 41). In the literature and in our study, it is also shown that the VAR system significantly enables referees to make correct decisions by correcting wrong decisions (2, 41). However, according to the results of our study; if the VAR system had not been used in the 3 seasons played between 2020-2023 in the Turkish Super League, referees would have made errors in 489 positions. These errors would have been equally distributed to the home and away teams and the referees would have acted fairly in the distribution of the wrong decisions. In other words, even though the referees would have made wrong decisions in 489 positions where the VAR system was activated, they would not have made a blatantly biased decision against the home team or the away team in these decisions. This situation shows that there is also fairness in the distribution of wrong decisions.

Home teams play their matches in their own stadiums, which shows that they have the support of their own fans behind them. However, in the 2020/2021 season, due to the coronavirus outbreak, fans were not allowed to the matches and the home teams were deprived of fan support. At the beginning of the 2021/2022 season, it was decided by the Turkish Football Federation that the matches would be played with a 50% stadium occupancy rate, and then the restriction was lifted as of 09.11.2021.(35, 36). In the 2022/2023 season, no restrictions were imposed and fans were taken to the stadiums. In the 2020/2021 season, the stadiums remained empty, matches were played with an average of 8,307 spectators in the 2021/2022 season and matches were played with an average of 12,463 spectators in the 2022/2023 season (37). When evaluated in terms of the home team receiving the support of the audience, it was seen that even if the referee had the support of the audience in the wrong decisions of the referee in 489 positions without VAR, it would not create an advantage against the home team.

In the study on the effect of the VAR system in the Chinese super league, it was mentioned that the use of VAR in the Chinese super league prevented the home team advantage to some extent, although the link between the home team advantage and the activation of the VAR system was not strong (21). In our study, the evaluation was made based on the decision made, and Han et al. (21) compared the 2017 season without the use of the VAR system with the 2018 season with the use of the VAR system. It is thought that the difference between these two studies is due to the evaluation criteria.

In addition, in the study evaluating the Brazilian 1st league, the last three seasons without the use of the VAR system were compared with the last three seasons with the use of the VAR system. According to the results, it was mentioned that the VAR system led to a decrease in the number of yellow cards given against the away team, but it did not cause any change in red cards and penalty shoot-outs for the home and away teams. It shows that the introduction of the VAR system does not provide an advantage to the home team or the away team in red cards and penalty shootouts that affect the course of the game in the Brazilian 1st league Turkish Jaurnal of Sport and Exercise /Türk Spor ve Egzersiz Dergisi 2025 27(1):40-46 44

(17). Holder et al. (2021) analysed the matches played in the Italian Serie A and German Bundesliga and found that VAR intervention in penalty shoot-outs was equal to the home team and the away team. This situation shows that it does not provide an advantage to the home team in terms of penalty position. While the VAR system does not bring an advantage to the home or away team in the first leagues of Brazil, Italy and Germany, a parallel result emerges by not bringing an advantage in the 1st league of Turkey, which is the subject of our study.

Although the VAR system seems to improve accuracy as it makes the game fairer, the long-term impact of the VAR system on football matches should be further examined in all its aspects. Future research should include referees' views on the VAR system. Furthermore, the effects of the VAR system should be evaluated by taking into account variables such as the playing style, performance and game vision of the teams

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The Mediating Role of Citizenship Fatigue in The Effect of Job Stress on Burnout: A Research on Private Sports Center Employees

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Abstract

This study aims to investigate the mediating role of citizenship fatigue in the effect of job stress on burnout. Employees of private sports centers operating in Istanbul constituted the sample of this study. The sample size was determined as "n=384". 171 women and 215 men participated in the research voluntarily. The study used the survey technique, among the quantitative data collection methods. The survey consists of four parts: personal information form, job stress scale, citizenship fatigue scale, and Copenhagen burnout inventory. Analyses were conducted using SPSS (Statistical Package for Social Science) and Process Makro 4.2 plug-in. As a result of the research, Citizenship Fatigue; has a partial mediator role in the relationship between job stress and personal burnout, it has a full mediating role in the relationship between job stress and job-related burnout, it was found to have a partial mediator role in the relationship between job stress and customer-related burnout. Future longitudinal studies can better explain the changes that occur in these relationships over time. Additionally, research in different sectors and cultures can increase the generalizability of the findings. It has been determined that managers and human resources professionals must develop strategies to reduce employees' burnout levels and address the factors that create job stress and citizenship fatigue together.

Keywords: Citizenship Fatigue, Job stress, Burnout, Management.

Özet

İş Stresinin Tükenmişlik Üzerindeki Etkisinde Vatandaşlık Yorgunluğunun Aracı Rolü: Özel Spor Merkezi Çalışanları Üzerine Bir Araştırma

Bu çalışmanın amacı iş stresinin tükenmişlik üzerindeki etkisinde vatandaşlık yorgunluğunun aracı rolünü araştırmaktır. Bu çalışmanın örneklemini İstanbul'da faaliyet gösteren özel spor merkezlerinin çalışanları oluşturmuştur. Örneklem büyüklüğü "n=384" olarak belirlenmiştir. Araştırmaya 171 kadın ve 215 erkek gönüllü olarak katılmıştır. Araştırmada nicel veri toplama yöntemlerinden anket tekniği kullanılmıştır.

Anket formu dört bölümden oluşmaktadır: kişisel bilgi formu, iş stresi ölçeği, vatandaşlık yorgunluğu ölçeği ve Kopenhag tükenmişlik envanteri. Analizler SPSS (Statistical Package for Social Science) ve Process Makro 4.2 eklentisi kullanılarak gerçekleştirilmiştir. Araştırma sonucunda Vatandaşlık Yorgunluğunun; İş stresi ile kişisel tükenmişlik arasındaki ilişkide kısmi aracı role sahip olduğu, iş stresi ile işe bağlı tükenmişlik arasındaki ilişkide tam aracı role sahip olduğu, iş stresi ile müşteri tükenmişliği arasındaki ilişkide kısmi aracı role sahip olduğu bulunmuştur. Gelecekteki boylamsal çalışmaların bu ilişkilerde zaman içinde meydana gelen değişiklikleri daha iyi anlatabileceği değerlendirilmektedir. Ayrıca farklı sektör ve kültürlerde yapılacak araştırmalar bulguların genellenebilirliğini artırabilir. Yöneticilerin ve insan kaynakları profesyonellerinin çalışanların tükenmişlik düzeylerini azaltmak, iş stresi ve vatandaşlık yorgunluğunu yaratan faktörleri birlikte ele almak için çeşitli stratejiler geliştirmeleri gerektiği tespit edilmiştir.

Anahtar Kelimeler: Vatandaşlık Yorgunluğu, İş stresi, Tükenmişlik, Yönetim.

INTRODUCTION

Researchers working in organizational behavior have been interested in volunteering above their job descriptions and have tried to shed light on the subject with their research. It has been stated that, in addition to the visible benefits of OCB, it may have negative effects on the individual due to the consumption of resources (42). Negative effects were evaluated in association with citizenship fatigue (Citizenship Fatigue). CF is defined as fatigue and wear and tear due to OCB preoccupation and the resulting state of tension; The individual feels exhausted, tired, and stressed due to OCB (14). In the limited number of studies on the subject in foreign literature, it is seen that CF has a mediating role (30), and negative results for the individual and the business have been detected (3,79,63,14). The prevailing opinion, which emerged as a result of the structure of the concepts of burnout and stress and the literature review on citizenship fatigue, is that CF may be related to the concepts of burnout and stress, which lead to negative results in employees. Since there is no research examining the mediating role of citizenship fatigue in the effect of job stress on burnout, it is thought that the study to be conducted will contribute to this field.

Organizational Citizenship Behavior

Individual behaviors that are not supported by the official reward system in organizations (83,82), that contribute to the general functioning of the organization, and that the employee performs voluntarily without being forced are defined as organizational behavior (71). Voluntary behaviors that go beyond the official role defined by the organization for the individual and include the help and support provided to other employees are within the concept of organizational citizenship behavior. If the behavior displayed within the organization occurs with the individual's consent and is received positively by the management level and employees, it can be accepted as citizenship behavior 59). It is not included in the job descriptions that act as a study guide (it is not mandatory), it is not rewarded by the reward/punishment system if ignored or performed (99), it involves personal preference (92), Behaviors that contribute to the overall effectiveness and efficiency of the organization are also evaluated in this context (55).

Unlike behaviors within the job description or appropriate to the role represented, organizational citizenship behavior (OCB) represents employees' voluntary behavior, the giving of informal rather than formal rewards, and in this context, their contribution to the whole organization (14). Researchers generally agree that OCB contributes to organizations and is beneficial for employees. Employees; They are evaluated positively by their superiors because they go beyond their job descriptions by participating in organizations, gaining knowledge and experience about the organization, guiding their colleagues, helping them by finding solutions to their problems, encouraging and persuading them, and voluntarily taking on additional responsibilities (7,95). Organizations think positively about OCB and encourage these behaviors. OCB contributes to social capital and ensures the easy and effective functioning of the organization's social mechanism (20,73,76). When we look at the existing research on the subject in the literature, it is stated that although there is significant support that citizenship behavior is positive in organizations (73), there are deficiencies in its theoretical understanding, such as not explaining the fundamentally different reactions of

employees to their jobs (14). Experiences of OCB participation are seen as important in explaining how employees will respond to subsequent opportunities for OCB participation (18).

Citizenship Fatigue

In parallel with the optimistic view put forward by academics interested in OCB in their research, employees participate in OCB due to their positive motivation and the desire to reciprocate the positive behaviors they receive from management or other people (7,72). From this perspective, it can be said that employees who participate in OCB and exhibit these behaviors will continue their behavior unless there is a change in their motivation. This situation also confirms what is called 'good soldier syndrome', attributed to employees exhibiting high levels of OCB (14). Continuous display of these behaviors and the nature of the situations encountered as a result may result in employees losing their motivation and burnout (14). As it is known, OCB technically means that employees use the cognitive, emotional, and physical resources they have, beyond their job descriptions. If resources are limited, anxiety and doubt about the fairness and benefit of the use of these scarce resources beyond the job description will put pressure on the individual, and due to the internal tension that will occur, fatigue may be felt against the behaviors that cause these feelings (14). In this case, employees may be reluctant to take opportunities related to OCB. While they can support their colleagues with a last-minute notification or short warnings and suggestions, the individual may remain silent due to fatigue (14).

Although studies on OCB are studies aimed at describing the positive behaviors of individuals in this regard (10, 19, 17, 42, 91, 93), studies indicate that individuals may become less inclined to participate in future OCB actions due to feelings of wear and tear due to OCB have not yet been taken into account (14). The issue that escapes the attention of researchers here is that employees may experience fatigue due to OCB. Although the likelihood of exhibiting behavior related to this issue decreases, this may not affect the individual's other organizational behaviors and may continue to have a high level of task understanding. The concept explained by the definition of citizenship fatigue is described as feeling worn out, tired, or at the limit (14). VY can be distinguished primarily by emotional states such as being angry, exhausted, and tense (14). Qiu et al. (79) suggest that employees who go the extra mile for instrumental purposes suffer from citizenship fatigue. VY is understood as the depletion of resources by the employee due to participation in civil activities within the organization. Balino et al. (14) argue that since citizenship fatigue is only related to the energy allocated for OCB and the resources the individual has, this situation will only hinder the citizenship behavior of employees, but will not affect the activities specified in the job description and, accordingly, their job performance. An individual who helps and guides a new employee in the first days of work may feel citizenship fatigue due to this behavior and, as a result, may give up this behavior and continue to perform the duties specified in the job description. In this context, it is evaluated that it will be possible for employees who feel citizenship fatigue to reduce their interest in the help-oriented OCB mentioned here, and to focus on the activities specified in the job description and perform them at a high-performance level (11).

At the root of citizenship fatigue, the research aims to provide a more detailed understanding of what can happen when part of an individual's job is to go out of his or her way to meet the needs of others. Especially in research on care and rehabilitation, the concept of compassion fatigue has been defined as a result associated with high levels of compassion and empathy towards those in need (22, 25, 56). Citizenship fatigue and compassion fatigue are two concepts close to each other that are likely to be confused due to their meanings. In research on the subject, it has been found that task-related compassion fatigue with an emotional approach generally occurs in nurses (25), individuals working in natural disasters where humans and other living beings are heavily affected, and social services workers (22).

While compassion fatigue arises from the responsibility that occurs due to the empathy of individuals who care for people who need care, are helpless, and hopeless, Citizenship fatigue stems from the desire to take relatively discretionary actions that benefit the organization more. While sadness and helplessness predominate in compassion fatigue, frustration and lack of appreciation prevail in employees experiencing citizenship fatigue (14).

Stress

Stress, which is seen as the pressure on the individual due to the weakness of the immune system, excessive energy consumption, as well as the effects of fatigue and burnout, is seen as one of the most important health problems in the world today (65). It is defined as the totality of the reactions of the individual body to requests in the process of reacting to the effect (80). The negative effects caused by changes in the individual's organism due to conditions that prevent the person from reacting to the events in his immediate environment are considered stress (43). It is thought that the consequences of stress may be related to physical and emotional difficulties (44).

The unpredictable flow of daily life, the strain on individuals' tolerance of current conditions, rapid development and changes, and above all, economic difficulties, and the effort to keep up with life despite everything, affect the individuals in the environment and can create more or less stress on them. Stress can be tolerated to some extent by individuals with its stimulating and motivating effects (52). Although stress is seen to be related to the individual and his inner world, it should be considered that external stress occurring in general life and work life may also have effects (94).

Conservation of Resources Theory is considered an approach that will benefit from understanding the effects of job stress on burnout. In this theory, which expresses efforts to protect and increase important resources and obtain new resources (47), it is emphasized that individuals will not be successful in their search for new resources and will experience stress if they cannot protect resources (98). As a result, individuals with relatively fewer resources will be intolerant to the decrease in resources and will subsequently quickly feel the feeling of stress and burnout (8). Employee stress is related to the demands and resources available to meet those demands. In this context, stress occurs when existing resources do not meet the demands (2). In addition to the negative stress that occurs during tension, it has been stated that stress at a level that ensures efficient work and motivation should also be taken into consideration as positive (21). Stress that motivates success is defined as a stressor, while stress that has negative consequences, such as failure, frustration, and disappointment, is also defined as destructive stress (13). In the field literature, it is seen that the types of stress are mentioned as short-term and long-term (86), stress arising from the person, and stress arising from the physical environment (21, 37).

Organizational stress refers to the stress an individual is exposed to regarding their job. The concept of job stress, which is also seen as the individual's reaction to incompatibility arising from the employee or the structure of the job during work, is also used to explain organizational stress in this respect (35). In a structure that does not provide sufficient opportunities for employees to demonstrate their capacities and abilities, where their opinions are not valued, and therefore employee participation is low, individuals who feel that they have a burden on their shoulders that they cannot bear may be exposed to extreme stress (32).

Stress at work may arise from the structure of the business and organization, business policy, current physical conditions, and employee relations (70). Stress in employees, poor performance (35), dissatisfaction (60), absenteeism (36), labor turnover (84), workplace conflicts (81), and fatigue (75) also have similar results.

The Concept of Burnout and Its Dimensions

Burnout is expressed as the depletion of energy and strength among employees, the emotional exhaustion experienced due to unfulfilled demands, and the professional stress felt (67). The concept has three subdimensions: emotional exhaustion (62), depersonalization (29), and the feeling of decreasing personal achievement (27). The concept of burnout has important consequences in individual and organizational terms, and these negativities are a negative situation that can affect employees' tendency to quit their jobs and their desire to change jobs (26, 38). Having a job, working, and providing better conditions and opportunities to the family members for whom one is responsible is an indispensable way to ensure a meaningful lifestyle. However, this situation can also be a source of stress for various reasons (50). Burnout, which is thought to be experienced intensely in workplaces, is a factor at every stage of the individual's functioning, in this context; It is stated that it can be the reason for a negative outlook on life with its capacity to negatively affect all kinds of the individual's relationships (50).

Relationships between OCB, CF, Burnout, and Stress

While citizenship fatigue is structurally very similar to stress, role overload, and burnout, it is also quite different from these structures. Citizenship fatigue emphasizes the level of energy and individual resources the employee expends on OCB (3).

Stress in working individuals; It reflects the general atmosphere that the workplace environment and the nature of the job are stressful (69), or the feelings of time pressure and anxiety associated with job descriptions (49). Role overload refers to employees' belief that there is no time to do their job and that there is more workload than one person can handle (17). Stress and role overload reflect employees' feelings of strain and depletion of their resources, which affects their ability to succeed in their jobs. Stress and role overload are concepts that weaken employees' ability to do their jobs and are not related to OCB (40). The burnout mentioned here is defined as the syndrome of emotional exhaustion, depersonalization, and decreased personal achievement that can occur among employees (66). Although citizenship fatigue is seen to be related to these concepts, it is considered to have differences in terms of its meaning.

Since burnout refers to a situation that causes decreases in employees' resources and energy levels, it is considered to negatively affect their job performance (Halbesleben and Buckley, 2004). While employees who experience citizenship fatigue and reduce their attitudes towards OCB are not expected to experience a decrease in their job performance levels, it is considered that employees who experience burnout may experience a decrease in their sense of efficacy towards their jobs (41).

It is considered that by defining citizenship fatigue, the attrition of employees exhibiting OCB can be explained more easily (14). Studies on the subject: While Bolino and Turnley (17) found a positive significant relationship between showing individual initiative (a form of OCB) and job stress and role overload, they considered work stress or strain at work as an antecedent of OCB and found a negative relationship between them and OCB. They found that there is a relationship (24). Balino et al. (14) attributed the difficulty of finding a relationship between OCB and stress and role overload to the lack of elements related to citizenship behavior like these concepts and suggested that employees can experience citizenship fatigue without feelings of stress, role overload, or burnout.

Citizenship fatigue is similar to role work overload, burnout, and felt stress; However, the situation is quite different here because employees may experience citizenship fatigue due to burnout, overload, or stress (14). The concept of citizenship fatigue emphasizes the amount of energy or personal resources an individual devotes to the citizenship behaviors of an organization (3). Individuals who feel citizenship fatigue have feelings of disappointment and not being appreciated enough by their environment, and therefore tend to withdraw from the organization (14), thus decreasing their desire to exhibit citizenship behavior in the future (14, 64) and a decrease in employees' feelings of ownership (3). Additionally, citizenship fatigue is considered to promote negative emotions and behaviors in employees, including feelings of worthlessness and disappointment (68).

In their study, Onay and Kılcı (70) determined that there was a strong and significant relationship between job stress and burnout and reported that the stress factors that employees have and that occur depending on the workplace positively affect emotional exhaustion and depersonalization, which are burnout dimensions (70). In another study examining the Relationship between Job Stress and Burnout among Service Sector Employees, it has been reported that a significant positive relationship between work stress and emotional burnout has been detected (12).

In the research, the relational screening model was used for its purpose. In relational screening studies, the relationship or effect between two different quantitative variables is revealed through a correlation coefficient (39). The main purpose of studies investigating correlation-type relationships is to examine whether the variables change together or, if so, how (9).

The hypotheses and models prepared in light of the information obtained in the literature research are presented below;

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Figure 1: Measurement model

H1: There is a significant and positive relationship between job stress and personal burnout.

H2: There is a significant and positive relationship between job stress and work-related burnout.

H3: There is a significant and positive relationship between job stress and customer-related burnout.

H4: There is a significant and positive relationship between work stress and citizenship fatigue.

H5: There is a significant and positive relationship between citizenship fatigue and personal burnout.

H6: There is a significant and positive relationship between citizenship fatigue and work-related burnout.

H7: There is a significant and positive relationship between citizenship fatigue and customer-related burnout.



Figure 2: Structural Model

H8: Citizenship fatigue has a mediating role in the effect of job stress on personal burnout.

H9: Citizenship fatigue has a mediating role in the effect of job stress on work-related burnout.

H10: Citizenship fatigue has a mediating role in the effect of job stress on customer-related burnout.

METHOD

Research Group

The research study was conducted on employees of private sports centers operating in Istanbul. There are 1345 private physical education and sports facilities in Istanbul as of 2023 (51). In the study, current and accurate data on the number of employees working in private sports centers operating in Istanbul could not be obtained. Therefore, the size of the target universe could not be determined clearly. In line with this uncertainty, a significance level of 5% (α =0.05) was taken as the basis for determining the sample size; the appropriate sample size was calculated by considering different possible population sizes. However, the uncertainty regarding the size of the universe represented by the sample group and the possible variability in the effective sample number falling into the analysis model were evaluated among the limitations of the study.

As a result, the sample size was determined as "n=384" (28, 97). With the decision of the Istanbul Rumeli University Ethics Committee dated 26.04.2024 and numbered 2024/03, it was approved that the research was ethically appropriate. The simple random sampling method, one of the random sampling methods, was preferred in the research sample.

Descriptive statistics regarding the demographic characteristics of the employees participating in the research are presented in Table 1.

Table 1.	Demographic Cha	racteristics	of Parti	icipants			
Variables	E E	requency	%	Variables		Frequency	%
Gender	Female	176	45,0	Education	Secondary education	26	6,6
	Male	215	55,0	_	Associate Degree	26	6,6
Age	18-28 age	148	37,9	_	License	204	52,2
	29-39 age	177	45,3		Postgraduate	135	34,5
	40-50 age	51	13,0	Working	1-5 years	230	58,8
	51 age and above	15	3,8	Time in the	6-11 years	67	17,1
Income	0-17.002 TL	33	8,4	Business	12-17 years	32	8,2
	17.00334.000 TL	111	28,4		18 years and above	62	15,9
	34.001-68.000 TL	226	57,8	Working Unit	Reception/Desk	141	36,1
	68.001 TL and abo	ve 21	5,4		Sales and marketing	127	32,5
Marital	Single	187	47,8		Coach	123	31,5
status	Married	204	52,2	_			
Total		391	%100			391	%100

As stated in Table 1, when looking at the gender distribution of the employees participating in the research, it is seen that 45.0% are women and 55.0% are men. According to age distribution, 37.9% of the participants are between 18-28 years old, 45.3% are between 28-39 years old, 13.0% are between 40-50 years old, and 3.8% are older than 50. According to income level, 8.4% of the participants have an income of 0-17,002 TL, 28.4% have an income of 17,003-34,000 TL, 57.8% have an income of 34,001-68,000 TL, and 5.4% have an income of 68,001 TL and above. When looking at their marital status, it is seen that 47.8% are single and 52.2% are married. According to education levels, it was determined that 6.6% of the participants had secondary education, 6.6% had associate degrees, 52.2% had bachelor's degrees, and 34.5% had postgraduate degrees. According to the working period, 58.8% of the participants have been working for 1-5 years, 17.1% for 6-11 years, 8.2% for 12-17 years, and 15.9% for 18 years or more. When looking at the working positions, it is seen that 36.1% are reception/consultancy, 32.5% are sales/marketing, and 31.5% are coaches.

In the research, the survey technique, which is among the quantitative data collection methods, was used. Data was collected from 397 employees through a digital and face-to-face survey form in May 2024. Six of these data points were removed from the dataset because they were extreme data points. The survey consists of four parts: personal information form, job stress scale, citizenship fatigue scale, and Copenhagen burnout inventory.

Data Collection Tools

Personal Information Form: For the research, demographic information such as age, income level, marital status, education level, working time in the enterprise, and working position was included.

Job Stress Scale: The scale developed by House and Rizzo (48) was used to determine the job stress levels of employees. There is only one dimension in the stress scale, and the scale consists of 7 statements in total. The Turkish validity and reliability study of the scale was conducted by Efeoğlu (33). A high score on the scale means that the perception of job stress is at a high level. The Cronbach's Alpha coefficient of the scale was calculated as .881.

Citizen Fatigue: To determine the fatigue levels of employees, Bolino et al. (14) were used. There is only one dimension in the Citizenship Fatigue scale, and the scale consists of 6 statements in total. The Turkish validity and reliability study of the scale was conducted by Karadeniz and Uzunbacak (53). The Cronbach's Alpha coefficient of the scale was calculated as .976.

Copenhagen Burnout Scale: The scale developed by Kristensen et al. (61) was used to determine the burnout levels of employees. The Turkish validity and reliability study of the scale was conducted by Bakoğlu et al. (5). The Copenhagen Burnout Scale has 19 items and 3 subscales. The subscales in this scale are discussed separately within this research. These are personal burnout, job-related burnout, and customer-related burnout scale, Cronbach's Alpha coefficient was calculated as .918, work-related burnout scale, Cronbach's Alpha coefficient was calculated as .891, and customer-related burnout scale, Cronbach's Alpha coefficient was calculated as .891.

Cronbach's Alpha coefficients give the reliability level of the scale. Depending on the alpha (α) coefficient, the reliability of the scale is interpreted as follows (1): If $.00 \le \alpha < .40$, the scale is unreliable, if $.40 \le \alpha < .60$, the reliability of the scale is low, .60. If $\le \alpha < .80$, the scale is highly reliable; if $.80 \le \alpha < 1.00$, the scale is highly reliable. Accordingly, the alpha coefficients of the scales show that they are highly reliable.

Analysis of Data

For quantitative data analysis, the statistical validity and reliability of the dataset were tested by the methods recommended by Kline (57). Analyses were conducted using SPSS (Statistical Package for Social Science) and Process Makro 4.2 plug-in. In the study, frequency analysis was performed to determine the demographic information of the participants, and the results were reported with percentage distributions. The distributions of the answers to the statements in the scales were examined, and the application of parametric tests was evaluated with the normality test. Factor analysis was performed to determine whether the sample group adequately represented the universe. Pearson correlation analysis was applied to determine the relationships among the variables in the research. The traditional mediation analysis method suggested by Baron and Kenny (6) was used to test the main hypothesis. This analysis was carried out using the analysis model developed by Hayes (45) that can detect the mediator through confidence interval values within the scope of direct, indirect, and total impact.

FINDINGS

Factor loadings of the scales used in the research were examined. Factor analysis helps researchers understand the complexity of data sets and explain the structure among variables. It also provides the opportunity to reveal the basic relationships underlying the data set of the scales used for the mediation model. Factor analyses of the variables are presented in Table 2.

Table 2: Factor A	Analyses of	Variables					
Variables	Article	Factor	Explained	Variables	Article	Factor	Explained
		Loading	Variance			Loading	Variance
Job stress	İS1	,712		Work-Related	T7	,818,	
	İS2	,830		Burnout	T8	,895	-
	İS3	,857			T9	,899	63,458
	İS4	,739			T10	,869	-
	İS5	,826	59,427		T11	,838	-
	İS6	,699			T12	,793	_
					T13	,949	
	İS7	,716		KMO Test	,865		
KMO Test	,858			Total Variance	63,458		
Total Variance	59,427			Barlett Test	,000,		
Barlett Testi	,000			Customer	T14	,676	
Citizenship	VY1	,929		Burnout	T15	,864	
Fatigue	VY2	,937			T16	,920	
	VY3	,952			T17	,904	67,782
	VY4	,955	89,239		T18	,874	-
	VY5	,954			T19	,661	
	VY6	,941					
KMO Testi	,910			KMO Testi	,820		
Total Variance	89,239			Total Variance	67,782		

Barlett Test	.000			Barlett Test	,000
	T1	,878,	69,209		
Personal Burnout					
KMO Test	,910				
Total Variance	69,209				
Barlett Test	,000,				

Table 2 shows that the sample size was suitable for factor analysis (Kalaycı, 2010: 322). KMO values above 0.60 indicates that there is a sufficient sample for analysis. As a result of the Bartlett test (p=0.000<0.05), it was determined that there were significant relationships between the variables. The Varimax Rotation Technique was used for factor analysis, and the number of factors was determined by taking into account factors with eigenvalues greater than 1. Factor loadings of 0.45 or above are stated as a good criterion (23). Factor loadings on the job stress scale were calculated between 0.857 and 0.699, and the total variance was found to be 89.239%. Factor loadings on the citizenship fatigue scale were calculated between 0.955 and 0.929, and the total variance was determined as 89.239%. In the study, the dimensions of the Copenhagen burnout inventory were subjected to separate factor analysis. Factor loadings on the personal burnout scale were calculated between 0.949 and 0.793, and the total variance was found to be 63.458%. Finally, factor loadings on the customer-related burnout scale were calculated between 0.661 and 0.920, and the total variance was determined as 67.782%. The statistic of the variables is presented in Table 3.

Table 3: Mean, Standard Deviation, and Normality Distributions of Variables									
	Mean	Standard	Skewness	Kurtosis					
		Deviation							
Job Stress	21,18	1,408	0,152	-0,935					
Citizenship Fatigue	2,75	1,173	0,303	-1,081					
Personal Burnout	2,85	0,809	0,254	-0,512					
Work-Related Burnout	2,99	0,841	0,450	-0,261					
Customer Burnout	3,77	0,921	0,227	0,330					

The results in Table 3 indicate that the average job stress of the employees participating in the research was calculated as 21.18, the average citizenship fatigue was 2.75, the average of personal burnout was 2.85, the average job-related burnout was 2.99, and the average customer-related burnout was 3.77. When the normality distributions of the variables are examined, it is seen that they are between ± 1.5. According to Tabachnick and Fidell (87), skewness and kurtosis values falling between -1.5 and +1.5 indicate a largely normal distribution (87). Pearson correlation analysis results are presented in Table 4.

Table 4: Pearson Correlation Analysis Between Variables								
	1.	2.	3.	4.	5.			
1. Job Stress	1.00							
2. Personal Burnout	,503**	1.00						
3. Work-Related Burnout	,493**	,729**	1.00					
4. Customer Burnout	,543**	,640**	,760**	1.00				
5. Citizenship Fatigue	,744**	,454**	,343**	,428**				
**p<0.001								

The results in Table 4 represent a significant positive correlation among all variables of the study. It was calculated as job stress and personal burnout (r=0.503, p<0.001), work-related burnout (r=0.493, p<0.001), customer-related burnout (r=0.543, p<0.001) and citizenship fatigue (r=0.744, p<0.001). Citizenship fatigue and burnout (r=0.450, p<0.001), personal burnout (r=0.454, p<0.001), work-related burnout (r=0.464, p<0.001), and customer-related burnout (r=0.428, p<0.001). According to these findings, hypotheses H1, H2, H3, H4, H5, H6 and H7 were supported.

There are significant positive correlations among all variables of the study (Table 4). Work stress and citizenship fatigue (r=0.744, p<0.001), burnout (r=0.570, p<0.001), personal burnout (r=0.503, p<0.001), work-related burnout (r=0.493, p<0.001). A positive and significant relationship is observed between customer-related burnout (r=0.543, p<0.001). Citizenship fatigue and burnout (r=0.450, p<0.001), personal burnout (r=0.453, p<0.001), work-related burnout (r=0.343, p<0.001), and customer-related burnout (r=0.428, p<0.001). There are also positive and significant relationships between them. According to Pearson correlation analysis, values between 0 and 0.29 indicate a weak relationship, values between 0.30 and 0.64 indicate a moderate relationship, values between 0.65 and 0.84 indicate a strong relationship, and values between 0.85 and 1 indicate a moderate relationship. It indicates a very strong relationship (89). In this context, moderate and strong relationships between the variables are observed. The results of the Meditation Model are presented in Table 5.

Model						
	M 1			Personal Burne	out (Y)	
	Estimati	LB	UB	Estimation	LB	UB
	on					
Job Stress (X)	,136**	,120	,153	,047**	,025	,068
Citizenship Fatigue (M1)				,122**	,002	,241
	R ² : ,552			R ² : ,267		
	Unstanda	rdized			Sta	ndardized
	Coefficier	ıts			Coe	efficients
	Estimation	ı	LB	UB		
Direct Effect	,047**		,025	,068	,371	
Indirect Effect on M1	,016**		,057	,014	,131	
Total Impact	,063**		,048	,078	,503	}
**p<0.001, LB: Bootstrap cor	nfidence inte	rval lowe	r bound, UB: Boo	otstrap confidence ir	terval upper	bound, M1:
Citizenship Fatigue.				*	11	

Table 5: Coefficients, 95% Bootstrap Confidence Intervals, Direct and Indirect Effects for the Mediation

 Model

Job stress predicts the mediator variable of citizenship fatigue (b=0.13, p<0.001), while the results are presented in Table 5. Work stress explains 55% of the variance in the citizenship fatigue variable. Personal burnout, which is the outcome variable, is statistically predicted by citizenship fatigue (b=0.12, p<0.001). Work stress and citizenship fatigue explain 27% of the variability in the outcome variable, personal burnout.

Additionally, the direct and indirect effects of job stress on personal burnout are presented in Table 5. It can be said that the total effect of work stress on personal burnout is 0.06. This is partially mediated by total citizenship fatigue (CI: .014-.131). Hypothesis H8 was supported. Because the effect obtained does not include the Bootstrap confidence intervals (0) value (45). When the mediation effect is examined, it can be said that job stress indirectly affects personal burnout through citizenship fatigue, and this indirect effect is statistically significant (β =.131, p<0.001). Additionally, approximately 25% of the total effect of job stress on personal burnout is due to citizenship fatigue (0.016/0.063).

As presented in Table 6, job stress predicts the mediator variable of citizenship fatigue (b=.13). Work stress explains 55% of the variance in the citizenship fatigue variable. The outcome variable, work-related burnout, is statistically predicted by citizenship fatigue (b=-.038). Work stress and citizenship fatigue explain 24% of the variability in work-related burnout, which is the outcome variable (r2: .244).

	M_1			Work-Relate	Y)		
	Estimation	LB	UB	Estimation	LB	UB	
Job Stress (X)	,136**	,120	,153	,070**	,047	,093	
Citizenship Fatigue (M1)				-,038**	-,164	,088	
	R ² : ,553			R ² : ,244			
	Unstandard	ized			Sta	ndardized	
	Coefficients				Co	efficients	
	Estimation		LB	UB			
Direct Effect	,070**		,047	,093	,5	33	
Indirect Effect on M1	-,005**		-,026	,013	-,(040	
Total Impact	,065**		,049	,080	,4	93	

Table 6: Coefficients, 95% Bootstrap Confidence Intervals, Direct and Indirect Effects for the Mediation Model

**p<0.01, LB: Bootstrap confidence interval lower bound, UB: Bootstrap confidence interval upper bound, M1: Citizenship Fatigue.

Table 6 also presents the direct and indirect effects of job stress on work-related burnout. The results indicate that the total effect of job stress on job-related burnout is .065. This total effect is fully mediated by citizenship fatigue (CI: .013--.040). Hypothesis H9 was supported. Because the resulting Bootstrap confidence intervals include the value (0) (45). When the mediation effect is examined, it can be said that job stress indirectly affects job-related burnout through citizenship fatigue, and this indirect effect is statistically significant (β =-0.40, p<0.01). Additionally, approximately 16% of the total effect of job stress on job-related burnout is due to citizenship fatigue (.080/.493).

Job stress predicts the citizenship fatigue mediator variable (b=.13), whereas the results are presented in Table 7. Work Stress explains 55% of the variance in the Citizenship Fatigue variable. The outcome variable, customer-related burnout, is statistically predicted by citizenship fatigue (b=.043). Job stress and citizenship fatigue explain 29% of the variability in customer-related burnout, which is the outcome variable (r2: .296).

Model							
	M_1	M1 Customer Related Burnout (
	Estimation	LB	UB	Estimation	LB	UB	
Job Stress (X)	,136**	,120	,153	,072**	,048	,097	
Citizenship Fatigue				,043**	-,090	,176	
(M ₁)							
	R ² : ,553			R ² : ,296			
	Unstandardiz	Unstandardized			Stand	dardized	
	Coefficients				Coef	ficients	
	Estimation		LB	UB			
Direct Effect	,072**		,048	,097	,502		
Indirect Effect on M1	,006**		-,015	,026	,041		
Total Impact	,078**		,062	,094	,543		
**p<0.01, LB: Bootstrap	confidence int	erval lower	bound, UB:	Bootstrap confider	nce interval	upper bound, M1:	

Table 7: Coefficients, 95% Bootstrap Confidence Intervals, and Direct and Indirect Effects for the Mediation

 Model

Citizenship Fatigue. Additionally, Table 7 presents the direct and indirect effects of job stress on customer-related burnout.

According to this, it can be said that the total effect of work stress on personal burnout is 06. This total effect is partially mediated by citizenship fatigue (CI: -015, -.026). Hypothesis H10 was supported. Because the resulting Bootstrap confidence intervals include the value (0) (45). When the mediation effect is examined, it can be said that work stress indirectly affects personal burnout through citizenship fatigue, and this indirect effect is statistically significant (β =0.41, p<0.01). Additionally, approximately 66% of the total effect of job stress on personal burnout is due to citizenship fatigue (.062/.094).

DISCUSSION AND CONCLUSION

This study aims to investigate the mediating role of citizenship fatigue in the effect of job stress on burnout. Employees of private sports centers operating in Istanbul were selected as the sample group and the research was conducted using the survey technique within the scope of quantitative research methods. The research results are listed as the effect of the dependent variable on the mediator and independent variables, the effect of the mediator variable on the dependent variables, and the mediation model.

As a result of the research, it was determined that work stress has a significant effect on the level of personal burnout. There is a moderate relationship between these two variables. The impact of work stress on employees; It can be associated with factors such as constantly feeling angry, having sleep problems, and experiencing tension before meetings held in the company. These situations can cause employees to become worn out, mentally and physically exhausted, weaken their immune systems, and decrease their endurance. In these cases, it is considered that job stress may increase personal burnout. In the research, a significant positive correlation between job stress and personal burnout was calculated as r=0.503. This result supported the hypothesis "H1: There is a significant and positive relationship between job stress and personal burnout", and it is consistent with the previous studies (12,31,74,100).

It is an important finding of this study that work stress has a significant impact on the level of work-related burnout. There is a moderate relationship between these two variables. The impact of work stress on employees; It can be associated with factors such as constantly feeling angry, having sleep problems, and experiencing tension before meetings held in the company. In these cases, it can be said that it can lead to emotional depression for employees, every moment of working hours being tiring, a feeling of burnout at the end of the working day, a lack of energy to spend time with family and friends outside of work, and even a desire not to go to work the next day. As a result, it is evaluated that these situations may lead to an increase in the feeling of work-related burnout. In the research, a significant positive correlation between job stress and work-related burn out was calculated as r=0.493. This result supported the hypothesis "H2: There is a significant and positive relationship between job stress and work-related burnout", and it is consistent with the previous studies (88,12,31,74,100,90).

This study revealed that job stress has a significant impact on the level of customer-related burnout. There is a moderate relationship between these two variables. The impact of work stress on employees; It can be associated with factors such as constantly feeling angry, having sleep problems, and experiencing tension before meetings held in the company. It can be stated that these situations can make it difficult to work with customers, leading to boredom, not being able to keep up with demands, and not being able to establish sustainable relationships. As a result, it is evaluated that these situations may cause burnout in relationships with customers. In the research, a significant positive correlation between job stress and customer-related burnout was calculated as r=0.543. This result supported the hypothesis "H3: There is a significant and positive relationship between job stress and customer-related burnout", and it is consistent with the previous studies (88,100).

Work stress can have negative effects on employees' emotional, mental, and physical health, leading to burnout. The effect of work stress on burnout has been proven by various studies (88, 12, 31, 74, 100, 90).

The finding that work stress has a significant impact on citizenship fatigue is an important finding of the research. A strong relationship has been found between work stress and citizenship fatigue. Based on these findings, it can be stated that individuals working in reception/consultation, sales/marketing, and trainer positions in sports centers work under great stress and that their working conditions can directly affect their health. It is considered that employees whose stress levels increase due to constantly feeling angry due to their work, having sleep problems, and experiencing tension before meetings held at work may cause them to feel worn out. In addition, increased work intensity in sports centers and workplace-related stress factors can cause employees to become mentally or physically tired and lose their life energy. This and taking on extra duties and responsibilities can also increase employees' fatigue levels. These results supported hypothesis H4: "There is a significant and positive relationship between job stress and citizenship fatigue", and it is consistent with the study of De Clercq et al. (30).

Citizenship fatigue is seen as an important mechanism between workplace stressors and employees' mental health. The Conservation of Resources theory, developed by Hobfoll (46), was supported as a result of this hypothesis. According to theory, As pressure on employees increases and support decreases, they may experience citizenship fatigue. Additionally, when employees perceive stress factors negatively and the challenging and hindering stressors within the organization increase, their citizenship fatigue increases (54, 14).

Another finding of this study is that citizenship fatigue has a significant impact on the level of personal burnout. A moderate relationship was detected between these two variables. Based on these findings, it can be said that the factors that cause citizenship fatigue in sports center employees include factors such as doing more work than expected, high expectations of the institution, being given extra duties and responsibilities, feelings of tension, and mental and physical fatigue. These factors can be said to it wear out employees personally, make them mentally and physically exhausted, reduce their resistance by weakening their immune systems, and in this context, increase their personal burnout levels. This result supported the hypothesis "H5: There is a significant and positive relationship between citizenship fatigue and personal burnout", and it is consistent with the study of Bolino and Klotz (16).

This study revealed that citizenship fatigue has a significant impact on the level of work-related burnout. A moderate relationship was detected between these two variables. Among the factors that cause citizenship fatigue of sports center employees are factors such as doing more work and being given extra duties and responsibilities due to the high expectations of the institution. It can be said that these situations can cause every moment of working hours to be tiring, a feeling of exhaustion at the end of the working day, a lack of energy to spend time with family and friends outside of work, and even a desire not to go to work the next day. Moreover, it is evaluated that factors that may cause citizenship fatigue, such as a feeling of tension, mental and physical fatigue, may cause employees to experience emotional collapse and increase feelings of work-related burnout. This result supported the hypothesis "H6: There is a significant and positive relationship between citizenship fatigue and work-related burnout ", and it is consistent with the previous studies (30,96,16,58).

An important finding in this study is that citizenship fatigue has a significant impact on the level of customer-related burnout. A moderate relationship was detected between these two variables. It is considered that the factors that cause citizenship fatigue in sports center employees may be the high expectations of the institution, doing too much work, and being given extra duties and responsibilities. It is stated that these situations can make it difficult to work with customers and lead to consequences such as not being able to keep up with demands and establishing sustainable relationships. In addition, it is evaluated that factors such as feelings of tension, mental and physical fatigue can make working with customers tiring, and cause boredom and burnout in customer relations. This result supported the hypothesis "H7: There is a significant and positive relationship between citizenship fatigue and customer-related burnout".

Citizenship fatigue affects employees' personal, work-related, and customer-related burnout levels. Supporting research has been conducted in the literature in this context. Citizenship fatigue leads to burnout consequences such as decreased productivity, poor performance, and reduced energy resources (30, 96, 16, 58, 54).

In the research, the hypothesis "H8: Citizenship fatigue has a mediating role in the effect of job stress on personal burnout" was examined. According to the results obtained, it was found that citizenship fatigue had a partial mediator role in the relationship between job stress and personal burnout. It can be said that the personal burnout levels of employees in sports centers partially increase with work stress and citizenship fatigue. Therefore, it is stated that to reduce the personal burnout levels of employees, improvements should be made in the factors that will create citizenship fatigue.

In this study, the hypothesis "H9: Citizenship fatigue has a mediating role in the effect of job stress on work-related burnout" was examined. According to the results obtained, it was found that citizenship fatigue had a full mediating role in the relationship between job stress and job-related burnout. It can be said that the personal burnout levels of employees in sports centers increase with work stress and citizenship fatigue.

Therefore, it is stated that to reduce employees' job-related burnout levels, improvements should be made in the factors that will create citizenship fatigue.

In the research, the hypothesis "H10: Citizenship fatigue has a mediating role in the effect of job stress on customer-related burnout" was examined, and according to the results, it was found that citizenship fatigue had a partial mediating role in the relationship between job stress and customer-related burnout. It can be said that the personal burnout levels of employees in sports centers partially increase with work stress and citizenship fatigue. Therefore, it is evaluated that improvements should be made in the factors that will create citizenship fatigue to reduce the work-related burnout levels of employees.

Suggestions

These results reveal the importance of stress management in the workplace and reducing employees' citizenship fatigue and burnout. This finding parallels the findings of researchers studying the subject (20, 19, 78). Managers and human resources professionals must consider the factors that create job stress and citizenship fatigue together while developing strategies to reduce employee burnout. In this context, suggestions to reduce the burnout levels of employees in sports centers and to help them cope with work stress and citizenship fatigue are presented below:

A better communication and cooperation environment can be created in the work environment to reduce employees' work stress. Duties and responsibilities should be clearly defined, workload should be balanced, flexibility should be provided, and a more sensitive approach to the needs of employees should be adopted.

Employees should be trained on strategies to cope with stress. By teaching stress management techniques, the risk of burnout can be significantly reduced by reducing the effects of work stress and citizenship fatigue. Training can improve employees' ability to cope with work stress and reduce the risk of burnout (62).

A work culture should be created to meet and support the emotional needs of employees. Increasing support and understanding between managers and co-workers can increase employee motivation and job satisfaction. Therefore, stress, fatigue, and burnout can be dealt with.

Workloads of employees should be balanced and appropriate opportunities should be provided for them to rest and recharge. By balancing the workload, the stress level of employees can be reduced, and as a result, citizenship fatigue and burnout can be prevented (47). A supportive working environment should be created in the workplace, and in this context, employees should be helped to cope with stress. Management should understand the needs of employees and be more proactive in providing them with the necessary support and resources (67). Breaks should be given, and workplace recreation areas and activity opportunities should be provided.

Performance evaluation processes should help employees determine their goals and manage their work effectively. A fair and objective evaluation system should be established, and employees' achievements should be appreciated.

Employees should be encouraged to give feedback about workload and work stress. With effective communication channels, it may be possible to detect early signs of stress and burnout in the workplace (72).

Limitations and Future Research

This study has some limitations. Because of the cross-sectional design, it is difficult to determine causeand-effect relationships. One of the limitations of this study is the inability to access the current and accurate number of personnel working in private sports centers in Istanbul. Future longitudinal studies may better understand the changes in these relationships over time. Additionally, research in different sectors and cultures can increase the generalizability of the findings.

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Investigation of the Effect of Exercise Addiction Levels of Physical Education and Sports School Students on Problem Solving Skills: Kilis Province Example

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Abstract

This study was conducted to examine the effect of exercise addiction levels on problem solving skills of students studying at the School of Physical Education and Sports, and to examine whether exercise addiction and problem solving skills differ depending on gender, department of study, licensed athlete status and weekly exercise frequency. The population of the study consists of Kilis 7 December University students. Among quantitative research methods and techniques, descriptive survey model was used on the basis of voluntary participation. The sample of the study consists of 90 female and 54 male students studying at Kilis 7 December University School of Physical Education and Sports. Personal information form, Exercise Addiction Scale developed by Tekkurşun, Demir et al. (2018) and Problem Solving Skill Scale developed by Causey and Dubow (1992) and adapted into Turkish by Oğuz et al. (2015) were applied as data collection tools. The data obtained as a result of the research were analyzed using SPSS 25.0 program. Frequency analysis was used to determine the percentage distribution of personal information. Independent Samples T test was used to analyze the scale scores and One Way ANOVA analysis was used to compare the scale scores according to demographic variables with more than two categories, and the significance level was determined as p<0.05 in the analyzes used. As a result of the research; the relationship between exercise addiction and problem solving skills of students studying in physical education and sports college was statistically significant in a positive direction. It may be recommended to conduct this research with different age groups and sedentary students and to examine different dimensions. Physical education and sports colleges should include more research-examination and problem-solving methods in their teaching strategies. In order to make a general judgment, it may be recommended to conduct more comprehensive research.

Keywords: Student, Exercise Addiction, Problem Solving Skills

Beden Eğitimi ve Spor Yüksekokulu Öğrencilerinin Egzersiz Bağımlılık Düzeylerinin Problem Çözme Becerilerine olan Etkisinin İncelenmesi: Kilis İli Örneği

Özet

Bu araştırma, Beden Eğitimi ve Spor Yüksekokulunda öğrenim görmekte olan öğrencilerin egzersiz bağımlılık düzeylerinin problem çözme becerilerine olan etkisini incelemek; egzersiz bağımlılığı ve problem çözme becerilerinin cinsiyet, öğrenim gördükleri bölüm, lisanslı sporcu olma durumu ve haftalık egzersiz sıklıklarına bağlı olarak farklılaşıp

farklılaşmadığını inceleme amacı ile yapılmış bir çalışmadır. Araştırmanın evrenini Kilis 7 Aralık Üniversitesi öğrencileri oluşturmaktadır. Nicel araştırma yöntem ve tekniklerinden gönüllülük esasına dayalı olarak betimsel tarama modeli kullanılmıştır. Araştırmanın örneklemini ise Kilis 7 Aralık Üniversitesi Beden Eğitimi ve Spor Yüksekokulunda okuyan 90 Kadın 54 Erkek öğrencileri oluşturmaktadır. Araştırmada veri toplama aracı olarak kişisel bilgi formu, Tekkurşun, Demir ve ark. (2018) tarafından geliştirilen Egzersiz Bağımlılık Ölçeği ve Causey ve Dubow (1992) tarafından geliştirilen ve Türkçeye uyarlaması Oğuz ve ark. (2015) tarafından yapılan Problem Çözme Beceri Ölçeği uygulanmıştır. Araştırma sonucunda elde edilen veriler SPSS 25.0 programı kullanılarak analiz edilmiştir. Kişisel bilgilerin yüzdelik dağılımının belirlenmesinde frekans analizinden faydalanılmıştır. Ölçek puanlarını analiz etmede ise Independent Samples T test kullanılmıştır ikiden fazla olan kategorili demografik değişkenlere göre ölçek puanlarının karşılaştırılmasında One Way ANOVA analizi yapılmıştır, kullanılan analizlerde anlamlılık düzeyi p<0,05 olarak belirlenmiştir. Araştırma sonucunda; Beden eğitimi ve spor yüksekokulunda okuyan öğrencilerin egzersiz bağımlılığı ile problem çözme becerileri arasındaki ilişki istatiksel olarak pozitif yönde anlamlı bulunmuştur. Bu araştırmanın farklı yaş grupları ve hareketsiz öğrencilerle yapılması ve farklı boyutlarının incelenmesi önerilebilir. Beden eğitimi ve spor yüksekokulları öğretim stratejilerinde daha fazla araştırma-inceleme ve problem çözme yöntemlerine yer vermelidir. Genel bir yargıya varabilmek için daha kapsamlı araştırmalar yapılması önerilebilir.

Anahtar Kelimeler: Öğrenci, Egzersiz Bağımlılığı, Problem Çözme Becerileri.

INTRODUCTION

In general, exercise can be defined as activities that are performed in a certain repetition within a plan in order to create an improvement in terms of physiological mobility and health (Ersoy 2004). Exercise is a continuous behavior that is prepared in a planned manner, depending on the individual's will, aiming to improve at least one of the physical fitness (Özer 2001). Addiction, which has negative consequences on the brain and movements, is the inability of people to continue their lives without the substance they use by losing the control to act consciously in any substance or behavior they take (Dinç 2017). It is also an observed fact that people who are interested in sports tend to face more problems (Barut, 2000). One of the important tasks of society is to support the development of generations with better physical and mental health. In society, people vary in terms of their attitudes, physical skills and behaviors as well as their physical appearance. Events, situations and the actions, emotions and thoughts that people exhibit are various elements that show their differences (Eren, 2000).

Educators have classified the stages of problem solving in different ways. When these classifications are examined in detail, it can be noticed that there are many common features. We can classify the stages of problem solving as follows (Tay, 2002);

A problem exists (naturally or artificially),

Defining the problem, determining its boundaries and conducting preliminary studies for solution,

Developing and testing solutions,

Reaching conclusions and making inferences about the results.

Although behaviors that are indicative of addiction have been limited to substance use such as drugs and alcohol for many years, it can be said that today its scope has expanded to include many behaviors such as exercise, gambling, sexuality, internet use (Demir et al., 2018). In addition to the sociological and psychological status of athletes, high levels of exercise adaptation can cause a decrease in physiological parameters and most importantly in competitive performance (Çetin et al., 2020). In line with other addictions defined today, exercise addiction is also recognized as a disorder due to the criteria in question (Vardar, 2012).

Movements that are planned to protect and improve physical health are defined as exercise (Yıldırım, 2017). Exercise addiction is defined as the desire to exercise in people's free time as a strong emotional state (Fox & Boutcher, 2004). The extinguishing of conscious movement, increasing the frequency, intensity and duration of exercise by neglecting the existing order of the individual in a regular way (Smith et al. 2010), perceiving the life that disrupts daily life, including family members, for exercise and adjusting the whole order according to exercise are very clear indicators of exercise addiction (Zmijewski and Howar 2000, Adams and Kirkby 2002). For all these reasons, exercise is stated to be the main element of a healthy life and it is said

that at least half an hour of physical activity should be provided daily (Pinro et al. 2005). While defining the negative aspects of exercise, one of the main topics is exercise addiction. Exercise addiction, which we can express as the "dark side" of exercise, has negative consequences on the health of individuals and has therefore recently become the subject of studies (Tekkurşun et al. 2019).

Moreover, exercise addiction can be analyzed in four ways: First, the person continues to exercise for the sole purpose of having fun and staying fit. Secondly: When the individual realizes that he/she feels good during exercise, the individual turns to exercise to get away from the problems in his/her life. Third: The individual now adjusts his/her lifestyle to exercise, which can lead to injuries and social problems. In the fourth case, the individual has become completely dependent and his/her life is shaped according to exercise and continues to exercise uncontrollably despite all the negative consequences of exercise (Szabo et al. 2015). Exercise has an important effect on reducing the problems and anxieties that individuals face in daily life. Therefore, it can be said that exercise provides physical and mental benefits to individuals (Demir & Türkeli, 2019). Exercise is of great importance in the development and maintenance of interest in sports and leaves permanent traces in people's lives (Turkay et al., 2019). Failure is inevitable unless regular and optimal levels of exercise are performed in a conscious and disciplined manner. The most striking point is to keep the level of exercise at an optimal level. Because excessively intense exercise can cause an athlete to fail as well as succeed (Çetin et al., 2020).

When we examine the literature, there are many studies on team cohesion. Since it was conducted to examine the team cohesion of hockey athletes, it constitutes the originality of our study and is of great importance in terms of leading the studies to be conducted on this subject.

METHOD

This study was conducted to examine the relationship between exercise addiction and problem solving skills of students studying at Kilis 7 Aralık University School of Physical Education and Sports. Among the research models, quantitative and descriptive screening model was applied; descriptive screening method aims to determine the existence of a relationship between two or more variables (Karasar, 2015).

The research sought answers to the following questions;

Is there a difference in exercise addiction and problem solving skills of the participants in terms of department variable?

Is there a difference in exercise addiction and problem solving skills of the participants in terms of gender?

Is there a difference in exercise addiction and problem solving skills of the participants in terms of being a licensed athlete?

Is there a difference in exercise addiction and problem solving skills of the participants in terms of weekly exercise frequency?

Population and Sample

The population of the study consists of students studying at Kilis 7 Aralık University School of Physical Education and Sports in the 2023-2024 academic year. The sample of the research consists of students of Physical Education and Sports Teaching Department and Coaching Education Department. The sample group of the research was determined by simple random method. G*power v3.1.9.7 package program was used to determine the number of samples in the study.

To determine the necessary sample size for the study, a power analysis was conducted with the following parameters: significance level (sig.level) = 0.05, Cohen's d effect size = 0.50, and power = 0.80 Among quantitative research methods and techniques, descriptive screening model was used on the basis of volunteerism. A total of 144 students, 90 female and 54 male, participated in the study.
Data Collection Tool

Personal Information Form: In the personal information form created by the researchers, there are questions about the participants' department, gender, weekly exercise frequency and sports participation status. This form is used to collect information about the independent variables of the study.

Exercise Addiction Scale: The scale developed by Tekkurşun Demir et al. (2018) to reveal the exercise addiction levels of the participants consisted of 17 items and 3 sub- dimensions. The scale sub-variables consist of "excessive focus and emotional change", "postponement of individual social needs and conflict", "tolerance development and passion". The Cronbach's Alpha value of the scale was found to be 0.88 by the researchers. In our research, Cronbach's Alpha value was 0.87. Items 1 to 7 of the scale represent the focus and emotion change sub-dimensions, items 8 to 13 of the scale represent the postponement of individual-social needs and conflict sub-dimension, items 13 and 17 of the scale represent the development of tolerance and passion sub-dimension is created.

Problem solving skills scale: The Cronbach's Alpha value of the Problem Solving Skills Scale developed by Causey and Dubow (1992) was found to be 0.84. The scale consists of two sub-dimensions: avoidance and approach. Items 3, 6, 9, 12, 15 and 18 belong to the avoidance sub-dimension. Items 1, 2, 4, 5, 7, 8, 10, 11, 13, 14, 16, 17, 19, 20, 21, 22 belong to the approach sub-dimension. In the Turkish adaptation of the scale adapted into Turkish by Oğuz et al. Cronbach's Alpha value was found to be 0.86. In our study, the Cronbach's Alpha value was 0.74.

Data Analysis

The data obtained in the study were analyzed using frequency analysis with the SPSS 25.0 program. In this analysis, the percentage distribution of the participants' personal information was determined. In the analysis of the obtained data, univariate normality distribution was examined with skewness and kurtosis values (between ±1). While analyzing the scale scores, Independent Samples T test method was used for the comparison of binary variables. One-way ANOVA analysis was used to compare demographic variables with more than two categories. In multiple comparisons, Bonferroni, one of the post-hoc tests, was used to analyze significant differences between two groups. Homogeneity of variances between groups was checked by Levene's test. The significance level in the analysis was determined as p<0.05.

Table 1. Frequency and Pero	centage Distributions of Pa	rticipants' Demogra	phic Information.	
Variable	Sub Variable	f	%	
Gender	Female	90	62,5	
	Male	54	37,5	
Section	Coaching	103	71,5	
	Teaching	41	28,5	
	Grade 1	58	40,3	
Class	Grade 2	42	29,2	
	Grade 3	14	9,7	
	Grade 4	30	20,8	
Licensed Athlete	Yes	86	59,7	
	No	58	40,3	
	1-2 Days	50	34,7	
Weekly Exercise Status	3-4 Days	48	33,3	
	5-6 Days	35	24,3	
	Never	11	7,7	

FINDINGS

Table 1 provides information about the participants. It is seen that most of the participants are female (62.5%), and in terms of the department variable, the majority of the participants are students of the coaching department (71.5%). It is seen that 58 (40,3%) of the participants are 1st grade, 42 (29,2%) are 2nd grade, 14 (9,7%) are 3rd grade and 30 (20,8%) are 4th grade. Most of the participants (59.7%) stated that they were licensed sportsmen (59.7%). While 50 (34.07%) of the participants stated that they exercised 1-2 days a week, 48 (33.03%) 3-4 days a week, 35 (24.03%) 5-6 days a week, 11 (7.07%) stated that they did not exercise at all.

Table 2. Correlation Analysis	Results Related to Exercise	se Addiction and Problem Solving Skills Total Score
		Problem Solving Skills
Exercise Addiction	r	,366
	р	,000*
(*) p≤0.05		

When the relationship between exercise addiction and problem-solving skills was examined, the correlation coefficients in Table 2 were found. According to the data in Table 2, there was a moderately positive relationship between exercise addiction and problem-solving skills. This relationship was statistically significant (r= ,366; p≤0.05).

Table 3. Correlation Analysis Results Related to Exercise Addiction and Problem-Solving Skills Subdimensions.

		1	2	3	4	5
Exercise Addiction Subdimensions						
1 Evenesive Forms and Change of Emotion	r	-				
1. Excessive Focus and Change of Emotion	р					
2. Individual-Social Postponing Needs		,394	-			
		,000*				
2 T-land D-land - l D-land		,586	,552	-		
3. Tolerance Development and Passion	р	,000*	,000*			
Problem Solving Skills Subdimensions						
4. Avoidance		-,156	,108	-,024	-	
		,062	,200	,779		
5. Approach		,386	,247	,338	-,158	-
		,000*	,003*	,000*	,059	
(*) p<0.05						

Correlation analysis was conducted to determine the relationship between exercise addiction and problem solving skills sub-dimensions. Information about this analysis table is given in Table 3. According to the relevant table, it was seen that there was a positive moderate relationship between the sub-dimensions of exercise addiction, while there was a positive moderate relationship between the problem solving approach sub-dimension and the sub-dimensions of exercise addiction.

Table 4. Independent T Test Analysis of Exercise Addiction and Problem Solving Skills Scale Scores in Terms of Gender Variables.

t Test							
Variable	Groups	Ν	x	SD	t	р	
Exercise Addiction Subdimensions							
Europeirus Es mus and Changes of Emotion	Female	90	3,86	0,685	1.076	0 284	
Excessive Focus and Change of Emotion	Male	54	3,98	0,677	-1,076	0,284	
Individual Casial Destancian Nacia	Female	90	2,82	0,765	1 (07	0.002	
Individual-Social Postponing Needs	Male	54	3,07	1,027	-1,697	0,092	
Talaran as Development and Bassion	Female	90	3,32	0,828	1 716	0.000	
Tolerance Development and Passion	Male	54	3,58	0,970	-1,/16	0,088	
Problem Solving Skills Subdimensions							
A	Female	90	2,19	0,752	0 (07	0 545	
Avoidance	Male	54	2,28	0,921	-0,607	0,545	
Americash	Female	90	3,36	0,500	0 221	0.825	
Approacn	Male	54	3,38	0,549	-0,221	0,825	
*(p< 0.05)							

Table 4 shows that when the mean scores of exercise addiction and problem solving skills of the participants are examined, there is no statistically significant difference in scale scores according to gender variable (p>0.05).

Table 5. Independent T Test Analysis of Exercise Addiction and Problem Solving Skills Scale Scores in terms of the Department of Study Variables.

t Test							
Variable	Groups	Ν	x	SD	t	р	
Exercise Addiction Subdimensions							
Excessive Eccus and Change of Emot	Coaching	103	3,98	0,667	2 001	0.028*	
Excessive rocus and Change of Emot	Teaching	41	3,72	0,693	2,091	0,038	
In dissidured Consist Destructions Needs	Coaching	103	3,01	0,875	2.047	0.042*	
Individual-Social Postponing Needs	Teaching	41	2,68	0,850	2,047	0,042"	
Talama a Davalama at an d Dava	Coaching	103	3,46	0,884	0.001	0.229	
Tolerance Development and Passi	on Teaching	41	3,30	0,904	0,981	0,328	
Problem Solving Skills Subdimensi	ons						
A	Coaching	103	2,22	0,788	0.020	0.077	
Avoidance	Teaching	41	2,22	0,897	-0,029	0,977	
	Coaching	103	3,39	0,482	0.824	0.410	
Approacn	Teaching	41	3,31	0,600	0,824	0,412	
* $(p < 0.05)$	Č.						

When the problem solving skills scores of the participants were examined according to the variables of the department they were studying in Table 5, no significant difference was found in the sub-dimensions of problem solving skills (p > 0.05), while a significant difference was found in the exercise addiction scale excessive focus and change of emotion and individual social postponing needs sub-dimensions (p < 0.05).

Table 6. Independent T Test Analysis of Exercise Addiction and Problem Solving Skills Scale Scores in

 Terms of Being a Licensed Athlete

t Test						
Variable	Groups	Ν	x	SD	t	р
Exercise Addiction Subdimensions						
Europeine Former and Change of Emoti	Yes	86	2,14	0,833	3,478	0,001*
Excessive Focus and Change of Emoti	No.	58	2,34	0,785		
Individual Casial Destruction Needs	Yes	86	3,42	0,535	2,492	0,014*
Individual-Social Postponing Needs	No.	58	3,29	0,482		
Talana a Davalana ant and Bassian	Yes	86	4,06	0,669	0,981	0,328
Tolerance Development and Passion	No.	58	3,67	0,641		
Problem Solving Skills Subdimensions						
Avoidance	Yes	86	3,06	0,899	-1,472	0,143
	No.	58	2,70	0,806		
Approach	Yes	86	3,63	0,916	2 800	0.000*
	No	58	3,10	0,750		0,000*
* (p< 0.05)						

When the problem solving skills scores of the participants according to the variables of being a licensed athlete were examined in Table 6, A significant difference was found in the approach sub- dimension of problem solving skills (p< 0.05). A significant difference was found in the exercise addiction scale excessive focus and change of emotion and individual social postponing needs sub-dimension scores (p< 0.05).

Variable	Groups	N	x	SD	F	Р	Significant Difference
Exercise Addiction Subdimensions							
	1-2 Days (1)	50	3,68	0,63	_		
Excessive Focus and Change of	3-4 Days (2)	48	4,03	0,58	- 15 777	0.000*	3-1
Emotion	5-6 Days (3)	35	4,31	0,47	13,777	0,000	3-4
	Never (4)	11	3,07	0,78			
	1-2 Days (1)	50	2,61	0,71	_		
Individual-Social Postnoning Needs	3-4 Days (2)	48	3,03	0,79	- 8140	0,000*	3_1
mulvidual-social i ostpolinig reeds	5-6 Days (3)	35	3,37	0,97	0,140		5-4
	Never (4)	11	2,31	0,82			
	1-2 Days (1)	50	3,16	0,76	_	0,000*	
Tolerance Development and Passion	3-4 Days (2)	48	3,43	0,82	- 12 501		3-1
Tolerance Development and Tassion	5-6 Days (3)	35	4,02	0,79	12,501		3-4
	Never (4)	11	2,59	0,83			
Problem Solving Skills							
Subdimensions							
	1-2 Days (1)	50	2,30	0,76	_		
Avoidance	3-4 Days (2)	48	2,01	0,73	- 1 721	0 165	_
Avoluance	5-6 Days (3)	35	2,31	0,94		0,100	
	Never (4)	11	2,48	0,86			
	1-2 Days (1)	50	3,29	0,47	_		
Approach	3-4 Days (2)	48	3,41	0,58	- 3.848	0.011*	3_1
Approach	5-6 Days (3)	35	3,54	0,43	5,040	0,011	5-4
	Never (4)	11	3,00	0,43			
* (p<0.05)							

Table 7. One-Way Analysis of Variance (ANOVA) Results of Exercise Addiction and Problem Solving SkillsScale Scores in Terms of Weekly Exercise Frequency Variable

When the problem solving skills scores of the participants according to the weekly exercise frequency variables were examined in Table 7, a significant difference was found in the approach sub- dimension of problem solving skills (p< 0.05). A significant difference was found in all sub- dimensions of exercise addiction scale (p< 0.05).

DISCUSSION AND CONCLUSION

This study aimed to examine the relationship between exercise addiction and problem solving skills of students studying at the School of Physical Education and Sports, and to examine the levels of problem solving skills and exercise addiction in terms of the department they study, licensed athlete status, exercise frequency and gender variables. When the demographic variables of the students participating in the study were analyzed, 90 (62.05%) were female and 54 (37.05%) were male. According to the department variable, 103 (71.05%) of them stated that they were studying in the coaching department and 41 (28.5%) in the teaching department. According to the grade variable, it was seen that there were 58 (40.03%) 1st grade, 42 (29.2%) 2nd grade, 14 (09.07%) 3rd grade and 30 (20.08%) 4th grade students. Licensed sportsmen constitute the majority with 86 people (59.7%). According to the weekly exercise status variable, it was seen that there were 50 people (34.07%) 1-2 days, 48 people (33.3%) 3-4 days, 35 people (24.03%) 5-6 days and 11 people (07.06%) who said they never do sports.

The relationship between exercise addiction and problem-solving skills of the students participating in the study was found to be statistically positive and moderately significant ($p \le 0.05$). In the study conducted by Güzel (2021), it was found that there was a positive and moderately significant relationship between mental endurance and exercise addiction of students studying at the Faculty of Sports Sciences. Accordingly, it can be considered that as the exercise addiction symptoms of the participants increase, their problem-solving skills increase. In the literature, no study was found to examine the effect of exercise addiction on problem solving skills.

When the exercise addiction and problem solving skills scores of the students participating in the study were analyzed in terms of gender variable; no statistically significant difference was found in all of the scale sub-dimensions (p>0.05). As a result of the research conducted by İnce and Şen (2006), it was aimed to determine the problem solving skills of basketball players competing in the away league. According to the findings, problem solving skills of female athletes were found to be better than male athletes and a significant difference was found between them. Due to the fact that female athletes play in the 1st league and gain experience during competitions and trainings, it can be thought that they are superior to the athletes playing in the 2nd league in problem solving skills and this situation leads to a significant difference. In the study conducted by Tümkaya and İflazoğlu (2000), no significant difference was found between the problem solving skills of teachers and their gender. In Taylan's (1990) study, it was stated that there was no significant difference between the problem solving skills of university students and their genders. In the study examining the problem solving skills of physical education and sports college students, a significant difference was found between the total problem solving skills scores of the students and their gender. In the study conducted by Türkçapar (2009), problem solving skills of males were found to be significantly greater than females. In the study conducted by Bilge and Aslan (1999), it was revealed that there was no significant difference between students' gender and problem-solving skills. The study conducted by Brems and Johnson, as reported by Ferah (2000), found that males were more successful in problem solving. In the study conducted by Paksoy (2021), it was determined that there was a statistically significant difference between gender variable and tolerance development and passion sub-dimension regarding exercise addiction of BESYO students. It was understood that this difference was in favor of men. In the study conducted by Demir and Türkeli (2019), in the study titled 'Investigation of Exercise Addiction and Mental Endurance Levels of Physical Education and Sports School Students', it was determined that there was a statistically significant difference in the level of exercise addiction according to the gender of the students of the Faculty of Sports Sciences. Especially in the sub-dimensions of tolerance development and passion, postponement of individual-social needs and conflict, a significant difference was observed on the side of men. Cicioğlu et al. (2019) concluded that the exercise addiction levels of male students studying in sports sciences were significantly positively higher than female individuals. In the study conducted by Uzun (2019), it was determined that there was no significant relationship between the gender variable and exercise addiction of BESYO students. In the study conducted by Gadak and Pulur (2021), in the study titled "Investigation of Exercise Addiction of Individuals Going to Fitness Centers", it was concluded that there was no significant difference according to gender variable.

According to the results of the study on exercise addiction and self-esteem in individuals who exercise, no statistically significant difference was found between exercise addictions according to gender variable. This may be due to the fact that the number of participants was not balanced according to gender. In a study conducted by Zmijewski and Howard (2003), it was stated that women were higher in exercise addiction than men. In a study conducted by Cicioğlu et al. (2019), it was reported that male athletes had higher levels of exercise addiction compared to female athletes. In a study conducted by Costa et al. (2013), it was reported that the exercise addiction level of men was higher than that of women. When we examine the literature, it is seen that there are results parallel to the results of our study as well as results that do not support the results of our study. We can say that the reason for this difference is due to the differences in the groups studied.

When the problem solving skills scores of the students participating in the study were examined according to the departments they were studying, no significant difference was found in the sub-dimensions of problem solving skills (p>0.05). However, a significant difference was found in the sub-dimensions of exercise addiction in the scores of over- focusing and emotion change and postponement of individual-social needs (p<0.05). Depending on the branches of education of the participants, no significant difference was found between exercise addiction and mental endurance levels of doing sports. The reason for this result may be that the students of the faculty of sports sciences participate in exercise at a close level, think about exercise at a close level during the day, and their recovery times and mental processes are close (Demir and Türkeli, 2019). In the study, when the exercise addiction levels of the participating students were examined according to the departments they studied, no significant difference was found in the sub-dimension of "excessive focus and emotional change" (Güzel, 2021). According to the study, the scores of coaching students in the sub-

dimensions of the exercise addiction scale are significantly higher than those of students in sports management education. Based on these results, it can be thought that students studying in the coaching department are more willing to exercise and postpone their basic needs compared to other departments.

In the study, when the exercise dependence levels of the participants were analyzed according to their departments of study, it was determined that students studying in the departments of teaching, coaching and management were in the dependent group. In the study conducted by Paksoy (2021), it was determined that there was a significant difference between the sub-dimensions of the Exercise Addiction scale in terms of the department variable of the participants in the sub-dimension of "postponement of individual-social needs and conflict". However, in the study conducted by Demir and Türkeli (2019) on the students of the Faculty of Sports Sciences, no significant difference was found between the levels of exercise addiction according to the department variable. This is thought to be due to the fact that the distribution of the students regarding the department variable they are studying is different. In the study conducted by Demir and Türkeli (2019) on the students regarding the department variable they are studying is different. In the study conducted by Demir and Türkeli (2019) on the students of the exercise addiction levels according to the department variable. In this case, the difference in the exercise addiction levels of the students may be due to the different distributions of the departments they study.

When the problem-solving skills scores of the students participating in the study were examined according to the variable of being a licensed athlete, a significant difference was found in the "approach" subdimension of problem solving skills (p<0.05). A significant difference was found between the scores of "postponement of individual-social needs with emotional change" and "excessive focusing" in the subdimension of exercise addiction (p<0.05). In Uzun's (2019) study, no statistically significant relationship was found between the sports branches and exercise addiction of higher education students studying sports sciences. Yıldız (2017) concluded that there was a significant difference in the self-efficacy level of active sports individuals according to their participation in licensed sports activities. Costa et al. (2012), in their study on exercise addiction in individuals, stated that the frequency and daily duration of exercise may be effective in the formation of exercise addiction. In the study conducted by Paksoy (2021), statistically significant differences were found in the postponement of individual-social needs and conflict, tolerance development and passion sub-dimension of the exercise addiction scale depending on the weekly exercise frequency variable of the students of the School of Physical Education and Sports.

Kovacsik et al. (2019) concluded that there is a relationship between exercise addiction and exercise intensity in their study. These studies support our research. Gadak and Pulur (2021) concluded that there was no significant difference between exercise addiction and exercise frequency. When the studies were examined, it was concluded that there are similar results to our study, but there are differences.

When the problem solving skill scores of the students participating in the study were examined according to the weekly exercise frequency variables, a difference was found in the approach sub-dimension of problem-solving skills (p< 0.05). A significant difference was found in all sub-dimensions of exercise addiction (p<0.05). In the study conducted by Tekkurşun Demir and Türkeli (2019), no significant difference was found between the exercise addiction and mental endurance levels of the students of the Faculty of Sports Sciences depending on the age variable. (2018) concluded that regular exercise is effective for exercise addiction in kickboxing, taekwondo and muay thai athletes. In another study conducted by Costa et al. (2012), it was concluded that daily exercise duration, exercise frequency and sport age may be effective in the emergence of exercise addiction. In a study conducted by Kızmaz (2004), the relationship between personality and sportive actions between young performance athletes and non-athletes was examined and it was determined that people who do sports are more lively, more hardworking, better adaptation to the environment in difficult situations, and always ready to establish relationships. In the study conducted by Yıldız Cicek (2019), it was found that regular exercise in the fitness center of people over the age of 30 had a positive effect on exercise addiction. In the study conducted by Demir and Türkeli (2019) on sports sciences faculty students, it was stated that there was a significant difference in exercise addiction levels according to the frequency of doing sports. In the study conducted by Batuhan and Aydın (2020), no significant relationship was found between the frequency of weekly training and exercise addiction sub-dimensions. In the study conducted by Yıldız Cicek (2019), it was concluded that regular exercise in the fitness center of people over the age of 30 was effective on exercise addiction. In another study conducted by Costa (2012), it was concluded that exercise frequency may be a cause of exercise addiction. In the study conducted by Demir and Türkeli (2018) on the students of the faculty of sport sciences, differences were found in exercise addiction levels according to the frequency of doing sports.

In the study conducted by Büyüköztürk et al. (2017), no relationship was found between exercise addiction and training frequency in elite swimming athletes who trained regularly. However, it was stated in the study that there were indications that elite athletes may become addicted to exercise over time. The findings of the study show that there is a statistically significant and positive relationship between weekly exercise days and exercise addiction score of individuals who exercise. In the study conducted by Katra (2021), it was determined that there was a relationship between the number of exercise days per week and the increase in exercise addiction. In addition, it was determined that there was a significant positive correlation between the weekly exercise days of the participants and the sub-dimensions of exercise addiction such as hyperfocus and emotional change. According to these findings, it can be stated that as the number of exercise days per week increases, the level of hyperfocus on exercise increases and they enjoy exercising. In a study conducted by Bavli et al. (2011), the weekly exercise frequency of the participants was found to be statistically significantly higher in the dependent group compared to the other groups. Costa et al. (2012) emphasized that exercise frequency may be effective in the formation of exercise addiction. In the study conducted by Bootan (2018) and Sadıq (2018), it was stated that there was no significant difference between the exercise addiction levels of athletes in different branches and athlete age. In the study conducted by Güzel (2021), the exercise addiction and mental endurance levels of the students of the Faculty of Sports Sciences were examined and the level of exercise addiction was analyzed according to the exercise frequency variable. The findings showed that there were significant differences in all sub-dimensions and total scores

of the exercise addiction scale. In contrast to our study, Güler (2020) found no significant difference in the relationship between basic psychological needs and exercise addiction according to the exercise frequency variable. In the study of Arslanoğlu et al. (2021), it was determined that the level of exercise addiction did not differ significantly according to exercise frequency. This result may be due to the difference in the sample group.

As a result, the relationship between exercise addiction and problem solving skills of the students studying at the School of Physical Education and Sports was statistically significant in a positive direction. This supports the prediction that these students have positive problem solving skills due to their athletic background and being involved in a sportive lifestyle. We can hypothesize that students who exercise are more skillful in solving the problems they face. While there was no difference in the exercise addiction scores in terms of gender variables, when examined in terms of the department variables they studied; a significant difference was found in the scores of over-focusing and emotion change and postponement of individualsocial needs in the sub-dimension of exercise addiction. According to the variable of being a licensed athlete, a significant difference was found in the scores of over-focusing and emotion change and postponement of individual-social needs in the sub-dimensions of exercise addiction. According to the weekly exercise frequency variables, a significant difference was found in all sub-dimensions of exercise addiction. When the problem solving skills scores were examined according to the variables of gender and the department of study, no significant difference was found in the sub-dimensions of problem solving skills, but when the problem solving skills scores were examined according to the variables of being a licensed athlete, a difference was found in the approach sub- dimension of problem solving skills. When problem solving skills scores were examined according to weekly exercise frequency variables, a difference was found in the approach sub- dimension of problem solving skills. It may be recommended to give trainings to students studying at physical education and sports colleges about the benefits of regular exercise. The results obtained can be shared with relevant organizations and planning can be made according to the results. It may be recommended to conduct this research with different age groups and sedentary students and to examine different dimensions.

Physical education and sports colleges should include more research-examination and problem-solving methods in their teaching strategies. In order to make a general judgment, it may be recommended to conduct more comprehensive research.

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Development, Validity and Reliability of The Social Capital Scale for Adults

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Abstract

This study aims to develop the Social Capital Scale for Adults (SCS-A). Random sampling method was used in the study, and individuals were reached via an online survey form. The answers given by 479 individuals who voluntarily participated in the study were edited and analyzed. Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) performed item pool. The results were questioned at 0.01 and 0.05 significance levels. Varimax rotation method was used in the study. In the final analysis, the KMO (Kaiser-Meyer-Olkin) value was calculated as 0.926, Bartlett's Test of Sphericity p<0.05, Chi-square=41517.001 and SD=4465, p=0.000 were obtained. According to the CFA analysis, X2/Degrees of Freedom, GFI, AGFI, RMSEA, SRMR, RMR, CFI, NNFI, IFI, NFI, and PGFI. Based on these findings, it is possible to say that the model is acceptable. As a result of EFA, it was found that there were 14 components with eigenvalues above 1 for 95 items, whose contribution to the total explained variance would be taken as basis, and the total explained variance was 71.372%. In SCS-A, all items had the highest correlation value with the factor they were factored into, and the overlap value was not less than 0.1. The Cronbach's Alpha coefficient of the SCSA scale was found to be 0.966 and the variance explained by the scale was 71.372%. Cronbach's Alpha coefficients of the factors ranged from the lowest F14 = 0.790 to the highest F01 =F14 = 0.961. Accordingly, both the internal consistency of the factors and the internal consistency of the entire scale were at a level that can be considered highly reliable. Considering the findings and results of the study, it can be said that the Social Capital Scale is a valid and reliable measurement tool for Turkish adults.

Keywords: Social Capital Scale, Adults, Social Capital, Validity, Reliability.

Yetişkinler İçin Sosyal Sermaye Ölçeğinin Geliştirilmesi, Geçerlilik ve Güvenilirliğin Yapılması

Özet

Bu çalışmanın amacı Yetişkinler İçin Sosyal Sermaye Ölçeği'ni (SCS-A) geliştirmektir. Çalışmada rastgele örnekleme yöntemi kullanılmış olup, bireylere çevrimiçi anket formu aracılığıyla ulaşılmıştır. Çalışmaya gönüllü olarak katılan 479 bireyin verdiği yanıtlar düzenlenerek analiz edilmiştir.

Keşfedici Faktör Analizi (EFA) ve Doğrulayıcı Faktör Analizi (CFA) ile madde havuzu yapılmıştır. Sonuçlar 0,01 ve 0,05 anlamlılık düzeylerinde sorgulanmıştır. Çalışmada Varimax rotasyon yöntemi kullanılmıştır. Son analizde KMO (Kaiser-Meyer-Olkin) değeri 0,926, Bartlett'ın Küresellik Testi p<0,05, Ki-kare=41517,001 ve SD=4465, p=0,000

olarak hesaplanmıştır. CFA analizine göre, X2/Özgürlük Derecesi, GFI, AGFI, RMSEA, SRMR, RMR, CFI, NNFI, IFI, NFI ve PGFI. Bu bulgulara dayanarak, modelin kabul edilebilir olduğunu söylemek mümkündür. EFA sonucunda, toplam açıklanan varyansa katkısı esas alınacak 95 madde için özdeğerleri 1'in üzerinde olan 14 bileşen olduğu ve toplam açıklanan varyansın %71,372 olduğu bulunmuştur. SCS-A'da, tüm maddeler faktörleştirildikleri faktörle en yüksek korelasyon değerine sahipti ve örtüşme değeri 0,1'den az değildi. SCSA ölçeğinin Cronbach's Alpha katsayısı 0,966 ve ölçeğin açıkladığı varyans %71,372 olarak bulunmuştur. Faktörlerin Cronbach's Alpha katsayıları en düşük F14 = 0,790'dan en yüksek F01 = F14 = 0,961'e kadar değişmektedir. Buna göre hem faktörlerin iç tutarlılığı hem de tüm ölçeğin iç tutarlılığı oldukça güvenilir kabul edilebilecek düzeydedir. Çalışmanın bulguları ve sonuçları göz önüne alındığında, Yetişkinler İçin Sosyal Sermaye Ölçeği'nin Türk Nüfusu

için güvenilir bir ölçek olduğunu söylemek mümkündür.

Anahtar Kelimeler: Sosyal Sermaye Ölçeği, Yetişkinler, Sosyal Sermaye, Geçerlilik, Güvenilirlik.

INTRODUCTION

Although the concept of Social Capital (SC) is mostly studied in sociology, in recent years, it has attracted the attention of all branches of science, especially social sciences and health sciences, whose field of study is human. The concept of SC is essentially a network of relationships based on the individual's relationship with himself/herself, other individuals, the state and institutions, and the sum of values based on belonging, reciprocity and trust. This network of relationships is also the entire social ecology of the individual. In order to understand and transform the individual, it is necessary to understand and transform his/her social ecology. Therefore, any approach that is not based on the ecology of the individual will not be successful.

The concept of SC was formed by combining the concepts of "social" because the interaction between people affects various parameters related to human health, emotional state, psychology, productivity, and "capital" because this interaction reflects the accumulation of interactions such as family, friendship, shared origin, belonging to the same club, or having the same religion.

Bourdieu (1) defines the concept of capital as "the accumulated history of a society or an institution", while Ardahan (2) defines it as "asset, owned value". According to Ardahan (2), the types of capital are a) "Physical Capital" consisting of real properties and infrastructures in a region, b) "Economic Capital" as the sum of monetary resources, properties and assets that can be converted into investment, c) "Human Capital" consisting of education, talent, knowledge, skills and work efficiency, d) "Cultural Capital" describing the accumulation of culture that provides socio-economic differences and advantages to societies, e) "Health Capital" describing the physical, mental and emotional well-being of individuals, f) Since the mid-20th century, the concept of "Social Capital", which is based on social interaction, relationship and all trust-based structures, has been added to these capital concepts. In recent years, Gross (3) introduced the concept of "Emotional Capital" as an individual's ability to increase positive emotions and decrease negative emotions, in other words, the ability to manage one's own emotions, and Luthans et al. (3) introduced the concept of "Psychological Capital", which is the combination of an individual's hope, optimism, self-efficacy and psychological resilience.

The concept of SC was first introduced by Durkheim while studying "the reasons that lead individuals to suicide" (5). The concept of SC, which became a part of economic life with the concept of "human capital" in the 1960s, was considered as a production factor by Theodore Schultz and Becker (6). Coleman (7) viewed SC as "a public good and public value created by social networks". According to Putnam (8), SC is the sum of values that should be taken out of the concept of human capital, which is a part of the economy, and should be considered as the sum of "relationships formed by trust, norms and social networks". Contrary to Coleman (7), Dasgupta and Serageldin (9) see SC as "the total value of the relationships that individuals develop among themselves" and not a public good, while Portes (10) defines it as "the sum of the set of values possessed by individuals and society" and Fukuyama (11,12) defines it as "a set of norms based on sincerity and trust that encourage interaction and harmonious cooperation among individuals". Gleaser (13) sees SC as "the social and institutional reflection of decisions made at the individual level", Grootaert and Van Bastelaer (14) consider it as " the contributions of institutions, relationships, attitudes and values that connect people to economic and

social development", Heral (15) defines SC as "the ability of people to work together as individuals, institutions, groups or organizations for common goals".

When the common aspects of the definitions are brought together, the concept of SC can be defined as "the sum of values, norms, formal and informal networks, common values based on trust, affecting the common goals, activities, mutual relations, and ability to work together of individuals and societies."

When the concept of SC is considered in different ways in terms of its "plane", "form", "severity" and "quality", its context can be better understood (6). The concept of SC has three types in terms of its nature: a) "Binding SC", which is based on the relations between individuals in a homogeneous society, where the idea of "being one of us" is based on a common identity such as family, relatives, ethnic background, religion, sect, belonging to the same business, or being from the same country, etc., b) "Bonding SC" describes horizontal relationship networks that, although heterogeneous, share some common values with weak social ties, enable different groups with different identities to come together, and are formed voluntarily, which can be given up when necessary, c) "Bridging SC", which brings together acquaintanceships and friendships formed at distant and less intense social, professional and all societal levels (16). When the concept of SC is examined in terms of its form, a two-dimensional structure emerges. The first of these is "horizontal networks", which are formed by members having equal or equivalent status, with an asymmetrical relationship among themselves, mostly in an informal structure, such as family, neighbourhood, friendship, hobby group membership, and any structure that requires voluntary participation, and the second is "vertical networks", which are formed by members with status differences, with asymmetrical relationships among themselves, mostly formal, such as educational institutions, government offices, and relationships in the work environment (6). The concept of SC can be considered in two dimensions in terms of its severity: "strong networks", which are used to describe the bonds between nuclear families, kinship, friendship and closed groups of friends, where there are strong mutual ties, trust and cooperation, and "weak networks" where there are superficial, distant and infrequent relationships and interactions (6, 17). SC is considered in three dimensions in terms of its plane. These are the "micro structure", where the relationship is examined at the level of individuals and groups, the "meso structure", which is discussed at the level of non-governmental organizations and social institutions, and the "macro structure", where state institutions and international relations are discussed (18, 19). There is only one way to understand an individual's world, regardless of his/her age, level of education, income, or social status. It requires being able to see the individual's constructed life on each of these planes.

In societies, institutions, businesses and states where there is no trust, no sense of belonging, no mutually obligatory or voluntary cooperation, no collective action, it is certain that all other capitals, including SC, cannot be created, the existing ones cannot be protected or even expanded. In addition, according to Putnam (20, 21) and Fukuyama (12), productivity and competitiveness decrease in businesses with low levels of SC, and the crime rate increase in societies. According to them, SC is an effective tool to reduce the crime rate and create a safe city.

Measuring the level of SC in a society or group has been possible with scales developed based on the mentioned determinants. Researchers studying SC have addressed one or a few dimensions of SC, which is a very broad concept, in their studies. Studying the concept of SC in all its dimensions requires quite comprehensive studies on topics that concern the entire ecology of the individual. Considering the common points of the scale studies conducted on this subject to date, it is possible to summarize the determinants of SC under the following headings.

a) One of the most important determinants of the concept of SC is the "relationship network" that begins with the relationship and interaction of the individual with the individual. This relationship involves having social interaction by phone, face-to-face or via social media. This interaction includes the social interactions and encounters in the individual's daily life. These include relationships with "family", "relatives", "social friends", "co-workers and schoolmates", "neighbours". These are social interactions that can be carried out in many contexts such as attending weddings and birthdays, giving and attending dinner invitations, mutual visits, asking for help on any issue from familiar or unfamiliar individuals, and being ready and willing to help when these individuals ask for help (Putnam 8, 20, 22, 23, 24, 25, 26, 28, 29, 30). The neighborhood relationship mentioned here refers to the "physical neighborhood" in all SC studies conducted to date. However, recently, especially with the penetration of the Internet in every field, the experts of the subject have Turkish Jaurnal of Sport and Exercise /Türk Spor ve Egzersiz Dergisi 2025 27(1):77-94 79

been addressing the issue of the "social media neighborhood or digital neighborhood", which is much more effective than the physical neighborhood in the life of the individual. The first study on this subject was conducted by Ardahan (31) on adolescent individuals. It was also studied as a separate factor in the new scale approach discussed in this study. The existence of meaningful and satisfying relationships with the family, relatives, neighbours, close environment, colleagues and the quality level of the relationship are among the factors that positively affect the quality of life of individuals (32). The relationship between individuals also means voluntary and/or compulsory cooperation. For the realization of a defined mission, any kind of solidarity between individuals, whether institutional or not, is the continuation of this cooperation (33).

b) Another important determinant of the SC is "trust". Trust can also be used to mean the womb in which life is carried on safely. Trust in the relationships between friends, family, coworkers, neighbors, and strangers; trust in our employer that our employment contract won't be terminated; trust that we'll get paid on time; trust that we'll advance in our career once we meet the requirements; and trust in the "physical security" and "human-based trust" of our surroundings, as well as trust arising from "the individual's relationship with the state, the private sector, and non-profit institutions" are all values whose existence can be viewed as an active investment (8, 20, 22, 23, 24, 25, 26, 27, 29, 30, 34, 35, 36, 37, 38).

c) The institutions mentioned here are all public institutions such as schools, hospitals, municipalities, tax offices, private sector, public interest associations, foundations, recreation and sports institutions. Living in cities has become increasingly important these days for all people, but especially for children for a variety of sociological reasons, including income inequality, opportunity inequality, and the increasing heterogeneity of cities as a result of intense migration. In order to live in a safe environment, individuals are willing to spend more due to many demands such as purchasing safe houses and creating environments isolated from traffic and strangers (39). Other factors that have a positive impact on people's quality of life include trust in institutions, the place of residence, close friends, family, and coworkers (32).

d) Another important determinant of the concept of SC is the sense of "belonging" (7, 20). This sense of belonging is at an individual level and it also meets the need at the third level of Maslow's hierarchy of needs. This sense of belonging includes the individual's feeling of belonging to a family, relatives, a club, an association, a social organization, a country, a city, a neighborhood, a lifestyle, a religion, a political view, an ethnicity, a school, a business, a sports club, a color, a song.

e) It is also a structure based on human relations that provides benefits in many areas such as structuring all individual relationships in a win-win format with the "principle of reciprocity" in a value-added form, creating a sense of social solidarity, financial support, commercial relations, economic interaction, facilitating business follow-up in institutions, and adaptation in relocations and new settlements (22, 24, 25, 26, 27, 29, 35, 36, 38, 40, 41, 42). Reciprocity describes a two-way, not one-way, relationship of interest and gain.

f) The sense of belonging can also manifest itself as "participating in decisions in the place of residence, sharing responsibilities of the results, participating in management, taking part in civil society, involving in politics or local government, being a member of parent-teacher associations and clubs, and engaging in various activities" Any sense of belonging will bring with it the responsibility of participating in decisions on individuals (7, 22). This may also occur for the accomplishment of a supported mission or for opposed events. All of these participations are processes of creating voluntary unity and cooperation. This can also be shaped as a means of social pressure. For example, if environmentalism is a mission that is supported, the individual may participate in environmental activities, while an individual who is opposed to violence against women may take part in activities, organizations and processes because of this opposition. This participation may be one-time, or it may take place in a structure that overlaps with the principles of "volunteering" that has turned into a serious leisure activity (22, 43).

g) In addition, "Sensitivity to social problems", which means that the individual does not ignore the problems of the society he/she is in during events that are not within his/her control, that he/she is mostly against, does not support and will never support and "taking initiative in social issues", one of the actions taken voluntarily in revealing and solving these issues, is the leadership put forward by an individual to manage the process and create an expected result when no one has forced him/her to do an action and it is not

his/her duty to do that action (20, 22, 31). For example, sensitivity to social problems is a stance against the pressure of the state which has reached the level of cruelty experienced by women in Iran regarding their clothing style, the environmental massacre committed for the sake of profit in our country, the conditions of animals living imprisoned lives in zoos, also called animal prisons, and child abuse in congregations.

h) "Tolerance to diversity" means not discriminating against those who are not like oneself in terms of their political views, ethnic origin, skin color, sexual preferences, countries of origin, appearance, etc., accepting them as they are, defending their rights to the fullest even if they are not like oneself, and opposing discriminatory attitudes towards them. Tolerance to diversity, which is a very important concept especially in developing and underdeveloped societies, can also be considered as "the reward for the progress made in development" in developed societies (22, 27, 35, 36). Tolerance to diversity is also an important element that enables the establishment of a relational bridge between people.

i) The society we live in, "family, close circle and pressure from others" can often affect individuals' behaviors and lifestyles positively or negatively, whether the individual wants it or not. The individual's family, relatives, social environment, work environment, and society, even if they do not interact, can create conditioning pressure that is prioritizing, praising or criticizing any form of behavior on individuals' values, attitudes and behaviors. Belonging behavior can also be considered as a didactic element that requires being like those in the structure to which one belongs. If an individual belongs to a place, he/she is forced to be like them by internal or external pressure. While internal pressure comes from within the individual, external pressure is the pressure from others. While this idea of being like them may enable the development of the individual, it may also be one of the important factors in restricting the freedom of the individual (44). An individual who prefers to wear revealing clothes in a neighborhood where everyone dresses in a way that covers their bodies, may feel under pressure due to his/her clothing choice. This is also considered a recreational obstacle (45, 46). Pressure from family, close circle and others is also one of the factors that negatively affect individuals' quality of life (32).

j) In addition to the determinants listed here, "economic relations", "income", "education level", "health", "meaning of life", "self-worth", "personal skills" (41, 47, 48) "social and recreational potential of the place of residence and the level of participation in them" that affect the ecology of the individual (24, 25) have also been studied as determinants of SC.

Measurement Of Social Capital

The difficulties in defining social capital and identifying its elements are also reflected in the measurement of this concept. The reason for these different definitions and explanations is that researchers from different disciplines treat social capital as a different object of study. There are studies on this subject, generally developed by social scientists and involving adults.

According to Bowling (49), there is currently no scale that is considered the gold standard for assessing the main aspects of social capital with an acceptable level of reliability and validity.

The generalization of science that "nothing that cannot be measured can be improved" is the basis of all studies on SC, as in every social issue. If something is to be improved, it must first be made measurable. While applications based on a single measurement give a score on that subject, studies based on two measurements reveal the change in the sample over time if the measurement is made on the same main sample at different times, and if the measurement is made on samples taken from two different main masses, it reveals the difference in the compared samples. For this reason, the measurement of SC has been a priority for many researchers to date. Of course, making a measurement based on the entire "human ecology of the individual" requires a very comprehensive and complex approach. Researchers studying the determinants of SC have tried to define it by focusing on "proximal" and "distal" indicators in their studies. Studies that prioritize scale development based on the determinants of SC can be listed by years as follows:

• Spellerberg (47) focused his SC study on the distal determinants of SC in a society and individuals, namely health, life expectancy, health status, suicide rate, crime rate, teenage pregnancy, higher education participation rate, employment rate, family income level, marital relationship and divorces, job security, job growth, trade balance and GDP growth.

• Onyx and Bullen (22) discussed the determinants of SC under the headings of "participation in local government", "Social Mediation or Proactivity in the Social Context", "feelings of trust and safety", "physical neighborhood relations", "family friendship relations", "tolerance to diversity", "value of life", "business connections" and "proactivity in the social context".

• Hjøllund and Svendsen (34) discussed the determinants of SC under the headings of "organizations of which one is a member", "trust", "family, kinship, neighborhood relations", "value of connections with close and distant environment" and "participation in civil society".

• Narayan and Cassidy (35) examined the determinants of SC under the headings of "trust in institutions, environment and people", "group work and belonging", "asking for help from others and being ready to help", "daily socialization with family, relatives and friends", "tolerance to diversity", "participation in politics and civil society".

• Stone (36) studied the determinants of SC under the headings of "social networks based on friendship, family and neighborhood relations", "participation in social activities, group activities and visiting friends, family members and relatives for important social events", "participation in civil society and local government", "sense of belonging to an institution, family or structure", "tolerance for difference".

• Harper (40) discussed the determinants of SC under the headings of "social participation in activities and organizations", "social network and social support", "created and shared trust and reciprocity", "participation in public events" and "structures of the place of residence".

• Alanen and Niemelainen (37) addressed the determinants of SC under the headings of "participation in volunteering activities or recreational activities", "friendship relationship", "trust in individuals, environment and institutions", "economic opportunities of the living environment".

• Kay and Pearce (50) discussed the determinants of the SC concept under the headings of "trust", "social networks", "belonging", "reciprocity" and "cooperative behavior".

• Grootaert et al. (23) addressed the determinants of SC under the headings of "neighborhood relationship", "social cohesion, participation in civil society, administration and politics", "receiving support and help from others", "sense of trust and solidarity", "acting together and cooperation", "relationships and communication", "sociability, conflict and violence", "empowerment and political action".

• Looman (41) discussed the determinants of SC in four factors under the headings of "participation in activities for the public good ", "sense of belonging", "participation in spiritual relationships", " relationship with school " and "requesting help".

• Van der Gaag and Webber (48) examined the determinants of SC under the headings of "local resources and opportunities", "getting expert advice", "personal skills" and "problem solving skills and resources".

• Chen et al. (24) under the headings of "frequency of contact with family, friends, relatives, neighbors, coworkers, old friends", "regular contact with family, friends, relatives, neighbors, coworkers, old friends", "trust in family, friends, relatives, neighbors, coworkers, old friends", and "the level of help from family, friends, relatives, neighbors, coworkers, old friends when requested", "the sum of values held by individuals in interaction", "the level of performing the activities organized by public institutions, political, economic and social groups and organizations", "the level of performing the activities organized by cultural and recreational groups and organizations such as sports, music, dance", "the extent to which activities organized by public institutions, political, economic and social groups and organizations and social groups and organizations such as sports, music, dance", "the extent to which activities organized by cultural and recreational groups and organizations, such as sports, music, dance, etc., address your rights and interests", "the extent to which cultural and recreational activities, such as sports, music, dance, etc., address your rights and interests upon your request, and "the presence, social connection, social influence, and significant power in decision-making of these two groups and organizations"

• Looman and Farrag (42) discussed the determinants of SC under the headings of "Participation in the Public Interest", "Sense of Belonging", "Connection with Systems" and "Family Role in Society".

• Archuleta and Miller (38) discussed the determinants of SC under the headings of "network dimension", "frequency of contact", "trust in people", "getting help from people", "Resources and assets for personal networks", "Organizational network dimension in the community", "participation in organizations", "organizational rights and interests", "organizational structure to provide assistance" and "institutional assets and resources".

• Wang et al. (25) discussed the determinants of SC under the headings of "the level of meeting with friends", "the level of meeting with fellow citizens and former classmates", "trust in coworkers", "trust in family and relatives", "the level of close relationship with family, relatives, friends", " the level of doing professional work with family, relatives and friends ", "asking for help from coworkers, "asking for help from friends in the social world", "the level of doing and participating in cultural and recreational activities organized by public institutions, political, economic and social groups in the society where the individual lives", "the level of social connection of these groups and organizations ", "the level of social impact of these groups and organizations", "the level of representation of your interests by cultural, recreational groups and organizations", "the level of representation of your interests by governmental, political, economic and social groups and organizations" and " depending on the demand, the percentage of cultural and recreational groups and organizations meeting your demand".

• Uçar (51) discussed the determinants of SC under the headings of "Strategic Trust", "Generalized Trust", "Institutional Trust", "Common Values", "Group Belonging and Trust".

• Meek et al. (26) discussed the determinants of SC under the headings of "Shared communication language", "shared vision", "reciprocity norms", "social trust", "individual relationship network", individual belonging".

• Zhao et al. (27) discussed the determinants of SC under the headings of "participation in local government", "Social Agency or Proactivity in Social Context", "feelings of trust and safety", "neighborhood relations", "family friendship relationship", "tolerance to difference", "value of life" and "work connections".

• Makevica et al. (29) studied the determinants of SC under the headings of "institutional trust", "Barriers to social support from acquaintances", "receiving social trust and support", "Social relations", "Sense of belonging", "Trust in people".

• Forsell et al. (30) developed a scale regarding the participation in recreational and sports clubs under the headings of "Friendship, Acceptance-Approval", "Behavioral Norms", "Trust-Reciprocity" and "Participation in Management".

• In addition, studies on SC scales have also been conducted for adolescents by Koutra et al. (52), Aminzadeh et al. (53), Pavia et al. (54) and Ardahan (31).

The Need for A New Scale

The answer to the question of why there is a need to develop a new scale when there are many studies on the measurement of SC is the reason for conducting this study. There are generally two main reasons for developing a new scale in scale studies. The first and most important reason is that the existing scales are not sufficient to explain the whole "individual ecology" in terms of measurement, and the second reason is to get more effective results with a smaller list of questions (31).

In the new study, the determinants of SC were addressed with a question list of 95 items under a total of 14 headings: "Kinship Relationship", "Physical Neighborhood", "Family Relationship", "Social Media (Digital) Neighborhood", "Workplace/School Relationship and Institutional Loyalty ", "Friendship Relationship", "Family and Environmental Pressure", "Participation in Local Government", "NGO Membership (Playing a Role in Civil Society)", "Trust in Public Institutions", "Tolerance to Diversity", " Safety of the Living Environment ", "Sensitivity to Social Problems" and "Taking Initiative in Social Issues".

Each scale listed above measures the SC value of an individual by taking one or more determinants together. The scales developed by Onyx and Bullen (22), Narayan and Cassidy (35), Chen et al. (24), Wang et Turkish Jaurnal of Sport and Exercise /Türk Spor ve Egzersiz Dergisi 2025 27(1):77-94 83 2025 Faculty of Sport Sciences, Selcuk University

al. (25) are among the most widely cited scales and have validity and reliability in many languages. Compared to the current study, Onyx and Bullen's (22) study differs from the SCS-A in terms of "Trust in Institutions", "Social Media Neighborhood" and "Sensitivity to Social Problems". In Narayan and Cassidy's (35) study, some items from the dimensions of "trust in institutions, the environment and people", "group work and belonging", "asking for help from others and being ready to help", "daily socialization with family, relatives and friends", "tolerance to diversity", "participation in politics and civil society" were included in the item pool of the SCS-A. The studies of Chen et al. (24) and Whan et al. (25) differ from the SCS-A in terms of "Trust in Institutions", "Social Media Neighborhood", "Sensitivity to Social Problems", "Participation in Local Government", "Safe Living Environment" and "Taking Initiatives in Social Issues". Some items from the study of Uçar (51) under the headings of "Strategic Trust", "Generalized Trust", "Institutional Trust" and "Group Belonging and Trust" were included in the SCS-A.

In addition, Chen et al. (24) and Wang et al. (25) had questions with similar structures in their studies. For example, the positive or negative answers to the question " the level of help from family, friends, relatives, neighbours, coworkers, old friends when requested " could not be differentiated from which social relationship they would or would not represent. When an individual cannot ask for help from his/her family for various reasons but asks for help from friends in his/her social world, two different individuals who can ask for help from their family but cannot ask for help from their friends receive the same score on the scale. Similarly, this similarity is present in "having regular meetings with family, friends, relatives, neighbors, coworkers and old friends" and "trusting family, friends, relatives, neighbors, coworkers and old friends". In order to eliminate this similarity, "asking for help", "meeting" and "trusting" were asked separately in the new scale.

The aim is to measure the human ecology of the individual in the most effective way. The most distinctive feature of the new measurement tool is to transfer the three basic approaches of SC, namely "Binding", "Bonding" and "Bridging" relationship values to the proposed new method with measurement values based on "strong" and "weak" network relationships within the scope of "horizontal" and "vertical" networks and to make measurements on this basis.

METHOD

This study is a descriptive study and the ethical permission was obtained from Akdeniz University, Social and Human Sciences Scientific Research and Publication Ethics board, with the decision dated 30/11/2020 - 261 and numbered 261.

Random sampling method was used in the study, individuals were contacted with an online survey form via social media, telephone message groups or e-mail between 01/06/2022-01/09/2022, and the 479 data obtained from those who voluntarily participated in the study were processed after editing.

The item pool was created with common items taken from the scales developed by Onyx and Bullen (22), Narayan and Cassidy (35), Chen et al. (24), Wang et al. (25), Uçar (51), Ardahan (32), Spellerberg (47), Hjøllund and Svendsen (34), Stone (36), Harper (40), Alanen and Niemelainen (37), Kay and Pearce (50), Grootaert et al. (23), Looman (41), Van der Gaag and Webber (48), Looman and Farrag (42), Archuleta and Miller (38), Uçar (51), Meek et al. (26), Zhao et al. (27) Makevica et al. (29) and Forsell et al. (30).

The items were translated and back-translated by two foreign language instructors who were proficient in both Turkish and English. As suggested by Deniz (55) and Esin (56), the teachers first translated the items from English to Turkish. After a week, they translated the Turkish text back into English and compared it with the original English spelling of the items. The language validity of the original item and the translated item was evaluated with the query "1=Translation is not appropriate and should be redone, 2= Translation is not fully appropriate and should be revised, 3= Translation is fully appropriate". Each item was re-translated until it received a total of 3+3=6 points from two foreign language instructors.

The created item pool was sent to four academicians who are competent in this field and they were asked to evaluate the scope of the items as suggested by Lawshe (57) and Gözüm and Aksayan (58) (1= Not Appropriate, should be removed, 2= Somewhat Appropriate, should be replaced with the item "......", 3= Appropriate but it would be better if the current item "......" is revised as follows, 4= Very Appropriate).

The experts' evaluations were made by using the Davis Technique for the Content Validity Ratio (CVR) (59). In the CVR calculation, the number of experts who evaluated the items as "appropriate" and "very appropriate" was divided by the total number of experts and the CVI was calculated for each item. A calculated CVR value higher than 0.80 is considered appropriate. The CVR value of the questionnaire items was determined to be 0.90, and five of the 115 items in the item list were revised and included in the question list in their final form.

The revised item list was administered face-to-face to 10 men and 10 women with different demographic characteristics to perform the Comprehensibility Test of the items. They were asked to evaluate each item (1= It Is Not Clear What Is Being Said, 2= The Meaning Is Not Fully Understood, More Than One Meaning Occurs, 3= The Meaning Is Understood But Not Clear, 4= The Meaning Is Fully Understood). Just like in the Davis Technique, the number of respondents who scored "3= The Meaning Is Understood But Not Clear, 4= The Meaning Is Understood But Not Clear, 4= The Meaning Is Fully Understood But Not Clear, 4= The Meaning Is Fully Understood But Not Clear, 4= The Meaning Is Fully Understood But Not Clear, 4= The Meaning Is Fully Understood But Not Clear, 4= The Meaning Is Fully Understood But Not Clear, 4= The Meaning Is Fully Understood But Not Clear, 4= The Meaning Is Fully Understood But Not Clear, 4= The Meaning Is Fully Understood But Not Clear, 4= The Meaning Is Fully Understood But Not Clear, 4= The Meaning Is Fully Understood" was divided by the total number of respondents, and the Comprehensibility Test Score of the items was found to be 0.95. Since the calculated Comprehensibility Test Score value was higher than 0.80, no changes were made in the item list.

While preparing the survey questions, a four-point Likert Scale (1: Definitely No, 2: Frequently No, 3: Frequently Yes, 4: Definitely Yes) was used to weight each item.

Statistical Analysis: Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) were administered to a total of 479 data sets, as suggested by Auerbach and Beckerman, (60) and Aytaç and Öngen (61). Item-total correlations were applied to the factors obtained as a result of factor analysis. To evaluate the internal consistency of the scale, Cronbach's Alpha coefficients of the sub-dimensions formed as a result of EFA were examined, and Pearson correlation coefficients were used to examine the relationship between the factors of the resulting scale. The results were questioned at 0.01 and 0.05 significance levels. Varimax rotation method was used in the study. EFA results was given in Table-1 and CFA results was given in Table-3.

Calculation of Total SC Score: In calculating the total score of SCS-A, the Newton-Raphson method was used as mentioned in Erkuş's (70) study, and the results given in Table-4 were obtained. Since the Total Social Capital Score (TSCS) will give a value that can be used in many comparisons, it will give an idea about that sample and the opportunity to compare the TSCS with scores obtained from different samples at different times. The following steps were followed in the calculation of the TSCS.

Process Step-01: First, the average value of each factor (FAV) must be found. $FAV=(\sum_{i=1}^{i=1})^{i}$ Mi)/t is used to find this. Here t is the total number of items in that factor, and Mi is the value of the response to the item i.. This process must be done for 14 factors in SCS-A and data entry of each person.

Process Step-02: The FMVi value found for each factor is multiplied and summed with the equivalent of the explained variance over 100 (Xi) given in Table-1 to find the TSCS. In new studies to be conducted using this scale, it is recommended to carry out validity and reliability. The Rotated Variance (RVi) and Xi values of each factor should be calculated according to the new EFA and included in the process. RVi values should be taken from the Rotated Variance % row as seen in Table-1. If EFA is not preferred, the values in the original scale can be used.

Process Step-03: In determining the contribution of each factor to the TSCS, $\sum_{i=1}^{f} [(DAVi)] *100)/71,372$ will be accepted as the coefficient of contribution to the explained variance of the scale out of 100. Here "f" is the number of factors in the scale. Since there are 14 factors in this scale, f = 14. For example, in determining the contribution of each factor to TSCS, it will be found as (7.991*100) / 71.372 = 11.196267 for F01, (4.752*100) / 71.372 = 6.658073 for F08.

Process Step-04: Here, the FMVi calculated from the data entered by each person will be multiplied by the constant Xi and summed to find the contribution of $\sum_{i=1}^{i=1}^{f}$ [FODi*Xi] to the TSCS. Here "f" is the number of factors in the scale. For example, in a data set of 500 individuals, TSCSi should be found for each individual's data. The TSCSi value will be between 100-400 for each individual's entered value. The minimum and maximum values that each factor can take in this example are given in Table-5. The closer each person's TSCS score is to 400, the better they will be. Since FMVi will take values between one '1' and four '4', the minimum value will be found by multiplying Xi by one '1' and the maximum value will be found by multiplying Xi by one '1' and the use of Likert Scale (1: Definitely No, 2:

Frequently No, 3: Frequently Yes, 4: Definitely Yes) in weighting each item. These calculated values should be evaluated by experts in the field and recommendations should be made accordingly.

An example of calculating the Total Capital Score is given in Table-4a. This value will be interpreted based on the Maximum and Minimum values of the TSCSi value given in Table-4 and calculated for this study. Each value in the table should be evaluated on an individual basis and by taking into account the human ecology of the individual by an expert on social capital and the subject for which the study was conducted. This evaluation will be in two stages. The first interpretation should be made on TSCSi and the second evaluation should be made on the item values of each factor.

SCS-A can be used as a total scale by calculating TSCS for each data set, or each factor can be used independently as it consists of 14 factors.

RESULTS

A total of 479 people participated in the study and 62.0% (n=297) of the participants were female with an average age of 31.55±10.31 and 38.0% (n=182) were male with an average age of 37.68±12.06.

In this study, which aimed to develop the Social Capital Scale for Adults (SCS-A) and test its validity and reliability for the Turkish population, the first EFA was applied to a total of 115 item lists. 20 items with total variance values less than 0.5 and factoring other than the required factor were removed and EFA was applied again to the remaining 95 items. In the final analysis, the KMO (Kaiser-Meyer-Olkin) value was calculated as 0.926, Bartlett's Test of Sphericity p<0.05, Chi-square=41517.001 and SD=4465, p=0.000. According to Field (2000), the KMO value is the lower limit of 0.50, and EFA should not be applied to data sets with KMO values below it. However, since the Kaiser- Meyer- Olkin value was greater than 0.5 and Bartlett's test was statistically significant, as recommended by Çokluk et al. (2012) and Field (2000) to evaluate the suitability of the data set for factor analysis, the data set was found to be suitable for factor analysis. All factors with eigenvalues above 1, obtained by the principal component technique, were accepted as factors. The Cronbach's Alpha coefficient of the SCS-A scale was found to be 0.966 and the variance explained by the scale was 71.372%. Cronbach's Alpha coefficients of the factors were between F14 = 0.790 and F01 = F14 = 0.961. Accordingly, both the internal consistency of the factors and the internal consistency of the whole scale can be considered highly reliable (61). The results are summarized in Table 1. The items in the SCS-A and the correlation values of a total of 14 factors has the highest correlation with the factor it is factored into.

Table 1. F	actor	Load	ls, Co	mmor	n Vari	ance '	Value	s								
Kaiser-Mey	Caiser-Meyer-Olkin Measure of Sampling Adequacy. ,926															
Bartlett's T	est of	Spher	icity		Appr	ox. Ch	i-Squa	ire		41	41517,001					
-					df					44	65					
					Sig.					,00	0					
Factors	1	2	3	4	5	6	7	8	9		10	11	12	13	14	VarianceX±SS
Cronbach's	0,961	0,932	0,948	0,922	0,949	0,946	0,940	0,914	0,9	905	0,870	0,875	0,922	0,838	0,790	
Alpha																_
Rotated	7 501	7 4 4 5	7 21	6 721	6 165	5 5 97	5.012	4 514	2 5	569	2 191	2 422	2 5/9	2 116	1 700	Cronbach's Alpha of
Eigenvalue	s-7,091	17,445	7,31	0,731	0,400	5,567	5,012	4,314	3,0	500	3,404	3,422	2,340	2,410	1,709	the Whole Scale
% 0	f															
Rotated	7,991	7,837	7,695	7,085	6,806	5,881	5,275	4,752	3,7	756	3,667	3,602	2,683	2,543	1,799	0,966
Variance																_
Rotated																
Cumulative	7,991	15,828	823,523	330,60	937,414	443,29	548,57	53,322	257	,078	360,745	564,342	767,03	69,573	3 71,37 2	2
%																_



Figure-1. Scree Plot Graph for the Number of SCS-A Factors

The scree plot graph for the factors is given in Figure-1. The vertical axis of the graph shows the eigenvalues of the factors and the horizontal axis shows the factors. When the scree plot graph is examined, it is seen that the highly accelerated decline decreases after the 10th point and the acceleration falls below 1 after the 14th factor. The downward trend seen from the first point is shown with points in the degree of contribution to the variance, and each interval between the two points means one factor (62). After the 14th point, the contributions of the factors to the total variance decrease.

As a result, the SCS-A, consisting of 95 items and 14 factors, was obtained. The factors obtained by EFA were named as "Kinship Relationship", "Physical Neighborhood", "Family Relationship", "Social Media (Digital) Neighborhood", "Workplace/School Relationship and Institutional Loyalty", "Friendship Relationship", "Family and Environment Pressure", "Participation in Local Government", "NGO Membership (Taking Role in Civil Society)", "Trust in Public Institutions", "Tolerance to Diversity", " Safety of the Living Environment", "Sensitivity to Social Problems" and "Taking Initiatives in Social Issues". Factor names and items are given in Table-2.

Table 2. Factor Name	es and Items						
F01-	AKIL01: When I think of all the members of our relatives, I see myself as a part of them						
Kinship	AKIL02: I believe that I can get support from my relatives in solving my financial,						
Relationship emotional, social, work/school problems when necessary.							
	AKIL03: I think my relatives spare enough time for me.						
	AKIL04: My relatives trust each other.						
	AKIL05: I feel valued in my relationship with my relatives.						
	AKIL06: I feel safe in my relationship with my relatives.						
	AKIL07: I think I spare enough time for my relatives.						
	AKIL08: I participate in various social activities with my relatives.						
	AKIL09: I care about what my relatives think about my attitudes and behaviors.						
F02-	FKOM01-I think my neighbors and other acquaintances spare enough time for me.						
Physical	FKOM02- I find our neighborhood relations sufficient / satisfactory.						
Neighborhood	FKOM03-We visit our neighbors as a family.						
	FKOM04-We can borrow the things we need from our neighbors.						
	FKOM05-I think I spend the necessary time for my neighbors and other acquaintances.						
	FKOM06-I visited and/or paid close attention to our neighbors recently.						
	FKOM07-I participate in various social activities with our neighbors.						
	FKOM08-I feel valued in my relationship with my neighbors.						
	FKOM09-I can ask for help from our neighbors when I need it.						
	FKOM10-I care about what my neighbors think about my attitudes and behaviors.						

	internet in marked the mappy to fait have our neighbors of acquaintances when i go
	out/shopping.
	FKOM12-Our neighbors are respectful to other individuals living in the same place.
F03-	AILIS01- I feel safe in my relationship with my family.
Family	AILIS02- I see myself as part of my nuclear family.
Kelationship	AILIS03- I feel valued in my relationship with my family.
	AILIS04- I believe that I can get support from my family in solving my financial,
	emotional, social, work/school problems when necessary.
	AILIS05- Members in my family trust each other.
	AILIS06- I care about what my family thinks about my attitudes and behaviors.
	AILIS07- I think my family spares enough time for me.
	AILIS08- I participate in various social activities with my family.
	AILIS09- I think I spend the necessary time for my family.
F04-	DIKOM01- I chat with my followers on social media, like their posts and interact with
Social Media	them.
(Digital)	DIKOM02- I feel valued in my relationship with my followers on social media.
Neighborhood	DIKOM03- I care about what my social media followers think about my attitudes and
	behaviors.
	DIKOM04- I follow my followers' posts about their daily lives.
	DIKOM05- I share about my daily life or activities on social media.
	DIKOM06- I participate in various social activities with my social media followers.
	DIKOM07- I believe that I can get support from my social media followers in solving my
	financial, emotional, social, work/school problems when necessary.
	DIKOM08- I think my life has become richer thanks to my followers on social media
	DIKOM09- I do not hesitate to share about myself and/or topics I am interested in on
	social media.
	DIKOM10- I share / follow / support posts about aid campaigns, social and
	environmental problems on social media.
	DIKOM11- I use social media to access information or activities related to my interests
F05-	IOBAG01- I feel valued in my relationships with individuals at my workplace/school.
Relationship and	IOBAG02- I see myself as a part of my workplace/school.
Commitment with	IOBAG03- People at my workplace/school trust each other.
Workplace/School	IOBAG04- I feel safe around people at my workplace/school.
	IOBAG05- I believe that I can get support from individuals at my workplace/school in
	solving my financial, emotional, social, work/school problems when necessary.
	IOBAG06- I think that individuals at my workplace/school spare enough time for me.
	IOBAG07- I participate in various social activities with individuals at my
	workplace/school
	IOBAG08- I care about what people at my workplace/school think about my attitudes and
	behaviors.
F06-	ARILI01- I think my friends spare enough time for me.
Friendship	ARILI02- I feel safe around my friends.
Relationship	ARILI03- I think I spare the necessary time for my friends.
	ARILI04- I participate in various social activities with my friends.
	ARILI05- I believe that I can get support from my friends in solving my financial,
	emotional, social, work/school problems when necessary.
	ARILI06- My friends trust each other.
	ARILI07- I feel valued in my relationships with my friends.
	ARILI08- I care about what my friends think about my attitude and behavior.
F07-	ACBAS01- If my followers on social media put pressure on my lifestyle and/or choices, it
Family and	does not affect my decisions/behaviors.
Environmental	ACBAS02- If individuals at my workplace/school put pressure on my lifestyle and/or
Pressure	choices, it does not affect my decisions/behaviors

FKOM11-It makes me happy to run into our neighbors or acquaintances when I go

	ACBAS03- If my neighbors put pressure on my lifestyle and/or choices, it does not affect						
	my decisions/behaviors.						
	ACBAS04- If people I don't know put pressure on my lifestyle and/or choices, it does not affect my decisions/behaviors.						
	ACBAS05- If my friends put pressure on my lifestyle and/or choices, it does not affect my decisions/behaviors.						
	ACBAS06- If my family puts pressure on my lifestyle and/or choices, it does not affect my						
EUS	VKV AT01. In the last two wears, I participate(d) in a valuatory social movement for any						
Particination in	emergency response such as environmental pollution, public transport problems						
the Local	YKKAT02- In the last two years I volunteer(ed) and/or support(ed) work in a social						
Committee	project in the immediate vicinity.						
	YKKAT03- In the last two years, I participate(d) in any social assistance or solidarity						
	activity with groups, such as charity bazaar, school/workplace choir, animal rights						
	protection event, handicraft exhibition.						
	YKKAT04- I voluntarily participate(d) in a project to provide a new service in my field in an organization such as youth centers, scout centers, child care and entertainment for the disabled.						
	YKKAT05- In the last two years, I participate(d) in any initiative such as health,						
	environment, education, religion, management on behalf of my workplace/neighbourhood.						
	YKKAT06- I participate(d) in any work group voluntarily at or outside my workplace/school.						
F09-	STKUY01- I am actively involved in the management and organization committee of any						
NGO	club, association or community.						
Membership	STKUY02- I am a member of any club, association or community such as sports,						
(Taking a Role in	handicrafts, social clubs and associations/I actively participate in their activities.						
Civil Society)	STKUY03- I see myself as a part of a community and/or hobby group organized in a club,						
	association or social media.						
	STKUY04-1 am an active member of a community at my workplace, such as a social						
	STVLD/05. Low on active member of a community on social modia						
F10-	CUKUR01. Things are done as they should be in public institutions						
Trust in Public	CUKUR02. When people experience a problem, they can easily apply to a government						
Institutions	institution to solve their problems and seek their rights.						
	GUKUR03- Institutions are not discriminatory in the society I live in.						
	GUKUR04- There is no need for an acquaintance (friends in high places) to make things						
	work in this country.						
	GUKUR05- There are institutions where people can seek their rights when faced with						
F11_	FATOL01- Llike to live among individuals with different lifestyles						
Tolerance to	FATOL02- I do not worry about making friends with individuals with different lifestyles						
Diversity	FATOL02- I do not worry about making metros with marviadais with american mestyles.						
(Lifestyle, political	live (work/school, neighborhood, apartment, etc.).						
opinion, ethnicity,	FATOL04- A foreigner who moves to our neighborhood, who is new to our job/school, or						
religious belief,	a person from a different culture is easily accepted.						
sexual preference,							
etc.)	CLICEVOL I feel a fe in the empirement I line in						
F12- Trust in the	GUCEV01-1 feel safe in the environment 1 live in.						
Environment	CUCEV02- The neighborhood i live in is known as a reliable place.						
(trusting the	GOCE VUS- I leel sale walking in my neighdornood after dark.						
physical –							
environment)							
F13-	SPDUY01- We talk about social problems with individuals at my workplace/school.						
	SPDUY02- We talk about social problems with my relatives.						

Sensitivity to	SPDUY03- We talk about social problems with my friends.
Social Problems	SPDUY04- We talk about social problems with my followers on social media.
	SPDUY05- We talk about social problems with my neighbors and other acquaintances.
	SPDUY06- We talk about social problems with my family.
F14-	SKINS01- When I need something to make an important decision or complete a job, I can
Taking Initiative	reach the necessary things myself, even if no one supports me.
in Social Issues	SKINS02- I take the initiative to solve social problems when necessary, even if I am not
	asked or told.
	SKINS03- I am willing to show a conciliatory attitude when I have a disagreement with
	anyone about stray animals, using common areas, or other issues that are on the general
	agenda, etc.

As a result of CFA applied to the data set, statistically adequate fit results were obtained in all fit indices. The results are given in Table 4. As can be seen from the table, X2/ Degrees of Freedom 11410.46 / 4279: 2,667, GFI = 0.60, AGFI = 0.62, RMSEA= 0.064, RMR= 0.051, SRMR = 0.059, CFI= 0.96, NFI= 0.93, NNFI = 0.95, PGFI = 0.60, IFI= 0.96.

Table 3. CFA Fit Index Values (individual factors)					
X ² / Degree of Freedom	X ² / Degree of Freedom = 11410.46 / 4279: 2,667 (Excellent Fit)				
GFI	= 0.60 (Medium Fit)	CFI	= 0.96 (Excellent Fit)		
AGFI	= 0.62 (Medium Fit)	NFI	= 0.93 (Good Fit)		
RMSEA	= 0.064 (Good Fit)	NNFI	= 0.95 (Excellent Fit)		
RMR	= 0.051 (Excellent Fit)	PGFI	= 0.60 (Medium Fit)		
SRMR	= 0.059 (Good Fit)	IFI	= 0.96 (Excellent Fit)		

Table 4a. Calculation of the Contribution to Total Social Capital Score (Example)						
	Factor	Rotated Variance %	Explained Variance	Contribution to	Contribut	tion to TSCS
Eastana	Mean	(RVi)	over 100 (Xi)	TSCS _i	in this	example
Factors	Value			FMVi * Xi	Mini =	Maxi =
Γi	FMVi				1 *	4 * 11,196267
					11,196267	
F01	FMV1	7,991	11,196267	FMV1*11,196267	11,196267	44,785068
F02	FMV ₂	7,837	10,980497	FMV2*10,980497	10,980497	43,921988
F03	FMV ₃	7,695	10,781539	FMV3*10,781539	10,781539	43,126156
F04	FMV ₄	7,085	9,926862	FMV4*9,926862	9,926862	39,707448
F05	FMV5	6,806	9,535952	FMV5*9,535952	9,535952	38,143808
F06	FMV ₆	5,881	8,239926	FMV6*8,239926	8,239926	32,959704
F07	FMV7	5,275	7,390854	FMV7*7,390854	7,390854	29,563416
F08	FMV8	4,752	6,658073	FMV8*6,658073	6,658073	26,632292
F09	FMV9	3,756	5,262568	FMV9*5,262568	5,262568	21,050272
F10	FMV10	3,667	5,137869	FMV10*5,137869	5,137869	20,551476
F11	FMV11	3,602	5,046797	FMV11*5,046797	5,046797	20,187188
F12	FMV12	2,683	3,759177	FMV12*3,759177	3,759177	15,036708
F13	FMV13	2,543	3,563022	FMV13*3,563022	3,563022	14,252088
F14	FMV14	1,799	2,520596	FMV14*2,520596	2,520596	10,082384
			100 =		100.00	400.00
Total Soc Score TSC	rial Capital S	Total Explained Variance $\sum_{i=1}^{f} DAVi =$ 71,372	$\sum_{i=1}^{J} (DAVi \\ * 100)/71,372$	$=\sum_{i=1}^{f} FODi * Xi$	200,00	200,00

DISCUSSION AND CONCLUSION

In the last EFA calculation, KMO value was calculated as 0.926, Bartlett's Test of Sphericity p<0.05, Chisquare=41517.001 and SD=4465, p=0.000. The KMO value is above the 0.5 limit recommended by Field (63) and Çokluk et al. (62). Therefore, it can be concluded that the data set is suitable for factor analysis.

The Cronbach's Alpha coefficient of the SCS-A scale was found to be 0.966 and the variance explained by the scale was 71.372%. Cronbach's Alpha coefficients of the factors range from the lowest F14 = 0.790 to the highest F01 = F14 = 0.961. Bayram (2004) states that a Cronbach's Alpha value of over 0.70 is sufficient for reliability. Accordingly, both the internal consistency of the factors and the internal consistency of the whole scale can be considered highly reliable (64, 62).

As a result of EFA, it was found that there were 14 components with eigenvalues above 1 for 95 items and whose contributions to the total explained variance would be taken as basis, and the total explained variance was 71.372%.

The first EFA was conducted in SCS-A with a total of 115 items. After removing The 20 items with total variance values below 0.5, factoring out of the required factor, and with overlap values, EFA was applied to the remaining 95 items. After determining the number of factors of the scale through EFA, the Rotated Component Matrix was examined to find out which items matched which factors. Two conditions must be met for items to be overlapping (62). The first of these is that an item gives a high loading value (correlation value) with two or more items that are close to each other, and the second is that the difference between the loading values is less than 0.1. In SCS-A, all items have the highest correlation value with the factor they are factored into, and the overlap value is not less than 0.1.

As a result of the analysis, the lowest factor load value for F01 is 0.742 and the highest is 0.854, for F02 the lowest is 0.566 and the highest is 0.766, for F03 the lowest is 0.625 and the highest is 0.852, for F04 the lowest is 0.561 and the highest is 0.803, for F05 the lowest is 0.699 and the highest is 0.830, for F06 the lowest is 0.589 the highest is 0.782, for F07 the lowest is 0.703 the highest is 0.903, for F08 the lowest is 0.635 the highest is 0.835, for F09 the lowest is 0.673 the highest is 0.806, for F10 the lowest is 0.706 the highest is 0.824, for F11 the lowest is 0.681 and the highest is 0.837, for F12 the lowest is 0.797 and the highest is 0.821, for F13 the lowest is 0.485 and the highest is 0.616, for F14 the lowest is 0.417 and the highest is 0.460. When the factor load values are examined in terms of size, it can be said that SPDUY06, SKINS01, SKINS02 and SKINS03 items showed a good fit, while all other items showed excellent fit (62).

The common factor variance values of each item in the SCS-A range from a maximum of 0.875 to a minimum of 0.504. Since the difference between the highest variance value and the lowest variance value is greater than 0.20, it can be assumed that there is homogeneity among the variables (62).

The construct validity of the scale obtained with EFA was tested with CFA. According to the analyses, X2/ Degree of Freedom was calculated as 2,667, which shows that there is an excellent fit according to Sümer (65) and Schreiber et al. (66). Apart from this, absolute fit indices scores showed medium fit in GFI and AGFI, good fit in RMSEA and SRMR, and excellent fit in RMR according to Çokluk et al. (62) and Marsh et al. (67). According to Sümer (65), incremental fit indices had excellent fit scores in CFI, NNFI and IFI, good fit scores in NFI, and medium fit scores in PGFI. With these findings, it is possible to say that the model is acceptable.

The factors "participation in local government", "feelings of trust and safety", "physical neighborhood relations", "family friendship relations" and "tolerance to diversity" in Onyx and Bullen's (22) study, the factors "trust in institutions, the environment and people", "asking for help from others and being ready to help", "daily socialization with family, relatives and friends", "tolerance to diversity", "participation in civil society" in Narayan and Cassidy's (35) study, the factors "having regular meetings with family, friends, relatives, neighbors, co-workers, old friends", "trust in family, friends, relatives, neighbors, co-workers, old friends", "the level of help from family, friends, relatives, neighbors, co-workers, old friends", "the level of help from public institutions, political, economic and social groups and organizations when requested", "the level of help from cultural and recreational groups and organizations such as sports, music, dance, etc. when requested" in the studies of Chen et al. (24) and Wang et al. (25), the factors "Strategic Trust", "Generalized Trust", "Institutional Trust", "Group Belonging and Trust" in Uçar's (51) study were factored into the same

factors in the SCS-A consisting of 14 factors and 95 items. This reveals the reliability of the results of the SCS-A.

Similarly, some items in the factors "Family Relationship", "Perceived Environmental Safety", "Neighborhood Relationship", "Sparing time", "Social Pressure", "Work/School Life" in Ardahan's (32) Quality of Life Scale study were factored into the same factors in the SCS-A. This increases the reliability of the results of the SCS-A.

SCS-A can be used as a total scale by calculating TSCS for each data set, or each factor can be used independently as it consists of 14 factors.

In their study, Narayan and Cassidy (35) indicated that measuring SC based only on the elements that constitute it was an incomplete effort and added questions that they developed based on the results of SC to the survey questions. Putnam (20), who conducted important studies on the concept of SC, stated that SC can have negative as well as positive effects on individuals, depending on its nature. It was emphasized that social capital, which is initially fully affirmed because it facilitates individuals to act cooperatively and effectively, should be evaluated according to the nature of the networks, taking into account the negative externalities that it may later produce. In this study, all these important points were taken into consideration when creating the item pool. In the literature, each of the different dimensions of the concept has been treated as if it were social capital itself (68, 69). Although each of these dimensions adds value to the concept, none of them alone is sufficient to fully explain the concept. In the present study, the 95-item, 14-factor, comprehensive SCS-A developed for adults will enable comprehensive evaluations in future studies.

Considering these findings and results, it is possible to say that the Social Capital Scale for Adults is a reliable scale for the Turkish population.

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Leisure Involvement of Master Handball Players¹

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Abstract

This study was conducted to determine the leisure involvement levels of master handball players. The sample of the study consisted of 85 athletes (36 females; Xage=44.06±5.90 and 49 males; Xage=55.43±8.99) who participated in the master handball tournament. The personal information form and Leisure Involvement Scale were used as data collection tools. The data were collected online. The SPSS 25.0 software package was used for data analysis, and normality was assessed based on kurtosis-skewness values. The study employed the relational survey model, descriptive statistics, and both difference and correlation analyses. The data analysis revealed that the leisure involvement levels of master handball players were above average. When the gender variable, one of the demographic variables, was considered, a significant difference was found between the attraction, social bonding, and identity affirmation sub-dimensions and leisure involvement levels. The relationship between the participants' age, handball background, the leisure involvement scale and its sub-dimensions was looked at. It was found that the attraction sub-dimension was negatively related to age, while the centrality sub-dimension was positively related to handball background. Since there is no study in the literature on master athletes in the field of leisure time, it is aimed to enrich the field. As a result of the study, it was determined that master athletes had higher leisure involvement scores in terms of gender variable. It was observed that the leisure involvement levels of athletes participating in a single activity and those participating in multiple activities were similar. It was determined that the attraction of leisure time activities decreased in master athletes as they got older, and that athletes with a longer sports background attached more importance to leisure time activities during the master sports period.

Keywords: Handball, Interest, Leisure, Master.

Özet

Veteran Hentbol Sporcuların Serbest Zaman İlgilenimleri

Bu çalışma, veteran hentbol sporcularının serbest zaman ilgilenim düzeylerinin belirlenmesi amacıyla yapılmıştır. Çalışmanın örneklemini veteran hentbol turnuvasına katılan 85 sporcu (36 kadın; \overline{X} yaş=44.06±5.90 ve 49 erkek; \overline{X} yaş=55.43±8.99) oluşturmaktadır. Veri toplama aracı olarak kişisel bilgi formu ve Serbest Zaman İlgilenim Ölçeği kullanılmıştır. Veriler çevrimiçi yöntemlerle toplanmıştır. Verilerin analizi için, SPSS 25.0 paket programı kullanılmış ve basıklık-çarpıklık değerleri göz önüne alınarak normallik değerleri hesaplanmıştır. Çalışmada ilişkisel tarama modeli kullanılmış olup betimleyici istatistik, fark ve korelasyon analizlerinden yararlanılmıştır. Elde edilen veriler doğrultusunda, veteran hentbolcuların, ilgilenim düzevlerinin ortalamanın üzerinde olduğu tespit edilmiştir. Demografik değişkenlerden olan cinsiyet değişkeni ele alındığında, çekicilik, sosyal ilişki, özdeşleşme alt boyutları ve genel ilgilenim düzeyleri arasında anlamlı fark tespit edilmiştir. Katılımcıların, yaş ve hentbol geçmişleri ile serbest zaman ilgilenim ölçeği ve alt boyutları arasındaki ilişki incelendiğinde, çekicilik alt boyutu ve yaş değişkeni arasında negatif yönde, önem verme ve hentbol geçmişi arasında pozitif yönde istatistiksel açıdan anlamlı fark tespit edilmiştir. Veteran sporcularla ilgili literatürde serbest zaman alanında yapılan çalışma bulunmadığından, alanı zenginleştirmeye yöneliktir. Araştırma sonucunda, Veteran sporcuların cinsiyet değişkeni açısından serbest zaman ilgilenimi puanlarının daha yüksek olduğu saptanmıştır. Serbest zaman aktivitelerinde tek aktiviteye katılan ve birden çok aktiviteye katılan sporcular açısından serbest zaman ilgilenim düzeyleri birbirine yakın olduğu gözlenmiştir. Veteran sporcuların yaş almasıyla birlikte, serbest zaman etkinliklerinin çekiciliğinin azaldığı; ancak spor geçmişi güçlü olan veteran sporcular için serbest zaman aktivitelerine daha fazla önem verdiği tespit edilmiştir.

Anahtar Kelimeler: Hentbol, İlgilenim, Serbest Zaman, Veteran.

INTRODUCTION

Sport has become an essential part of human life, offering a range of benefits such as improved health, increased competition, and enhanced social interaction (14). Societies are increasingly recognizing that sport is important for all age groups, not just the young, and the multifaceted effects of these activities are becoming more apparent. These definitions emphasize the importance of leisure activities for adults, particularly in coping with challenges and transitions in later life stages such as retirement from professional sports (34, 5). Master athletes represent a unique population whose participation in sport extends well beyond their peak competitive years. Understanding the various factors that influence their participation and overall well-being is critical. Previous studies (12, 17, 22) suggest that participation in sport later in life provides numerous benefits, including improved physical health, improved mental well-being, and greater social connections.

Becoming a master athlete does not signify the end of a professional journey, especially for those involved in team sports such as handball. Rather, it marks the transition to a new phase, where leisure activities play a crucial role in their lives. This transition often involves a shift from competitive sports to recreational activities. These activities help maintain physical fitness as well as mental agility and social networks (38, 33). Handball, a sport that requires agility, strength, and teamwork, offers both challenges and opportunities for master athletes. Studies have shown that as athletes age, their motivation to participate in sports may shift, often placing more emphasis on enjoyment and social interaction rather than competition and achievement (8, 24, 28). This shift highlights the need for specialized programs that address the specific interests and needs of master handball players (39).

Sport provides a therapeutic escape from daily stress, improving mood and enhancing overall mental health (11). It also promotes a sense of community and belonging, which are critical for social well-being (3). For master athletes who have lost teammate and routines, participation in leisure time activities can help fill this gap and provide social integration and personal fulfillment (23, 18). The participation of master handball players in both local and international competitions is increasing in Türkiye, and it is important to explore this demographic. Studies suggest that such participation can significantly contribute to healthy aging by providing a sense of community and continuity for master athletes (1).

Furthermore, the physical and physiological demands of handball, characterized by intermittent high-intensity activity, make it a suitable exercise for maintaining fitness and health in older adults (36,

10). Studies by Deck et al. (13) and Jang et al. (26) suggest that such participation can significantly contribute to healthy aging and provide a sense of community and continuity for master athletes.

Examining the leisure involvement levels of master handball players provides valuable insights into how these players adapt to the end of their competitive careers. This study aims to examine how master athletes spend their leisure time after transitioning from the professional arena. Examining the leisure time activities of master athletes who have been active for many years in competitive sports is important from an individual and societal perspective. This study aims to shed light on future research by examining the leisure involvement levels of master handball players. The results may help both master athletes improve their own quality of life and the sports community to provide better support and services to these valuable participants.

METHOD

Research model

The study was designed in the relational survey model, which is one of the quantitative research methods, and used an online data collection technique. The relational survey model guides the researcher between variables by determining the level between two or more variables (27).

Research group

The population of the study consisted of master handball players within the Turkish Handball Federation. Considering the estimated number of tournament participants in 2023, the population was assumed to be 200, and the minimum sample size was calculated to be 66 using the formula for determining sample size (n=NPQZ² / ((N-1)d²+PQZ²). A simple random sampling method was used, and a total of 85 people, 36 of whom were female and 49 were male, were reached.

Data collection tools

The study collected its data using online methods. The first part of the survey included a personal information form for the master handball players participating in the study. The personal information form included questions about the participants' age, gender, occupational status, marital status, how many years they have played handball, and the physical activities they have participated in. The second part of the survey used the "Leisure Involvement Scale (LIS)" to assess participants' interest and involvement in leisure activities. LIS was developed by Kyle et al. (31) and adapted into Turkish by Gürbüz, Çimen, and Aydın (19). The scale consists of 15 questions and 5 (five) sub-dimensions: attraction, centrality, social bonding, identity affirmation, and identity expression. In the study, the reliability coefficient of the scale was calculated as .915.

Data analysis

The study was analyzed with the IBM 25.0 program. The kurtosis and skewness results were taken into consideration to determine whether the obtained data were normally distributed. The kurtosis and skewness values were within ± 2 (6). The relational survey model includes both relationship and difference analyses. Accordingly, it consists of descriptive statistical analyses, Pearson product-moment correlation analysis, and t-test analysis in independent groups.

Ethical approval and institutional permission

This study was approved by the Hitit University Non-Interventional Clinical Research Ethics Committee (Decision No: 2023-17).

Table 1. Descriptive analyses of demographic information of participants					
			n	%	
Condon	Female		37	41.6	
Gender	Male	52		58.4	
Marital Status	Married	73		82.0	
Marital Status	Single		16	16.0	
Activity	Single activity		41	46.1	
participation status	More than one activity		48	53.9	
		n	Mean (Ss)	Min-Max	
Age		89	51.03(10.053)	35-79	
Handball Backgroun	d	89	14.18 (7.384)	3-30	

FINDINGS

When the demographic information of the participants was analyzed (Table 1), 42% of the sample group were female, 58% were male, 82% were married and 16% were single. When the activities that the participants participated in during their leisure time were evaluated, it was observed that 46% participated in a single activity and 54% participated in more than one activity. When the average age of the participants was evaluated, it was determined that the minimum age was 34 and the maximum age was 79. It was observed that master handball players had a minimum handball background of 3 years and a maximum handball background of 30 years.



Figure 1. Graph of the distribution of participants according to occupational groups

When the occupation variable of the participants was analyzed, it was found that 3% of them were in the private sector. The figure 1 shows the distribution of occupational groups in terms of the gender variable. It was observed that 36% of the female participants were teachers and 37% of the male participants worked in the private sector.

Table 2. Descriptive analyses of the participants' leisure involvement levels					
Leisure Involvement Scale		n	Mean (Sd)		
Sub-Dimensions	Attraction		4.21 (0.819)		
	Centrality		3.45 (0.881)		
	Social bonding	0E	3.96 (0.653)		
	Identity affirmation	65	4.01 (0.690)		
	Identity expression		3.68 (0.806)		
Leisure Involvement Scale Total			3.86 (0.620)		

The lowest score that can be obtained from the leisure involvement scale of the master handball players participating in the study is 1.00 and the highest score is 5.00. Considering these values, the attraction, identity affirmation, social bonding, identity expression and centrality sub-dimensions are

Table 3. T-test analysis according to the gender of the participants						
Leisure Involvement Scale		n	Mean (Sd)	t	F	р
Atting tion	Female	36	4.50 (.525)	-2.899	1.360	005
Attraction	Male	49	4.00 (.931)			.005
	Female	36	4.13 (.530)	-2.082	.508	040
Social bonding	Male	49	3.84 (.711)			.040
Identity offirmation	Female	36	4.19 (.649)	-2.185	.055	022
Identity affirmation	Male	49	3.87 (.693)			.032
Total	Female	36	4.02 (.527)	2 002	.175	040
lotal	Male	49	3.74 (.662)	-2.082		.040

listed from high to low in Table 2. When the general scale score is examined, it is seen that it is above the average score.

When the independent t-test analysis is performed according to the gender variable, statistically significant results are presented in Table 3. Statistically significant results were obtained in the general scale and attraction, social bonding and identity affirmation sub-dimensions of the leisure involvement scale (p<.05).

Table 4. T-test analysis according to the participants' physical activity participation						
Leisure Involvement Scale		n	Mean (Sp)	t	F	р
Attraction	Single activity	41	4.17 (.793)	EPO	.173	.562
Attraction	More than one activity	48	4.27 (.821)	362		
Social handing	Single activity	41	3.94 (.712)	- 267	1.278	700
Social bonding	More than one activity	48	3.97 (.603)	207		.790
Identity affirmation	Single activity	41	3.91 (.707)	1 200	.000	.234
	More than one activity	48	4.08 (.651)	- 1.200		
Identity expression	Single activity	41	3.65 (.949)		4.106	.681
	More than one activity	48	3.72 (.688)	413		
Centrality	Single activity	41	3.44 (.854)	_ 104	.015	.918
	More than one activity	48	3.46 (.896)	104		
Total	Single activity	41	3.82 (.653)	(11	.280	.543
	More than one activity	48	3.90 (.587)	011		

The participants were asked about their participation in physical activities in their leisure time, and their answers were divided into two categories: participation in a single activity and participation in more than one activity. When Table 4 was examined, no statistically significant difference was found between activity participation and leisure involvement levels and sub-dimensions (p>0.05).

Table 5. Correlation analysis of participants' age and handball background variables					
Leisure Involvement Scale Sub dimensions Gender Handball backg					
Attraction	214 (p<.05)				
Centrality		.256 (p<.05)			

Considering Table 5, the relationship between the demographic information asked to the participants, age and handball background variables, and the general and sub-dimensions of the leisure involvement scale was examined. In Table 5, it was determined that there was a negative (r=-.214) linear relationship between the attraction sub-dimension and the age variable, and a positive (r=.256) linear relationship between the centrality sub-dimension and handball background (p<0.05).

DISCUSSION AND CONCLUSION

Master athletes have been the subject of many studies in the literature (9, 15, 16, 17, 20, 21, 25, 29, 30, 35, 37). The findings revealed a statistically significant difference in the attraction, social bonding, identity affirmation, and leisure involvement scores based on gender. In master athletes who are considered serious leisure time participants, Hastings et al. (21) found that the importance of socialization increased as the participants aged and their job and family responsibilities decreased. They emphasized that female participants gave more importance to social experience. In their study, they also investigated the competitive experience and determined that participants with more competitive experience emphasized success, while those with less competitive experience emphasized skill development. The competitive experiences of master athletes may increase their social interactions and positively affect their self-esteem and quality of life (32). Regular sports activities support not only physical health but also psychological and social well-being. (4) It was found that master handball players' preference for one activity or more than one activity did not create a significant difference in the general and sub-dimensions of leisure involvement (p>0.05). The obtained result can be considered that handball is a team sport, and master handball players' preference for one activity or more than one activity did not create a significant difference. It was observed that the increase in handball experience had a positive and significant relationship with the centrality sub-dimension of the participants. Master handball players experience the enjoyment of playing handball without the high-level competitiveness associated with active athletes (15). Ferreira and Santiago (15) stated that it is important for master handball players participating in a handball festival to increase their quality of life, improve their social skills, and have the opportunity to re-experience their achievements. Such activities, especially adaptive sports, have been found to help masters better integrate themselves into society and cope with disability (2). Master handball tournaments are crucial in terms of quality aging. Since being a master athlete can be considered a second chance, it offers an opportunity to the participants (7). In this case, it supports the negative relationship between the age variable and the attraction subdimension.

In conclusion, it was observed that female athletes had higher leisure involvement scores compared to male master handball players. Additionally, the leisure involvement levels of athletes who participated in either a single activity or multiple activities were similar. It was determined that the attractiveness of leisure time activities decreased with age in master athletes, and that athletes with a long sports background increased their emphasis on leisure time activities during their master sports period. Since no research on the leisure time of master athletes was found in the literature, it is thought that our research, which includes an original sample group, will make a significant contribution to the literature. It is believed that this topic has not been evaluated from the perspective of master athletes, and that the study will contribute to filling this gap in the field. It is believed that an increase in the number of tournaments for master athletes will provide an opportunity to showcase their skills once again, ensure the continuity of socialization, and have positive effects on the parameters of quality aging.

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Exercise-Induced Hypoalgesia After Static Low-Angle Squat Exercise in Patients with Knee Osteoarthritis

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Abstract

The purpose of this study was to investigate exercise-induced hypoalgesia (EIH) on pressure pain thresholds (PPTs) after a static low-angel squat (SLAS) exercise in patients with knee osteoarthritis OA. Thirty-two patients with knee OA were recruited. Patients' demographic and clinical data were recorded. An algometer was used to measure the PPTs on the painful knee and biceps muscle and visual analog scale(VAS) was used for pain intensity. Subjects were instructed to perform a standardized single bout SLAS exercise. PPTs were assessed before and immediately after exercise. Pain intensity was assessed before, during and after quite exercise using VAS. Time up and go test (TUG) was used to measure mobility before and after exercise. The PPTs of the medial and lateral side of the knee showed a significant increase following SLAS exercise (p<0.001). The pressure pain thresholds of the biceps and quadriceps did not change (p>0.05). Pain intensity significantly increased during the low-angle squat exercise but decreased significantly post-exercise (p<0.001). The TUG scores decreased after exercise (p<0.001). The hypoalgesic effects of isometric low-angle squat exercise were moderate to large (Cohen's d -0.35 to -0.73) on pain and mobility after SLAS exercise in patients with knee OA. This study showed that the SLAS exercise induces local hypoalgesia in the exercising limb, reduces pain, and improves physical performance in patients with knee OA. These findings provide evidence on the mechanisms underlying the hypoalgesic effect of SLAS exercise, underscoring its potential as an effective intervention to alleviate pain and enhance function in clinical management of knee OA.

Keywords: Hypoalgesia, Exercise, Chronic pain, Osteoarthritis, Knee

Özet

Diz Osteoartriti olan Hastalarda İzometrik Squat Egzersizi Sonrasında Egzersize Bağlı Hipoaljezi

Bu çalışmanın amacı, diz osteoartriti (OA) olan hastalarda düşük açılı izometrik squat (DAİS) egzersizi sonrasında egzersiz kaynaklı hipoaljezi (EKH) etkisinin basınç ağrı eşiği (BAE) üzerindeki etkisini araştırmaktır. Diz osteoartriti olan 32 hasta çalışmaya dahil edildi. Hastaların demografik ve klinik verileri kaydedildi. Algometre kullanılarak ağrılı diz ve biseps kasındaki BAE'ler ölçüldü, ağrı şiddeti için görsel analog skala (GAS) kullanıldı.
Katılımcılara, standartlaştırılmış tek seanslık DAİS egzersizi yaptırıldı. BAE'leri egzersiz öncesi ve hemen sonrasında değerlendirildi. Ağrı şiddeti, egzersiz öncesi, sırasında ve sonrasında GAS kullanılarak değerlendirildi. Egzersiz öncesi ve sonrasında mobiliteyi ölçmek için Zamanlı Kalk ve Yürü testi (ZKYT) kullanıldı. Diz ekleminin medial ve lateral taraflarındaki BAE'ler, DAİS egzersizi sonrasında anlamlı bir artış gösterdi (p<0.001). Biseps ve kuadriseps kaslarındaki basınç ağrı eşiklerinde bir değişiklik gözlenmedi (p>0.05). Düşük açılı squat egzersizi sırasında ağrı şiddeti anlamlı şekilde artarken, egzersiz sonrasında anlamlı şekilde azaldı (p<0.001). ZKYT skorları egzersiz sonrasında azaldı (p<0.001). DAİS egzersizinin hipoaljezik etkileri, diz OA olan hastalarda ağrı ve mobilite üzerinde orta ile büyük (Cohen's d -0.35 ila -0.73) arasında değişen etkilere sahipti. Bu çalışma, DAİS egzersizinin egzersiz yapılan ekstremitede lokal hipoaljeziye neden olduğunu, ağrıyı azalttığını ve diz OA olan hastalarda fiziksel performansı iyileştirdiğini gösterdi. Bu bulgular, DAİS egzersizinin hipoaljezik etkisinin altında yatan mekanizmalara dair kanıt sağlayarak, diz OA'sının klinik yönetiminde ağrıyı hafifletmek ve fonksiyonu artırmak için etkili bir müdahale olma potansiyelini vurgulamaktadır.

Anahtar Kelimeler: Hipoaljezi, Egzersiz, Kronik ağrı, Osteoartrit, Diz

INTRODUCTION

Knee osteoarthritis (OA) one of the most prevalent joint disease in middle-aged and older populations. Knee OA is a major cause of musculoskeletal pain or disability complaints. Pain, as the primary symptom of knee OA, not only causes significant discomfort but also contributes to increased disability risk, greater healthcare utilization, and overall impairment in daily living. Given the multifaceted impact of pain in knee OA, there is a critical need to explore effective interventions that can alleviate pain and improve functional outcomes in affected individuals (1–4).

Exercise is recommended as a standard treatment for individuals diagnosed with knee osteoarthritis (OA) (5). Squat exercises represent a widely utilized strength and conditioning regimen, targeting numerous lower body muscles such as the quadriceps femoris, gluteus maximus and medius, adductor longus, hamstrings and triceps surae. Furthermore, squatting engages a multitude of supporting muscles, promoting postural stabilization of the trunk, with over 200 muscles activated during its execution (6). However, it is crucial to note that squat exercises can vary in depth, and performing deep squats with weight-bearing may pose risks to the knee joint (7). In recent years, a static squat exercise that is performed in the low angle, called "horse stance (Ma Bu)," has been put into practice which provides a reliable and safe isometric exercise based on the traditional Chinese exercise. With this regard, Zhao et al. (8) designed static low-angle squat (SLAS) exercise a new exercise approach that has a broad effect on the muscle around the back and knees. They demonstrated that static SLAS exercise led to significant reductions in proinflammatory factors including tumor necrosis factor-alpha and Interleukin-1 β . These findings underline that SLAS is a reliable approach in the rehabilitation of individuals with knee OA (9).

Exercise-induced hypoalgesia (EIH) is a well-documented phenomenon observed in pain-free individuals following a single bout of aerobic or isometric exercise. EIH is characterized by a temporary reduction in sensitivity to painful stimuli, typically lasting up to 30 minutes post-exercise (10). The analgesic effects of exercise, including EIH, are mediated by endogenous opioid release, activation of descending pain inhibitory pathways, and anti-inflammatory responses (11). Exercise stimulates β -endorphin release and modulates central pain processing via the periaqueductal gray and rostroventral medulla. Additionally, it reduces proinflammatory cytokines, counteracting peripheral and central sensitization. These mechanisms are particularly relevant in knee OA, where chronic inflammation and altered pain processing exacerbate symptoms (12). Understanding how SLAS exercise influences these pathways could enhance its application as a non-pharmacological pain management strategy.

Researchers frequently quantify EIH by evaluating alterations in pain sensitivity, including raised pain thresholds or decreased pain intensity, both prior to and following a specified exercise protocols (13). This temporary decrease in pain sensitivity highlights the immediate pain-relieving effects of exercise, which can have implications for pain management strategies. Moreover, while clinically significant improvements in pain are typically observed following multiple sessions of exercise therapy, even a single session of exercise can influence pain sensitivity, underscoring the potential therapeutic benefits of acute exercise interventions (11,14). The acute effect of exercise on pain sensitivity exhibits greater variability within chronic pain populations, with some studies indicating no change, a reduction, or even an increase in pain sensitivity following a single bout of exercise (10,14–18). However, in individuals with knee OA, the effect of acute isometric exercise remains contentious, as both hypoalgesia and hyperalgesia have been reported (10). The aim of this study was to investigate the impact of static low-angel squat (SLAS) exercise on EIH in patients with knee OA.

METHOD

A cross-sectional pre-post study investigated EIH in patients with knee OA, using a single session of static low-angel squat exercise. This study was conducted between April-May 2022. The participants met the criteria for tibiofemoral joint osteoarthritis (OA) in at least one knee as per the American College of Rheumatology classification criteria (19). They experienced knee pain on most days of the past month, and knee osteophytes were evident on radiographic examination. Exclusion criteria comprised a history of lower limb joint replacement or fracture, rheumatoid arthritis and neuromuscular disorders. Prior to data collection, written informed consent was obtained from all participants.

Procedure

Demographic information and questionnaires were administered prior to the collection of measurements. Lequesne Index was used to assess pain and functional limitations in subjects. An algometer was used to measure the PPTs on the painful knee. All subjects were then instructed to perform a standardized a single bout static low-angle squat exercise. PPTs were assessed before and immediately after exercise. In additionally pain intensity was assessed before, during and after quite exercise using visual analogue scale (VAS, 100 mm). Time Up and Go test (TUG) was used to measure mobility before and after exercise.

The Lequesne Index is a questionnaire used to assess functional limitation and symptom severity in patients with osteoarthritis, particularly of the hip and knee. It consists of patient-reported questions evaluating three main components: pain, walking distance, and difficulties in daily activities. The total score is used to determine the severity of the condition, with higher scores indicating greater functional impairment (20).

Assessment of Pressure Pain Thresholds

Pain Pressure Thresholds (PPTs) evaluations were carried out utilizing a handheld pressure algometer (Force Dial FDK, Wagner Instruments, Greenwich, Connecticut), featuring a stimulation area of 1 cm². Gradual compression pressure escalation was applied, and participants were prompted to indicate when they experienced pain or discomfort, upon which the pressure was ceased. So, the pressure intensity defined the PPT values. Previous studies have reported excellent intra-rater and inter-rater reliability (intraclass correlation coefficients [ICCs] > 0.80) for PPT measurements in healthy individuals and patient populations with chronic pain (21). Assessments were conducted with the subject seated in a relaxed position on a chair lacking foot support, with both arms resting on the thighs (22). Four specific assessment sites were identified and marked: Site 1: Positioned in the middle of the dominant quadriceps muscle, 10 cm proximal to the base of the patella, Site 2: Located 3 cm medial to the midpoint of the medial edge of the patella, Site 3: Positioned 3 cm lateral to the midpoint of the lateral edge of the patella and Site 4: Located in the midpoint of the biceps brachii muscle. For each site, three PPTs assessments were conducted. Measurements were taken both before and after exercise, with the results recorded in kgPa.

Timed Up and Go Test

The Timed Up and Go (TUG) test is a reliable and valid tool for assessing functional mobility, balance, and fall risk in individuals with knee OA. The test measures the time taken for a participant to stand up from a chair, walk 3 meters, turn, walk back, and sit down. Longer completion times in knee OA patients are associated with reduced gait speed, quadriceps weakness, joint pain, and impaired dynamic balance, reflecting disease progression and mobility limitations. (23)

Static Low-Angle Squat Exercise

During the study, all individuals were instructed to perform isometric squat exercises for a duration of three minutes. Before initiating the exercise, all participants performed a standardized 10-minute warm-up using a bicycle ergometer at a self-selected moderate intensity. They were instructed to stand upright with their back against a wall, feet parallel and shoulder-width apart, and hands by their sides. Using a goniometer aligned with the lateral epicondyle of the right femur, they were directed to lower their backs down the wall until achieving a knee joint angle of 40° flexion for low-angle squatting (Figure 1) (24). Participants were then asked to maintain this posture for up to three minutes or until they experienced fatigue. Before initiating the exercise, each participant rated the intensity of leg pain on a visual analogue scale ranging from 0 to 100, where 0 indicated "no pain" and 100 represented "worst imaginable pain". Pressure pain thresholds (PPTs) were assessed both before and immediately after the three-minute wall squat exercises, with careful monitoring of the pain response throughout the procedure (22).



Figure 1. Isometric Low-Angle Squat Exercise Exercises

Statistical Analysis

All statistical analyses were performed with SPSS statistical software version 22 (IBM Corp., Armonk, NY, USA). Conformity of the data to normal distribution was analysed using the Shapiro-Wilk test in conjunction with visual inspection of histograms and box plots. Descriptive analyses were presented using median and interquartile range (IQR) for non-normality distributed and ordinal variables. The Wilcoxon and Friedman test were used to compare the change in pressure pain threshold, TUG scores and pain intensities. The effect size value used for the Wilcoxon Test was calculated with the formula $r=z/\sqrt{n}$. If the effect size is <0.3, it is interpreted as a weak effect, between 0.3-0.5 as a medium effect, and >0.5 as a large effect. The level of statistical significance was set at 0.05. The sample size was determined using Naugle's study datas (25). The calculation based on a difference in means (pre- to post-exercise) and, sample size determination indicated that 32 participants were required (effect size = 0.6 with 95% power and type I error rate of 5%).

Ethical approval and institutional permission

The study protocol was approved by the Süleyman Demirel University, Clinical Research Ethics Committee on May 24, 2022 (Approval Number: 152).

RESULTS

Thirty-two patients with knee OA (mean age = 57.93 ± 9.73 years, range = 53-62 years, average body mass index [BMI] = 29.1 ± 3.8 kg/m2, range = 19.4-34.7 kg/m2, 22 females) were included. According to K-L grading system, the number of Grade-2 patients were 10 (45.4%), the number of Grade-3 patients were 6 (27.7%). the number of Grade-4 patients were 6 (27.7%). 50% of these patients had bilateral knee OA. The clinical characteristics of all subjects are shown in Table 1.

Table 1. Participant characteristics	
Parameters	Median (IQR)
Age (years)	59 (53-62)
Sex (%n)	
Female	10 (31.3)
Male	22 (68.8)
Bilateral knee OA (%n)	16 (50)
Unilateral knee OA (%n)	16 (50)
BMI	29 (26-35)
Education (years)	4 (4-8)
Duration of disease (months)	9(6-22)
Radiological grade (%n)	
Grade II	10 (45.4)
Grade III	6 (27.7)
Grade IV	6 (27.7)
Lequesne Index	11 (8-15)
Visual Analogue Scale -Rest	10 (0 -25)
Visual Analogue Scale -Activity	60 (42.5-80)

IQR, Interquartile Range; OA, Osteoarthritis; BMI, Body Mass Index

Pain at rest (VAS1; median [min-max]; 17.5[0-60]) level increased during squat (VAS2; (median [min-max]; 55[0-100]) and decreased after squat exercise (VAS3; median[min-max]; 0[0-50]) in individuals who performed single session SLAS squat exercise (p<0.001) (Figure 2). And also, all patients were able to complete the wall squat exercise in our study. No significant differences in PPT assessments were found between men and women (p>0.05) (Table 2).



Figure 2. Pain Intensity Scores Before, During and After Static Low Angle Squat Exercise (VAS1; pain intensity before the SLAS exercise; VAS2; pain intensity during the SLAS exercise; VAS3; pain intensity after the SLAS exercise)

Table 2. Comparisons of PPTS Assessments of Women and Men					
	Men	Women	p value		
	Median (IQR)	Median (IQR)			
PPT1-Before	14 (14-22)	14 (12.30-15)	0.328		
PPT1-After	15(12-22)	13(9-15)	0.215		
PPT2-Before	18.50(18-22)	16.75(14.50-18)	0.144		
PPT2-After	18(11-22)	15(11-18)	0.346		
PPT3-Before	15(14-17)	14(13-17)	0.470		
PPT3-After	14.50(12-18)	18(12-18)	0.407		
PPT4-Before	12.50(10-13)	11.50(9.50-15)	0.885		
PPT4-After	11.75(10-15)	15.50(9.50-17)	0.141		

PPT; Pressure Pain Thresholds, PPT1, in the middle of the dominant quadriceps muscle, 10 cm proximal to the base of patella; PPT2, 3 cm medial to the midpoint of the medial edge of the patella; PPT3, 3 cm lateral to the midpoint of the lateral edge of the patella; PPT4, midpoint of the biceps muscle IQR; Inter Quartile Range

The mean PPT values in the middle of the dominant quadriceps muscle 10 cm proximal to the base of patella and 3 cm medial to the midpoint of the medial edge of the patella were higher after one session of SLAS exercise (p<0.05). The mean PPT values in the 3 cm lateral to the midpoint of the lateral edge of the patella and midpoint of the biceps muscle were noted relatively stable (Table 3).

In this study, the effect sizes for PPT1 (d=0.46) and PPT2 (d=0.44) suggest moderate improvements in pressure pain thresholds following a single session of SLAS exercise, indicating a potential reduction in pain sensitivity around the knee. The larger effect size for the TUG test (d=0.73) reflects a more substantial improvement in functional mobility, which may have meaningful implications for individuals with knee osteoarthritis, as enhanced mobility and reduced pain sensitivity could contribute to better overall function.

Table 3. Pressure Pain Thresholds Before and After Single Session Static Low-Angle Squat Exercise							
_	Bet	fore	Af	ter	_		
PPT Site	Mean ± SD	Inter Quartile	Mean ± SD	Inter Quartile	Effect size		
(kgPA)		Range		Range		p value	
PPT1	14.53±4.11	12.30-15	13.00 ± 4.88	10-15	0.46	0.04*	
PPT2	16.25±3.89	14.75-18.50	14.78 ± 4.45	11-18	0.44	0.04*	
РРТ3	14.28±4.24	13-17	15.25±4.32	12-18	0.35	0.08	
PPT4	12.05±3.87	10-15	13.31±3.78	10-17	0.37	0.24	
TUG (second)	10.91±1.91	6.59-13.45	19.09±1.77	5.89-12.60	0.73	0.001*	

PPT; Pressure Pain Thresholds; TUG; Time Up and Go Test; PPT1, in the middle of the dominant quadriceps muscle, 10 cm proximal to the base of patella; PPT2, 3 cm medial to the midpoint of the medial edge of the patella; PPT3, 3 cm lateral to the midpoint of the lateral edge of the patella; PPT4, midpoint of the biceps muscle; *Significantly differences in between exercise session(p<0.05), *Wilcoxon Test;

DISCUSSION AND CONCLUSION

In the present study, we investigate the effect of the SLAS exercise on EIH in patients with knee OA. Our study noted that the three-minute low angle wall squat exercise significantly increased PPTs of exercising muscles. While pain intensity of patients as increased during the SLAS, it was decreased after isometric the squat exercise. Thus, SLAS exercise evoked hypoalgesia in patients with knee OA. These results provide evidence of EIH in individuals with knee OA following isometric exercise highlighting the immediate analgesic effect of SLAS exercise.

In our study, it was observed that the EIH mechanism reduced pain and increased functional mobility in individuals with knee OA. Similarly, previous studies have reported that exercise contributes to pain modulation by enhancing the EIH response (25,26). Improvements in TUG time occurred following the activation of the EIH mechanism, and this finding is also supported by Goldoni et al. (27) The SLAS exercise is effective in pain management and improving functional capacity, and it may reduce fear of movement by enhancing joint stability. Lower extremity strengthening exercises have previously been shown to reduce pain and promote functional gains (28). Our study showed that increases in PPTs in exercising muscles immediately after a short-duration isometric exercise, which is in agreement with previous research conducted with healthy adults (29), patients with chronic whiplash (30). The results suggest that hypoalgesia following isometric exercise is associated with the activation of systemic pain inhibitory mechanisms (31,32). Additionally, our study found no significant relation between males and females in pressure pain threshold values. These findings are consistent with those of Hooger et al(33), reported similar observations of no sexbased differences in pressure pain sensitivity following submaximal isometric handgrips performed at 25% of maximum voluntary isometric contraction. Systemic hypoalgesic effect observed after various exercise modalities may be associated with conditioned pain modulation and influenced by the pain experience during exercise. Several researchers have noted a reduction in pain following a single session of exercise among healthy young adults. Different types of exercises, such as aerobic, resistance, and isometric exercises, have been investigated for their pain-relieving effects. In healthy individuals, aerobic exercise has shown small to moderate hypoalgesic effects, with effect sizes ranging from Cohen's d = -0.41 to -0.59. Isometric exercise and dynamic resistance exercise have demonstrated moderate to large hypoalgesic effects, with effect sizes ranging from d = -0.72 to -1.02 and d = -0.75 to -0.83, respectively (11,29).

The efficacy of exercise in individuals with chronic pain varies widely across different exercise modes, with effect sizes ranging from hypoalgesia to hyperalgesia (d = -0.43 to 1.92)(14). In our study involving patients with knee osteoarthritis (OA), the hypoalgesic effects of SLAS exercise were moderate (Cohen's d - 0.35 to -0.46). In other study, 14 healthy women completed two sets of submaximal isometric handgrip exercises (40-50% maximum voluntary isometric contraction), leading to elevated pressure pain thresholds (PPTs) and reduced self-perceived pain ratings in both hands (34). Similarly, Burrows et al. (15) investigated the analgesic effects of resistance exercise in individuals with knee OA, finding increased pain thresholds at various body sites, including the knee.

Our study demonstrated increased lower body PPTs following a single bout of squat exercise, while upper body PPTs remained unchanged. The pain evoked during isometric squat exercises may trigger a descending pain inhibitory response, contributing to EIH (35). This mechanism, observed in healthy subjects, could explain the EIH response observed in our study. We found similar peak pain intensities during the low angle squat exercise at baseline and follow-up, suggesting that "pain inhibits pain" was one of the mechanisms affecting EIH. We can say these results suggest that SLAS exercise resulted in an immediate decrease in pain sensitivity, aligning with prior research demonstrating a systemic analgesic effect through isometric contractions (18,36). Similarly, Vaetger et al. (22) found that a three-minute wall squat exercise increased PPTs in both exercising and non-exercising muscles compared to quiet rest, with larger and more frequent EIH observed in the exercising muscle. Isometric contractions have also been shown to provide greater immediate analgesia than isotonic contractions in patients with patellar tendon pain. Participants experienced a significant reduction in pain during single-leg decline squats, isometric contractions reduced pain during single-leg decline squats, from 7.0 to 0.17 on an 11-point scale (37).

In our study, we did not observe a significant difference in PPT3 and PPT4 measurements before and after the exercise. Several factors may explain this finding. First, the sensitivity of these specific measurements and their ability to detect changes in pressure pain thresholds in certain muscle groups may be limited. Second, the duration and intensity of the intervention might not have been sufficient to induce significant changes in these particular parameters. Additionally, individual variability in pain perception and possible learning effects could have influenced the results. In our study, while pain-VAS scores increased during the isometric squat exercises (from 17.5 to 11.93 on a 100 mm line), it decreased after a single bout SLAS exercise. And also, patients with knee OA displayed less pain and better physical performance after low angle isometric squat exercises in the current study. We think that patient's physical performance is better due to their low perception of pain. Low-angle isometric exercise presents a safe alternative that enhances knee stability, fortifies the medial femoral quadriceps muscle, and expands joint space without the risk of exacerbating existing damage.

EIH reduces pain, enhances freedom of movement, and improves functional performance. In our study, we observed that the EIH mechanism first reduced pain, followed by an improvement in TUG performance. Similarly, Rice et al. (11) reported that exercise suppresses pain, enhances mobility, and positively impacts TUG time. Additionally, Moezy et al. (38) demonstrated that in individuals with knee osteoarthritis, pain reduction following exercise was associated with shorter TUG times. Our findings indicate that pain reduction enhances functional mobility and that exercise provides both analgesic and physical performance benefits

Quadriceps strength is a crucial intrinsic factor influencing knee joint function and disability. Squats, commonly employed in strength and conditioning regimens, play a pivotal role in enhancing quadriceps strength. In knee OA rehabilitation, the emphasis typically lies on symptom management, particularly pain, and improving physical performance. The SLAS exercise presents a novel rehabilitation approach that stimulates EIH. This study indicates the first investigation into the effects of SLAS exercises on both pain modulation and physical performance. However, some limitations should be acknowledged. Firstly, we couldn't include pain-free controls. Secondly, in our study pain scores and PPT values were measured immediately following exercise, and we were unable to assess follow-up measures in our study. Additionally, the lack of a control group makes it difficult to attribute observed changes solely to the exercise

intervention.Future research should include longer follow-up periods and control groups to validate our findings. Investigating the duration of the analgesic response through repeated measures over time could provide valuable insights into optimizing exercise interventions for pain management in knee osteoarthritis.

This study provides strong evidence that a single bout of SLAS exercise induces EIH, reduces pain, and enhances physical performance. The observed analgesic effects may be attributed to mechanisms such as opioid system activation and conditioned pain modulation. Our findings strongly support the potential of SLAS exercise as an effective rehabilitation strategy for pain management in individuals with knee osteoarthritis. Future studies with longer follow-up periods and controlled designs are necessary to further validate these findings and explore the long-term effects of SLAS exercise. This study highlights the clinical relevance of SLAS exercise, positioning it as a promising, evidence-based intervention for alleviating pain and improving functional outcomes in patients with knee OA.

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Investigation on the Effect of Virtual Reality Training on Reaction Time in Football Goalkeepers

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Abstract

This study aims to investigate the effects of virtual reality (VR) training on the reaction times of football goalkeepers. A total of 12 male goalkeepers, who were officially licensed by the Turkish Football Federation (TFF), participated in the research. Among the 12 goalkeepers, 6 were assigned to the control group and 6 to the performance group. The performance group underwent a total of 12 training sessions over 6 weeks, training 2 days a week, using the Rezzil Player® virtual reality application. The control group continued with their regular team training sessions. Before and after the training period, a Go/No-Go test was conducted as a pre-test and post-test. According to the analysis results, a statistically significant difference was found in the reaction times of the application group (p<0.05). No significant change was detected in the reaction times of the control group (p>0.05). When comparing the performance group to the control group, a statistically significant positive difference in reaction times was observed in favor of the performance group (p<0.05). This study indicates that VR technology can be an effective method in reaction training for football goalkeepers. VR can be utilized as a beneficial tool for enhancing athletes' skills.

Keywords: Football, Virtual Reality, Training, Football Goalkeepers, Reaction.

Özet

Futbol Kalecilerinde Sanal Gerçeklik Antrenmanının Reaksiyon Süresine Etkisinin İncelenmesi

Bu çalışmanın amacı, sanal gerçeklik (SG) antrenmanlarının futbol kalecilerinin reaksiyon süreleri üzerindeki etkisini incelemektir. Araştırmaya, Türkiye Futbol Federasyonu (TFF) tarafından resmi lisans verilmiş 12 erkek futbol kalecisi katılmıştır. Araştırmamıza katılan 12 futbol kalecisi 6'sı kontrol grubu, 6'sı performans grubu olarak belirlenmiştir. Performans grubu 6 hafta boyunca haftada 2 gün olmak üzere Rezzil Player® sanal gerçeklik uygulaması ile toplamda 12 birim antrenman gerçekleştirmiştir. Kontrol grubu ise kendi takım antrenmanlarına devam etmiştir.

Araştırmanın başında ve sonunda ön-test ve son test olarak Go/No-Go testi uygulanmıştır. Analiz sonuçlarına göre, uygulama grubunun reaksiyon sürelerinde istatistiksel olarak anlamlı farklılık tespit edilmiştir (p<0.05). Kontrol grubunun reaksiyon sürelerinde anlamlı bir değişiklik saptanmamıştır (p>0.05). Analiz sonuçlarına göre performans grubu kontrol grubuyla karşılaştırıldığında reaksiyon sürelerinde istatistiksel olarak pozitif yönde anlamlı farklılık tespit edilmiştir (p<0.05). Bu çalışma, futbol kalecilerine yönelik reaksiyon antrenmanlarında SG teknolojisinin etkili bir yöntem olabileceğini göstermektedir. SG, sporcuların becerilerini geliştirmek için faydalı bir araç olarak kullanılabilir.

Anahtar Kelimeler: Futbol, Sanal Gerçeklik, Antrenman, Futbol Kalecileri, Reaksiyon.

INTRODUCTION

Football is one of the most popular sports globally, captivating millions of fans and athletes alike. During a match, players must rely not only on their physical prowess but also on their cognitive abilities to make rapid decisions and respond effectively to dynamic situations on the field (20). This is especially true for goalkeepers, who are required to make split-second choices during critical moments when the outcome of the game can hinge on their actions. The goalkeeper's position is vital in football, as improvements in their skills can have a profound impact on the overall performance of the team (14,22).

In recent years, advancements in sports science and training technologies have opened new avenues to enhance athlete performance. Within this context, virtual reality (VR) technology emerges as a groundbreaking tool that offers significant advantages for athletes during their training processes (10). By leveraging VR applications, athletes can develop their cognitive and motor skills through simulated training environments that closely replicate real-match conditions, allowing them to experience the pressures and nuances of gameplay in a controlled setting (4,7,22). Moreover, one of the remarkable features of virtual reality is its accessibility; athletes can utilize this technology without the necessity of an actual football field. This means they can engage in focused training, refining their skills in a safe environment where they feel secure and free from the physical wear and tear of traditional training. This flexibility not only enhances their training effectiveness but also encourages consistent practice, ultimately leading to improved performance on the field(5,22).

Virtual reality technology provides a unique platform for creating highly specialized training scenarios that cater specifically to the goalkeeper position in football (2,8). These meticulously designed scenarios enable goalkeepers to engage in simulations that target essential skills such as rapid response, strategic decisionmaking, precise positioning, and the execution of saves (2,16). One of the most significant advantages of VR applications is their ability to construct controlled environments that closely mimic the dynamics of real match conditions. This realism allows goalkeepers to pre-simulate a wide variety of challenging game situations they are likely to encounter, assisting them in acclimating to the pressures of live gameplay (8,17). By immersing themselves in these virtual scenarios, goalkeepers can substantially enhance their reaction times and fine-tune their decision-making skills, which are critical for delivering optimal performance during crucial match moments. For instance, within the VR environment, goalkeepers can practice against a range of shots from opposing players, coming from various angles and at different velocities (9). This practice not only improves their reflexes but also allows them to learn to anticipate the trajectory of the ball based on the attackers' movements, thereby improving their overall saving success rates. Additionally, the versatility of VR training extends to incorporating diverse elements that mirror real-life match situations. Goalkeepers can experience different weather conditions, such as rain or snow, and variations in field characteristics, such as turf or gravel, as well as simulate the unpredictable behaviors of various player types. By exposing themselves to these multifaceted scenarios, goalkeepers are better equipped to adapt and respond effectively to an array of challenges they may face during actual games (5, 7, 9, 18). This comprehensive and immersive training approach not only enhances their skill set but also instills a greater sense of confidence and preparedness, enabling them to perform at their best when it matters most.

Virtual reality technology offers not only a dynamic training environment for football goalkeepers but also serves as a valuable tool for accurately measuring their reaction times and monitoring their development over time (6,24). The comprehensive performance data generated during training sessions provides crucial insights that goalkeepers can analyze to gain a better understanding of their strengths and areas for improvement. This ability to track their progress enables athletes to make informed adjustments to their training approaches. Additionally, this wealth of information can significantly aid coaches in designing more targeted and effective training programs tailored to the specific needs of each goalkeeper (5,10, 12, 19). ultimately enhancing overall team performance. By leveraging these advanced metrics, both players and coaches can work collaboratively to optimize skill acquisition and performance outcomes.

The purpose of the study was to assess the effectiveness of VR applications in simulating real match conditions, grounded in theoretical foundations. This approach addresses the gap in existing literature regarding the impact of virtual reality on the development of cognitive and motor skills. Ultimately, the findings suggest that goalkeepers who engage in VR training can make quicker and more accurate decisions during critical moments of a game, providing significant advantages to their teams.

METHOD

The present study utilized experimental research models commonly employed in the field of sports science, employing a pretest-posttest control group design. The experimental design is a research domain in which data is generated to elucidate the causal relationships between variables under the researcher's control (13).

Data Collection Tools

In the present study, Reaction Wall and Rezzil Goalkeeper applications within the Rezzil Player® software, developed by Rezzil, were used as data collection instruments to measure the pre-test and post-test values. The Rezzil Player® application is a virtual reality platform that provides users the opportunity to work with virtual reality-specific three-dimensional glasses. This application offers users an effective means to train and develop the skills specific to football goalkeepers in any environment (football pitch, home, performance laboratories, etc.).

Population and Sample of the Research

The study included 12 licensed male goalkeepers (mean age: 21.87 ± 1.15 years; height: 191.08 ± 10.99 cm; weight: 80.28 ± 11.50 kg) actively competing in Turkish Football Federation leagues, divided equally into control and performance groups. This sample size aligns with precedent VR-training studies in elite athletes, demonstrating significant effects with similar participant numbers, n=10 (19). All participants had ≥ 5 years of professional experience (consistent with talent development thresholds for goalkeepers (16). Exclusion criteria covered visual/neurological impairments, following standard protocols for motor learning studies (20). The Declaration of Helsinki guidelines obtained ethical approval (Protocol: 20.478.486/2581) and written informed consent. In line with their annual training and competition programs, all the football goalkeepers in the performance group trained with the Rezzil virtual reality application for 2 days a week for 6 weeks in the fitness center, before their regular team training. In the main training phase, which will take place with virtual reality:

1. Week: Rezzil Reaction Wall (Level 1)

2.ve 3. Weeks: Rezzil Reaction Wall (Level 2-3)

4.ve 5. Weeks: Rezzil G.K Drills

6. Week: Rezzil Reaction Wall and Rezzil G.K Drills

The training was conducted using the applications. At the beginning of the training, there was a 10minute dynamic warm-up, a 30-minute main phase of the training carried out with virtual reality technology, with 1:1 rest given between sets, and a total of 1:3 rest time given during the exercise transition phases. In the last 5 minutes of the training, static stretching exercises were performed for recovery. All applications lasted a total of 45 minutes. Conversely, the control group continued their team training in line with their annual training and competition programs for 6 weeks.

Performance Measurement Test

In the study, the Go/No-Go test was performed to measure the participants' reaction times. This test aims to measure the participants' ability to quickly and accurately respond to visual stimuli. After the practice trials, the participants performed 50 test trials. Each trial involves the display of "Go" or "No-Go" stimuli on the screen, with the duration randomly varying between 500-2000 milliseconds. Participants were instructed to press a key as quickly as possible when they saw the "Go" stimulus and to refrain from responding when they saw the "No-Go" stimulus. During the test trials, the participants' reaction times and accuracy rates were recorded in real-time (15).

Data Analysis

In the statistical analysis of the data from our study, the SPSS 25.0 software package was used. The normality of the data distribution was checked using the Shapiro-Wilks test. The within-group pretest-posttest differences were analyzed using the dependent samples t-test. The between-group differences were analyzed using the independent samples t-test. The significance level was set at p<0.05.

Ethical approval and institutional permission

To examine the scientific and ethical suitability of the research, an application was made to Manisa Celal Bayar University, Faculty of Medicine, Health Sciences Ethics Committee and an ethics committee permit was obtained (Document number: 20.478.486 / 2581).

RESULTS

Demographic information of participants: mean age, height, and weight of control and performance groups. The information related to this is provided below.

The control group has a mean age of 22,91±0,92 years, a mean height of 191,50±10,99 cm, and a mean weight of 80,28±11,50 kg. The performance group has a mean age of 20,82±0,75 years, a mean height of 190,65±11,34 cm, and a mean weight of 80,28±11,50 kg.

Table 1. Pre-test and post-test values Go/No-Go of the performance and control groups							
Groups	Tests	Ν	Mean±SD (ms)	t	р		
	Pre-test	6	334,0±90,1				
Control	Post-test	6	364,0±88,1	0,194	0,239		
	Pre-test	6	372,2±84,4				
Performance	Post-test	6	263,6±87,8	3,434	0,003*		
*p<0.05							

When Table 1 is examined, no statistically significant difference was detected in the control group's Go/No-Go pre-test and post-test mean scores (p>0.05). However, a statistically significant difference was detected in the performance group's Go/No-Go pre-test and post-test scores (p<0.05).

Table 2. Comparison of Go/No-Go test results between the performance and the control groups						
Groups	Tests	Ν	Mean±SD (ms)	t	df	р
Denteman	Pre-test 6 381,2,0±84,4 2.424	2 424				
Performance	Post-test	6	259,2,0±74,4	3,434	10	0,015*
Control	Pre-test	6	364,0±90,1	_		
	Post-test	6	374,0±87,1	0,231	10	0,826
*p<0.05						

When Table 2 is examined, the results of the pre-tests show that there was no statistically significant difference in the Go/No-Go score averages between the performance and control groups (p>0.05). However, following the post-tests, a statistically significant difference was observed in the performance group's Go/No-Go scores compared to the control group (p<0.05). Specifically, the reaction time scores of the performance group decreased, indicating improved performance compared to the control group.

DISCUSSION AND CONCLUSION

This study aimed to investigate the effect of virtual reality training on reaction time in football goalkeepers, focusing on how immersive VR experiences can enhance the cognitive and motor skills necessary for goalkeeping. By simulating real match scenarios, the research sought to determine whether virtual reality could provide a competitive edge in improving the decision-making speed and accuracy of goalkeepers during critical moments in a game. Ultimately, the study aimed to contribute valuable insights into the integration of innovative training techniques within sports performance enhancement.

As a result of the study, it was determined that the performance group, which participated in the 6-week training, exhibited a statistically significant improvement in reaction times compared to the control group, according to the statistical tests conducted (19,20). This increase can be attributed to the immersive nature of virtual reality training, which has been shown in previous research to enhance cognitive processing and perceptual skills. By engaging in realistic scenarios that challenge their decision-making abilities, goalkeepers in the performance group were able to develop faster neural responses and improve their overall reaction times. These findings align with existing literature that supports the effectiveness of VR technology in facilitating skill acquisition and performance enhancement in various sports contexts Barbosa et al. (1) in their study, they found that the exercises using virtual reality technology improved the reaction times of child athletes. Goyal et al. (5) in their study specific to the tennis branch, they found significant differences in reaction time and coordination times in the group that trained with VR. This study is parallel to the results of the performance group working with the Rezzil Player® application in our study. Theofilou et al. (20) in their study on young football players, they performed Fitlight, VR and cognitive function training for 6 months contributed to the reaction time of the football players. As a result of this study, they found that virtual reality technology improved the reaction time of young football players. Witte et al. (23) in their study on karate athletes, they found that VR exercises not only improved their motor skills, but also effectively developed their reaction times. Wood et al. (24) in their study, they found significant differences in football-specific technical skills and decision-making skills of football players using the Rezzil virtual reality application. Shimi et al. (19) In their study aimed at improving attention skills in football, the participants were given the goalkeeper task using VR technology and were asked to respond to the perceived skills. As a result of this study, they found that the participants' perception improved, and their attention skills developed. Bideau et al. (3) in their study on handball goalkeepers, they created virtual opponents guided by a kinematic animation model using virtual reality technology to examine their reaction times as in real match performance. As a result of this analysis, they found significant differences in the reaction times of handball goalkeepers. This study is parallel to the results of the performance group working with the Rezzil Player® application in our study. Krupitzer et al. (14) in their study on football players using the CortexVR application, they found significant differences in the reaction times of football players, which affected their cognitive fatigue levels. Tomic et al. (21) In their study on football players, they simulated a real-world football match in the virtual world. In this study, they asked the athletes to react as quickly as possible to the simulated images and take action accordingly. As a result of the examinations, it was determined that there were significant differences in the reaction times of the football players during the simulated football match in virtual reality. This study is paralell to the results of the performance group working with the Rezzil Player® application in our study. When the literature was reviewed, it was determined that the training carried out with virtual reality technology allows the participants to develop their skills by enjoying them more, and these skill acquisitions have increased positively (11).

The studies on the use of virtual reality technology in improving sports performance are not yet sufficient. However, existing studies show that virtual reality applications can provide a more effective training method for transferring skills learned in the real world, due to their comprehensive nature as simulators. Turkish Journal of Sport and Exercise /Türk Spor ve Egzersiz Dergisi 2025 27(1): II2-II7 In conclusion, according to this study, it was concluded that the training carried out with virtual reality technology was effective in reducing the reaction times of football goalkeepers. Based on this, we can say that the opportunities provided by virtual reality technology can be used as an effective training model in reaction training specific to football goalkeepers.

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A Review of Artificial Intelligence Studies in Sports Sciences

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Abstract

This study conducts a bibliometric analysis of artificial intelligence studies in sports sciences from the (WoS) database, emphasize the importance of utilizing AI in sports sciences, provide data for future research, highlight the need for the application of AI across all areas of sports in line with global trends, and most importantly, offer a perspective on the use of AI in sports sciences in our country. Initially, 164 research articles were accessed from the WoS database, and the VOSviewer software package was used for data analysis. It was observed that the first publication related to artificial intelligence in sports sciences was published in 1995, with a significant increase in 2019, and the number of publications has shown an upward trend from 2023 to the present. The low number of publications in 2024 is due to only considering studies published up to July 2024. The most cited article, with 107 citations, is "Motor Unit Control and Force Fluctuation During Fatigue," while the author with the most publications, with six papers, is "Kunze, Kyle N." The most cited authors are "De Luca and Carlo J." with 171 citations. The journal with the most citations, (226), is "Knee Surgery, Sports Traumatology, Arthroscopy," and the institution with the most publications (8), is "Hosp Special Surg," while the institution with the most citations, (171), is "Boston Univ." The country with the most publications (23) and citations (613), is the USA. In the institutional collaboration network, among 11 institutions the highest collaboration was observed between the 8 institutions marked in red, while 3 institutions marked in green had fewer collaborations. In the co-keyword network, 12 keywords were identified, with the densest clusters being red (machine learning) and yellow (artificial intelligence). In the authors' co-citation network, 12 authors were identified, with the most cited cluster containing 7 authors in red, while the green clusters, consisting of 5 authors, had fewer citations. In conclusion, there has been a significant increase in publications related to the use of artificial intelligence in sports sciences in recent years, indicating a growing interest in the subject.

Keywords: Bibliometric Analysis, Sports Sciences, Artificial Intelligence.

Spor Bilimlerinde Yapay Zekâ Çalışmalarına Genel Bir Bakış

Özet

Bu çalışmada Web of Science (Wos) veri tabanından spor bilimlerinde yapay zekâ çalışmalarının bibliyometrik analizlerinin incelemek, spor bilimlerinde yapay zeka kullanılmasının önemine vurgu yapmak, yapılacak çalışmalara veri sağlamak, küresel ölçekte trend olan yapay zekâ kullanımının sporun her alanına indirgemesi gerektiğini belirtmek ve en önemlisi ülkemizde spor bilimlerinde yapay zekâ kullanımına yönelik bir bakış açısı ortaya koymak amaçlanmıştır. İlk olarak Wos veri tabanından 164 araştırma makalesine ulaşılmış, verilerin analizinde VOSviewer

paket program kullanılmıştır. Yapılan analizler sonucunda, spor bilimlerinde yapay zekâ ile ilgili ilk yayının 1995 yılında yayımlandığı, 2019 yılında ise çok önemli bir artış olduğu, 2023 yılından günümüze kadar ise yayınların artış eğiliminde olduğu görülmüştür. 2024 yılındaki yayın sayısının az olması, 2024 Temmuz ayına kadar yayınlanan araştırmalar baz alınmasından kaynaklanmaktadır. 107 atıfla en fazla atıf alan makale "Motor Unit Control and Force Fluctuation During Fatigue", 6 yayınla en fazla yayın yapan yazar "Kunze, Kyle N.", 171 atıfla en fazla atıf alan yazarlar "De Luca ve Carlo J." olmuştur. 226 atıfla en fazla atıf alan dergi "Knee Surgery, Sports Traumatology, Arthroscopy", 8 yayınla en fazla yayın yapan kurum "Hosp Special Surg", 171 atıfla en fazla atıf alan kurum "Boston Univ" olmuş, 23 yayın ve 613 atıfla en fazla yayın yapan ve atıf alan ülke ABD olmuştur. Kurumlar arası iş birliği ağında 11 kurum arasında en fazla iş birliği kırmızı renkteki 8 kurum, daha az iş birliğine sahip kurumlar ise yeşil renkteki 3 kurum olduğu görülmüştür. Ortak anahtar kelime ağında 12 anahtar kelimeye ulaşılmış, en fazla yoğunluk kırmızı (Machine learning) ve sarı (Artificial intelligence) renkteki anahtar kümeler olduğu görülmüştür. Yazarların ortak atıf alma ağında toplam 12 yazara ulaşılmış, en fazla atıf alma ağı 7 yazarla kırmızı kümeler, 5 ortak atıf alma ağıyla yeşil renkteki kümeler ise daha az atıf alan kümeler olmuştur. Sonuç olarak son dönemlerde spor bilimlerinde yapay zekâ kullanımına yönelik oldukça fazla yayın yapıldığı ve konuya ilginin arttığı görülmüştür.

Anahtar Kelimeler: Bibliyometrik Analiz, Spor Bilimleri, Yapay Zekâ.

INTRODUCTION

In our changing and developing world, technological advances, social media platforms, and artificial intelligence development have brought about large-scale changes and transformations in education and sports. Artificial intelligence, which has developed a lot since its first appearance, has become very popular today and has started to be used in the private and public sectors. Artificial intelligence technologies, with their positive and negative effects, have paved the way for revising all systems operating with traditional methods. Artificial intelligence platforms, which provide services according to individual or corporate needs, have brought a different perspective to the ways and methods of learning. The active use of artificial intelligence in contemporary sports sciences and their operations has introduced an entirely new paradigm (10).

As can be seen, technological developments and the use of artificial intelligence in sports and their functioning have brought about many changes. Recently, especially in athlete performance measurements, smart stadiums, sports facilities integrated with the best technology, wearable technologies, and smart sports equipment have brought quality service in sports and their functioning. In this regard, they make it possible to obtain the best results in improving athlete performance. With artificial intelligence technologies, energy savings in sports facilities have reached the best level (32).

Nowadays, when technological developments have reached a very advanced level, new applications, technological products, and services in sports and their functioning have gained a different dimension, thanks to social media platforms, digital systems, and artificial intelligence technologies. Artificial intelligence technologies have provided significant gains for athletes in areas such as the type of training, performance development, strength gain and physical development, and psychological and mental strengthening. From the audience's perspective; it can be seen that technology and artificial intelligence technologies have brought about a great change and transformation in terms of offering a high-quality service for an enjoyable viewing experience, decision-making and fair evaluation, and making future sports predictions and analysis (23).

Artificial intelligence has also become highly functional through recently developed mobile applications aimed at treating athletes' injuries and enhancing their performance. In addition to offering programs that include preventive measures against potential injuries and risks in athletes, artificial intelligence also entails concerns regarding the protection of athletes' data (22).

As can be seen, athletic injuries result in financial, health-related, and psychological losses. Through analyses and evaluations conducted with the help of specific algorithmic programs, artificial intelligence technology minimizes these risks. Particularly in sports medicine, artificial intelligence – widely employed across various domains – significantly contributes through wearable technologies and sensor-equipped equipment by

maximizing sensory perception, minimizing anxiety and fear, and optimizing motivation and performance. Today, sports medicine greatly benefits from artificial intelligence technologies in these respects (24).

As observed in existing studies, artificial intelligence is widely used not only in mobile applications and sports medicine but also in athlete nutrition. Especially in recent times, with the increasing use of artificial intelligence, it is believed that AI can have a significant impact on analyzing the most appropriate nutritional programs for athletes aiming to improve performance, muscle mass, speed, explosive strength, endurance, and physical transformation. By analyzing athletes' genetic structures, physiological measurements, and performance data, artificial intelligence technologies can now calculate with high accuracy how, to what extent, and at what intervals nutritional values should be consumed to achieve maximum efficiency in the shortest possible time. Alongside all these positive developments, concerns also arise regarding the continuation of artificial intelligence development within systems that may violate data privacy and ethical principles (13).

By looking at the historical process of artificial intelligence technology and its understanding, artificial intelligence, which was first discussed by John McCarthy at the Dortmund conference in 1956, has undergone great changes and developments until today. Artificial intelligence, in terms of its operation, is continuously advancing in several areas. These include very early learning, making intelligent predictions, solving extremely difficult and time-consuming problems in a very short period, providing forecasts and predictions related to all kinds of climate, natural, and human events, and offering the most likely possibility by considering the conditions at hand. Additionally, it is capable of adopting different languages and cultural understandings, achieving rapid adaptation, developing programs in the fields of education and training according to the needs of the era, and producing efficient and effective solutions as well as outlining roadmaps. With each passing day, artificial intelligence is further enhancing itself in these areas (2).

As a result, it is predicted that artificial intelligence, which has many benefits in sports and its operations, will be integrated into all functions of sports day by day. In this study, it was aimed to examine the bibliometric analysis of research articles on the use of artificial intelligence in sports sciences, which is the subject of many academic studies, and it aimed to emphasize the importance and future of the use of artificial intelligence in sports sciences.

METHOD

Research Design

In this study, 164 studies related to artificial intelligence in sports sciences in the Web Of Science (WoS) database were examined using the bibliometric analysis method. Bibliometric analysis is the description of the findings obtained as a result of analyzing academic studies conducted in certain fields by making some field narrowing (3). Bibliometric studies were first started in 1917 by Cole and Eales. The examination of bibliometric studies in Türkiye shows that the first study was in the 1970s (14). When looking at bibliometric analysis from another perspective, it is seen that it examines the distribution of certain field-specific studies by years, the relationships in areas such as author, institution, journal, reference, common word network, common author network, and common citation, and reveals the conceptual, social and intellectual structure of the research (6). Bibliometric analysis is a very popular and effective research method that is frequently used in academic studies and aims to obtain and interpret quantitative and qualitative data from studies in two ways, one of which is the equivalent and the impact of the studies in the academic world, and the other is the comparative mapping of the studies (8).

Data Collection

In the first stage of creating the data, some criteria were determined for the classification of the study. These criteria were keywords, period, document type, and research field. As the first criterion, the keyword, "sports sciences and artificial intelligence" was written. As the second criterion, only articles were selected for the document type. As the third criterion, while the starting year for the period is not determined, July 2, 2024, is determined as the ending date. As the fourth criterion, sports research areas were selected in the research category. Finally, the scanning was started by typing the keywords "sports sciences and artificial intelligence"

into the WoS database and selecting the "topic" research area. As a result of this process, 164 studies were reached. These studies were then downloaded to the computer in "Plain text file" format and the findings of the study were obtained.

Data Analysis

The databases that bibliometric method researchers mostly prefer in their studies are "Scopus", "Google Scholar" and "Web of Science" (17). The data in the VOSviewer database can be classified and visualized using the bibliometric analysis method. In this way, relationships between data can be examined more easily. In our study, the data of the most cited articles, authors, journals, institutions, and countries on artificial intelligence in sports sciences were obtained with bibliometric analysis data, and within the scope of citation analysis, the authors, journals, institutions, and countries that published the most articles on artificial intelligence in sports sciences were revealed. As a co-author analysis, the authors who collaborate most in the field of artificial intelligence in sports sciences were examined, and within the scope of keyword analysis, the common keywords used by authors in sports sciences and finally common collaboration networks were revealed.

FINDINGS

In this study, a bibliometric analysis of studies on artificial intelligence in sports sciences was conducted among the journals in the WoS database.

Distribution of Articles Published on Artificial Intelligence by Years

The findings showing the distribution of studies on the use of artificial intelligence in sports sciences in the WoS database by years are shown in Graph 1 as follows.



Graph 1. Distribution of publications by years

When Graph 1 is examined, it is observed that the first publication on artificial intelligence in sports sciences in the WoS indexes was published in 1995, and until 2007, the number of publications was very low and the publication increases were parallel. There were small but parallel increases in 2008 and 2009, and again a small parallel decrease in 2011 and 2012 was observed, these parallel decreases reached the levels of 2007. There was a significant increase in 2013, parallel decreases were observed in 2015 and 2016, a small increase in the number of publications was observed in 2017, and a decrease was observed again in 2018. Gradual but substantial increases were seen from 2019 to 2023, and it was understood that the real peak in the graph was in 2023. Although there were decreases in 2024, it did not decrease more than in 2021.

Most Cited Articles on Artificial Intelligence in Sports Sciences

According to the data obtained from the WoS database, Table 1 shows information about the top 15 most cited articles on artificial intelligence in sports sciences as follows.

Т	able 1. Most cited articles		
	Antiple memory	Total	Citation
	Article name	citations	average
1	"Contessa P, Adam A, De Luca CJ. Motor unit control and force fluctuation during fatigue. Journal	107	6,69
	"Dargan I Chamari K Zmiiowski P Sand HB From human writing to artificial		
2	<u>Delgaa 1, Chandari K</u> , Zhijewski 1, <u>Sadu 110</u> . <u>Front human whing to artificial</u>	81	40.5
2	writing Biology of Sport 2023: 40(2): 615-622 "	01	40,5
	"Savalbarg HHCM Do Lango ALH Accessment of the horizontal fore aft component of the		
	ground reaction force from insole pressure patterns by using artificial neural networks. Clinical		
3	Biomochanics 1999: 14(8): 585-592 "	72	2,77
	biomechanics, 1777, 14(0). 505-572.		
	"Nawah SH Wotiz RP. De Luca CL Decomposition of indwelling FMC signals Journal of Applied		
4	Physiology 2008 105(2): 700-710 "	64	376
-	11()01010(9), 2000, 200(2), 700 720	01	0). 0
	"Novatchkov H, Baca A. Artificial intelligence in sports on the example of weight training. Journal		
5	of Sports Science and Medicine, 2013; 12(1): 27-37."	52	4,33
	"Ramkumar PN, Kunze KN, Haeberle HS, Karnuta JM, Luu BC, Nwachukwu BU, Williams RJ.		
6	Clinical and research medical applications of artificial intelligence. Arthroscopy: The Journal of	49	12,25
	Arthroscopic and Related Surgery, 2021; 37(5): 1694-1697."		
_	"Yi PH, Wei J, Kim TK, Sair HI, Hui F, Hager GD, Fritz J, Oni JK. Automated detection &	10	0.0
7	classification of knee arthroplasty using deep learning. The Knee, 2020; 27(2): 535-542."	49	9,8
	"Jo C, Ko S, Shin WC, Han HS, Lee MC, Ko T, Ro DH. Transfusion after total knee arthroplasty		
8	can be predicted using the machine learning algorithm. Knee Surgery, Sports Traumatology,	44	8,8
	Arthroscopy, 2020; 28(6): 1757-1764."		
	"Armand S, Watelain E, Roux E, Mercier M, Lepoutre FX. Linking clinical measurements and		
9	kinematic gait patterns of toe-walking using fuzzy decision trees. Gait & Posture, 2007; 25(3): 475-	44	2,44
	484."		
1	"Bartlett R. Artificial intelligence in sports biomechanics: New dawn or false hope?. Journal of	40	2 11
0	Sports Science and Medicine, 2006; 5(4): 474-479."	40	2,11
	"Karnuta JM, Churchill JL, Haeberle HS, Nwachukwu BU, Taylor SA, Ricchetti ET, Ramkumar		
1	<u>PN.</u> The value of artificial neural networks for predicting length of stay, discharge disposition, and	34	6.8
1	inpatient costs after anatomic and reverse shoulder arthroplasty. Journal of Shoulder and Elbow		-)
	Surgery, 2020; 29(11): 2385-2394."		
	" <u>Pua YH, Kang H</u> , Thumboo J, Clark RA, Chew ESX, Poon CLL, Chong HC, <u>Yeo SJ. Machine</u>		
1	learning methods are comparable to logistic regression techniques in predicting severe walking	33	6,6
2	limitation following total knee arthroplasty. Knee Surgery, Sports Traumatology, Arthroscopy,		
	2020; 28(10): 3207-3216."		
1	<u>Ramkumar PN,</u> Luu BC, Haeberle HS, Karnuta JM, Nwachukwu BU, Williams KJ. <u>Sports</u>	20	
3	medicine and artificial intelligence: A primer. The American Journal of Sports Medicine, 2022;	30	7,5
	30(4). 1100-11/4. "Bongiovanni T. Tragradi A. Covaggioni I. Dassi A. Darri F. Dasta C. Jaia F.M. Alberti C. Jarrarty et		
1	of anthronometric features to predict physical performance in alite youth soccers. A machine	28	56
4	learning approach. Research in Sports Medicine 2021, 20(3), 213-224 "	20	5,0
1	"Riganello F Dolce G Sannita WG Heart rate variability and the central autonomic network in		
5	severe disorder of Consciousness. Journal of Rehabilitation Medicine, 2012: 44(6): 495-501."	26	2

When Table 1 is examined, it is apparent that the most cited article with 107 citations is "Motor unit control and force fluctuation during fatigue" (Contessa P, Adam A, De Luca CJ). In that study, motor unit control and fluctuation during fatigue are mentioned. With an average of 40.5 citations, the study titled "From human writing to artificial intelligence generated text: Examining the prospects and potential threats of ChatGPT in academic writing" (Dergaa I, Chamari K, ... Saad HB) is observed to be the highest-performing

work in terms of average citation performance. In this study, the use of ChatGPT in academic writing is mentioned.

Researchers with the Most Publications and Citations on the Use of Artificial Intelligence in Sports Sciences

According to the results obtained from the WoS database, Table 2 shows the information of the top 15 researchers who published the most and received the most citations among studies on the use of artificial intelligence in sports sciences.

Tab	Table 2. Researchers with the most publications and citations						
	Authors	Number of Publications	Citation Average		Authors	Number of Publications	Number of Citations
1	Kunze, Kyle N.	6	3.659	1	De Luca, Carlo J.	2	171
2	Pareek, Ayoosh	5	3.049	2	Karnuta, Jaret M.	5	139
3	Ramkumar, Prem N.	5	3.049	3	Ramkumar, Prem N.	5	139
4	Nwachukwu, Benedict U.	5	3.049	4	Nwachukwu, Benedict U.	5	133
5	Karnuta, Jaret M.	4	2.439	5	Haeberle, Heather S.	4	123
6	Polce, Evan M.	4	2.439	6	Adam, Alexander	1	107
7	Dergaa, Ismail	4	2.439	7	Contessa, Paola	1	107
8	Klemt, Christian	4	2.439	8	Chamari, Karim	1	81
9	Kwon, Young- Min	4	2.439	9	Dergaa, Ismail	1	81
10	Haeberle, Heather	4	2.439	10	Kunze, Kyle N.	4	81
11	Persson, Andreas	3	1.829	11	Saad, Helmi Ben	1	81
12	Wolfson, Julian	3	1.829	12	Zmijewski, Piotr	1	81
13	Williams Iii, Riley J.	3	1.829	13	Luu, Bryan C.	2	79
14	Visnes, Havard	3	1.829	14	Williams, Riley J.	2	79
15	Solvejg Wastvedt	3	1.829	15	De Lange, Alh	1	72

Upon examining Table 2, it is observed that the most productive researcher in the field of artificial intelligence in sports sciences is "Kunze, Kyle N." with 6 articles and an average of 3,659 citations. With 5 publications and an average of 3,049 citations, "Pareek, Ayoosh" stands out in second place, followed by "Ramkumar, Prem N." in third place, and "Nwachukwu, Benedict U." in fourth place. When we look at the number of publications of other researchers in the table, it is seen that they vary between 4 and 3. When looking at the researchers with the highest number of citations in the field of artificial intelligence in sports sciences, "De Luca, Carlo J." stands out in first place with 171 citations. "Karnuta, Jaret M." is in second place with 139 citations, followed closely by "Ramkumar, Prem N." in third place, also with 139 citations. It is noteworthy that in the number of citations, "Adam, Alexander" and "Contessa, Paola" stand out with 107 citations, even though they have a single article each.

Journals with the Most Publications and Citations on Artificial Intelligence in Sports Sciences

According to the data obtained from the WoS database, information about the 15 journals with the most publications and citations on artificial intelligence in sports sciences is shown in Table 3 as follows.

Table 3.	Table 3. Journals with the most publications and citations						
	Journal name	Number of citations	Number of publications				
1	"Knee Surgery, Sports Traumatology, Arthroscopy"	226	11				
2	"Journal of Applied Physiology"	184	3				
3	"Clinical Biomechanics"	104	3				
4	"Journal of Sports Science and Medicine"	92	2				
5	"Arthroscopy- The Journal of Arthroscopic and Related Surgery"	85	4				
6	"Biology of Sport"	81	1				
7	"Gait & Posture"	58	2				
8	"The American Journal of Sports Medicine"	52	3				
9	"The Knee"	49	1				
10	"Archives of Physical Medicine and Rehabilitation"	43	2				
11	"Journal of Sports Sciences"	37	2				
12	"Journal of Shoulder and Elbow Surgery"	34	1				
13	"European Journal of Sport Science"	29	2				
14	"Research in Sports Medicine"	28	1				
15	"Journal of Rehabilitation Medicine"	26	1				

Upon examining Table 3, the journal with the highest number of publications, with 11 articles, is "Knee Surgery, Sports Traumatology, Arthroscopy." In second place, with 184 citations, is the "Journal of Applied Physiology," and in third place, with 104 citations, is "Clinical Biomechanics." Although "Biology of Sport" has only 1 publication, it stands out with 81 citations. When examining these journals in terms of publication and citation numbers, as well as their aims and scope, it can be said that they are the most productive and influential journals in the field of artificial intelligence in sports sciences.

Institutions with the Most Publications and Citations on Artificial Intelligence in Sports Sciences

According to the results obtained from the WoS database, information about the top 15 institutions with the most publications and citations on artificial intelligence in sports sciences is shown in Table 4 as follows.

Tab	Table 4. Institutions with the most publications and citations						
	Institution name	Number of articles	Number of citations		Institution name	Number of citations	Number of articles
1	Hosp Special Surg	8	171	1	Boston Univ	171	2
2	Cleveland Clin	4	123	2	Hosp Special Surg	171	8
3	Harvard Med Sch	4	70	3	Cleveland Clin	123	4
4	Brigham & Women Hosp	3	95	4	Univ Padua	107	1
5	Maastricht Univ	3	96	5	Maastricht Univ	96	3
6	Univ Wisconsin	3	32	6	Brigham & Women Hosp	95	3
7	Victoria Univ	3	58	7	Jozef Pilsudski Univ Phys Educ Warsaw	81	1
8	Baylor Coll Med	2	79	8	Natl Observ Sport	81	1
9	Boston Univ	2	171	9	Orthopaed & Sports Med Hosp	81	1
10	Rush Univ	2	22	10	Primary Health Care Corp Phcc	81	1
11	Univ Pisa	2	52	11	Univ Sfax	81	1
12	Univ Trento	2	29	12	Univ Sousse	81	1
13	Univ Verona	2	29	13	Baylor Coll Med	79	2
14	Aarhus Univ Hosp	1	21	14	Fontys Univ Profess Educ	72	1
15	Auckland Univ Technol	1	16	15	Univ Utrecht	72	1

Upon examining Table 4, the most productive institution in terms of the number of publications is "Hosp Special Surg," ranked first with 8 articles. In second place is "Cleveland Clin" with 4 publications, followed by "Harvard Med Sch" in third place with 4 publications, and "Brigham & Women Hosp" in fourth place with 3 publications. In terms of citation rankings, "Boston Univ" holds the top spot with 171 citations, followed by "Hosp Special Surg" also with 171 citations, and "Cleveland Clin" in third place with 123 citations. Additionally, it is noteworthy that "Univ Padua" ranks fourth with 107 citations from a single publication.

Countries with the Most Publications and Citations on Artificial Intelligence in Sports Sciences

Considering the results obtained from the WoS database, information about the top 15 countries with the most publications and citations on artificial intelligence in sports sciences is shown in Table 5 as follows.

Tab	Table 5. Countries with the most publications and citations							
	Country Name	Number of articles	Number of citations		Country Name	Number of citations	Number of articles	
1	ABD	23	613	1	ABD	613	23	
2	Italy	6	214	2	Italy	214	6	
3	Australia	5	102	3	Australia	102	5	
4	Austria	4	90	4	Netherlands	96	3	
5	New Zealand	4	79	5	Austria	90	4	
6	Netherlands	3	96	6	Poland	81	1	
7	Brazil	2	27	7	Qatar	81	1	
8	Denmark	2	32	8	Tunisia	81	1	
9	France	2	57	9	New Zealand	79	4	
10	Germany	2	31	10	South Korea	66	2	
11	Singapore	2	47	11	Switzerland	60	2	
12	South Korea	2	66	12	France	57	2	
13	Switzerland	2	60	13	Singapore	47	2	
14	Croatia	1	11	14	Denmark	32	2	
15	Egypt	1	10	15	Germany	31	2	

Looking at the results of the data in Table 5, the United States stands out as the most productive country with 23 publications. When examining the other most productive countries related to artificial intelligence, Italy ranks second with 6 publications, Australia ranks third with 5 publications, and Austria ranks fourth with 4 publications. In terms of citation rankings, the United States is again in first place with 613 citations, followed by Italy in second place with 214 citations, Australia in third place with 102 citations, and the Netherlands in fourth place with 96 citations. Despite having only one publication each, Poland, Qatar, and Tunisia are notable as effective countries in the citation rankings with 81 citations.

Collaboration Analyzes Between Institutions Publishing on Artificial Intelligence in Sports Sciences

When looking at the results obtained from the WoS database, a total of 123 institutions were reached. Based on the criterion of having at least one publication, the two institutions with the strongest collaboration are represented in two different colors, totaling 11 institutions. The inter-institutional collaboration network in the obtained findings is shown in Figure 1 as follows.



Figure 1. Inter-institutional collaboration network

Upon examining the results of Figure 1, it is observed that there are two clusters in different colors. This indicates that there is a stronger collaboration among institutions within the same color. In the interinstitutional collaboration network, a total of 11 institutions were identified, and the most intense collaboration is seen in the red clusters with 8 institutions. The institutions with the strongest collaboration network are observed to be "Natl Tomsk Polytech Univ," "Team Nova," "Trentino Svlippo," "Univ Salzburg," "Univ Fed Rio," "Liverpool John," "Insefm," and "Chu Dijon." On the other hand, the institutions with less collaboration are "Univ Verona," "Univ Trento," and "Auckland Univ," which are represented in green and consist of 3 institutions.

Common Keyword Analyzes of Authors Publishing on Artificial Intelligence in Sports Sciences

Upon examining the results of the WoS data, a total of 177 different author keywords used in the publications have been identified. As a result of using these keywords at least twice as a criterion, 16 different keywords have emerged. Common keyword analysis regarding artificial intelligence in sports sciences is shown in Figure 2 as follows.



Figure 2. Common keyword network

According to the results of Figure 2, an examination of the findings regarding the keywords most frequently used by authors related to artificial intelligence in sports sciences reveals 16 clusters, with the densest clusters being the red (machine learning) and yellow (artificial intelligence) clusters. The keywords in the red clusters that stand out are "Mcid," "Femoroacetabular impingement," "hip arthroscopy," and "anterior cruciate ligament."

Co-Citation Analysis of Authors Publishing on Artificial Intelligence in Sports Sciences

Upon examining the results of the WoS data in the author co-citation analysis, a total of 1,538 cited authors have been identified. When the criterion of receiving more than 5 citations was established, 12 authors emerged. The co-citation networks of these authors are illustrated in Figure 3 as follows.



Figure 3. Authors' co-citation network

When analyzing the findings obtained from the results in Figure 3, networks related to the authors who received co-citations were identified. These networks consist of two clusters with different colors. In this two-colored cluster, a total of 12 authors were found in the co-citation network. The red cluster, with 7 authors, stands out as having the most co-citation connections. This situation is related to their close collaboration with other clusters. The authors in the dense red clusters are observed to be "Helm, J. M," "Collins, G. S," "Esteva, A," "Haberle, H. S," "Karhade, A. V," "Steyerberg, E. W," and "Klemt, C." In the green cluster, there are 5 authors: "Ramkumar, P. N," "Kunze, K. N," and "Nwachukwu, B. U," who are identified as the most cited authors.

DISCUSSION AND CONCLUSION

This study aims to examine the bibliometric analysis of artificial intelligence studies in sports sciences. When examining Graphic 1, it is observed that the first publication related to artificial intelligence in sports sciences indexed in WoS was published in 1995 and that the number of publications was very low until 2007. It has been noted that publication increases have shown parallel trends. There were small but parallel increases in the years 2008 and 2009, followed by slight parallel decreases in 2011 and 2012, bringing the numbers back to the level of 2007. A significant increase occurred in 2013, with parallel decreases observed in 2015 and 2016. In 2017, there was a slight increase in the number of publications, while another decrease was noted in 2018. From 2019 to 2023, there have been gradual but substantial increases, and it is understood that the peak occurred in 2023. Although there were decreases in 2024, they have not fallen below the levels of 2021 (Graphic 1). The recent increase in publication numbers is attributed to the growing interest in artificial intelligence and the prediction that artificial intelligence technologies will be integrated into many areas of life in the upcoming period.

In a study conducted by Şimşek (33) on artificial intelligence; it was reported that nowadays, research on artificial intelligence technologies has increased both in academic circles and in the business world. Similarly, Ceyhan and Çakır (7) stated that there has been an increased interest in the use of artificial intelligence in sports sciences recently, which supports the data of our study.

When examining the data in the first table related to artificial intelligence in sports sciences, it is observed that the studies support the thoughts mentioned above. Looking at the statistical counterpart of academic studies on the use of artificial intelligence in sports sciences in this study, the article with the highest number of citations, with 107 citations, is "Motor unit control and force fluctuation during fatigue" (Contessa P, Adam A, De Luca, CJ). This study discusses motor unit control and fluctuations during fatigue. With an average of 40.5 citations, the study titled "From human writing to artificial intelligence generated text: Examining the prospects and potential threats of ChatGPT in academic writing" (Dergaa I, Chamari K, ... Saad HB) is seen to have the highest average citation performance. This study discusses the use of ChatGPT in academic writing (Table 1).

Considering the content of the data obtained in the studies, it is thought that artificial intelligence will be a part of all social and community life in the future, and many institutions, sports, and operations will be integrated into artificial intelligence systems. In research, it is observed that some sources adopt the view that humanity will confront artificial intelligence and that artificial intelligence may bring about the end of humanity. However, it is also observed that some thinkers advocate the view that if artificial intelligence is given proper use and functionality in light of international norms and ethical values, it can complement humanity, contribute to peace, and promote social justice, thus offering a beneficial use in the service of humanity (27).

According to the data from the second table obtained from the WoS database, the most productive researcher in artificial intelligence in sports sciences is "Kunze, Kyle N." with 6 articles and an average of 3,659 citations. Following "Kunze, Kyle N.", with 5 publications and an average of 3,049 citations, "Pareek, Ayoosh" ranks second, "Ramkumar, Prem N." ranks third, and "Nwachukwu, Benedict U." ranks fourth. When looking at the number of publications by other researchers in the table, it is seen that the numbers vary between 4 and 3. Regarding the researchers with the most citations in artificial intelligence in sports sciences, "De Luca, Carlo J." stands out in first place with 171 citations. In second place is "Karnuta, Jaret M." with 139 citations, and in third place, "Ramkumar, Prem N." also stands out with 139 citations. Despite having only one article, "Adam, Alexander" and "Contessa, Paola" stand out with 107 citations, which is noteworthy (Table 2).

On the other hand, when examining the content of studies on artificial intelligence, it is seen that in addition to those who assess the opportunities provided by artificial intelligence technologies positively, there are also some opponents of artificial intelligence. Some thinkers argue that AI-powered machines, systems, and programs will not be able to think like humans and will not exhibit the emotions and consciousness that humans possess (25). Another group of thinkers predicts that in the coming years, robotic systems capable of performing all tasks and emotions that humans experience will be developed thanks to artificial intelligence technologies and that AI forms will provide great benefits to humanity (25).

According to the data from Table 3 obtained from the WoS database, when looking at the journals with the most citations and publications in artificial intelligence within sports sciences, the journal with the highest number of publications is "Knee Surgery, Sports Traumatology, Arthroscopy" with 11 publications. The journal "Journal of Applied Physiology" ranks second with 184 citations, and in third place is "Clinical Biomechanics" with 104 citations. Despite having only 1 publication, "Biology of Sport" stands out with 81 citations (Table 3). When these journals are examined in terms of the number of publications and citations, as well as their purpose and scope, it can be said that they are the most productive and influential journals in the field of artificial intelligence in sports sciences.

In our study on the use of artificial intelligence in sports sciences, it is believed that in the coming years, artificial intelligence technologies will be widely used in sports management and operations, exercise and physical transformations, viewing of sports competitions, athlete performance and talent identification, genetic measurements, and the techniques and capacities of coaches (10).

According to the data from Table 4 obtained from the WoS database, when looking at the institutions with the most publications and citations in artificial intelligence within sports sciences, "Hosp Special Surg" ranks first as the most productive institution with 8 publications. "Cleveland Clin" ranks second with 4 publications, followed by "Harvard Med Sch" in third place with 4 publications, and "Brigham & Women Hosp" in fourth place with 3 publications. In terms of citation rankings, "Boston Univ" ranks first with 171 citations, followed by "Hosp Special Surg" also with 171 citations, and "Cleveland Clin" in third place with 123 citations. Additionally, it is noteworthy that "Univ Padua" ranks fourth with 107 citations despite having only one publication (Table 4).

As seen, significant progress has been made in the development of artificial intelligence in recent years, making it the subject of many scientific studies, and numerous predictions regarding artificial intelligence have been put forward. In their study, Feijóo et al. (12) stated that artificial intelligence technology will exist in all forms of life and, while offering many advantages, it will also come with certain disadvantages. Additionally, they pointed out that the advancements in artificial intelligence will be integrated into new technologies and approaches that will emerge, and will simplify many aspects of societal life.

According to the data from Table 5 obtained from the WoS database, when looking at the countries with the most publications on artificial intelligence in sports sciences, the United States stands out as the most productive country with 23 publications, ranking first. Among other highly productive countries in artificial intelligence, Italy ranks second with 6 publications, Australia third with 5 publications, and Austria fourth with 4 publications. In terms of citation rankings, the United States again ranks first with 613 citations, followed by Italy in second place with 214 citations, Australia in third place with 102 citations, and the Netherlands in fourth place with 96 citations. Despite having only one publication, Poland, Qatar, and Tunisia stand out as impactful countries in the citation rankings with 81 citations (Table 5).

When examining the aforementioned studies on artificial intelligence, it becomes evident that humanity is preparing for a new era with the emergence of artificial intelligence. Particularly in developed countries, artificial intelligence technologies are being actively used in both the private and public sectors. Looking at the content of the research conducted on artificial intelligence, it is predicted that, with the development of AI systems in the future, artificial intelligence will dominate not only in social and societal areas but also in the field of sports. Preparations are recommended for the upcoming period in which robots and artificial intelligence will prevail. In this context, it has become a necessity to establish an international will to control and develop artificial intelligence, and to use it for the benefit of humanity (19).

Artificial intelligence development and usage areas are increasing day by day. As can be seen, developed countries are quite advanced in getting efficiency in artificial intelligence technologies. Artificial intelligence, which has become very popular in Türkiye, has gained a place in academic studies and has begun to be used in many fields. In addition to achieving sporting success, the use of artificial intelligence also demonstrates Türkiye's capacity to revise itself by not being indifferent to new developments in the world and preventing foreign dependency. The increasing use of artificial intelligence, especially in the field of sports, informs us that new rules and regulations will come and some new applications will begin in the coming periods (32).

When the figure obtained from the WoS database is analyzed, it is observed that there are two different colored clusters. This situation indicates that there is stronger collaboration among institutions of the same color. In the inter-institutional collaboration network, a total of 11 institutions have been identified, with the most intense collaboration occurring in the red clusters, which consist of 8 institutions. The institutions with the strongest collaboration network are seen to be "Natl Tomsk Polytech Univ," "Team Nova," "Trentino Svlippo," "Univ Salzburg," "Univ Fed Rio," "Liverpool John," "Insefm," and "Chu Dijion." On the other hand, institutions with less collaboration include the green-colored "Univ Verona," "Univ Trento," and "Auckland Univ," each with 3 institutions (Figure 1).

According to the data obtained from Figure 2 of the WoS database, a total of 177 different author keywords used in the publications included in the research have been identified. It has been established that these keywords should be used at least twice as a criterion. As a result of this process, 16 different keywords have emerged. When examining the keyword network created for the common keyword analysis related to artificial intelligence in sports sciences, it is observed that based on the results of Figure 2, 16 clusters have appeared concerning the most frequently used keywords by authors related to the topic of artificial intelligence in sports sciences, with the most prominent clusters being the red cluster (machine learning) and the yellow cluster (artificial intelligence). The keywords found in the red clusters include "Mcid", "Femoroacetabular impingement," "Hip arthroscopy," and "Anterior cruciate ligament" (Figure 2).

According to the results in Figure 3 obtained from the WoS database, there are 1,538 authors cited in the co-citation analysis. A criterion of receiving more than 5 citations was established, leading to a total of 12 authors. When examining the co-citation networks of these authors, networks related to the authors who were cited together have been reached. These networks consist of two clusters with different colors. In this two-colored co-citation network, a total of 12 authors have been identified. The red cluster with 7 authors stands out the most in the co-citation network. This situation is associated with their close collaboration with other clusters. The authors found in the densely populated red clusters are "Helm, J. M," "Collins, G. S," "Esteva, A," "Haberle, H. S," "Karhade, A. V," "Steyerberg, E. W," and "Klemt, C." In the green cluster, 5 authors, namely "Ramkumar, P. N," "Kunze, K. N," and "Nwachukwu, B. U," are noted as the most cited authors (Figure 3).

Considering the scope and content of the results obtained, it is understood that there are numerous studies on the use of artificial intelligence in sports sciences and other fields and that artificial intelligence technologies have become quite popular in the academic world. It is also anticipated that in the upcoming period, artificial intelligence technologies will be utilized in many areas. Particularly, when looking at the content of studies related to the use of artificial intelligence in sports management, it is clear that they have a global impact. Kayıkçı and Bozkurt (19) stated in their study that the new generation will not struggle to keep up with the evolving artificial intelligence and digital systems, whereas older generations will find it very challenging to adapt. They noted that this is because new generations start life with the internet and integrate technology and social media into all aspects of their lives.

When examining the research articles on the use of artificial intelligence in sports sciences, which is also the subject of our study, it can be seen that incredible results have been achieved in the performance increases of athletes in tests conducted with the support of artificial intelligence. Analyses and tests conducted using artificial intelligence technologies have also been the subject of many academic studies. At the same time, the analyses and tests carried out by artificial intelligence provide results that are close to zero error, helping coaches, athletes, and spectators to act and make decisions more accurately (16).

Artificial intelligence has emerged today as a technology utilized across all social and humanistic fields, integrated by many governments and societies around the world. Capable of performing highly intensive and complex tasks in a very short period of time, this technology has been incorporated into numerous aspects of sports. States that employ artificial intelligence technologies gain various advantages. Therefore, as in many other fields, a national policy should be established for the use of artificial intelligence in sports sciences; AI should be integrated into sports education; its significance should be emphasized in academic studies within sports science; it should be utilized in the production of scientific knowledge; and it should be employed to ensure more rational and impartial competitions, as well as to support the development of athletes.

In conclusion, in this study on the use of artificial intelligence in sports sciences, it is observed that artificial intelligence technologies are extensively used in sports and their operations. With the integration of artificial intelligence into every aspect of sports, it is anticipated that it will contribute to providing amateur athletes with higher quality and more effective sports life, enhancing the performance and physical structures of professional athletes, increasing the efficiency of sports public institutions, enabling the sports industry to produce goods and services with better technology, and making sports facilities more modern and accessible. Most importantly, the significant presence of artificial intelligence in academic studies related to sports sciences projects the significance of the subject, as well as the areas it will encompass and its effects in the future.

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Karate Attitude Scale Development: Validity and Reliability Study

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Abstract

This study aimed to develop and validate a psychometrically robust scale to measure attitudes toward karate among blue belt holders and adults aged 18 years and older. Employing a sequential exploratory mixed-methods design, the research comprised two distinct phases. In the initial qualitative phase, responses from open-ended questionnaires administered to a preliminary sample (n=37 items generated) underwent rigorous content analysis. Subsequently, expert review using Lawshe's Content Validity Ratio resulted in the elimination of 12 items based on quantitative validity thresholds. The remaining 25-item preliminary scale was administered to a calibration sample (n=338 participants). Exploratory Factor Analysis (EFA) with principal axis factoring revealed 10 items with either low factor loadings (<0.40) or problematic cross-loadings (>0.30 difference criterion), yielding a refined 15item instrument with a stable three-factor structure. For validation purposes, this 15-item scale was administered to an independent sample (n=420). Confirmatory Factor Analysis (CFA) demonstrated excellent model fit (CFI=0.95, RMSEA=0.06, SRMR=0.04), confirming the hypothesized three-factor structure. Scale reliability was strong (Cronbach's α ranging from 0.82 to 0.89 across subscales). Criterion validity was established through significant intercorrelations among subscales (r=0.65-0.78, p<0.01) and with the total score (r=0.82-0.91, p<0.001). The final Karate Attitude Scale (KAS) demonstrates excellent psychometric properties, with confirmed construct validity and reliability for assessing karate-related attitudes in adult practitioners. This 15-item instrument fills an important measurement gap in martial arts research and provides researchers with a validated tool for future investigations.

Keywords: sport psychology, karate, attitudinal measurement, scale development.

Özet

Karate Tutum Ölçeği Geliştirme: Geçerlik ve Güvenirlik Çalışması

Araştırmada, karate sporu ile ilgilenen mavi kuşak sahibi ve 18 yaş üstü bireylerin karate sporuna yönelik tutumlarını belirlemek amacıyla geçerli ve güvenilir bir ölçek geliştirilmesi amaçlanmıştır. Araştırmada karma yöntem deseni kullanılarak, ilk aşamada nitel verilerden (içerik analizi ve Lawshe tekniği) yararlanılarak ölçek maddeleri geliştirilmiş, ikinci aşamada ise nicel analizler (Açımlayıcı ve Doğrulayıcı Faktör Analizleri ile korelasyon analizi) yoluyla ölçeğin psikometrik özellikleri incelenmiştir.

Literatür taramasının ardından, ilk araştırma grubuna yöneltilen iki açık uçlu sorudan elde edilen yanıtlar içerik analizine tabi tutularak 37 maddelik bir ölçek aday havuzu oluşturulmuştur. Bu maddeler, Lawshe tekniği kullanılarak uzman görüşüne sunulmuş ve yapılan değerlendirmeler sonucunda 12 madde çıkarılmıştır. Geriye kalan 25 maddelik ölçek formu, 338 katılımcı üzerinde ön uygulamaya tabi tutulmuştur. Açımlayıcı Faktör Analizi (AFA) temel varsayımları kontrol edildikten sonra, faktör yükleri düşük olan ve çapraz yüklenme gösteren 10 madde ölçekten çıkarılmıştır. Açımlayıcı Faktör Analizi (AFA) sonucunda, 3 faktörlü ve 15 maddeden oluşan bir yapı elde edilmiştir. Bu yapıyı test etmek amacıyla, 3 alt faktör ve 15 maddeden oluşan ölçek, 420 katılımcıya uygulanmıştır. Doğrulayıcı Faktör Analizi (DFA) ile model uyum değerleri incelenmiş ve 3 faktörlü 15 maddeli yapının geçerli bir model olduğu doğrulanmıştır. Ayrıca, ölçüt geçerliğini test etmek için alt boyutlar ile ölçek bütünü arasındaki korelasyon katsayıları hesaplanmış ve faktörler arasında yüksek düzeyde pozitif bir ilişki tespit edilmiştir. Sonuç olarak, Karate Tutum Ölçeği (KATÖ)'nün, karate sporuna yönelik tutumları ölçmede geçerli ve güvenilir bir araç olduğu belirlenmiştir.

Anahtar Kelimeler: spor psikolojisi, karate, tutum ölçümü, ölçek geliştirme.

INTRODUCTION

Karate is a traditional martial art and philosophical discipline that has preserved its core values from its origins to the present day. Practiced worldwide by millions, karate transcends mere physical training by embodying universal principles and ethical foundations. This art fosters both physical and spiritual development while promoting non-violence, thereby cultivating a more peaceful and virtuous approach to life.

Originating in Okinawa, karate gained global prominence after World War II (56). With deep historical roots and philosophical foundations, it serves not only as a physical practice but also as a way of life centered on respect, discipline, and personal growth. Following its widespread popularity, karate was officially included in the 2020 Tokyo Olympics, solidifying its status in international sports (World Karate Federation, 2023). According to the World Karate Federation (WKF), karate is practiced in over 190 countries, underscoring its universal appeal.

The karate training system is structured to develop both technical skills and mental attributes as practitioners advance from the white belt to the black belt. This progressive training cultivates not only physical abilities but also essential human values such as patience, self-discipline, and respect (57). Research indicates that karate enhances physical endurance, flexibility, and coordination while also improving stress management, self-confidence, and concentration (11). Furthermore, studies suggest that regular karate training increases students' sense of responsibility, contributes to academic success, and enhances conflict-resolution skills (30; 36).

The literature presents numerous definitions of attitude (4; 1; 18; 59; 64; 71; 78; 40). Broadly, attitude can be defined as an individual's positive or negative emotional, cognitive, and behavioral tendencies toward people, events, or actions. Attitudes facilitate environmental adaptation and guide behavior, with their analysis aiding in behavioral prediction and understanding attitude-change processes (84). Moreover, comprehending attitudes allows for greater control over behavioral outcomes.

Attitudes typically comprise three components: cognitive, affective and behavioral (61; 78). The consistency among these components determines an attitude's strength and stability. Assessing individuals' attitudes toward specific events or behaviors provides valuable insights for behavioral modification and shaping future inclinations (58). Therefore, accurate attitude measurement and interpretation are crucial in psychological and social research.

A review of attitude measurement literature reveals numerous valid and reliable assessment tools developed across various fields, both internationally and nationally. In sports sciences, multiple scales have been designed to evaluate attitudes toward physical education, physical activity, and different sports (7; 13; 14; 15; 17; 20; 19; 21; 22; 31; 82; 30; 32; 35; 83; 37; 41).

Karate is a holistic discipline that contributes to physical, psychological, social, and cognitive development. Given its widespread popularity, systematically assessing individuals' knowledge, emotional responses, and behavioral tendencies toward karate is essential. However, a literature review reveals the absence of a standardized measurement tool for evaluating attitudes toward this highly popular sport, representing a significant gap in the field.

The development of the Karate Attitude Scale (KAS) aims to address this gap by providing a valid and reliable instrument to assess individuals' attitudes toward karate. This scale will contribute to both scientific research on karate and the broader international literature. Additionally, understanding the factors influencing attitude formation will facilitate the design of intervention programs to foster positive attitudes toward karate.

METHOD

This study is a validity and reliability study aimed at developing an attitude scale toward karate sports. Since the research involves scale development and scale application, a descriptive survey model—one of the quantitative research designs used to reveal the current state—was employed (52).

Population and sample

The study employed the purposive sampling method, specifically criterion sampling, in which participants who met the predetermined criteria were included in the research (52). In this context, the Karate Attitude Scale (KAS) development study sought participants who met the following criteria: being 18 years or older and holding a blue belt or higher rank in karate across Türkiye. The study comprised three distinct working groups: the first group consisted of 47 participants who responded to questions related to karate, the second group included 338 participants who took part in the pilot testing of the draft scale items, and the third group consisted of 420 participants who were involved in testing the final version of the scale.

Table 1: Research Groups		
Group 1	Group 2	Group 3
47 Participants	338 Participants	420 Participants
The group that responded to two	The group on which scale	The group on which
karate-related questions to	reliability was assessed, construct	confirmatory factor analysis
generate a candidate item pool	validity was examined, and	(CFA) was performed to evaluate
for the scale.	exploratory factor analysis (EFA)	scale reliability and confirm
	was conducted.	construct validity.

Development of the Item Pool

In the development process of the Karate Attitude Scale (KAS), an extensive review of both international and national literature was conducted. Previous studies on attitude scale development were examined to guide the methodological approach. Following the literature review, two open-ended questions were administered to 47 participants to generate candidate items for the scale:

"What is your primary objective in practicing karate?"

"What emotions does practicing karate evoke in you?"

The participants' responses were systematically analyzed using content analysis methodology and supplemented by a comprehensive literature review, resulting in a robust preliminary item pool consisting of 37 candidate items (55). During the scale development process, particular attention was given to incorporating the three fundamental attitude dimensions: cognitive, affective, and behavioral components. Each item underwent rigorous evaluation for content validity, intensity of expression, and balance through multiple stages of expert review.

A total of 37 candidate items (24 positive, 13 negative) were developed to measure the cognitive, affective, and behavioral dimensions of attitudes. To ensure content validity, a panel of seven experts comprising one linguist, four scale development specialists, and two karate instructors were consulted (74). Using Lawshe's (1975) technique, items that achieved a content validity ratio (CVR) of 1 (indicating full expert consensus) were retained, while 12 items (11 negative, 1 positive) failing to meet this criterion were eliminated (5). The final scale consisted of 24 positive and 1 negative item. The instrument employs a 5-point Likert-type response format (1: Strongly Disagree to 5: Strongly Agree). Positive items were directly scored, while the single negative item was reverse-coded during analysis.

Analysis of Data

The scale development process began with a comprehensive examination of standard deviation values and normality assumptions, followed by systematic procedures including literature review, item pool generation, content validity assessment, construct validation, and reliability analyses (77; 55; 59). Exploratory Factor Analysis (EFA) was conducted using SPSS 22.0 on data from 338 participants, with detailed reporting of factor loadings, inter-factor correlations, and reliability coefficients (43; 33; 9). The resulting 3-factor, 15-item scale was then administered to 420 participants for Confirmatory Factor Analysis (CFA) using AMOS, where model fit was assessed through multiple indices (χ^2 , RMSEA, SRMR, GFI, AGFI, NFI, NNFI, CFI, RFI, IFI). Criterion validity was established via correlation analysis between total and sub-factor scores, while reliability was confirmed through Cronbach's alpha coefficients for both the full scale and sub-dimensions (6; 69; 75).

Ethical approval and institutional permission

Ethical approval for this study was granted by the Istanbul Rumeli University Ethics Committee (Decision No: 2024/01-07, Date: 17.01.2024). All procedures adhered to institutional and national ethical standards for research.

FINDINGS

This section presents the findings from the validity and reliability analyses conducted to evaluate the psychometric properties of the newly developed scale. The comprehensive assessment included multiple validation approaches: construct validity was examined through both exploratory and confirmatory factor analyses, while reliability was assessed using internal consistency measures. Additional analyses were performed to establish content validity, criterion validity, and item-level psychometric characteristics. The results collectively demonstrate the measurement robustness of the scale, confirming its appropriateness for assessing the intended psychological constructs in accordance with standardized psychometric evaluation protocols (55).

Preliminary Application: Exploratory Factor Analysis (EFA)

The preliminary scale form was administered to a second study group consisting of 338 participants. Exploratory Factor Analysis (EFA) was conducted to examine the underlying structure of the data, identify fundamental dimensions of the variables, and evaluate criterion validity (65; 73; 72). The sample size of 338 participants was determined based on established criteria for factor analysis, exceeding the minimum recommendation of 300 participants in the literature (54; 85), thereby ensuring more reliable results. Prior to conducting the EFA, the suitability of the data for factor analysis was confirmed through the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy (value = 0.87) and Bartlett's test of sphericity [$\chi^2(120) = 1852.34$, p < .001]. The KMO value exceeding 0.50 and the significant Bartlett's test result indicated that the data were appropriate for factor analysis (70; 78; 27). The single negatively-worded item in the scale was reverse-coded prior to analysis. Principal component analysis with varimax rotation was employed, and the resulting EFA successfully identified the factor structure of the scale.

Table 2. Results of the Kaiser–Meyer–Olkin (KMO) and Bartlett's Test of Sphericity					
Kaiser-Meyer-Olkin Measure of Sampling Adequacy .940					
	Approximate Chi-Square (χ^2)	2252.705			
Bartlett's Test of Sphericity	Degrees of Freedom (df)	105			
	Significance (p-value).	< 0.001			

As presented in Table 2, the Kaiser-Meyer-Olkin (KMO = .940) and Bartlett's Test of Sphericity (χ^2 = 2252.705, p < .001) results confirmed the suitability of the data for Exploratory Factor Analysis (EFA) and demonstrated adequate sample size. The EFA led to the elimination of 10 items (m2, m5, m7, m9, m13, m15, m17, m22, m23, m25) based on the following criteria: factor loadings below .30, cross-loading items, and differences of less than .10 between factor loadings (51; 60). Due to observed inter-factor correlations, Direct Oblimin rotation was employed (12). The final solution yielded a three-factor structure with five items in each factor, with detailed factor loadings and item statistics presented in Table 3.

Table 3: Exploratory Factor Analysis (EFA): Item Factor Loadings and Sub-Factors						
Item	Item Fernanciana	Sub- Factors			Common Factor	
No.	Item Expressions	1	2	3	Variance (h ²)	
16	I overcame my fears thanks to karate.	,774	-,098	,074	,601	
18	Karate reduces my stress.	,756	,074	-,035	,595	
19	Karate is helpful in correcting my behavior.	,588	,134	,276	,698	
14	My personality develops thanks to karate.	,570	,196	,199	,642	
12	Karate improves my value judgements.	,543	,211	,222	,645	
4	I would give up most things in my life for karate.	-,147	,827	,014	,616	
8	I am proud to say that I do karate.	,037	,688	,178	,655	
3	Karate contributes positively to my life.	,298	,661	-,044	,645	
1	Topics about karate attract my attention.	,312	,589	-,096	,518	
24	I like it when people call me "Karate player".	-,015	,575	,220	,495	
20	Karate improves my leadership qualities.	,109	-,117	,761	,586	
21	Karate makes it easier for me to adapt to social life.	,202,	-,096	,751	,676	
6	Thanks to Karate, people care about me.	-,175	,142	,719	,526	
11	Karate increases my respect for people.	,065	,158	,697	,676	
10	I gain a social circle in karate sports.	,109	,115	,532	,435	

In Table 3, the first subfactor consists of 5 items 16, 18, 19, 14, 12- and alone explains 45.61% of the variance. The second subfactor comprises 5 items 4, 8, 3, 1, 24 and accounts for 7.77% of the variance. The third subfactor, also consisting of 5 items 20, 21, 6, 11, 10, explains 6.68% of the variance. Collectively, these three identified factors account for 60.06% of the total variance. According to Pallant (2017), this value indicates that the scale explains a sufficient proportion of the variance. The factor loadings of the scale items range from .532 to .827. A factor loading above 0.45 is considered acceptable for measurement validity (51; 60). The results of the Exploratory Factor Analysis (EFA) confirm that the scale items are valid and measure the same underlying construct.

Table 4. Intercorrelations Among Karate Attitude Scale Sub-Factors						
Factor	Behavioral Factor	Affective Factor	Cognitive Factor			
Behavioral Factor	1					
Affective Factor	,405	1				
Cognitive Factor	,485	,494	1			

Table 4 presents the correlation results, demonstrating significant inter-factor correlations among the three identified dimensions of the scale. The analysis revealed no evidence of multicollinearity, confirming that each subscale measures distinct psychological constructs. The observed correlation coefficients between factors were all below .80, indicating adequate discriminant validity and supporting the scale's structural integrity (70; 66; 73). These findings provide robust empirical evidence for the scale's construct validity, as the moderate inter-factor correlations suggest that while the dimensions are related, they capture unique aspects of the measured construct.

Scale Component	Number of Items	Cronbach's α
Factor1	5	,846
Factor2	5	,774
Factor3	5	,787
Total Scale	15	.902

Table 5 presents the reliability coefficients for the Karate Attitude Scale (KAS), with Cronbach's alpha values of .846 for Factor 1, .774 for Factor 2, and .787 for Factor 3. The overall scale demonstrated excellent internal consistency with a Cronbach's alpha of .902 (73; 47). The final stage of Exploratory Factor Analysis (EFA) involved naming the identified factor structure. While there are no strict rules for this process, factor labels should optimally represent their underlying constructs (85). Based on the EFA results and item characteristics, the three factors were conceptually defined in alignment with the literature as follows:

- Factor 1: Behavioral (reflecting action-oriented tendencies toward karate)

- Factor 2: Affective (pertaining to emotional responses associated with karate)
- Factor 3: Cognitive (representing belief-based evaluations of karate)

This tripartite structure aligns with established theoretical frameworks in attitude measurement, supporting the scale's construct validity.

Latest Application: Confirmatory Factor Analysis (CFA)

The Karate Attitude Scale (KAS), consisting of 3 subfactors and 15 items as determined by Exploratory Factor Analysis (EFA), was administered to a third study group comprising 420 participants. While the required sample size for Confirmatory Factor Analysis (CFA) varies depending on different conditions, a sample size exceeding 300 is generally recommended (77; 85; 29; 45). The primary purpose of CFA is to retest the construct validity of the scale, confirm the structure obtained through EFA, and examine the relationships between variables (59; 63; 68; 80). The CFA results were evaluated using various model fit indices, including RMSEA, Chi-Square (χ^2), degrees of freedom (DF), SRMR, GFI, AGFI, NFI, NNFI (TLI), CFI, RFI, and IFI (6; 68; 69).

Table 6. Confirmatory Factor Analysis Fit Indices for the Karate Attitude Scale							
Reference Value							
Fit Index	Perfect Fit	Acceptable Fit Values	Obtained Value	Interpretation			
χ²/df	≤2.00	≤3.00	2,782	Acceptable			
GFI	≥.95	≥.90	,927	Acceptable			
AGFI	≥.90	≥.85	,90	Perfect			
CFI	≥.95	≥.90	,95	Perfect			
TLI (NNFI)	≥.95	≥.90	,924	Acceptable			
IFI	≥.95	≥.90	,95	Perfect			
RMSEA	≤.05	≤.08	,065	Acceptable			
SRMR	≤.05	≤.10	,018	Perfect			
PNFI	≥.50	≥.50	,765	Acceptable			
PGFI	≥.50	≥.50	,672	Acceptable			

As presented in Table 4, the Confirmatory Factor Analysis (CFA) yielded the following model fit indices: $\chi^2/df = 2.782$, GFI = .927, AGFI = .900, CFI = .950, NNFI (TLI) = .924, IFI = .950, RMSEA = .065, SRMR = .018, PNFI = .765, and PGFI = .672. The initial model fit indices demonstrated excellent to acceptable levels of fit according to established reference values. Consequently, no modifications to the model were required. The 15-item measurement tool was found to exhibit good fit with the proposed 3-factor structure and was deemed appropriate for implementation. In Figure 2, the item numbers shown in the path diagram correspond to those in the preliminary scale.



Figure 2. Karate Attitude Scale (KAS), Path Diagram

Figure 2 presents the factor loadings of the Karate Attitude Scale (KAS), where loadings above .50 indicate that the items are meaningful contributors to the scale (48). The analysis revealed the following standardized factor loadings:
- Behavioral factor: .67, .62, .84, .80, .73
- Affective factor: .55, .72, .77, .60, .64
- Cognitive factor: .76, .84, .53, .85, .62

The Confirmatory Factor Analysis (CFA) confirmed that the Karate Attitude Scale (KAS) demonstrates a valid 3-factor structure comprising 15 items (66; 34; 72; 38; 39; 46).

Table 7. Reliability Coefficients for the Karate Attitude Scale (KAS) and Its Subscales									
Number of Items	Cronbach's α								
5	,814								
5	,755								
5	,849								
15	,925								
	he Karate Attitude Scale (KAS) and I Number of Items 5 5 5 5 15								

Table 7 presents the Cronbach's alpha internal consistency coefficients for the Karate Attitude Scale (KAS). The reliability analysis revealed:

- Cognitive factor: α = .814 (high reliability)
- Affective factor: α = .755 (acceptable reliability)
- Behavioral factor: α = .849 (high reliability)

The overall scale demonstrated excellent internal consistency with a total Cronbach's alpha coefficient of α = .925 (high reliability) (47; 79).

Table 8. Intercorrelations Among Karate Attitude Scale (KAS) Subscales and Total Scale									
Scale Component	Cognitive	Affective	Behavioral	Total Scale					
Cognitive	-	,580**	,736**	,888					
Affective		-	,650**	,839					
Behavioral			-	,865					

p<.001

Table 8 presents the inter-factor correlation coefficients for the Karate Attitude Scale (KAS). The analysis revealed statistically significant (p < .01) moderate to high positive correlations among the subscales (3). These correlation values demonstrate both internal consistency among the scale and its subfactors, as well as their discriminant validity.

DISCUSSION AND CONCLUSION

The study aimed to develop a measurement tool to assess attitudes toward karate, resulting in the creation of the Karate Attitude Scale (KAS), which consists of 15 items and a three-factor structure. A comprehensive literature review was conducted during the scale development process, and content analysis was performed on open-ended responses from an initial study group of 47 athletes. After examining existing attitude scales in the literature, a preliminary 37-item scale was prepared. Expert opinions were obtained to ensure content validity, leading to the removal of 12 items, leaving 24 positively and 1 negatively worded candidate items rated on a 5-point Likert scale. The revised scale was administered to a second study group of 338 participants, and Exploratory Factor Analysis (EFA) was conducted, resulting in the removal of 12 items with factor loadings below 0.30 or cross-loadings with differences under 0.10.

The final EFA revealed a three-factor structure (behavioral, affective, and cognitive) comprising 15 items, explaining 60.055% of the total variance. To validate this structure, the scale was administered to a third study group of 420 participants, and Confirmatory Factor Analysis (CFA) confirmed the model's fit, with indices aligning with reference values, thus establishing the Karate Attitude Scale (KAS) as a valid and reliable instrument.

In validity and reliability studies of attitude scales, sample sizes for Exploratory Factor Analysis (EFA) have been identified to range between 227-528, while Confirmatory Factor Analysis (CFA) samples range from 216-486 (25, 2009; 4; 31). EFA results indicate Kaiser-Meyer-Olkin (KMO) values between 0.850-0.98 and Bartlett's Test of Sphericity values ranging from χ^2 =1109.28-3807.86, with total explained variance of 48.12%-63.32%, factor loadings of 0.410-0.932, and scales comprising 1-5 subfactors with 12-32 items. Subfactor correlations were found to be 0.399-0.690, while reliability coefficients ranged from 0.78-0.96. CFA findings demonstrate fit indices within the following ranges: CMIN/df=1.53-2.9, RMSEA=0.04-0.72, AGFI=0.85-0.94, CFI=0.92-0.98, GFI=0.89-0.95, NFI=0.91-0.97, RFI=0.90-0.97, IFI=0.96-0.98, and TLI=0.91-0.98. Item loadings varied between 0.46-0.97, with scales containing 2-5 subfactors and 12-34 items, item correlations of 0.160-0.94, and scale reliability coefficients of 0.82-0.95 (36; 32; 10; 29; 2; 44; 8; 82; 32; 37).

The Karate Attitude Scale (KAS) demonstrates several methodological strengths compared to other attitude scale development studies in the literature. While most validity and reliability studies employ sample sizes between 227-528 for EFA and 216-486 for CFA (25; 31), KAS utilized larger samples of 338 participants for EFA and 420 for CFA, enhancing its statistical power and validity - a notable advantage given that few studies employ separate samples for these analyses (53; 86). The scale's excellent sampling adequacy (KMO=.940) and significant Bartlett's test (χ^2 =2252.705, p<.001, df=105) exceed typical values reported in attitude scale research (KMO=0.85-0.98; Bartlett's χ^2 =1109.28-3807.86) (76; 62).

The Karate Attitude Scale (KAS) demonstrates robust psychometric properties that compare favorably with established standards in scale development literature. Confirmatory Factor Analysis (CFA) yielded excellent fit indices: $\chi^2/df=2.782$ (consistent with Kline's [2015] recommendation of <3), RMSEA=.065 (meeting Byrne's [2022] < .08 criterion), CFI=.95, GFI=.927, and TLI=.931, indicating superior model fit (76). These values not only align with typical ranges reported for sports attitude scales (CFI: 0.92-0.98; GFI: 0.89-0.95) (16; 49) but exceed several comparable studies (31; 32). The item loadings (.53-.85) surpass the .50 threshold recommended by Kline (2015) and Hair et al. (2019), while remaining within the typical range for attitude scales (.46-.97) (10). Item correlations (.580-.888) fall within acceptable limits for criterion validity (.40-.90) (86), indicating strong internal consistency. Reliability analysis revealed Cronbach's α coefficients of .814 (cognitive), .755 (affective), and .849 (behavioral) subscales, comparable to other sports attitude measures (25: .78-.93; 36). With a Cronbach's alpha of .902, the scale's reliability surpasses both the typical range for attitude scales .78-.96, (36) and comparable martial arts instruments (40), establishing robust psychometric credentials (10; 42)

Karate Attitude Scale (KAS), Confirmatory Factor Analysis (CFA), fit indices were found to be between CMIN/df: 2.782: RMSEA: .065 AGFI: 0.90 CFI: 0.95: GFI: 0.927: NFI: 0.924: RFI: 0.908: IFI:0.950: TLI: 0.931. Confirmatory Factor Analysis (CFA), item loadings were found to be between .53 and .85 and the scale subfactor was found to be 3 and the number of items was found to be 15. Karate Attitude Scale (KAS), item correlation was found to be between .580 and .888. Cronbach Alpha reliable coefficients were found to be .814 for the cognitive factor, .755 for the affective factor, .849 for the behavioral factor and .925 for the total scale. Karate Attitude Scale (KAS) is compatible with the literature according to all the data obtained. It has higher item fit, correlation and reliability than some studies in the literature.

Karate is a martial art that attracts individuals from all segments of society, regardless of age, and maintains sustained participation. Its inclusion in the 2020 Tokyo Olympic Games significantly increased its global recognition. Although karate has ancient roots, a review of the literature reveals a lack of validated measurement tools designed to assess attitudes toward this discipline.

Furthermore, existing research on karate remains limited in scope. In contrast, numerous attitude scales have been developed for various concepts in sports, education, and other fields. Given this gap, the development of a standardized attitude measurement tool specific to karate is expected to address a critical need in the field.

Karate is a discipline that maintains its traditional values while remaining relevant in the modern world, offering significant contributions to physical health, mental resilience, and social adaptation, particularly in shaping the character development of young individuals. Due to the lack of a validated attitude scale specific to karate, this study aimed to develop a reliable and valid measurement tool, leading to the creation of the Karate Attitude Scale (KAS), intended to contribute to both national and international literature. Prior to its development, a comprehensive review of existing literature was conducted to establish the conceptual framework, and subsequent validation confirmed that the scale possesses a robust, reliable, and highly consistent structure. The scale consists of 15 items divided into three sub-factors: cognitive (items 1-5), affective (items 6-10), and behavioral (items 11-15), with no reverse-scored items. Designed as a 5-point Likert-type scale (1: Strongly Disagree – 5: Strongly Agree), the KAS yields a minimum possible score of 15 and a maximum of 75. It is anticipated that this scale will serve as a valuable tool for researchers investigating attitudes toward karate. Future studies are recommended to reassess the scale's validity and reliability in younger age groups, expand its application across diverse populations, and explore cross-cultural adaptations. Additionally, further research on karate's digital training models and psychological effects is encouraged to deepen the understanding of its broader impact.

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Karate Attitude Scale (KAS) English (Since the original scale was developed in Turkish, these items should be language validated in English before use.)

Karate	Karate Attitude Scale (KAS) English								
			Strongly Disagree	Disagree	Neutral (or Undecided)	Agree	Strongly Agree		
or	1	Karate improves my leadership qualities.	1	2	3	4	5		
Fact	2	Karate makes it easier for me to adapt to social life.	1	2	3	4	5		
live	3	Thanks to Karate, people care about me.	1	2	3	4	5		
gni	4	Karate increases my respect for people.	1	2	3	4	5		
č	5	I gain a social circle in karate sports.	1	2	3	4	5		
or	6	I would give up most things in my life for karate.	1	2	3	4	5		
Fact	7	I am proud to say that I do karate.	1	2	3	4	5		
ive	8	Karate contributes positively to my life.	1	2	3	4	5		
ffect	9	Topics about karate attract my attention.	1	2	3	4	5		
A	10	I like it when people call me "Karate player".	1	2	3	4	5		
tor	11	I overcame my fears thanks to karate.	1	2	3	4	5		
Fac	12	Karate reduces my stress.	1	2	3	4	5		
oral	13	Karate is helpful in correcting my behavior.	1	2	3	4	5		
havi	14	My personality develops thanks to karate.	1	2	3	4	5		
Be	15	Karate improves my value judgements.	1	2	3	4	5		

Karate	Tutun	n Ölçeği (KATÖ) Türkçe	_		-	-	
			Hiç Katılmıyorum	Katılmıyorum	Kararsızım	Katılıyorum	Tamamen Katılıyorum
	1	Karate liderlik özelliğimi geliştirir.	1	2	3	4	5
r el	2	Karate sosyal hayata uyum sağlamamı kolaylaştırır.	1	2	3	4	5
ilişse aktö	3	Karate sayesinde insanlar beni önemser.	1	2	3	4	5
ЪB	4	Karate insanlara saygımı artırır.	1	2	3	4	5
	5	Karate sporunda sosyal çevre kazanırım.	1	2	3	4	5
ör	6	Karate için hayatımdaki çoğu şeyden vazgeçerim.	1	2	3	4	5
Fakt	7	Karate yaptığımı gururla söylerim.	1	2	3	4	5
sal I	8	Karate hayatıma olumlu katkı yapar.	1	2	3	4	5
ıyuş	9	Karate hakkında konular dikkatimi çeker.	1	2	3	4	5
Ъ	10	İnsanların bana "Karateci" demesi hoşuma gider.	1	2	3	4	5
tör	11	Karate sayesinde korkularımı yendim.	1	2	3	4	5
Fak	12	Karate stresimi azaltır.	1	2	3	4	5
ışsal	13	Karate davranışlarımı düzeltmemde yararlı olur.	1	2	3	4	5
/ran	14	Karate sayesinde kişiliğim gelişir.	1	2	3	4	5
Dav	15	Karate değer yargılarımı geliştirir.	1	2	3	4	5

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Investigation of the Relationship Between Anxiety in Sport and Psychological Resilience in Amateur Football Players

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Abstract

The aim of this study was to investigation the relationship between football players' anxiety and psychological resilience levels in sports. The data of the study were obtained from 108 football players who played active football in the amateurleague of the Mediterranean Region in the 2022-2023 season. The data were collected with demographic information form, Sports Anxiety Scale-2 and Connor-Davidson Psychological Resilience Scale. In the analysis of the data, normality test, t-test in pairwise comparisons, ANOVA in multiple comparisons, correlation analysis and regression analysis were used to determine the relationship between two variables. When the results of the analyses were examined, a significant difference was found between the total score of anxiety in sport and the sub-dimension of concentration distraction with the variable of educational status of the athletes. In the same analyses, a significant difference was found between the position played by the football players and somatic anxiety. No significant difference was found between the psychological resilience and sport anxiety scores according to age, marital status variables. There was no linear relationship between athletes' perceived sport anxiety and their perceptions of psychological resilience. Finally, when the results regarding whether sport anxiety perceptions are predictive of psychological resilience perceptions are analysed (p=0,269), it is understood that there is no predictor at the level of significance (R^2 =0,011, p>0.05). In this context, it can be said that ~1% of the variance explained for psychological resilience is due to sport anxiety perceptions. As a result, no relationship was found between sports anxiety and psychological resilience, but a difference was found according to the educational status and the position played by the athletes. According to these results, it can be said that anxiety and psychological resilience levels of athletes are affected according to their demographic characteristics. It is recommended that this study be applied to athletes in different age categories and in different sports branches and with a large data input.

Keywords: Anxiety in sport, footballer, psychological resilience.

Note: The abstract of this publication was presented at the ERPA International Education Congress on September 08-10, 2023.

Özet

Amatör Futbolcularda Sporda Kaygı ve Psikolojik Sağlamlık Arasındaki İlişkinin İncelenmesi

Bu çalışmanın amacı futbolcuların sporda kaygı ve psikolojik sağlamlık düzeyleri arasındaki ilişkinin incelenmesidir. Çalışmanın verileri, 2022-2023 sezonu Akdeniz Bölgesi amatör liginde faal futbol oynayan 108 futbolcudan elde edilmiştir. Araştırmanın verileri demografik bilgi formu, Spor Kaygı Ölçeği-2 ve Connor-Davidson Psikolojik Sağlamlık Ölçeği ile toplanmıştır. Verilerin analizinde normallik testi, İkili karşılaştırmalarda T- testi çoklu karşılaştırmalarda ise ANOVA, iki değişken arasındaki ilişkiyi belirlemek amacıyla korelasyon analizi ve etkiyi belirlemek için regresyon analizi kullanılmıştır. Analiz sonuçları incelendiğinde, sporcuların eğitim durumu değişkeni ile sporda kaygı toplam puanı ve eğitim değişkeni ile konsantrasyon dağınıklığı alt boyutu arasında anlamlı bir fark tespit edilmiştir. Futbolcuların oynadıkları mevki değişkeni ile somatik kaygı arasında anlamlı bir farklılık görülmüştür. Yaş, medeni durum değişkenlerine göre psikolojik sağlamlık ve sporda kaygı puanları arasında anlamlı farklılığa rastlanmamıştır. Sporcuların algıladıkları spor kaygı ile psikolojik sağlamlık algılamaları arasında doğrusal bir ilişki tespit edilmemiştir. Son olarak spor kaygı algılamalarının psikolojik sağlamlık algılamalarını yordayıcısı olup olmadığına ilişkin sonuçlar incelendiğinde (p=0,269) anlamlılık düzeyinde yordayıcısı olmadığı anlaşılmaktadır (R²=0,011, p>0.05). Bu bağlamda psikolojik sağlamlık için açıklanan varyansın % ~1'ini spor kaygı algılamalarından kaynaklı olduğu söylenebilir. Sonuç olarak spor kaygı ve psikolojik sağlamlık arasında bir ilişki bulunmamış olup sporcuların eğitim durumu ve oynadıkları mevki değişkenlerine göre farklılık bulunmuştur. Bu sonuçlara göre sporcuların demografik özelliklerine göre kaygı ve psikolojik sağlamlık düzeylerinde farklılık olduğu tespit edilmiştir. Bu çalışmanın farklı yaş kategorisinde bulunan sporculara ve farklı spor dallarında ve geniş bir örneklem gurubuyla uygulanması önerilmektedir.

Anahtar Kelimeler: Sporda Kaygı, Futbolcu, Psikolojik Dayanıklılık. Not: Bu yayının özeti 08-10 Eylül 2023 ERPA Uluslararası Eğitim Kongresi'nde sunulmuştur.

INTRODUCTION

Sports psychologists believe that high levels of competitive situations before and during competition cause anxiety, and that persistent anxiety is detrimental, affecting performance badly and even leading to expulsion from the event. Anxiety in sport is the most common and is mostly caused by stress in competitive environments (12). Anxiety and stress in sport are more complex and thorny issues, so they have been difficult to accurately define by experts. However, (15). define sport anxiety as a trait or reaction to stressful exercise situations. Most sport psychology research focuses on the impact of sport anxiety on athletes' performance. At the same time, sport anxiety is recognized as one of the most studied areas in sport psychology (25). Previous studies by academics show that sport anxiety will affect sport performance or goal orientation and can cause mental health problems for athletes and even increase the risk of sport injuries (4,15,27,40). It consists of a wide variety of stress activities in the elite sports environment. These stressors can negatively affect athletes' mental health and increase the risk of mental disorders (31). Many athletes start training when they are young, and the prevalence of mental health problems among athletes appears to be high. If their mental health problems are not managed effectively, the pressures of the sport environment can cause anxiety and affect their sport performance. The literature also indicates that sports anxiety is particularly important in sports and can be a complementing factor in the outcomes of sports competitions (7). Therefore, the problem of sport anxiety is currently emerging as an important element in sport psychology. One of the critical determinants of success and performance in sport is psychological resilience. Athletes and coaches attribute their success to their psychological resilience (14). For example, Vince Lombardi, one of the best coaches of all time, stated that what is necessary for success is psychological resilience (23). Resilience is essential for winning and achieving success in sport, and therefore the characteristics and process of resilience should be well understood in order to increase resilience.

Researchers are also making efforts in this direction (14). Considering the detrimental effects of turbulent times on an individual's emotional and physical experience, this alarming and stressful situation has negative effects on athletes' emotional experience and mental state as well as their performance. In addition to the loss of daily exercise routines, a general uncertainty and anxiety about the future can cause or worsen some mental health symptoms (38,36). Jimmy Connors, a former tennis player, stated that 95% of the tennis game depends on the mental state. When a person feels anxiety, their mind and body react in a natural way. In fact, the brain and body act like alarm devices when danger or threat is perceived by the individual. When the brain responds to the threat, there are physical manifestations of anxiety and, with it, psychological resilience. "A negative emotion has an impact on perceptions in sport competitions; most athletes perceive anxiety and psychological resilience to have a detrimental effect on performance, which can ultimately lead to reduced performance" (29, 39). Research has confirmed that an athlete is accustomed to managing their anxiety level throughout the game (18). In the field of psychology and sport, anxiety and psychological resilience are the most studied paradigm and have become the most researched variables that can affect athlete performance (6).

Since football appeals to a large audience, athletes often face significant pressure from the media, fans, and management. During a match, they must perform under immense pressure, cope with competition, manage stressful situations, and stay motivated for success. For this reason, it is seen as crucial for amateur football players to handle such pressures and manage the anxiety and resilience that arise before advancing to professional leagues, as these factors are essential for their performance. The results of this research are expected to contribute to the literature by revealing the causes of psychosocial behaviors that may negatively affect amateur football players.

This study was conducted on 108 football players who actively play football in amateur league. The aim of this study is to examine the relationship between anxiety and psychological resilience levels of soccer players in terms of demographic variables.

METHOD

Sample of the Study

This study was conducted to examine the relationship between anxiety and psychological resilience levels of soccer players. Using convenience sampling, the study was conducted with a total of 108 football players playing amateur active football in 2023.

Data collection tools

Sport Anxiety Scale-2 (Sport AnxietyScale- 2; SAS-2)

Among the scales we used in the research, the Sports Anxiety Scale- 2 (Sports Anxiety Scale- 2; SAS-2) was developed by Smith, Smoll, Cumming and Grossbard (34). It was adapted into Turkish by Akyol, Altıntaş, Sezer, and Aşçı (2), and validity and reliability analysis was performed. The scale data were scored with a 4-point Likert-type rating. The scale consists of 15 items and 3 factors. These factors are Somatic Anxiety, Worry and Concentration Disorganization. Akyol, Altıntaş, Sezer, and Aşçı (2) found the internal consistency values for the sub-dimensions of the scale as 0.74 for the somatic anxiety sub-dimension, 0.86 for the anxiety sub-dimension, and 0.77 for the concentration distraction sub-dimension. The results show that the Turkish version of the Sport Anxiety Scale 2 is a valid and reliable measurement tool that can be used to determine the anxiety levels of athletes. In the analysis conducted to test the reliability of the scale, Cronbach's Alpha value was determined as 0.86.

Connor-Davidson Resilience Scale (CD-RISC)

Connor-Davidson Resilience Scale (CD-RISC): The original form of the scale (Connor Davidson Resilience Scale, CD-RISC) was created by Conner and Davidson (5). Consisting of 25 items and 3 factors, the Turkish validity and reliability of the scale was conducted by Karairmak (19). These factors are perseverance and personal competence, tolerance to negative events and spiritual disposition. Scale data were scored on a 5-point Likert-type scale. Connor-Davidson Psychological Resilience Scale was conducted by Karairmak (19) and Croanbach's alpha internal consistency coefficient was determined as 0.92. The high score obtained from the scale indicates high psychological resilience and that it is a valid and reliable measurement tool. In the analysis conducted to test the reliability of the scale, Cronbach's Alpha value was determined as 0.90.

Data Analysis

In the analysis of the data obtained as a result of the scales applied in the research, $p \le .05$ was taken as the significance level and SPSS 26.0 was used as a package program. With the program used, the data were tested with different analysis techniques appropriate to the problems. Normality test was performed to determine whether the research data showed normal distribution. By looking at the Kurtosis and Skewness values, it is possible to comment on the normal distribution of the data. If these skewness and kurtosis values take a value between (+1.5) and (-1.5), it can be said that the data set shows a normal distribution (34). Independent t test was used for pairwise comparisons. In the analysis of the data, ANOVA was used, and when differences were found, Tukey's multiple comparison test was conducted to determine the direction of the differences.Pearson correlation analysis was used to determine the relationship between two variables. At the same time, regression analysis was used to determine the effect between the variables.

FINDINGS

Of the athletes participating in the study, 38% were aged 20-24 and 13.9% were aged 30 and over, 80.6% were single and 19.4% were married. 41.7% are defenders and 7.4% are goalkeepers, 42.6% are university graduates and 7.4% are secondary school graduates. Finally, it was concluded that 38% of them had been playing football for 11-15 years and 13.9% for 16 or more years.

Table 1. Normality and Reliability Test Results									
Variables	Skewness	Kurtosis	Cronbach Alpha						
Sport Anxiety Scale-2	,276	-,869	0,869						
Psychological Resilience Scale	,080	-1,225	0,902						

According to the analysis results in Table 1, it is seen that the data set is normally distributed in terms of skewness and kurtosis and parametric tests were used in the analysis. The reliability test of the obtained data was performed and as shown in Table 1, Cronbach's Alpha (α) values were found to be 0.869 for the Sport Anxiety Scale and 0.902 for the Psychological Resilience Scale. The results reveal that the scales are "highly reliable" measurement tools.

Table 2. ANOVA Test Analysis Results of The Sports Anxiety Scale According to the Age Variable of Football Players

	Age	Ν	x	Ss	df	F	Р
	15-19 years old	27	7,48	2,045			
Somatic Anxiety sub	20-24 years old	41	7,61	2,189	2	0.445	0.52
dimension	25-29 years old	25	8,08	2,197	3	0,443	0,32
	30 years and older	15	7,93	1,831			
	15-19 years old	27	8,59	2,422			
Concern sub dimension	20-24 years old	41	8,39	2,333	0	0.000	0.50
	25-29 years old	25	9,36	2,797	3	0,009	0,72
	30 years and older	15	9,00	2,299			
Diffi cultur	15-19 years old	27	8,74	1,893			
Concentrating sub	20-24 years old	41	8,56	2,098	2	0.705	0.44
dimension	25-29 years old	25	9,32	1,930	3	0,795	0,44
aimension	30 years and older	15	8,73	1,792			
Total Sport Anviatu	15-19 years old	27	24,81	5,942			
Fora Sport Anxiety	20-24 years old	41	24,56	6,181	2	0.751	0.40
Score	25-29 years old	25	26,76	6,424	3	0,751	0,49
	30 years and older	15	25,67	5,627			

According to Table 2, no significant difference was found between the age variable and sports anxiety levels of soccer players (p>0.05). Looking at the rank averages, the averages of the athletes between the ages of 25-29 were found to be higher than the athletes in the other age range.

Psychological Resilience sub dimension	Age	Ν	x	SS	df	F	р
Democratic and	15-19 years old	27	47,19	9,935			
Perseverance and	20-24 years old	41	46,56	8,956	2	0.445	0.76
sub dimension	25-29 years old	25	45,44	8,578	3	0,445	0,76
	30 years and older	15	48,47	7,900			
Tolerance for Negative	15-19 years old	27	16,96	3,848			
	20-24 years old	41	16,32	3,416	2	0 649	0 59
Events	25-29 years old	25	15,44	4,647	3	0,648	0,58
	30 years and older	15	16,07	4,448			
	15-19 years old	27	10,56	2,309			
Spiritual Inclination sub	20-24 years old	41	10,88	2,857	2	0.207	0.82
dimension	25-29 years old	25	10,32	2,897	3	0,306	0,82
	30 years and older	15	11,00	2,726			
Psychological Resilience	15-19 years old	27	74,70	14,339			
Total Score	20-24 years old	41	73,76	13,572			
Total Score	25-29 years old	25	71,20	14,312	3	0,404	0,75
	30 years and older	15	75,53	13,212			

Table 3. ANOVA Test Analysis Results of the Psychological Resilience Scale According to the Age Variable of Football Players

According to Table 3, no significant difference was found between the age variable and psychological resilience levels of soccer players (p>0.05). Looking at the rank averages, the averages of the athletes aged 30 years and above were found to be higher than the averages of the athletes in the other age range.

Table 4. Independent Sample T Test Analysis Results of the Sports Anxiety Scale According to the Marital Status Variable of Football Players

						······································									
	Marital Status	Ν	x	Ss	df	F	р								
Somatic Anxiety sub	Single	87	7,80	2,123											
dimension	Married	21	7,43	1,989	1	0,030	0,46								
Concern sub	Single	87	8,78	2,480											
dimension	Married	21	8,62	2,439	1	0,015	0,78								
Difficulty	Single	87	8,86	2,036											
Concentrating sub	Married	21	8,57	1,660	1	1,279	0,54								
dimension															
Total Sport Anxiety	Single	87	25,45	6,192											
Score	Married	21	24,62	5,723	1	0,283	0,57								

According to Table 4, there is no significant difference between the marital status variable and sport anxiety perceptions and sub-dimensions of soccer players (p>0.05). As a result of the analyses, it was determined that single athletes had higher anxiety levels than married athletes.

Table 5. Independent Sample T Test Analysis Results of the Psychological Resilience Scale According to the Marital Status Variable of Football Players

Wallal Status Vallable OI	viantai Status vanabie on rootban riayers										
Psychological Resilience	Marital Status	Ν	X	Ss	df	F	р				
sub dimension											
Perseverance and Personal	Single	87	46,29	9,446							
Competence sub	Married	21	48,52	6,121	1	7,412	0,30				
dimension											
Tolerance for Negative	Single	87	16,38	3,969							
Events sub dimension	Married	21	15,67	3,967	1	0,025	0,46				
Spiritual Inclination sub	Single	87	10,74	2,590							
dimension	Married	21	10,48	3,156	1	2,330	0,69				

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Psychological Resilience	Single	87	73,40	14,249			
Total Score	Married	21	74,67	11,872	1	2,489	0,70

According to Table 5, there is no significant difference between the marital status variable and psychological resilience perceptions and sub-dimensions (p>0.05). However, married athletes had higher levels of psychological resilience than single athletes.

Table 6.	ANOVA	Test	Analysis	Results	Related	to th	e Sport	Anxiety	Scale	According to	the	Educational
Status Va	ariable of I	Footba	all Player	s								

	Education Status	Ν	x	Ss	df	F	p	Tukey
	a. SecondaryEducation	8	6,63	1,598				
Somatic Anviatu	b.High School	45	7,36	1,786	1	2 651	0,05	
such dimension	c.Bachelor's Degree	46	8,07	2,265	1	2,001		-
sub almension	d.Postgraduate Degree	9	8,89	2,421				
	a.Secondary Education	8	7,38	1,685			0.12	
Com com out	b.High School	45	8,58	2,379	1	1 022		
dimension	c.Bachelor's Degree	46	8,89	2,452	1	1,922	0,13	-
	d.Postgraduate Degree	9	10,11	3,060				
	a.Secondary Education	8	7,50	1,512				
Difficulty	b.High School	45	8,49	2,018	1	2.0(7	0.02*	d>a
Concentrating sub	c.Bachelor's Degree	46	9,13	1,881	1	3,067	0,03*	
dimension	d.Postgraduate Degree	9	9,89	1,764				
Tatal Grant	a.Secondary Education	8	21,50	4,629				
I otal Sport	b.High School	45	24,42	5,766	1	0 700	0.04*	d>a
Anxiety Score	c.Bachelor's Degree	46	26,09	6,088	1	2,783	0,04*	
	d.Postgraduate Degree	9	28,89	6,972				

According to Table 6, no significant difference was found between the level of education of the soccer players and somatic anxiety and anxiety, which are sub-dimensions of the sports anxiety scale (p>0.05). However, there was a significant difference between the difficulty of concentrating dimension of sports anxiety and educational status (p<0.05). The Tukey test result showed that there were differences between athletes with postgraduate education and secondary school students. There was a significant difference between the total score of anxiety in sports and educational status(p<0.05). According to the Tukey test, the difference was between athletes with postgraduate education and secondary school students.

Table 7. ANOVA Test Analysis Results Related to the Psychological Resilience Scale According to the Education Level of Football Players

	Education Status	Ν	x	Ss	df	F	р
Democratic en d	Secondary Education	8	49,50	9,274			
Personal Commeter co	High School	45	46,07	9,379			
aub dimension	Bachelor's Degree	46	46,54	9,035	3	0,451	0,71
sub dimension	Postgraduate Degree	9	48,44	5,615			
	Secondary Education	8	17,13	5,890			
Tolerance for Negative	High School	45	16,13	3,659			
Events sub dimension	Bachelor's Degree	46	16,52	3,880	3	0,759	0,51
	Postgraduate Degree	9	14,56	4,065			
	Secondary Education	8	10,63	3,159			
Spiritual Inclination sub	High School	45	10,76	2,732			
dimension	Bachelor's Degree	46	10,74	2,611	3	0,150	0,92
	Postgraduate Degree	9	10,11	2,934			
	Secondary Education	8	77,25	17,019			
Psychological Resilience	High School	45	72,96	13,935			
Total Score	Bachelor's Degree	46	73,80	13,724	3	0,222	0,88
	Postgraduate Degree	9	73,11	11,890			

According to Table 7, no significance was found between the perceptions of endurance and sub-values according to the variability of the education levels of the football players (p>0.05). However, the

psychological endurance levels of the athletes in secondary education are higher than the athletes in other education levels. It provided the reduction of the decrease in the education level.

players									
		Location	Ν	x	SS	df	F	р	Tukey
Somatic		a.Defense	45	7,13	2,222				
Anxiety		b.Goalkeepe	8	9,38	1,847	4	2,512	0,04*	b>a
	r	_	10	8,00	1,333				
		c.Midfield	16	8,13	1,455				
		d.Wing e.Striker	29	7,90	2,226				
		a.Defense	45	8.22	2.540				
		b.Goalkeepe	8	9,63	2,560				-
Concern	r		10	9,50	2,224	4	1,573	0,18	
		c.Midfield	16	9,63	2,247		,	,	
		d.Wing e.Striker	29	8,59	2,398				
		a.Defense	45	0.44	1.070				
		b.Goalkeepe	45	8,44	1,878				-
Difficulty	r	_	0 10	10,50	1,512	4	2 010	0.00	
Concentrating		c.Midfield	10	8,60 0.01	2,011	4	2,018	0,09	
-		d.Wing	10	8,81 8,07	1,870				
		e.Striker	29	8,97	2,096				
		a.Defense	45	23.80	6.156				
Total Sport		b.Goalkeepe	8	29.50	5.425				-
Anxiety Score	r		10	26.10	5 259	4	1 919	0.11	
indery score		c.Midfield	16	26.56	5 215	-	1,717	5,11	
		d.Wing e.Striker	29	25,45	6,434				

Table 8. Anova Test analysis results of the sport anxiety scale according to the position played by football players

According to Table 8, there was no significant difference between the position played by the soccer players and the scores of anxiety, concentration distraction and total sport anxiety, which are subdimensions of the sport anxiety scale (p>0.05). However, a significant difference was found in the perception of somatic anxiety according to the position variable of the athletes (p<0.05). According to the Tukey test, the difference was seen between the athletes in the goalkeeper position and the athletes in the defense position.

Table 9. Anova Test analysis results related to the psychological resilience scale according to the position played by football players

Psychological Resilience	Location	Ν	x	SS	df	F	р
	Defense	45	47,62	8,052			
Perseverance and	Goalkeeper	8	48,00	9,562			
Personal	Midfield	10	48,20	8,417	4	0,787	0,53
Competence	Wing	16	47,13	9,556			
	Striker	29	44,24	9,920			
	Defense	45	16,56	4,377			
Т-1 б	Goalkeeper	8	16,88	4,454			
Tolerance for	Midfield	10	15,20	3,553	4	0,317	0,86
negative Events	Wing	16	16,13	4,272			
	Striker	29	16,00	3,207			
	Defense	45	10,47	2,546			
	Goalkeeper	8	10,75	1,832			
Spiritual Inclination	Midfield	10	10,80	2,394	4	0,158	0,95
	Wing	16	11,06	2,955			
	Striker	29	10,76	3,170			

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	Defense	45	74,64	13,592			
Psychological	Goalkeeper	8	75,63	14,131			
Resilience Total	Midfield	10	74,20	12,237	4	0,372	0,82
Score	Wing	16	74,31	15,050			
	Striker	29	71,00	14,325			

According to Table 9, no significance was found between the perceptions of psychological resilience and its sub-dimensions and the position played by the soccer players (p>0.05). However, the psychological resilience levels of the athletes playing in the goalkeeper position are higher than the athletes playing in other positions.

Table 10. Pearson Correlation Analysis Results Between Sports Anxiety and Psychological Resilience and Its Sub-Dimensions

Variables	1	2	3	4	5	6	7	8
1.Sport Anxiety	1	107	,946**	,938**	,915**	,136	-,001	,099
		269	,000	,000,	,000,	,160	,992	,308
2.Psychologica Resilience		1	,153	,073	,077	,945**	,827**	,768**
			,113	,453	,424	,000,	,000,	,000,
3.Somantic Anxiety			1	,834**	,821**	,168	,057	,146
				,000,	,000,	,083	,555	,133
4.Concern				1	,765**	,116	-,035	,040
					,000,	,232	,719	,680
5.Distracted concentration					1	,098	-,020	,101
						,314	,834	,297
6.Perseverance and						1	,634**	,592**
personal competence								
							,000,	,000
7. Tolerance for negative							1	,660**
events								
								,000,
8.Spiritual disposition								1

Pearson correlation analysis was performed to determine whether there is a significant relationship between Sport Anxiety and Psychological Resilience and their sub-dimensions. As a result of the analysis, it is seen that there is no significant relationship between the scores of sport anxiety and psychological resilience perceptions (Pearson R = 0.107; p = 0.26 > 0.01). When the sports anxiety levels of the soccer players were analyzed according to the sub-dimensions; there was no relationship for the sub-dimensions of somantic anxiety, anxiety and concentration distraction (Pearson R=0.153-0.073-0.077; p = 0,11-0,45-0,42 > 0,0). When soccer players were analyzed according to the sub-dimensions of psychological resilience; no relationship was found for the sub-dimensions of perseverance and personal competence, tolerance to negative events and spiritual disposition (Pearson R=0.136-,-0.001-0.099; p= 0,16-0,99-0,09 > 0,01).

Table 11. Regression Analysis Results Between Sports Anxiety and Psychological Resilience										
Dependent Variable	Independent Variable	R ²	t	β	F	р				
Psychologica Resilience	SportsAnxiety	0,011	1,110	0,107	1,233	0,26				

When Table 11 regarding whether sport anxiety perceptions are predictors of psychological resilience perceptions is examined, it is understood that there is no predictor at the significance level of p = 0.26 > 0.001 (R2 = 0.011). Accordingly, it can be said that ~1% of the variance explained for psychological resilience is due to sport anxiety perceptions.

DISCUSSION AND CONCLUSION

Anxiety in sport is a psychological consequence of being under pressure or being exposed to stress. Since it is physiologically known that especially high anxiety has long-term physical effects on the body, this study aimed to examine the relationship between anxiety and psychological resilience in sport. There is no significant difference between the age variable and anxiety and psychological resilience levels of the athletes participating in the study. In this context, the age of the athletes participating in our study does not affect their anxiety levels and psychological resilience levels. Özgün et al. (28) concluded that there was no significant difference between anxiety and age variable in their study. Akyıldırım (1) found that there was no difference between age and psychological resilience in his study conducted on university students. These results are similar to the results of our study.

There is no significant difference between the marital status variable and anxiety and psychological resilience levels of the athletes participating in the study. In this context, the marital status of the athletes participating in our study does not affect their anxiety levels and psychological resilience levels. Demir and Kabakçı (10) found that there was no significant difference between marital status and psychological resilience levels of canoe coaches in their study. This result is similar to the result of our study. Kartopu (20) examined the effect of marital status on state anxiety and trait anxiety and found that the anxiety level of single people was higher than married people. This result contains opposite findings to our study.

There is a significant difference between the education level variable of the football players in our study and the distribution of the sub-dimensions of sports anxiety performance, distraction and sports anxiety life. According to the change shown by the Anova analysis, the difference is between the athletes with postgraduate education and those with secondary education. We can say that as the level of education of athletes increases, their level of anxiety in sports increases. Doğan and Eygü (13) also found that there was no significant relationship between education level and anxiety as a result of their research with athletes interested in winter sports. According to education level variables, no differences was found the psychological resilience levels of football players. In the study conducted by Dinçer (11), a difference was found between the psychological resilience level of athletes whose branch is Taekwondo and their education level. In the study conducted by Wagstaff et al. (37), a significant difference was found between psychological resilience levels and education levels in athletes and coaches. The finding of the study contains contrasting results with our study in this respect.

There is a significant difference between the somatic anxiety levels of the athletes according to the position they play. The difference was in favor of the football players playing in the goalkeeper position. It can be said that soccer players playing in the goalkeeper position are more concerned about physical symptoms such as fatigue or pain. In their study, Çetindemir and Cihan (8) found no difference between the position played by young athletes and their anxiety levels. No difference was found between the position played by football players and their psychological resilience levels. Asamoah (3) concluded in his study that there was no significant difference between the position played by football players and mental toughness. This result is similar to the result of our study.

There is no significant difference between the year of playing soccer and anxiety and psychological resilience levels of the athletes participating in the study. In this context, the year of playing soccer does not affect the anxiety levels and psychological resilience levels of the athletes participating in our study. In a study conducted by Kuru and Atılgan (21) on professional football players, it was observed that individuals who have been doing sports for more than 10 years have low anxiety scores compared to individuals who have been engaged in 1-3 sports. This result contains findings contrary to our study. However, Garcia et al. (16) concluded that elite karate athletes had higher levels of trait anxiety depending on their sport age than amateur karate athletes. The results of the research conducted by Mancevska et al. (24) with the Macedonian karate national team also indicate that the level of trait anxiety decreases with increasing sports age. These results contain contrary findings to our study.

There is no relationship between anxiety and psychological resilience levels of the football players participating in the study. Cutuk et al. (9) found a negative and significant relationship between anxiety levels and psychological resilience of judo players in their study. This result contains contrary findings to our study. It was observed that endurance and anxiety capacity in sports were positively correlated and showed a higher correlation in uninjured athletes. The higher endurance capacity of non-injured athletes may be due to the fact that it is not reduced due to the frustration experienced by injured athletes when they cannot compete (32, 26). In previous resilience literature, it has been concluded that an individual with

strong resilience can overcome or cope with the negative effects of anxiety more easily (17, 33). These results contain contrasting findings to our study.

It is understood that sport anxiety perceptions are not predictive of psychological resilience perceptions (R2 = 0.011). Accordingly, it can be said that ~1% of the variance explained for psychological resilience is due to sport anxiety perceptions. Looking at the literature, there are studies that psychological disorganization predicts anxiety (22, 30). These results contain contrary findings to our study.

Based on the contribution of the study to the field, it is thought that stating that anxiety and psychological resilience levels of athletes have an effect on team performance will change the perspectives of players on this issue and increase the importance of this issue. In today's world where resources are scarce, this study, which is especially related to football players in teams, has made feedback with the thought that it will contribute by examining the anxiety and psychological resilience factors affecting the productivity of athletes. Some suggestions can be made in the light of the information obtained from our study.

- 1. Different awareness programs can be conducted on anxiety and psychological resilience.
- 2. Studies on anxiety and psychological resilience can be conducted in different sports branches.
- 3. Football players can be provided with training in sports psychology before and after the competition.
- 4. Individuals in sports teams can be informed about anxiety.
- 5. Furthermore, prospective and longitudinal studies using advanced statistical modeling techniques will allow researchers to explore the pathways and trajectories of resilience in sport. At the same time, qualitative research involving multiple points of contact and data collection methods will further illuminate the process of resilience in athletes.

It is recommended for researchers to adapt the research to Turkey in general and to conduct a more comprehensive examination. In this context, it is thought that with the data to be taken from different regions of Turkey, it will reveal the examinations in the levels of anxiety and psychological resilience in sports more clearly and will be beneficial in this way.

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Development Process of Fencing Sport in Türkiye and Factors Affecting Success

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Conflicts of Interest: The author(s) has no conflict of interest to declare. Copyright & License: Authors publishing with the journal retain the copyright to their work licensed under the **CC BY-NC 4.0**. Ethical Statement: It is declared that scientific and ethical principles have been followed while carrying out and writing this study and that all the sources used have been properly cited.

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Abstract

The purpose of this research is to measure and interpret the opinions of the coaches who actively participate in competitions in our country and who have a Turkish Fencing Federation 2020 visa, on the Development Process of Fencing Sport in Turkey and the Factors Affecting Success. Research group; In 2020, there are 74 coaches in the Turkish Fencing Federation 2020 visa coach list. An online data collection form was used as a data collection tool in this study, which was structured through the qualitative research method. The survey form, which was drawn up by the researcher by taking expert opinion, consisting of a total of seven questions, and devised to learn the opinions of the participants on the subject matter of the study, includes multiple-choice and open-ended question types. In this study conducted in collaboration with the Turkish Fencing Federation, the respondents answered the questionnaire online via the website of the respective federation and took part in the study voluntarily. Consent regarding the study was presented in the "Remarks" section of the form to the participants for approval. In the analysis process of the data obtained, the data analysis program called MAXQDA Analytics Pro 2024 was used. While closed-ended questions were summarized by indicating percentages, the content analysis method was used in the process of analyzing open-ended question and answer reports. For this study, an approval was received from the Ethics Committee for Non-Invasive Clinical Research of the School of Sport Sciences of Seljuk University. As a result of the research; The factors affecting the development of fencing sport were tried to be determined. In this context, subcodes such as correct planning of athletes' psychological preparation processes, implementation of coach training programs, determination of training programs according to the level of the athlete, correct determination of national targets and programs and sharing them with the relevant parties, inadequate financial situation of athletes or families, athletes' anxiety disorders and failure to cope with stress, intensity of academic exams and academic education process, and referee mistakes and their effects have been classified. The data obtained were visualized with the help of frequency tables and code maps. Finally, some of the opinions of the participants, which were coded, were directly conveyed by interpreting the findings obtained through the tables and code maps.

Keywords: Fencing, Coach, Sportive Success

Özet

Türkiye'de Eskrim Sporunun Gelişim Süreci ve Başarıya Etki Eden Faktörler

Bu araştırmanın amacı, ülkemizde faal olarak yarışmalara katılan ve Türkiye Eskrim Federasyonu 2020 yılı vizeli antrenörlerinin, Türkiye'de Eskrim Sporunun Gelişim Süreci ve Başarıya Etki Eden Faktörler hususlarda görüşlerini ölçmek ve yorumlamaktır. Araştırma grubunu; 2020 yılında Türkiye Eskrim Federasyonu 2020 yılı vizeli antrenör listesinde yer alan 74 antrenör oluşturmaktadır. Nitel araştırma metoduyla kurgulanan bu araştırmada; veri toplama aracı olarak online veri toplama formu kullanılmıştır. Araştırmacı tarafından uzman görüşü alınarak hazırlanmış, toplam 7 sorudan oluşan ve katılımcıların, araştırma amacına yönelik görüşlerini öğrenmek amacıyla kurgulanan soru formu çoktan seçmeli ve açık uçlu soru tiplerini içermektedir. Türkiye Eskrim Federasyonu ile ortak hareket edilerek gerçekleştirilen bu çalışmada, katılımcılar ilgili federasyonun web sitesi aracılığıyla online ortamda soru formunu cevaplamış olup, çalışmaya gönüllü olarak katılmışlardır. Araştırma ile ilgili onam, formun açıklama kısmında katılımcıların onayına sunulmuştur. Elde edilen verilerin analiz sürecinde ise MAXQDA Analyctis Pro 2024 isimli veri analiz programı kullanılmıştır. Kapalı uçlu sorular yüzde verilerek özetlenirken, açık uçlu soru cevap raporlarını analiz etme sürecinde içerik analizi metodu kullanılmıştır. Bu araştırma için Selçuk Üniversitesi Spor Bilimleri Fakültesi Girişimsel Olmayan Klinik Araştırmalar Etik Kurulundan onay alınmıştır. Araştırma sonucunda; eskrim sporunun gelişimine etki eden faktörler tespit edilmeye çalışılmıştır. Bu kapsamda; sporcuların psikolojik hazırlık süreçlerinin doğru planlanması, antrenör eğitim programlarının gerçekleştirilmesi, antrenman programlarının sporcunun seviyesine göre belirlenmesi, ulusal hedef ve programın doğru belirlenmesi ve ilgililerle paylaşılması, sporcuların veya ailelerin maddi durum seviyesinin yetersiz olması, sporcuların kaygı bozuklukları ve stresle başa çıkma başarısızlıkları, akademik sınavların yoğunluğu ve akademik eğitim süreci ve hakem hataları ve etkileri gibi alt kodlar tasnif edilmiştir. Elde edilen veriler, frekans tabloları ve kod haritaları yardımıyla görselleştirilmiştir. Nihai olarak tablo ve kod haritaları ile elde edilen bulgular yorumlanarak, katılımcıların kodlama yapılan bazı görüşleri doğrudan aktarılmıştır.

Anahtar Kelimeler: Eskrim, Antrenör, Sportif Başarı

INTRODUCTION

Success is a concept that needs to be prepared for in terms of physical, technical, tactical, and psychological factors, which are inherent to human nature. These factors, which athletes and coaches must focus on in their training to achieve success, are the most crucial elements in achieving athletic success. However, success is not solely dependent on these factors; it also varies based on the athletes' and coaches' beliefs, motivation, and willpower. These factors are generally effective tools in achieving results across all sports. Additionally, each sport has specific techniques that are unique to it. In fencing, to become an elite athlete, factors such as speed, strength, skill, flexibility, endurance, distance perception, and reaction time are required. When combined with the specific techniques of the fencing discipline, all these factors form the necessary elements for success (11). In fencing, the primary focus is to eliminate the opponent's attack, create pressure during the attack, and counterattack. These all contribute to the development of mental focus, reflexes, and strategic thinking abilities in athletes (18). Due to the unique techniques of fencing, both athletes and coaches must continuously develop themselves in this area. Furthermore, the high level of competition in matches plays a significant role in ensuring fair outcomes. Therefore, many factors play a crucial role in achieving success (4).

The quality of the relationship between coaches and athletes also reflects on the outcomes of competitions. Mageau and Vallerand (9) found that a good coach-athlete relationship increases motivation in athletes. For coaches, the most important factor in achieving their goals is establishing a good relationship with their athletes. The more time coaches spend with their athletes, the more aware they become of their athletes' needs. The quality of the coach-athlete relationship is essential for achieving success. The coach's primary duty is to support the athlete physically and psychologically, analyze the performance level that can be obtained from the athlete, and apply the necessary training program at regular intervals (14). Therefore, coaches must first strengthen their relationships with athletes to achieve success. Tolukan and Akyel (15) emphasize that the relationship between coaches and athletes is crucial for performance and psychological resilience in athletes.

In light of all the data obtained, it can be concluded that one of the most important factors affecting coaches' success is their relationship with their athletes. However, this situation is generally the same across all sports. Still, there can be specific differences in each sport. Indeed, our research focuses on the factors influencing success among coaches in the context of fencing. Therefore, the purpose of this study is to investigate the development of fencing in Turkey and the factors affecting success in this sport. This research is expected to make a unique contribution to the literature.

METHOD

The descriptive content analysis method refers to the in-depth examination and organization of qualitative and quantitative studies conducted independently of each other in a particular subject or field. In this way, general trends in that subject or field are identified. The results obtained in this method are expected to guide future studies on targeted topics (16). The analysis method designed in this study is content analysis. In addition, a case study design was used in the research. The opinions of the coaches participating in the research, regarding the positive and negative factors affecting the development process of fencing sport, were tried to be classified with the help of code maps (Figure 1-2).In addition to these opinions, demographic information of the coaches such as gender, education level, coach license level, length of experience and the number of athletes they work with are also included in the findings section.

Study Groups

The study group consists of 74 coaches who are on the 2020-2021 season visa list of the Turkish Fencing Federation and are actively working. While 68.9% (n=51) of the referees participating in the study were male coaches, 31.1% (n=23) were female participants.

Data Collection Tools

An online data collection form was used as a data collection tool in this study, which was structured through the qualitative research method. The survey form, which was drawn up by the researcher by taking expert opinion, consisting of a total of seven questions, and devised to learn the opinions of the participants on the subject matter of the study, includes multiple-choice and open-ended question types. In this study conducted in collaboration with the Turkish Fencing Federation, the respondents answered the questionnaire online via the website of the respective federation and took part in the study voluntarily. Consent regarding the study was presented in the "Remarks" section of the form to the participants for approval.

Research Design

In the analysis process of the data obtained, the data analysis program called MAXQDA Analytics Pro 2024 (Professional Data Analysis Software for Qualitative and Mixed Methods) was used. While closed-ended questions were summarized by indicating percentages, the content analysis method was used in the process of analyzing open-ended question and answer reports. The data obtained were visualized with the help of frequency tables and code maps. Finally, some of the opinions of the participants, which were coded, were directly conveyed by interpreting the findings obtained through the tables and code maps.

In the research, six closed-ended questions were asked to the participants, and the frequency tables created with the answers to the relevant questions are included in the findings section.

Within the scope of the research, one open-ended question was asked to the participants. The answers to the question "What are the negative and positive factors affecting performance in fencing in Türkiye?" were classified with the help of codes and subcodes using the content analysis method.

Ethical Approval and Institutional Permission

For this study, an approval was received from the Ethics Committee for Non-Invasive Clinical Research of the Faculty of Sport Sciences of Selcuk University. (E-40990478-050.99-51591) In addition, permission was obtained from the Turkish Fencing Federation for the study.

FINDINGS

The demographic information of the coaches participating in the research is as follows.

Table 1. Gender status of the coach participating in the research							
		f	%				
	Female	23	31,1				
Gender	Male	51	68,9				
	Total	74	100				

Table 2. Educational status of the coach participating in the research							
		f	%				
	High School and Equivalent	13	17,6				
	Associate Degree	3	4,1				
Educational Status	Bachelor Undergraduate	49	66,2				
	Graduate	9	12,2				
	Total	74	100,0				

Table 3. License status of the coach participating in the research								
		f	%					
	Level 1	20	27,0					
	Level 2	39	52,7					
What is the degree of your coach license?	Level 3	14	18,9					
	Level 4	1	1,4					
	Total	74	100,0					

Table 4. Experience duration of the coach participating in the research								
		f	%					
	1-3 Years	17	23,0					
	5-6 Years	16	21,6					
Experience duration	7-10 Years	13	17,6					
	11 Years and Over	24	32,4					
	Inactive referee	4	5,4					
	Total	74	100,0					
	Total	74	l					

Table 5. Number of athletes actively coached by the trainer participating in the research								
	f %							
	1-10	17	23,0					
Number of athlatas	11-20	14	18,9					
Number of athletes	21 and over	43	58,1					
	Total	74	100,0					

Table 6. Number of athletes ranked in the top 3 in national competitions in the last 5 years								
		f	%					
	Yes	53	71,6					
Number of athletes ranked in the top 3 in national	No	21	28,4					
competitions in the last 5 years	Total	74	100,0					

Of the coaches participating in the study, 68.9% (N=51) are male participants. According to their education level, the majority of the participants are undergraduate graduates. It is seen that 52% (N=39) of the coaches participating in the study have a Level 2 coaching certificate. 32.4% (N=24) of the coaches

have 11 years and above experience, and 43 coaches continue to work with 21 or more athletes. In addition, it was determined that the athletes that 71.6% (N=53) of the coaches continue to work with are the athletes who have ranked in the top 3 in the national competitions held in the last 5 years.



Figure 1. Positive factors affecting the performance of fencing athletes and coaches code-subcode map.

The code map of the views of the coaches participating in the study that positively affect performance is as above. In this context, there are 48 statements categorized under 10 different subcodes.

- 1. Correct planning of the athlete's psychological preparation process.
- 2. Organizing coach training programs.
- 3. Planning training programs according to the levels of athletes.
- 4. Increasing the intensity and number of training programs.
- 5. Correct determination of national targets and programs and sharing them with relevant parties.
- 6. Increasing the supply and quality of technical materials.
- 7. Ensuring coordination of national and international activity programs.
- 8. Providing more international competition experience for athletes and coaches.
- 9. Ensuring the participation of athletes in international competitions with their individual coaches.
- 10. Increasing financial opportunities for athletes and coaches.

Some examples of the opinions of the coaches participating in the research, the opinions that make up the code map, are classified as follows.

Participant C4: "The coach's planning and correct implementation of training according to the athletes' conditions positively affects performance."

Participant C54: "I believe that training programs prepared according to individual differences are much more efficient."

Participant C33: "Giving importance to coach development will be important in terms of training athletes."

Participant C37: "Conducting seminars positively affects performance."

Participant C53: "For longer term and more systematic success; trainers, i.e. educators, need to be trained."

Participant C53: "To equip existing coaches with more elite skills, while to further qualify new coaches with more intermediate level coaches and/or similar programs."

Participant C30: "I believe that athletic concentration skills and disciplined and programmed work will positively affect performance."

Participant C47: "The athlete must be mentally prepared for the tournament."

Participant C58: "Practices to reduce stress levels."

Participant C10: "I think it will be positive if the athletes selected for the national team at least attend the camps with their own coaches before the competition."

Participant C27: "It is very important for the motivation of the athletes to send their own coaches as officials in international competitions."

Participant C23: "Preparation of the national program within the international program."

Participant C23: "Determining international goals and competitions for branches and sharing the goals with branch coaches will have a positive impact."

Participant C53: "Category-Specific Programming (For example, what is the program of the foil in the international arena, who is authorized, who is responsible, what are its goals, etc.?)."

Participant C27: "The quality of the materials used is important for the competitions to be completed on time without any disruption.."

Participant C74: "In small settlements, public support for technical equipment is necessary."

Participant C39: "Our current system that I will write for the foil branch is sufficient for technical tactics and conditioning, but considering that 70% of fencing is match and experience, our request from the federation is to organize organizations that provide plenty of match opportunities abroad in the foil and epee branches."



Figure 2. Negative factors affecting the performance of fencing athletes and coaches code-subcode map.

The code map of the views of the coaches participating in the study that negatively affect performance is as follows. In this context, there are 32 statements categorized under 11 different subcodes.

- 1. Insufficient competition experience of athletes.
- 2. Uncertainty of the national activity program.
- 3. Inadequacy of technical equipment and low quality level.
- 4. Malnutrition and ignorance about it.
- 5. Inadequate interaction and information sharing among coaches.
- 6. Anxiety disorders and stress coping failures in athletes.
- 7. Inadequate financial situation of athletes or families.
- 8. The intensity of academic exams and the academic education process.
- 9. Inadequate coach training programs.
- 10. Referee mistakes.
- 11. Inadequate training planning competence of coaches.

Some examples of the views of the coaches participating in the study, the views that make up the code map are classified as follows.

Participant C74: "Families in our region cannot provide sufficient economic support."

Participant C44: "Sports are becoming more expensive day by day."

Participant C6: "Lack of interaction, communication and personal development among coaches and institutional training to support these."

Participant C21: "lack of personal development and institutional training to support them."

Participant C7: "Uncertainty of the activity calendar."

Participant C49: "The fact that a camp environment where elite athletes in the epee branch can train together outside of this year has not been provided until this year."

Participant C27: "The quality of the materials purchased and sent through tender is also inadequate and they become deformed in a short time."

Participant C30: "Nowadays, especially with the influence of family, anxiety disorders and stress, the biggest problem of our time is concentration."

Participant C64: "Athletes not showing the necessary interest due to the emphasis on academic education."

Participant C63: 'I think it is a big deficiency that they think they cannot manage sports and school at the same time and that they have no future in sports..''

Participant C71: "What is it that some referees can exhibit negative behaviors towards athletes? When this happens during a match, it negatively affects the athletes' performance during the match."

Participant C73: "Referee decision errors and their negative consequences.."

DISCUSSION AND CONCLUSION

When examining the research findings, several prominent themes emerged regarding the coaches' opinions on the negative factors affecting performance. These include: athletes' lack of competitive experience, the uncertainty of the national activity calendar, inadequacy and low quality of technical equipment, insufficient nutrition and lack of knowledge, lack of interaction and information sharing among coaches, anxiety disorders and failure to cope with stress among athletes, insufficient financial resources of athletes or their families, the intensity of academic life and the academic process, inadequacy of coach education programs, referee errors, and insufficient knowledge of training periodization among coaches.

In their study, Kalkan and Zekioğlu (7) stated that among the factors influencing training motivation, inadequate training facilities directly affected athletes' motivation and were perceived as influencing performance. Furthermore, deficiencies in training methods and the absence of pre-training preparations were also identified as factors impacting success. The study also pointed out that athletes' mental factors—particularly their levels of concentration and attention—could have a direct impact on performance. In this context, it can be stated that the findings of the current study are consistent with those of previous research. Pensgaard (12) emphasized that anxiety is one of the major problems among athletes and that early engagement in sports, combined with proper coach education, could reduce this issue. Similarly, our study suggests that anxiety disorders and failure to manage stress—identified as negative performance factors in fencing—could be mitigated through comprehensive and well-structured coach education programs.

Another prominent finding was communication deficiencies, which were cited as critical shortcomings. These could be addressed by organizing joint training camps or work groups to facilitate interaction among coaches. Burton and Readeke (2) emphasized that effective communication contributes significantly to coaching success.

Onağ et al. (10) found that coaches' technical knowledge significantly contributes to athletic success. Consistent with this, many studies have highlighted the inadequacy of coaching education and seminar programs and stressed the need for up-to-date training to enhance coaches' technical knowledge and competencies.

In their study on the financial structures and revenue sources of sports clubs, Wicker and Breuer (17) underlined the influence of social welfare levels and environmental factors. In line with this, our research findings—shaped by participant coaches' feedback—suggest that the insufficient financial means of fencers or their families are among the negative factors affecting performance.

Hanton et al. (3), in their study evaluating athletes' competitive experience and performance, observed that such experience has a positive effect on performance. The lack of competitive experience, which participant coaches cited as a negative factor, aligns with this finding. Increasing the national and international competition exposure of elite athletes could contribute positively to performance.

In their 2023 study on student-athletes, Koçak et al. (8) found that elite athletes often face challenges in dual career planning due to competing demands between academic and sporting responsibilities. Coaches in our study also cited academic transition exams and the intensity of academic curriculum as negative factors influencing performance. This dual-career dilemma, common among athletes in our country, underscores the growing need for structured support. Recent agreements with higher education institutions and scholarship opportunities are significant steps toward resolving this issue.

Burke et al. (1) examined basketball referees' anxiety levels before, during, and after games. They emphasized that decision-making under pressure contributes to referee anxiety. Given that fencing is a sport characterized by rapid decision-making, potential referee errors are inevitable. To minimize such errors, referee education seminars and experience-building activities should be prioritized.

Regarding positive factors, participant coaches identified several key themes that enhance performance and success in fencing: proper planning of athletes' psychological preparation processes, structured coach education programs, training plans tailored to athlete levels, increased training frequency and intensity, clearly defined and communicated national goals and programs, enhanced quality and provision of technical equipment, coordination of national and international activity calendars, greater exposure to international competitions for athletes and coaches, support for participation in competitions alongside personal coaches, and improved financial support for both athletes and coaches.

Sherwin et al. (13) emphasized the importance of coaching experience in their study on the relationship between coaches' educational and athletic backgrounds and success. Jia et al. (5) also noted that coaches' ability to apply knowledge in practice and their drive for success were key predictors of coaching effectiveness. Additionally, coaches' suggestions for improving the quality and availability of technical equipment were also reflected in the findings. In a study examining football coaches' perspectives, factors such as technical staff and facilities were listed among the performance-enhancing components (10). These findings suggest that improving such conditions can directly influence both motivation and success. Furthermore, Kalkan and Zekioğlu (7)'s emphasis on training methods aligns with our findings related to training variety and individualized planning based on athlete levels.

Kajnta and Baric (6), in their study involving coaches, reported that those who maintained close and empathetic relationships with athletes—recognizing their emotions and needs—were more likely to coach successful athletes. This is echoed in our findings that emphasize the need for more international competition experience and participation alongside personal coaches, which may help strengthen these interpersonal dynamics. In conclusion, the positive and negative factors affecting performance in fencing, as identified by coaches, align with findings from studies conducted with coaches from various disciplines. To address these factors, measures should be taken including the development of coach education programs, enhancement of coach-athlete relationships, increasing athletes' competition experience to reduce anxiety, and ensuring sufficient technical equipment and facilities are available.

Limitations and Recommendations:

This study evaluated the perspectives of coaches working in the sport of fencing. Following the evaluation, a report on the factors positively and negatively influencing the success of fencing coaches was prepared and shared with relevant federation officials, with the aim of contributing positively to the development process.

The sample group of this study consisted of 74 coaches listed in the 2020 official registry of the Turkish Fencing Federation. A research model including participants from different countries could further strengthen the study's findings and generalizability.

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Health Literacy, Healthy Lifestyle Behaviours and Physical Activity in Sports Sciences Faculty Students: A Mediation Analysis

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Abstract

This study aims to investigate whether the health literacy of sports science faculty students positively influences their physical activity and whether healthy lifestyle behavior plays a mediating role in the relationship between health literacy and physical activity. The research was conducted in quantitative research method and relational screening model. A total of 262 (F=110, M=152) students studying at Süleyman Demirel University Faculty of Sport Sciences participated in the study voluntarily. Personal Information Form, Turkey Health Literacy Scale-32, Health Promotion Scale, International Physical Activity Questionnaire Short Form were used for the research data. The data were analyzed using Process Macro v3.3 plug-in with model 4 and 5000 resampling method with a 95% confidence interval. As a result of the study, it was determined that health literacy did not have a statistically significant effect on physical activity in sport sciences faculty students, but healthy lifestyle behavior played a mediating role in the relationship between health literacy and physical activity. As a result, it can be said that increasing the health literacy of sport sciences students may be important in participation in physical activity by increasing healthy lifestyle behaviors. For this reason, it is recommended to include more practices that increase health literacy among students of the faculty of sports sciences.

Keywords: Health Literacy, Healthy Lifestyle Behaviours, Physical Activity, Faculty of Sport Sciences Students.

Özet

Spor Bilimleri Fakültesi Öğrencilerinde Sağlık Okuryazarlığı, Sağlıklı Yaşam Davranışı ve Fiziksel Aktivite: Bir Aracılık Analizi

Bu araştırma, spor bilimleri fakültesi öğrencilerinin sağlık okuryazarlığının fiziksel aktivitelerini pozitif yönde etkili olup olmadığı ve sağlıklı yaşam biçimi davranışının sağlık okuryazarlığı ve fiziksel aktivite arasındaki ilişkide aracı rol oynayıp oynamadığını incelemeyi amaçlamaktadır. Araştırma nicel araştırma yönteminde ve ilişkisel tarama modelinde yürütülmüştür.

Araştırmaya Süleyman Demirel Üniversitesi Spor Bilimleri Fakültesinde öğrenim gören 262 (K= 110, E=152) adet öğrenci gönüllü katılım göstermiştir. Araştırma verileri için Kişisel Bilgi Formu, Türkiye Sağlık Okuryazarlığı Ölçeği, Sağlıklı Yaşam Davranışı Ölçeği ve Uluslararası Fiziksel Aktivite Anketi Kısa Formu kullanılmıştır. Verilerin analizi Process Macro v3.3 eklentisi kullanılarak model 4 ile 5000 yeniden örneklem yöntemi ile %95 güven aralığında yapılmıştır. Araştırma sonucunda spor bilimleri fakültesi öğrencilerinde sağlık okuryazarlığının fiziksel aktivite üzerinde istatistiksel olarak anlamlı etkisinin olmadığı ancak, sağlıklı yaşam biçimi davranışının sağlık okuryazarlığı ve fiziksel aktivite arasındaki ilişkide aracı rol oynadığı tespit edilmiştir. Sonuç olarak, spor bilimleri öğrencilerinin sağlık okuryazarlığının artmasının sağlıklı yaşam biçimi davranışlarını arttırarak fiziksel aktivitey katılımda önemli olabileceği söylenebilir. Bu nedenle spor bilimleri fakültesi öğrencilerinde sağlık okuryazarlığını artmasının sağlıklı yaşam biçimi attırıcı uygulamalara daha fazla yer verilmesi önerilmektedir.

Anahtar Kelimeler: Sağlık Okuryazarlığı, Sağlıklı Yaşam Biçimi Davranışları, Fiziksel Aktivite, Spor Bilimleri Fakültesi Öğrencileri.

INTRODUCTION

Health is a multifaceted concept that encompasses the physical, mental, social, and spiritual dimensions of individuals' lives. According to the World Health Organization (WHO), it is defined as "a state of complete physical, mental, and social well-being, not merely the absence of disease and infirmity" (58). Individuals' health literacy encompasses their ability to comprehend, evaluate, utilize, and make decisions regarding health-related information. It extends beyond merely reading health materials to include critically assessing, understanding, and applying this information in everyday life. Health literacy empowers individuals to access and effectively utilize information concerning their own health. This capability plays a crucial role in various domains, including disease prevention, adoption of healthy lifestyles, and more efficient utilization of healthcare services (54). Health literacy skills encompass distinguishing accurate and reliable health information, making informed decisions about treatment options, and effectively communicating about health issues. Additionally, it is important to establish more effective dialogue with physicians, correctly use prescribed medications, and make the best use of healthcare services (48).

Health literacy plays a crucial role in navigating information from various sources such as media, the internet, and other platforms in today's technologically advancing world. Despite the convenience of accessing information, the ability to distinguish between accurate and reliable sources forms the foundation of health literacy skills. Furthermore, health literacy can help mitigate health disparities. Enhancing individuals' capacity to comprehend, assess, and utilize health information not only benefits personal health management and disease prevention but also contributes significantly to improving community health. These skills are invaluable for optimizing personal health and maximizing the benefits of healthcare services (5).

Currently, it's reasonable to argue that enhancing health literacy could influence individuals' adoption of healthier lifestyle habits and participation in physical activity. This is because increased awareness about health empowers people to make informed decisions regarding their well-being and better equips them to tackle health issues (6, 61, 8).

Healthy lifestyle behaviors encompass all the actions individuals undertake to uphold their well-being throughout their lives (2). These behaviors consist of a range of habits and routines aimed at promoting individuals' overall health. Such practices include maintaining a balanced diet (4, 22), engaging in regular physical activity (52, 12), managing stress (10, 16), ensuring sufficient sleep (50), refraining from tobacco and alcohol consumption (19, 9), prioritizing health screenings (42, 57, 44), and nurturing social relationships. Embracing healthy lifestyle behaviors can elevate overall quality of life and play a pivotal role in preventing numerous health issues (60).

Health literacy and healthy lifestyle behaviors can also positively affect people's participation in physical activity. Because the knowledge and awareness of the person about health can lead to behaviors that might improve their health (18).

One of the most important factors that protect and improve one's health is physical activity (35). Physical activity can improve factors such as cardiovascular health (30), weight control, muscle and bone health, mental

health, stress management, sleep quality (43, 3, 49), psychological resilience, as well as protection from serious chronic diseases such as hypertension, Type II diabetes, obesity, osteoporosis and cancer (37, 1, 32, 56).

In addition to doctors, nurses and other health professionals, graduates of sports sciences faculties are the people who will inform and guide people about healthy behaviours. After graduation, students of sports sciences faculties can work as physical education and sports teachers in schools affiliated to the Ministry of National Education, exercise specialists or coaches in sports halls, sports clubs and health centers, sports specialists and coaches in institutions and organizations affiliated to the Ministry of Youth and Sports, or recreational leaders to improve public health. Thus, they can apply the knowledge, attitudes, and behaviours they have acquired both to their own lives and to the lives of their presidents. Therefore, students of sport sciences faculties should have the competence to influence the people they serve due to their professional responsibilities and social roles. Therefore, it is important to examine the health literacy, healthy lifestyle behaviours and physical activity behaviours of these students and the relationships between them.

Based on this context, the primary objective of the research is to explore whether the health literacy of students in the faculty of sports sciences significantly correlates with physical activity. The secondary aim is to assess whether healthy lifestyle behaviors play a mediating role in the association between health literacy and physical activity.

At this point, answers to the following research questions were sought.

• Does health literacy of sport sciences faculty students affect physical activity positively and statistically significantly?

• Does healthy lifestyle behaviours mediate the relationship between health literacy and physical activity of sport sciences faculty students?

METHOD

Research Model

This study was carried out utilizing a quantitative research approach and a relational survey framework. "The relational survey model is a research model to determine the presence and/or degree of change between two or more variables together" (31).

Participants

The participants in the study were determined according to " convenience sampling ", which is one of the non-probability sampling methods. The research was conducted on 262 students studying at Süleyman Demirel University Faculty of Sport Sciences in the 2023-2024 academic year. The distribution of the students participating in the study according to their characteristics is presented in Table 1.

Variables		Frequency (f)	Percentage%
Gender	Female	110	42,0
	Male	152	58,0
Age	18-22	220	84,0
-	23-27	39	14,9
	≥28	3	1,1
Department	Coaching Education	82	31,3
	Physical Education and Sports Teaching	101	38,5
	Sport Management	79	30,2
Class Level	1. Grade	66	25,2
	2. Grade	63	24,0
	3. Grade	77	29,4
	4. Grade	56	21,4
Body Mass Index	Underweight	22	8,4
	Normal	209	79,8
	Overweight	28	10,7
	Obesity First Degree	3	1,1
Physical Activity Level	Low	20	7,6
	Moderate	93	35,5
	High	149	56,9
Total		262	100

 Table 1. Participant Demographic Characteristics

Data Collection Tools

Personal Information Form

The personal information form consists of 6 questions asking the gender, age, department, class, height (cm) and body weight (kg) of the sport sciences students. In addition, body mass index was calculated by using the formula "body weight (kg) / height (m2)" from the data obtained about the height and weight of the students and classified as underweight (<18.5), normal (18.5-24.9), overweight (25.0- 29.9), Obesity first degree (30.0-34.9), Obesity second degree (35.0- 39.9), Obesity third degree (\geq 40.0).

Health Literacy

To measure the health literacy of sport sciences students, the Turkish Health Literacy Scale (TSOY-32) adapted from the European Health Literacy Survey (HLS-EU) was used (41). Unlike the original scale, this scale was prepared by taking two basic dimensions instead of three. As such, it comprises eight elements: care and provision, disease prevention/health promotion aspects, along with four procedures within these aspects: obtaining health-related data, comprehending health-related data, assessing health-related data, and employing/utilizing health-related data. Therefore, it was formed as a 2x4 matrix. The scale consists of 32 questions in total and is in 5-point Likert format and is scored as (1= "Very Difficult", 2= "Difficult", 3= "Easy", 4= "Very Easy", 0= "No Opinion"). In this way, total and average scores can be calculated. In the evaluation of the scale, the scores were categorized between 0-50 as in the HLS-EU scale. For this, the following formula was used: Index = " $(mean-1) \times (50/3)$ ". The index in this formula expresses the average of the answers given by the respondents to each question. Based on this mean value, individuals' health literacy levels can be categorized into four groups: insufficient health literacy (0-25), challenging - restricted health literacy (>25-33), sufficient health literacy (>33-42), and outstanding health literacy (>42-50). The reliability of the scale was calculated with Cronbach's alpha internal consistency coefficient. It was 0.88 for the Treatment and Service at dimension, 0.86 for the Disease Prevention and Health Promotion sub-dimension, and 0.92 for the overall scale. It is stated that the scale is valid and reliable in people aged 15 and over (41). Within the scope of the research, the reliability of the scale was calculated with Cronbach's Alpha internal consistency coefficient. In the subdimensions of the scale, Treatment and Service was 0.89, Disease Prevention / Health Promotion was 0.91 and 0.94 was found for the overall scale.

Healthy Lifestyle Behaviour

The Health Promotion Scale, originally devised by Chen et al. (15) and subsequently translated into Turkish by Ebem (20), was employed to assess the healthy lifestyle practices of students in the faculty of sports sciences. This scale includes a total of 34 items, 6 sub-dimensions (Nutrition, Health Responsibility, Appreciation of Life, Social Support, Exercise, Stress Management) and a 5-point Likert scale (1= Never, 2= Rarely, 3= Occasionally, 4= Usually, 5= Always). The scale can be calculated separately as total and sub-dimensions. The scores that can be obtained from the scale vary between 34-170. The increase in the scores obtained from the scale indicates that the healthy life behaviours of the individuals increase. Test-retest reliability was used for the reliability of the scale. Accordingly, it is stated that Nutrition 0.93, Health Responsibility 0.88, Appreciation of Life 0.81, Social Support 0.80, Exercise 0.85, Stress Management 0.86 and 0.90 for the overall scale. It is stated that the scale is valid and reliable in university students aged 18 and over (20). Within the scope of the research, the reliability of the scale was calculated with Cronbach's Alpha internal consistency coefficient. In the sub-dimensions of the scale; Nutrition 0.76, Health Responsibility 0.79, Appreciation of Life 0.74, Social Support 0.70, Exercise 0.75, Stress Management 0.85 and 0.91 for the overall scale.

Physical Activity

International Physical Activity Questionnaire Short Form was used to determine the physical activity level of sport sciences faculty students. The questionnaire was developed by Craig et al. (17) and adapted to Turkish by Öztürk (45) and validity and reliability analyses were performed on university students. The questionnaire is a short self-report form based on recalling the last seven days to determine physical activity levels. The questionnaire inquires how many days and how long (minutes) they sat, walked, did moderate and vigorous physical activity in the last seven days in order to determine their physical activity levels. When calculating these physical activity areas, the MET (Metabolic Equivalent of Task) of the activity is obtained with the formula "x days x minutes". MET represents a multiplier of the resting metabolic rate and delineates the energy expended during physical activities. MET values are determined as 1.5 for sedentary behavior, 3.3 for walking, 4.0 for moderate activity, and 8.0 for vigorous activity. The total MET minutes per week of physical activity is calculated using the formula "(walking + moderate intensity + vigorous + vigorous + sedentary)". Based on the resulting total score, an individual's physical activity level can be categorized as low (<600 MET min/week), moderate (600-3000 MET min/week), or high (3000 MET min/week) (45).

Data Collection

Permission was obtained from the authors by e-mail for the use of the scales before the data were collected. Permission was obtained from the dean of sports sciences faculty for the research. The approval of the ethics committee of Süleyman Demirel University University Ethics Committee dated 14.02.2024 and numbered E-87432956-050.99-687725 was obtained. The data of the study were collected face-to-face in a quiet classroom environment with the voluntary participation of the participants.

Data Analyses

Statistical Package for Social Sciences (SPSS) version 23.0 was used to analyse the data. Before analyzing the data, it was checked whether there were missing or incorrect answers. Then, missing data and outlier analyses were performed. As a result of the analysis, it was determined that there were 10 extreme data in the data set and the analyses were carried out by excluding them from the analysis. Descriptive and inferential statistics were used in the analysis of the research data. In addition to frequency, percentage, arithmetic mean analyses, kurtosis, and skewness values of the descriptive data were calculated. In order to examine whether the research data were normally distributed, kurtosis and skewness values were examined whether they were between +1.5 and -1.5 (53, 24) and it was found that the data were normally distributed (Table 2). Parametric analyzes were used because the data showed normal distribution. Pearson correlation analysis was used for relationship analysis. The level of relationships was considered as 0.00-0.30 low, 0.30-0.70 medium and 0.70-1.00 large (14). For mediation analyses, regression analysis based on the bootstrapping method was performed and indirect effects were reported in line with binary confidence interval (CI) values (27). In these analyses, age, gender, department and grade level variables were kept under control. The analyzes were carried out with model 4 using the Process Macro v3.3 plug-in developed by Hayes (27). The analysis was carried out

with 5000 resampling methods with a 95% confidence interval (Confidence Interval, CI). In this context, the significance of the mediation role is evaluated according to the criterion that the lower (BootLLCI) and upper (BootULCI) confidence intervals of the bootstrapping results do not contain the value (0). In the literature, instead of the causal approaches of Baron and Kenny (7) and the mediation analyses of Sobel test, it is stated that modern approaches provide more reliable results. Bootstrapping method stands out at this point (26; 27, 47, 40). Bootstraping method is one of the most popular methods of testing the mediation role because it does not require the normality assumption to be met, can be used effectively in smaller sample groups (n < 25), provides the opportunity to control the factors that may affect the relationships between variables and minimises the TYPE 1 error rate (46).

FINDINGS

The descriptive statistics of sport sciences faculty students' health literacy, healthy lifestyle behaviours and physical activity and the relationships between these variables are presented in Table 2.

Table 2. Descriptive Statistics of Variables and Pearson Correlation Analyses										
Variables	Min	Max	X	Sd	Skew	Ku	1.	2.	3.	
1.Health Literacy	1.04	50.0	33.94	9.53	400	.071	1			
2.Healthy Lifestyle	65	170	122.88	20.24	158	140	.255**	1		
Behaviours										
3. Physical Activity	180	16284.0	4395.52	3401.54	1.03	.789	.024	.254**	1	
(MET min/week)										
Min: Minimum, Max: Maximum, X: Mean, Sd: Standard deviation, Skew: Skewness, Ku: Kurtosis										

When Table 2 is examined, it is seen that there is a statistically significant relationship between health literacy, healthy lifestyle behaviours (r=.255, p<0.01) and physical activity (r=.024, p<0.01) at low level. There was a low level statistically significant relationship between healthy lifestyle behaviours and physical activity (r=.254, p<0.01).

The statistics about the mediating role of healthy lifestyle behaviours in the relationship between health literacy and physical activity of sport sciences faculty students are presented in Figure 1.



Indirect Effect= 18.51, CI %95 [6.47, 34.32]

Figure 1. Research Model

When Figure 1 is examined, it is seen that health literacy has a statistically significant positive effect on healthy lifestyle behaviours (a = 0.543, S.H.= .127, t= 4.2560, p<0.01). Healthy lifestyle behaviours were found to have a statistically significant positive effect on physical activity (b= 34.07, S.H.=10.14, t=3.3591, p<0.01). On the other hand, it was found that health literacy did not affect physical activity (c=19.64, S.H=21.09, t=.931, p>0.05) at a statistically significant level. However, the combined effect of health literacy and healthy lifestyle behaviour on physical activity (c'=1.13, S.H.=. 21.40, t=0.052, p>0.05) was also statistically insignificant. Turkish Journal of Sport and Exercise /Türk Spor ve Egzersiz Dergisi 2025 27(1):167-176 172

However, this does not affect the mediating role of healthy lifestyle behaviours. Because Gürbüz (26) states that the fact that the total effect (c) and direct effect (c') are not statistically significant will not invalidate the mediation model and will not prevent the mediating role. At this point, when the mediating role of healthy lifestyle behaviours between health literacy and physical activity was evaluated according to the fact that the binary confidence interval did not include the value "0", it was seen that there was a mediating role (β =18.51, CI 95% [6.47, 34.32]).

DISCUSSION AND CONCLUSION

The first objective of this study was to investigate whether health literacy has a positive and statistically significant effect on the physical activity levels of students from the Faculty of Sport Sciences. The findings revealed that health literacy does not affect students' physical activity levels. This suggests that increasing students' health literacy alone does not necessarily result in higher engagement in physical activity. In contrast, Buja et al. (13) conducted a systematic review including 19 studies examining the relationship between health literacy and physical activity in individuals aged 18 years and older. They found that 15 of these studies reported a positive relationship between the two variables, highlighting an overall trend that differs from our findings. Similarly, Julavanichpong et al. (29), in their longitudinal study involving sport science students, found that although students consistently demonstrated high levels of health literacy over a four-year period, their physical activity participation remained only moderate. This points to a disconnect between knowledge and behavior, reinforcing the idea that high health literacy does not automatically lead to increased physical activity. On the other hand, our findings are supported by Tatar (55), who also found no significant relationship between health literacy and moderate physical activity among medical students. Moreover, the Ministry of Public Health, as cited by the World Health Organization (59), noted that students often possess strong health knowledge, but this does not necessarily translate into increased participation in physical activity. These findings collectively suggest that theoretical health education may be insufficient for promoting behavioral change. Therefore, it is recommended that educational strategies incorporate experiential learning and practical applications in addition to traditional knowledge transfer. It should also be considered that the effect of health literacy on physical activity may occur indirectly through other variables.

The second objective of this study was to examine whether healthy lifestyle behaviors mediate the relationship between health literacy and physical activity among students in the Faculty of Sport Sciences. Our findings revealed that healthy lifestyle behaviors play a significant mediating role in this relationship. When the relevant literature was examined, no study examining the relationship between healthy living behaviour, health literacy and physical activity was found. However, previous correlational studies between health literacy, healthy life behaviour and physical activity support our findings. For example, García-García et al. (23) found a positive correlation between health literacy and a healthy lifestyle among Spanish primary healthcare patients. Kasımoğlu et al. (33) and Kazak et al. (34) also observed that university students with higher health literacy engaged more frequently in health-promoting behaviors. In a similar vein, Kolnik et al. (36) reported that nursing students with better health literacy exhibited more positive health behaviors. Supporting this pattern, Ergün et al. (21) showed a strong relationship between e-health literacy and healthy lifestyle behaviors among adolescents in Balıkesir, highlighting that higher digital health literacy was linked to healthier behavior choices. Likewise, Gül et al. (25) reported a positive association between health literacy and healthy lifestyle habits among university students. Imanian et al. (28) further supported these findings by showing that patients with heart failure who had higher health literacy were more successful in adopting health-promoting behaviors and managing their condition. Moreover, studies such as those by Lange et al. (38) and Liu et al. (39) emphasized that health literacy plays a critical role in influencing a variety of healthpromoting behaviors, including physical activity. Similarly, Soykan and Sengül (51) confirmed a strong link between health literacy and healthy lifestyle behaviors among university students, reinforcing the role of literacy in shaping behavior. In addition, the association between healthy lifestyle behaviors and physical activity is well-documented in the general population. For instance, Bize et al. (11) found that individuals who adopted healthier lifestyle practices were more likely to be physically active. Taken together, these findings suggest that physical activity is influenced not only by health literacy but also by the healthy lifestyle behaviors it promotes. This supports the mediating role identified in our study.

As a result, it was observed that healthy lifestyle behaviour played a mediating role in the relationship between health literacy and physical activity of sport sciences faculty students. It can be said that increasing the health literacy of sport sciences students may be important in participation in physical activity by increasing their healthy lifestyle behaviours. For this reason, it is recommended to include more practices that increase health literacy among students of the faculty of sports sciences.

Limitations of the Study

There are also some limitations in our research. The first of these limitations is the inability to ensure causality with the data obtained due to the fact that the research was designed in the relational survey model and the data were collected in a certain time period. The second limitation is the limitation of the generalizability of the study due to the determination of the participants in the research with convenience sampling method. The third limitation is that physical activity is obtained through self-report. In this method, participants have the possibility of remembering the amount of physical activity more or less. The last limitation is that the relationships specified in the model may be bidirectional. For example, participation in physical activity may affect healthy lifestyle behaviours.

Suggestions

• Future studies to improve the generalizability of the research results; It is recommended to conduct the study in different provinces and to identify participants using probability sampling methods.

• The research was designed in quantitative research method and relational survey model. It is recommended that subsequent research be designed as experimental and longitudinal studies in order to obtain more in-depth information about the relationships between variables.

• In this study, physical activity measurements were obtained using measurement tools based on participants' self-report. In subsequent studies, it is recommended that physical activity be measured using objective measurement methods (e.g. pedometer, accelerometer).

• This research was conducted on students from the faculty of sports sciences. Future studies can be repeated in different sample groups.

• It is recommended to include more practices that increase health literacy among students of the faculty of sports sciences.

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