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Spor Bilimleri Araştırmaları Dergisi

Amaç

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

Kapsam

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

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- CABI's Leisure, Recreation and Tourism Abstracts,
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Journal of Sport Sciences Research

Aim

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

Scope

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

Indexing and Abstracting

- HW Wilson Education Fulltext Index
- ULAKBİM TrIndex
- EBSCO SPORTDiscuss Fulltext
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The Investigation of the Effects of Short-Term Body Weight Loss on Elite Wrestlers on Anaerobic Performance and Reaction Time in Tournament Conditions*

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Research Article
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Abstract

Athletes, who engage in wrestling, perform weight adjustment before the competitions like all weight loss category sports. For this reason, weight management is a very important factor prior to matches. When the studies on weight loss are examined, it is seen that athletes lose weight in a short time close to the competition. This study aimed to investigate the effects of short-term body weight loss in elite wrestlers on anaerobic performance and reaction time during tournament conditions. Ten experienced international level male wrestlers participated as a volunteer in this study. Participants lost 5% of their body weight within 48 hours, in 72 hours; 1 kg tolerance was given over 5% of body weight. During this process, body composition measurement, Wingate anaerobic performance test (WAnT), Countermovement Jump (CMJ), and visual and auditory reaction tests were conducted. In this study, a randomized crossover design was used and applications lasted four days. Two-way ANOVA with repeated measures was used for statistical analysis. Due to short-term body weight loss in body composition, total body water (TBW) and fat-free mass (FFM) were significantly reduced. In contrast, there was no statistically significant difference in body fat percentage (BF %), visual and auditory reaction time, CMJ and average power (AP). However, there was a significant increase was seen in Peak power (PP) and fatigue index (FI). The results indicate that 5% loss of body weight within 48 hours caused significant changes in body composition and negatively affected the fatigue index. For this reason, athletes who lose weight should avoid rapid weight-loss practices that will cause sudden changes in body composition in order to maintain their athletic performance.

Keywords: Wrestlers, Rapid weight loss, Anaerobic power, Reaction time

* This study was presented as a master's thesis at Bolu Abant Izzet Baysal University, Healthy Science. Moreover, it was presented as an oral presentation in 18. International Sports Sciences Congress 7 –9 November 2020.

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INTRODUCTION

Wrestling is a combat sport that includes many motor features such as strength, speed, endurance, flexibility, technique, and reaction. It consists of various weights categories and styles. Since wrestling is a sport branch based on body weight, weight adjustment is one of the important issues that closely concern many athletes participating in competitions. Athletes who are engaged in wrestling adjust their current weight according to certain weights and apply this process many times during a year (Yarar et al., 2017). In general, the weight adjustment process in athletes is carried out in the form of weight gain, weight loss, and maintaining the athlete's current weight. In terms of time, this process is carried out systematically in the long term, but it is carried out in a short time, within a few days before the competition. When the studies conducted on weight loss are examined, it is seen that athletes perform the weight adjustment procedure in a time close to the competition (Kordi et al., 2011; Sundgot-Borgen and Garthe, 2011). In addition, it is reported that the average weight loss is 4-5% of the athlete's body weight (Rashidlamir et al., 2009; Reljic et al., 2013; Timpmann et al., 2008).

In order to reach the targeted weight in a short time, the athlete's fir reduces food and liquid consumption. In addition, they use wrong methods and techniques such as vomiting the consumed food, using laxative pills (diarrhea medication), diet pills, diuretic pills, exercising intensely, and staying in the sauna for a long time (Roklicer et al., 2022). Considering that the athletes participate in more than one competition during the season and lose weight by using the methods and techniques listed above, we can better understand the severity of the situation.

When the physiological effects of massive weight loss in a short time are examined, it is thought that it causes a large amount of fluid loss, and that the fluid loss will negatively affect both health and performance. The most striking example of this is the death of three university student wrestlers in the USA in 1997 due to the loss of 15% of their body weight associated with hunger and dehydration (Centers for Disease Control and Prevention, 1998; Oppliger et al., 2003). Due to these and similar events, various policies have been developed to ban unsafe weight loss methods. In 1967, a banner headline on the front page of the Des Moines, Iowa Register newspaper proclaimed "Heath Peril in Wrestling" (Des Moines Sunday Register, 1967). In 1969, the Lowa Health Community proposed prohibiting high school wrestlers from losing weight. In 1976, the American College of Sports Medicine (ACSM) published that the fat ratio of wrestlers should be determined before the season and it should not be allowed to fall below 5%, and dehydration should be prohibited (Oppliger et al., 1996). In 1996, a new regulation on weight loss was introduced, and it was stated that weight loss should be bound by a rule and a limit should be set by enacting a law (Convertino et al., 1996). Starting from the 1998-1999 season, the National Collegiate Athletic Association (NCAA) made the decision to determine the minimum bodyweight of each wrestler at the beginning of the season and to perform the weighing of athletes one hour before each competition in order to prohibit rapid weight loss (Kondo et al., 2020).

In the wrestling branch, before 2018, weighing used to be performed one day before the competitions, and the athletes would draw their lots after the weighing process and participate in the competitions the next day. While there were about 16-17 hours between weighing and

competition, the matches were completed on the same day. These rules were changed on January 1, 2018 (Kondo et al., 2020). In the new rules, the competitions last for two days, and every morning before the competitions, athletes are weighed and athletes with appropriate weight participate in the competitions. The wrestler, who cannot adjust his/her weight, is deemed to be defeated by default and cannot take place in the classification, and his/her opponent in the match is considered the winner by default. On the second day, on the other hand, a tolerance of 2 kg was applied (only for 2018). There is a period of 2 hours between the weighing and the competition (Türkiye Güreş Federasyonu, 2017).

In terms of its characteristics, wrestling is a dynamic sport that requires continuous action consisting of two 3-minute periods of high intensity. In a high-intensity wrestling competition, the amount of lactic acid in the blood can rise up to 16-20 mmol/L (Hübner-Wozniak, 1993). For this reason, wrestlers must have a good anaerobic capacity. Therefore, the relationship between sudden weight loss and anaerobic capacity is important. However, the limited number of studies examining the effect of short-term weight loss on the performance of the wrestlers during the tournament period, especially in the new system, led us to plan this study. The aim of this study was to investigate the effects of short-term weight loss on anaerobic performance and reaction time in tournament conditions.

METHODS

Research Model

In this study, a crossover experiment design was used with random sample selection method to determine the anaerobic performance and reaction times of wrestlers before and after weight loss.

Participants

Ten experienced international-level male wrestlers (age: 22.5±1.5 years, body height: 173.2±6.4cm, bodyweight: 77.8±11.6kg, body fat %: 14.0±5.2) participated as a volunteer in this study. Written informed consent was obtained from the participant prior to participation and following an explanation of the purpose of the study, measurement procedures, and possible adverse events. Participants in the study were determined by random sampling method among athletes who had lost weight before.

Ethical Approval

All the procedure of this study was approved by the Clinical Research Ethics Committee of Abant Izzet Baysal University (Decision no: 2018/48 Date: 22.03.2018).

Data Collection Tools

Body composition measurements: Body height was measured to the nearest ±0.1cm via a stadiometer via a manual scale (Seca 700, Germany). Participants were asked to remove all clothing, shoes, jewelry, and other accessories except light shorts for the measurements. The body fat, fat-free mass, and total body water were measured by a bioelectrical impedance analyzer (Tanita BC-418 MA, Tanita, Tokyo, Japan).

Urine specific gravity: For the determination of urine specific gravity E-Line Hand Held Refractometer (B+S Code 44-891) with a scale ranging from 1.000 to 1.050 was used. Urine samples were collected in sterile containers and examined immediately. Moreover, all measurements were conducted by the same person in order to prevent possible errors. The tests were conducted (Baseline, after wake up, after weight in, the second day after wake up, and after weight in) five times.

Wingate 30s anaerobic test: The 30s WAnT performance was conducted with a cycle ergometer (Monark Ergomedic 894E, Peak Bike, Sweden). Seat height was adjusted for each subject and toe clips were used to prevent the slipping of the feet from the pedals. Each participant cycled at 70–80 rpm after the standard warm-up. At the beginning of the test, the subjects were instructed to pedal as fast as possible against unloaded resistance (Inbar et al., 1996). The resistance applied was adjusted relative to body weight (0.075 * body weight in kg). During the test when the subject reached 150 rpm 30 s, the measurement phase was started automatically. Verbal encouragement was given to each subject till the end of the test. In this test, peak power (PP), mean power (MP), minimum power, and their relative values were obtained from the software. The fatigue index (FI) was calculated by the formula of Inbar et al., (1996).
Fatigue index = [peak power (W) – minimum power (W)] / peak power (W) *100.

Reaction time: For the assessment of visual and audial reaction time, the Newtest 1000 reaction timer was used with both hands. The subjects showed a response to the stimulus immediately. The subjects were tested three times and the best score was used.

Countermovement jump (Bosco): In order to determine the vertical jump performance of the participants, the time they stayed in the air was measured using the Bosco Mat (Newtest 1000, Oulu, Finland). In this test, the athlete stood on the mat with weight evenly distributed over both feet. Hands were placed on the hips. The athlete squats down until the knees were bent at approximately 90°, and the upper body is kept straight. The athlete jumped vertically as high as possible and landed back on the mat with both feet hitting the ground at the same time. The best score of three attempts was recorded. One minute rest was given between trials. The maximum flying time from experiments was recorded. Power is calculated with the formula shown below (Sayers et al., 1999): Peak power (W) = [60.7 * Jump height (cm)] + [45.3 * Body mass (kg)] – 2055.

Collection of Data

By holding a meeting with the participants two weeks prior to starting the research, detailed information was given to them about the purpose and duration of the research, the tests to be applied in the research, the possible risks that may occur during the study and the benefits to be obtained from the study. Later, the subjects who participated in the study were asked to read and sign the form prepared in accordance with the Helsinki Declaration stating that they volunteered to take part in the study and containing detailed information about the study. Later, the test equipment to be used in the research was introduced to the participants, and the athletes were allowed to do some exercises with this equipment to get used to them. Participants were asked to continue their routine sleep patterns, to sleep a minimum of 7 hours the day before the

tests, and also not to consume stimulants or diuretics such as caffeine and alcohol 24 hours before the tests.

This study was designed to simulate the tournament process of wrestling (weight, tournament duration, number of matches during the day, and rest periods between matches). Before starting to lose weight, the body weights of the athletes were determined on an empty stomach in the morning, and after the ratio to be reduced was determined, the participants were informed and the weight reduction process was initiated at 09:00 in the morning on the same day. At the end of the 48-hour period, 5% of the body weight at 09:00 and then at the end of the 72 hours, 1 kg tolerance over 5% of the body weight was applied, and the weight reduction process was completed. During the weight reduction process, the weight of the athletes was checked at regular intervals, and a determined rate of weight loss was achieved by weighing time. The study started with 12 athletes, and two athletes who could not lose weight were excluded from the study. Running, basketball, wrestling training, food restriction, and sauna application were used as weight-loss methods for athletes. After 48 hours, competition weighing was conducted between 08:00 and 09:00 in the morning, and performance tests were applied at 10:00, 13:00, and 15:00 on the first day. On the second day, between 08:00 and 09:00 in the morning, competition weighing was performed again, and the athletes who lost weight by applying a tolerance of 1 kg over 5% of their body weight were taken to performance tests at 11:00 and 14:00. The competition lasted for 2 days, and during this period, the athletes were subjected to weighing 2 times and performance tests 6 times. The control group performed all applications similarly, except for weight loss. The summary of the research design described above can be seen in Table 1.

Table 1. Experimental design of the study

Baseline		**1th competition day**		**2nd competition day**
• Urine specific gravity **08:00-09:00 Weigh-in** • Body composition **10:00 am** • Wingate test • Reaction time test • Countermovement Jump test	**5% weight loss in 48 hours**	• Urine specific gravity **08:00-09:00 Weigh-in** • Body composition • Urine specific gravity • Breakfast **10:00 am** • Wingate test • Reaction time test • Countermovement Jump test **13:00 pm** • Wingate test • Reaction time test • Countermovement Jump test • Limited lunch **15:00 pm** • Wingate test • Reaction time test • Countermovement Jump test • Limited dinner	**Weight loss with a tolerance of 1 kg over 5% in 72 hours**	• Urine specific gravity **08:00-09:00 Weigh-in** • Body composition • Urine specific gravity • Breakfast **11:00 am** • Wingate test • Reaction time test • Countermovement Jump test **14:00 pm** • Wingate test • Reaction time test • Countermovement Jump test

Analysis of Data

All statistical tests were processed using SPSS software (Version 20.0; IBM, Armonk, NY, USA). To test normality, we used the Shapiro-Wilk test and Levene's test for the homogeneity of variance. Once the assumption of normality was confirmed, parametric tests were performed. Following the normal distribution, mean and standard deviations (M ± SD) were calculated for all variables. Two-way ANOVA with repeated measures was used to compare the differences between application (experimental weight loss and control) and times (at baseline, three times on the first day, two times on the second day 2x6) for each variable. When appropriate, significant differences between means were determined using the Bonferroni test.

When a significant difference was found between times, a one-way analysis of variance for repeated measures was used for the statistical analysis between consecutive measurements. When significant differences were found in the application and time effect according to variance analysis, a paired-sample t-test was used for assessing the differences between baseline and other times. Effect sizes were calculated for all variables. The thresholds used for the interpretation of the effect size were: .01 small effect size, .06 medium effect size, .14 large effect size (Cohen, 1988). For the description of changes from baseline percent change (Δ %) was calculated. The significance level was stated at $p \leq .05$.

FINDINGS

The changes in body composition variables during experimental and control applications at baseline, 1st and 2nd competition days are presented in Table 2.

Table 2. Body composition variables during experimental and control applications

Variables		Measurements		
		Baseline M ± SD	**1th Competition day M ± SD**	**2nd Competition day M ± SD**
BW (kg)	Experimental	77.8±12.5	73.8±12.0[a-b]	74.2±12.0[a-b]
	Δ%		-5.2	-4.6
	Control	77.1±12.8	77.0±12.6	77.7±12.9
	Δ%		-0.03	+0.8
BF (%)	Experimental	11.4±4.1	11.3±4.0	10.6±4.6
	Δ%		-0.6	-6.9
	Control	11.0±4.5	11.4±3.8	10.5±4.5
	Δ%		+3.4	-4.7
TBW (kg)	Experimental	49.3±6.6	47.0±6.8 [a-b]	47.5±5.9[a-b]
	Δ%		-10.8	-3.6
	Control	49.0±6.9	48.9±6.9	49.8±7.5
	Δ%		- 0.2	+0.4
FFM (kg)	Experimental	67.4±9.0	64.5±9.3 [a-b]	65.1±8.1 [a-b]
	Δ%		-4.2	-3.3
	Control	67.0±9.5	66.7±9.4	67.7±10.3
	Δ%		-0.4	+1.0

Note. **BW**: Body weight. **BF%**: Body fat percentage **TBW:** Total body water **FFM**: Fat-free mass, Δ% = percent change from the baseline. [a]Significant application x time effect. [b]Significantly different from baseline

Significant application and time effect was found in BW [$F_{(2-18)}$=130.454; p=0.000, partial η^2=0.935]. TBW [$F_{(2-9)}$=14.283; p=0.000, partial η^2=0.613], FFM [$F_{(2-9)}$=8.830; p=0.002, partial η^2=0.495]. The experimental application was significantly different from the control regarding the continuum of BW, TBW, and FFM from baseline to 1st competition day and 2nd competition day. Due to the rapid weight loss practice decrease was observed in BW (Δ%:-5.22), TBW (Δ%:-10.8), and FFM (Δ%:-4.2). Moreover, the significant main effect for applications was indicated regarding BW [$F_{(1-9)=}$ 39.170; p= 0.000, partial η^2=0.813); TBW [$F_{(1-9)}$=20.502; p=0.001, partial η^2=0.695], FFM [$F_{(1-9)}$=7.160; p=0.025, partial η^2=0.443. On the other hand, there was no statistically significant difference was found in BF% [$F_{(2-9}$)=1,040; p=0,832, partial η^2=0.019]. According to the follow-up test a significant decrease was found in BW, TBW, and FFM owing to weight loss practice on the 1stand 2nd competition days during the weight-loss period.

Performance variables during experimental and control applications baseline, 1st and 2nd competition days are presented in Table 3.

Table 3. Performance variables during experimental and control applications

Variables		Baseline M ± SD	Measurements: 1th Competition day M ± SD			2nd Competition day M ± SD	
			1th Measurements	2nd Measurement	3th Measurement	1th Measurement	2nd Measurement
PP (W/kg)	Experimental	11.4±1.6	12.7±2.03[a]	12.8±1.5 [a]	12.8±1.8 [a]	12.6±1.3 [a]	12.9±1.5 [a]
	Δ%		+11.3	+12.4	+11.8	+10.2	+12.8
	Control	11.9±1.3	12.4±1.4	12.4±1.6	12.0±1.4	12.2±1.3	12.2±1.5
	Δ%		+4.0	+3.4	+0.2	+2.3	+2.0
AP (W/kg)	Experimental	7.4±0.7	8.2±0.8	8.3±0.6	8.1±0.8	8.1±0.6	8.3±0.5
	Δ%		+9.9	+11.6	+8.5	+9.6	+11.9
	Control	7.7±0.5	8.0±0.5	8.1±0.5	8.07±0.4	8.0±0.4	8.1±0.5
	Δ%		+3.8	+4.6	+3.9	+3.2	+4.5
FI (%)	Experimental	64.2±8.4	65.5±6.2	68.9±8.9	69.9±11.4 [a]	64.5±7.1	63.8±8.3
	Δ%		+1.9	+7.2	+8.8	+0.3	-0.5
	Control	62.2±7.1	65.4±8.4	66.1±7.4	60.8±5.2	66.0±9.1	62.8±6.3
	Δ%		+5.0	+6.2	-2.3	+6.6	+0.9
CMJ (W)	Experimental	3621.3±549.2	3505.6±648.8	3505.7±547.1	3456.2±615.5	3479.3±565.0	3471.6±616.8
	Δ%		-3.1	-15.7	-4.5	-3.9	-4.1
	Control	3575.1±51.2	3580.3±670.5	3598.5±590.8	3503.0±588.8	3526.5±587.7	3612.8±634.3
	Δ%		+0.1	+0.6	-2.01	-1.3	+1.0
RT Right-hand (ms)	Experimental	240.6±28.4	231.8±21.6	217.5±16.7	226.9±25.0	210.3±29.5	200.4±29.2
	Δ%		-3.6	-9.6	-5.6	-12.5	-16.7
	Control	241.5±28.4	222.1±21.6	215.0±16.7	227.7±25.0	222.1±29.5	233.4±29.2
	Δ%		-8.0	-10.9	-5.7	-8.03	-3.3
RT Left-hand (ms)	Experimental	232.1±30.3	227.5±35.0	204.9±24.7	232.1±23.9	213.6±27.5	219.1±26.2
	Δ%		-1.9	-11.7	0	-7.9	-5.6
	Control	232.7±22.9	216.1±18.1	219.9±19.4	222.4±21.7	211.5±28.2	225.5±22.3
	Δ%		-7.1	-5.5	-4.4	-9,1	+3.0
RT Auditory (ms)	Experimental	181.6±40.1	173.0±20.4	174.6±21.3	175.4±11.7	171.3±18.3	166.1±16.8
	Δ%		-4.7	-3.8	-3.4	-5.6	-8,5
	Control	176.0±25.4	172.9±28.6	171.5±22.5	170.5±12.4	164.2±12.2	174.0±22.5
	Δ%		-1.7	-2.5	-3.1	-6.7	-1.1

Note. PP: Peak power, AP: Average power FI: Fatigue index CMJ: Counter movement jump RT: Reaction time, Δ% = percent change from the baseline. [a]Significant application x time effect. [b]Significantly different from baseli

Significant application and time effect was found in PP [$F_{(5-9)=}$2.915; p=0.023, partial η^2=0.245], FI [$F_{(5-9)=}$2.423; p=0.050, partial η^2=0.212]. The experimental application was significantly different than the control regarding the continuum of PP at baseline to all other measurement times' Table 3. Moreover, there were statistically significant differences in 3rd measurement. Due to the rapid weight loss practice increase was observed in PP (Δ%: +11.3, +12.4, +11.8, +10.2, +12.8) and FI (Δ%: +8.85). Moreover, the significant main effect for applications was indicated regarding PP [$F_{(1-9)=}$ 4.758; p= 0.057, partial η^2=0.346]; FI [$F_{(1-9)=}$4.937; p=0.053, partial η^2=0.354]. On the other hand there were no significant differences found in AP, [$F_{(5-9)=}$ 1,334; p=0,267, partial η^2=0.129], CMJ, [$F_{(5-9)=}$ 1,567; p=0,189], partial η^2=0.148) and reaction times (right hand-left hand and auditory) after body weight loss [$F_{(5-9)=}$ 1,384; p=0,247, partial η^2=0.134], [$F_{(5-9)=}$ 0,759; p=0,584, partial η^2=0.078], [$F_{(5-9)=}$ 150,075; p=0,910, partial η^2=0.032].

The changes in urine-specific gravity variables during experimental and control applications at baseline, 1st and 2nd competition days are presented in Table 4.

Table 4. Urine-specific gravity during experimental and control applications

Variables		Measurements				
			1st Competition day M ± SD		2nd Competition day M ± SD	
		Baseline	After wake up	Before the first match	After wake up	Before the first match
USG (gr/ml)	Experimental	1027,7	1034,6[b]	1034,2	1032,3 [b]	1031,7
	Δ%		+0.6	+0.6	+0.4	+0.3
	Control	1023,5	1026,4	1027,8	1021,7	1026,0
	Δ%		+0.2	+0.3	-0.1	+0.2

Note. USG: Urine specific gravity. Δ% = percent change from the baseline. [a]Significant application x time effect. [b]Significantly different from baseline

The experimental application was significantly different than the control [$F_{(1-9)=}$1232,010; p=0,000, partial η^2=0.772] regarding the continuum of USG at 1st and 2nd competition day after wake up Table 3. Due to the rapid weight loss practice, a significant increase was observed in USG (Δ%:+0.6, +0.4).

DISCUSSION and CONCLUSION

The purpose of this study was to examine the effect of short-term body weight loss on anaerobic performance and reaction time during a tournament process in elite wrestlers. The most important findings of the study are that after 5% body weight loss within 48 hours and body weight loss performed with a tolerance of 1 kg over 5% weight loss within 72 hours, there was a decrease in BW, FFM, TBW, and increase in FI and USG values. In addition, there was no statistically significant difference in BF%, PP, AP, CMJ, and reaction times.

In this study, the participants lost an average of 5.2% of their body weight within 48 hours and 4.6% of their body weight within 72 hours (Table 2). When the studies on body weight loss are examined, the average weight loss before the competition was determined by Almasi et al., (2013) as 5.2%, Gulati et al., (2006) as 5%, and above, Hall and Lane (2001) as 5.1%, and Reljic et al., (2013) as 5.6%. Bodyweight loss in the present study is similar to the literature.

When the BF% values were examined, there was no statistically significant difference ($p=0.839$) was found between the experimental and control groups (Table 2). Similarly, Coufalova et al., (2014) and Gulati et al., (2006) reported that there was no significant difference in BF% values in their studies. When the effect of weight loss on body composition is examined, 70% of the weight loss realized within a week is reduced from body fluids, 25% from fats, and 5% from proteins (Katch et al., 2011). When this period becomes shorter, the rate of fluid loss increases. Since weight loss was realized within 48 hours in this study, it is thought that most of the reduction in weight loss was due to fluid loss.

There was a statistically significant ($p=0.00$) decrease in FFM during the experimental application group compared to the control group (Table 2). Similarly, Reljic et al., (2013), found that FFM values decreased during body weight loss and increased again after body weight loss in their study. In addition, Coufalova et al., (2014) and Almasi et al., (2013) obtained similar results in their studies. FFM consists of muscles, body fluid, and various elements in our body (Birch et al., 2004). Combat athletes greatly reduce their consumption of food and fluids during weight adjustment. In this case, energy intake is insufficient, and the body converts amino acids in the body to glucose to provide the necessary energy. As a result, a decrease in muscle tissue occurs. In addition, there is a decrease in the total amount of body fluid as well as a decrease in body fluids and muscle density (Coufalova et al., 2014). In this study, the decrease in FFM values is thought to have occurred due to the reasons listed above.

In this study, there was a statistically significant decrease was seen in TBW during the experimental application (Table 2). Similarly, Coufalova et al., (2014), Kukidome et al., (2008), Reljic et al., (2013), Sagayama et al., (2014), and Yoshioka et al., (2006) found in their studies that there was a significant decrease in the total amount of body fluid during weight loss. The reason for the decrease in the total amount of body fluid is thought that the combat athletes decreased their fluid consumption while losing weight, did intense training, and stayed a long time in hot environments such as saunas, causing a decrease in body fluids.

When the PP (W/kg) values of the participants after their body weight loss were examined, it was found that there was a statistically significant increase ($p=0.02$) in the experimental group compared to the control group (Table 3). Similarly, Yadollahzadeh et al., (2015) found a significant increase in anaerobic power (W/kg) values in their study. In contrast to these studies, Almasi et al., (2013) stated in their study that there was a significant decrease in anaerobic power (W/kg) values. Apart from these studies, Marttinen et al., (2011) reported in their study that there was no statistically significant difference in anaerobic power (W/kg) values. When the present study and the above study results are examined, the results obtained are contradictory.

Anaerobic power can be expressed in two different ways W and W/kg (Özkan et al., 2010). Watt is an absolute expression used without taking the weight of the body into account, whereas w / kg is a more relative expression, and since it is calculated by taking the body weight of the person into account, it reveals the differences that may occur between individuals more meaningfully. Therefore, it would be more correct to use (W/kg) if PP is compared in weight sports. In relative values (W/kg), when the participant loses weight, the current anaerobic power may appear to be increased or unchanged on the contrary. It is thought that the increase in PP (W/kg) values in the present study may be explained in light of the above explanation.

When AP (W/kg) values after body weight loss were examined, it was found that there was no statistically significant difference (p=0.26) between the experimental and control groups (Table 3). Similarly, Marttinen et al., (2011) stated in their study that there were no significant differences in AP (W/kg) values after weight loss. In contrast to these studies, Almasi et al., (2013) found that there was a significant decrease in AP (W/kg) values in their study. Inconsistent results from studies on the effects of rapid weight loss may have stemmed from different tests applied in the studies, different rates of weight loss, durations in weight loss, weight loss methods, and different recovery times after rapid weight loss.

When the FI (%) values after body weight loss were examined, it was found that there was a statistically significant difference (p=0.05) between the experimental and control groups (Table 3). The difference between the experimental and control groups reached the highest level during the 3rd match. Similarly, Cengiz, (2015) stated in his study that there was an increase in FI values. In addition, in the study they conducted, Cengiz and Demirhan, (2013) examined the lactate levels of wrestlers during the competition and determined that the lactate level reached the highest level during the 3rd match. The decrease in body fluid due to rapid weight loss determined in the present study and the increase in lactate level after weight loss as mentioned in the above study is thought to be the reasons for the increase in FI values in the present study.

When the measurement times were compared for the CMJ values of the experimental and control groups after the participants' body weight loss, no statistically significant difference was found (p=0.18) (Table 3). Similarly, Fogelholm et al., (1993) showed that there was no change in jumping performance with loads of different weights after sudden weight loss. Filaire et al., (2001) revealed that rapid weight loss had no effect on vertical jump performance. Kraemer et al., (2001) found that there was no difference in vertical jump performance compared to the performance before weight loss.

The reason why there was no difference in anaerobic power values is that energy is supplied from the ATP-CP system in short-term high-intensity exercises (Katch et al., 2011). Houston et al., (1981) stated in their study that there was no change in muscle ATP and CP concentration after weight loss through 4 days of food and fluid restriction. In this study, muscle ATP-CP concentration was not measured, but it is thought that the reason for the absence of any change in PP, AP, and CMJ values due to the explanation mentioned above is due to the absence of the change in muscle ATP.

It was found that there was no statistically significant difference in reaction times (right hand-left hand and auditory) after body weight loss (p=0.247; p =0.584; p=0.910) (Table 3). Similarly, Wilson et al., (2014) stated that there was no significant difference in reaction times. Muscle activation is one of the most important factors affecting reaction time. Sodium and potassium are electrolytes responsible for muscle activation. Fogelholm et al., (1993) found that there were no changes in serum potassium, magnesium, and zinc levels after 59 hours of rapid weight loss. Reljic et al., (2013) stated in their study that there were no changes in plasma sodium, potassium, calcium, and magnesium levels after 5.6% body weight loss was realized in 5 days. Similarly, Filaire et al., (2001), Judelson et al., (2008), and Yang et al., (2014), found that there was no significant change in serum potassium levels in the studies they conducted. In light of these studies, it is thought that there was no significant difference in reaction time since there was no change in the electrolytes responsible for muscle activation.

When the USG values after body weight loss were examined, it was seen that there were statistically significant (p=0.00) differences was seen experimental group (Table 4). Périard et al., (2012) observed a statistically significant increase in USG values after short-term weight loss in their study. Evetovich et al., (2002) stated in their study that there was a significant increase in USG values after a rapid weight loss of 2.9%. Demirkan et al., (2011) stated in their study that there was an increase in USG values in wrestlers who lost 3.9% of body weight within 3 days, but this increase was not statistically significant. Teresa et al., (2004) found in their studies that there was a significant increase in USG values during short-term body weight loss.

The USG of the experimental group was found to be higher than that of the control group on both the first and second days of the competition. USG is briefly defined as the concentration of ions in the urine or the concentration of dissolved substances in the urine (Guyton and Hall, 2013). Depending on the amount of fluid taken into the body, it varies between 1.013 and 1.029 (gr/ml) in healthy adult individuals. In case of dehydration, it rises above 1.030 (gr/ml). USG is also affected by factors such as the amount of fluid taken and excessive sweating (Armstrong, 2005). For these reasons, the increase in urine density can be thought to have resulted from the subjects restricting fluid intake for weight loss, and the excretion of the existing fluid in the body with sweat as a result of weight-intensive training.

The results of this study revealed that 5% BW loss within 48 hours affects Peak power, body composition, USG, and physiological responses related to anaerobic performance, negatively. This indicates that if a wrestler is frequently more than 5% over his/her competing weight class, athletes and coaches should consider improving body composition by revising the training and habitual diet plans, or by changing the participants ‘weight class. Therefore, the respondents should avoid combat sports athletes from performing rapid weight loss in order to protect their athletic performance.

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

Authors' Contribution: Research Design; HY; RT, Data Collection- HY; RT, statistical analysis; HY, Preparation of the article; HY; RT

Ethical Approval

Ethics Committee: Clinical Research Ethics Committee of Abant Izzet Baysal University
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The Correlation between Event and Life Satisfaction and Curiosity and Discovery Levels of Individuals Participating in Activities in Recreational Areas*

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Abstract

The aim of this research is to determine the levels of curiosity and exploration, event and life satisfaction levels of individuals participating in activities in these areas and compare these levels according to various demographic variables. The universe of the study is the individuals in Erzurum city. The sample group consisted of 1140 volunteers, 585 males and 555 females, who attended activities in recreation areas. In this research, recreation areas of Erzurum city were determined and ARCGIS 10.5 program based on GPS systems and geographic information systems were used to map these areas. The "The Curiosity and Exploration Inventory" (CEI-II), " Event Satisfaction Scale" (ESS) and "Life Satisfaction Scale" (LSS) were used as data collection tools in the study. Descriptive statistics, independent samples t-test, ANOVA and Simple Correlation tests were used in the analysis of the obtained data. Cronbach's Alpha analysis was carried out to determine the reliability of measurement tools. According to the findings obtained, “age", "marital status" and "educational status", a statistically significant difference was found in all scale scores of the variables whereas according to the variable "place of participation in activities", there is statistically significant difference in "ESS" and "LSS". According to the correlation between the scales, it was found that there is only a positive and low level statistically significant correlation between the total average scores of the “LSS” and the total average scores of the “ESS”. It was concluded that the levels of curiosity and exploration, event satisfaction, and life satisfaction of the participants differ according to their various demographic characteristics and that the higher the satisfaction obtained from the activities, the higher the life satisfaction.
Keywords: Recreation area, Curiosity and exploration, Life satisfaction, Leisure participation

Rekreasyonel Alanlarda Etkinliklere Katılan Bireylerin Merak ve Keşfetme, Etkinlik ve Yaşam Doyum Düzeyi İlişkisi

Öz

Araştırmanın amacı, rekreasyonel alanlarda etkinliklere katılan bireylerin merak ve keşfetme, etkinlik ve yaşam doyum düzeylerinin belirlenmesi ve çeşitli demografik değişkenlere göre karşılaştırılmasıdır. Çalışmanın evrenini Erzurum şehrinde bulunan bireyler, örneklem grubunu ise rekreasyon alanlarında etkinliklere katılan 585 erkek ve 555 kadın olmak üzere toplam 1140 gönüllü birey oluşturmuştur. Araştırmada veri toplama aracı olarak, “Merak ve Keşfetme II” (MKÖ II) ölçeği “Etkinlik Doyum Ölçeği” (EDÖ) ve “Yaşam Doyum Ölçeği” (YDÖ) kullanılmıştır. Elde edilen verilerin analizinde betimsel istatistik yöntemler, bağımsız örneklem t-testi, ANOVA ve basit korelasyon analizi yöntemleri kullanılmıştır. Ölçeklerin güvenirliklerini belirlemek için Cronbach Alpha iç tutarlık katsayıları hesaplanmıştır. Elde edilen bulgulara göre, “yaş”, “medeni durum” ve “eğitim durumu” değişkenlerinin tüm ölçek puanları arasında, “etkinliklere katılım yeri” değişkenine göre “EDÖ” ve “YDÖ”ne ilişkin toplam ortalama puanları arasında istatistiksel olarak anlamlı düzeyde bir farklılık olduğu tespit edilmiştir. Ölçekler arasında ilişkiye göre sadece “YDÖ”nin toplam ortalama puanları ile “EDÖ”nin toplam ortalama puanları arasında pozitif yönde ve düşük düzeyde istatistiksel olarak anlamlı bir ilişki olduğunu göstermiştir. Sonuç olarak, katılımcıların merak ve keşfetme, etkinlik doyumu, yaşam doyumu düzeylerinin çeşitli demografik özeliklerine göre farklılık gösterdiği ve etkinliklere katılım sıklığındaki artışa bağlı olarak, yaşam doyumu seviyelerinin artacağı söylenebilir.
Anahtar Kelimeler: Rekreasyonel alanlar, Merak ve keşfetme, Yaşam doyumu, Serbest zaman katılımı

* This study is based on his doctoral dissertation completed at Manisa Celal Bayar University Institute of Social Sciences.

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INTRODUCTION

The concept of curiosity, which is present in every moment of life from the day people come into the world to the day their lives end, is a phenomenon that leads them to make new discoveries, sail towards the unknown, and while doing so, to research, learn and be involved in some activities. It is a belief in ancient Hindu that Brahma claimed people would dig the deepest parts of the earth, they would learn to dive into the ocean and finally they would climb the highest mountains to achieve divinity (Persson & Bondke-Persson, 2017). In the literal sense, all the inventions, all the accomplishments and anything that is new have been achieved by the sense curiosity throughout the history. The sense of satisfaction and pleasure derived from life as a result of activities, which are one of the destinations of this journey of discovery, makes people feel physically and mentally well (Fox, 1999).

It is important to learn about the activities we encounter in our journey of discovery triggered by the sense of curiosity, the satisfaction obtained from these activities by people who want to use their leisure time in this direction, and the levels at which their life satisfaction is affected, in order to create a healthy, socially strong and happy society (Cho, 2020; Hawkins, Foose & Binkley, 2004). The fact that the activity areas where people who want to use their leisure time in line with their curiosity can spend this time should be at a level that can meet their needs and that the activities should be of high quality and tailored to the individual in order for them to experience the highest level of satisfaction from the activity makes the studies on this subject more valuable.

Curiosity is defined as the desire to understand the unknown with the desire to explore, the tendency to obtain new experiences and the state of desire and desire that gives pleasure (Kashdan & Steger 2007; Kashdan et al., 2009). It is also explained as a desire or desire to understand oneself and the environment one lives in, as well as the desire to research and gain new experiences about the events that take place in the environment (Demirel & Diker-Coşkun, 2009). Berlyne (1954), who has many studies in the field of psychology, examined curiosity under two headings as perceptual curiosity and epistemic curiosity, and epistemic curiosity was examined in two subscales as specific curiosity and diversive curiosity.

Berlyne (1954) defined the concept of perceptual curiosity as the state of acquiring new information through behaviors directed by emotional concepts (sight, smell, sound) in order to obtain new information about complex and uninterpretable objects or situations that develop with the increase of sensory perception along with impulsive perceptions. This sense of curiosity in humans and animals mobilizes the organism to obtain information (Renner, 2007). The concept of perceptual curiosity has created an explanatory situation in explaining exploratory behaviors in animals (Loewenstein, 1994). Epistemic curiosity, on the other hand, blends the restlessness resulting from lack of knowledge with the feeling of curiosity and tends to investigate new ideas and facts, and the resulting learning and discovery state reveals a relaxed and motivational state in people (Berlyne, 1954). The fact that it appears as a continuous problem-solving process until satisfactory answers are obtained to the questions asked in order to reach knowledge distinguishes it from perceptual curiosity and reveals that it

is a human-specific type of curiosity (Mittman & Terrell, 1964; Litman & Spielberger, 2003; Renner, 2007).

The physical and mental characteristics of people change in the world where change is constantly experienced between the past and the present. Within this change, recreational activities in leisure time have helped people to protect their physical and mental health (Demirel et al., 2017). While leisure time is defined as the time period that people use in the activities they are interested in, apart from meeting the basic biological needs necessary for the continuity of life with the time they spend on their work and occupations (McLean & Hurd, 2015; Veal, 1992), it is also defined as a time period in which people in the globalizing world have effects on obtaining a sense of success as well as getting pleasure and satisfaction in their leisure time (Chen et al., 2013).With the increase in leisure time, the number of activities that people are oriented towards has also increased rapidly. These activities are all kinds of social, physical, spiritual and mental activities that are done for a purpose, cannot be transferred to another person, have voluntary participation, revitalize the individual by giving happiness to the individual, on the basis of personal satisfaction, passive or active participation (Güngörmüş & Yenel, 2020). Recreation within leisure time is; Although it is a systematically prepared activity that people carry out with a sense of responsibility in their lives and enable them to get rid of the routine lifestyle they are dependent on, it is a phenomenon that provides the energy, enthusiasm and excitement required to overcome the difficulties that people may encounter in their lives, and also adds value to their lives and provides positive opportunities (Mclean & Hurd, 2015).

Participating in recreational activities to be happy, satisfied and satisfied has an important place in human life (Soyer et al., 2017). The feeling of satisfaction that people get from the activity they choose with their curiosity and desire to explore brings out the concept of life satisfaction. Myers and Diener (1995), while explaining the concept of life satisfaction, stated that it includes behaviors such as accepting the positive and negative characteristics of the person in their entirety, having positive feelings about their life, as well as setting goals and taking action to achieve these goals. For this reason, the contribution of leisure time activities to the increase in people's life satisfaction, such as the effect of individual development, is too important to be ignored (Benson, 1975; Hemingway, 1996).

Satisfaction with the experience of a sporting event as a leisure activity can help to identify its role in the development of physically active leisure. Specifically, prediction of event satisfaction, activity commitment and future practice intention would highlight the importance of service quality for organizations responsible for the provision of such experiential services. This information, combined with an understanding of motives, can help to identify the developmental capacity of events to promote positive attitude change. However, it should be examined whether this potential increase is observed among the least active members of a population or only among those already active. A useful way to examine this potential is to assess the level of physical activity participation (Funk et al., 2011).

When the literature is examined, it is noteworthy that there are few studies on curiosity and exploration, event satisfaction and life satisfaction. No study was found in which the relationship between these variables was examined. In this sense, filling the gap in the literature makes the study important. In line with this information, the aim of this study is to determine the curiosity and discovery, event and life satisfaction levels of individuals participating in activities in recreational areas and to compare them according to various demographic variables.

METHOD

Research Model

The research was designed according to the quantitative research model and conducted within the framework of the relational survey model. Since the relationships between dependent and independent variables affecting curiosity and exploration, activity satisfaction and life satisfaction were examined, the relational survey model was used. Relational survey model is a research model that aims to determine the existence and/or degree of change between two or more variables (Karasar, 2015).

Participants

The research aimed to obtain quantitative data from individuals participating in activities in recreation areas in Erzurum between 2018-2020. The research group of this study, which is based on the relational survey model, consists of a total of 1140 volunteer individuals, 585 men and 555 women, who participate in leisure activities in Erzurum metropolitan districts. The research group was determined using purposive sampling method, one of the non-probability sampling techniques. Purposive sampling allows the use of situations that are considered rich in information and allows for in-depth study (Yıldırım & Şimşek, 2000). In this sampling, criteria that are thought to be important for selection are determined. It is thought that the sample selected according to these criteria can represent the research universe with all its qualities (Tavşancıl & Aslan, 2001).

Data Collection Tools

In the study, the participants were asked to fill out a questionnaire form consisting of two different sections. In the first part of the questionnaire form, various questions including personal information of the participants were included. In the second part, the participants expressed their opinions about the statements in the "Curiosity and Exploration Inventory II" (CEI- II), ""Event Satisfaction Scale" (ESS) and "Life Satisfaction Scale" (LSS).

Curiosity and Exploration Inventory II; The scale developed by Kashdan et al., (2009) was adapted into Turkish by Akın (2012). The scale is a self-assessment scale that measures curiosity and exploration and consists of 10 items on a 5-point Likert scale (1= not at all suitable for me and 5= completely suitable for me). High scores indicate a high level of curiosity. There are no reverse scored items in the scale.

Event Satisfaction Scale: The scale, which was developed by Oliver (1980), adapted by Funk et al., (2011) and adapted into Turkish by Aydın et al., (2018), consists of three items to measure activity satisfaction. Each item is answered on a 7-point scale (1: Strongly Disagree - 7: Strongly Agree). The scale, which aims to measure activity satisfaction, is suitable for all ages from adolescents to adults.

Life Satisfaction Scale: It was developed by Diener et al., (1985) to determine the satisfaction of individuals with their lives. The scale consists of five items related to life satisfaction. Each item is answered on a 7-point scale (1: not at all appropriate - 7: very appropriate). The scale, which aims to measure general life satisfaction, is suitable for all ages from adolescents to adults. The scale was adapted into the Turkish language by Yetim (1991). A high score on the scale indicates a high degree of life satisfaction and a low score indicates a low degree of life satisfaction.

Ethical Approval

A letter of permission dated 05/12/2018 was obtained from Manisa Celal Bayar University Faculty of Medicine, Health Sciences Ethics Committee that the study was scientifically and ethically appropriate. At the beginning of the forms delivered to the individuals participating in the study, information about the confidentiality of the information and the purpose of the research was given.

Data Collection

Quantitative data were collected by applying scales for curiosity and exploration, event satisfaction and life satisfaction levels through one-on-one interviews by the researcher by giving information about the content of the study to visitors who were in rural and urban recreation areas of Erzurum city and who volunteered to participate in the study.
The data were answered by the participants within 10-15 minutes on average. The data were answered on a voluntary basis.

Data Analysis

At the end of the data collection process, a total of 1140 scales were transferred to the IBM SPSS 25 program and made ready for analysis. Then, the data obtained by using the SPSS program were evaluated. In the analysis of the data, Shapiro-Wilk test and skewness and kurtosis analysis methods were used to test the normality distribution. In determining the differences between variables, independent samples t-test for related samples, ANOVA and Simple Correlation tests were performed. Cronbach's Alpha analysis was applied to determine the reliability of the measurement tools. In the statistical analysis and interpretations of the data, $p<0.05$ significance level was taken into consideration.

Table 1. Distribution of scale scores

	N	Min.	Max.	Mean / SD	Skewness	Kurtosis	C. Alpha	Shapiro-Wilk
LSS	1140	1,20	6,60	4,17 / 0,67	0,39	1,27	0,77	0,97/0,00
ESS	1140	1,00	7,00	5,09 / 0,87	-0,74	1,87	0,73	0,95/0,00
CEI-II-Stretching	1140	1,60	4,60	3,32 / 0,43	-0,03	0,02	0,74	0,98/0,00
CEI-II-Embracing	1140	1,40	4,80	2,99 / 0,48	0,06	0,63	0,69	0,98/0,00
CEI-II Total	1140	2,10	4,60	3,15 / 0,35	0,18	0,54	0,81	

When the results of the Shapiro-Wilk test are analyzed, it is seen that there are deviations from normality in the total score of the ESS, the total score of the LSS, and the sub-dimension scores of the CEI ($p<0.01$). Since p values are less than $\alpha=0.05$, the variables are not normally distributed. However, when the skewness and kurtosis values are examined, it is observed that these values are in the range of ±1.87 for all score groups. According to Tabachnick and Fidell (2013), skewness and kurtosis values within the range of ±1.5 and according to George and Mallery (2010) within the range of ±2 are acceptable for normality. From this point of view, after examining the normal distribution curves and Q-Q distributions, it was decided to apply parametric statistical techniques for the analysis procedures for determining the relationship, considering that deviations from normality were not excessive.

When the mean scores of the participants in the study for the 2 subscales of the CEI are examined, it is seen that the factor with the highest mean is " Stretching " and the Cronbach Alpha internal consistency coefficient varies between 0.69 and 0.74 for the subscales of the scale. The Cronbach Alpha internal consistency coefficient of the total scale was calculated as 0.81. It was determined that the total mean score of the LSS was 4.17. The Cronbach Alpha internal consistency coefficient of the total scale was calculated as 0.77. In addition, the total mean score of the ESS was found to be 5.09. The Cronbach Alpha internal consistency coefficient of the total scale was calculated as 0.73.

FINDINGS

Table 2. T-test results of the research group according to marital status variable

Variable	Marital Status	N	Mean / SD	t	P
LSS	Single	414	4,29 / 0,72***	4,68	**0,00***
	Married	726	4,10 / 0,64		
ESS	Single	414	5,17 / 0,92*	2,29	**0,02***
	Married	726	5,05 / 0,83		
CEI-II-Stretching	Single	414	3,36 / 0,46***	2,82	**0,00***
	Married	726	3,29 / 0,41		
CEI-II-Embracing	Single	414	3,03 / 0,54*	2,49	**0,01***
	Married	726	2,96 / 0,45		

***p<0.05, **p<0.01, ***p<0.001**

When Table 2 is analyzed, it is seen that the participants' "LSS" [$t_{(1138)}= 4.68$; $p=0.00<0.05$] and the total mean scores of "ESS" with [$t_{(1138)}= 2.29$; $p=0.02<0.05$] and "Stretching" of "CEI" [$t_{(1138)}= 2.82$; $p=0.00<0.05$] and "Embracing" [$t_{(1138)}= 2.49$; $p=0.01<0.05$] sub-dimension mean scores showed a significant difference according to the "marital status" variable. In the total mean scores and subscales of the scale in which a significant difference was detected, the scores of the "single" participants were statistically significantly higher.

Table 3. ANOVA test results of the research group according to age variable

Variable	Age	N	Mean / SD	F	p	Difference
LSS	25 ≥ Age [1]	274	4,36 / 0,79***	11,19	**0,00***	1>2, 1>3, 1>4, 1>5, 2>5, 3>5
	26-35 Age [2]	285	4,18 / 0,65***			
	36-45 Age [3]	233	4,15 / 0,63***			
	46-55 Age [4]	172	4,12 / 0,52			
	56 ≤ Age [5]	176	3,94 / 0,59			
ESS	25 ≥ Age [1]	274	5,28 / 0,99***	5,46	**0,00***	1>2, 1>4, 1>5
	26-35 Age [2]	285	5,08 / 0,86			
	36-45 Age [3]	233	5,08 / 0,80			
	46-55 Age [4]	172	4,97 / 0,81			
	56 ≤ Age [5]	176	4,95 / 0,75			
CEI-II-Stretching	25 ≥ Age [1]	274	3,40 / 0,46***	4,23	**0,00***	1>4, 1>5
	26-35 Age [2]	285	3,31 / 0,41			
	36-45 Age [3]	233	3,32 / 0,41			
	46-55 Age [4]	172	3,25 / 0,41			
	56 ≤ Age [5]	176	3,26 / 0,45			
CEI-II-Embracing	25 ≥ Age [1]	274	3,08 / 0,56***	4,85	**0,00***	1>2, 1>3, 1>5
	26-35 Age [2]	285	2,94 / 0,49			
	36-45 Age [3]	233	2,96 / 0,45			
	46-55 Age [4]	172	3,02 / 0,44			
	56 ≤ Age [5]	176	2,91 / 0,42			

***p<0.05, **p<0.01, ***p<0.001**

When the results of the analysis were analyzed, the total scores of the participants regarding the LSS showed a significant difference according to the "age" variable [$F_{(4-1135)}$= 11.19; p=0.00< 0.05]. According to the results, it was determined that there was a significant difference between the scores of the participants in the "25 ≥ age" group and the scores of the participants in the other four age groups and between the scores of the participants in the "56 ≤ age" group and the scores of the participants in the "36-45 age" and "46-55 age" groups. The total mean scores of the participants in the "25 ≥ age" group were statistically significantly higher than the scores of the participants in the other four groups, while the total mean scores of the participants in the "56 ≤ age" group were statistically significantly lower than the scores of the participants in the "36-45" and "46-55" age groups.

The total scores of the participants on the ESS showed a significant difference according to the "age" variable [$F_{(4-1135)}$= 5.46; p=0.00< 0.05]. According to the results, it was determined that there was a significant difference between the total mean scores of the participants in the "25 ≥ age" group and the scores of the participants in the "26-35 years", "36-45 years" and "56 ≤ age" groups, and that the total mean scores of the participants in the "25 ≥ age" group had a statistically significant higher mean than the participants in the other three groups.

The mean scores of the research group in the " Stretching " sub-dimension of the CCQ showed a significant difference according to the "age" variable [$F_{(4-1135)}$= 4.23; p=0.00<0.05]. According to the results, it is seen that there is a significant difference between the mean scores of the participants in the "25 ≥ age" group and the scores of the participants in the "46-55 years" and "56 ≤ age" groups, and the mean scores of the participants in the "25 ≥ age" group regarding

the " Stretching " sub-dimension are statistically significantly higher than the participants in the other two groups.

It is seen that there is a significant difference in the mean scores of the " Embracing " sub-dimension of the CEI according to the "age" variable [$F_{(4-1135)}$= 4.85; p=0.00<0.05]. According to the results, it was determined that there was a significant difference between the mean scores of the participants in the "25 ≥ age" group and the scores of the participants in the "26-35 years", "46-55 years" and "56 ≤ age" groups and that the mean scores of the participants in the "25 ≥ age" group regarding the " Embracing " sub-dimension were statistically significantly higher than the participants in the other three groups.

Table 4. T-test results of the research group according to the place of participation in the activities

Variable	place of participation in activities	N	Mean / SD	t	P
LSS	Urban areas	1043	4,19 / 0,67***	2,74	**0,00***
	Rural areas	97	3,99 / 0,64		
ESS	Urban areas	1043	5,11 / 0,85*	2,14	**0,03***
	Rural areas	97	4,91 / 0,98		
CEI-II-Stretching	Urban areas	1043	3,31 / 0,43	-0,39	0,69
	Rural areas	97	3,33 / 0,43		
CEI-II-Embracing	Urban areas	1043	2,99 / 0,49	-0,03	0,97
	Rural areas	97	2,99 / 0,43		

***p<0.05, **p<0.01, ***p<0.001**

According to the data in Table 4, the total mean scores of the participants' "LSS" [$t_{(1138)}$= 2.74; p=0.00<0.05] and "ESS" [$t_{(1138)}$= 2.14; p=0.03<0.05] showed a significant difference according to the "place of participation in activities" variable. In the total mean scores of the scale where a significant difference was found, the scores of those who participated in the activities in "urban areas" were statistically significantly higher. In addition, it was concluded that the " Stretching " [$t_{(1138)}$= -0.39; p=0.69>0.05] and " Embracing " [$t_{(1138)}$= -0.03; p=0.97>0.05] subscales of the "CEI" did not show a significant difference according to the "place of participation" variable.

Table 5. The results of the analysis of the relationship between CEI and event and life satisfaction of the research group

	LSS	ESS	CEI-II-Stretching	CEI-II-Embracing
LSS	1	0,139**	0,079**	0,053
ESS		1	0,032	0,004
CEI-II-Stretching			1	0,134**
CEI-II-Embracing				1

***p<0.05, **p<0.01, ***p<0.001**

The results of the simple correlation analysis showed that there was a positive and low level statistically significant relationship only between the total mean scores of the LSS and the total mean scores of the ESS.

DISCUSSION and CONCLUSION

The results of the study showed that the participants' total mean scores of the "LSS" and "ESS" and the mean scores of the " Stretching " and " Embracing " subscales of the "CEI" showed a significant difference according to the "marital status" variable. In the total mean scores and subscales of the scales where a significant difference was found, the scores of "single" participants were statistically significantly higher. When the related field studies are examined, it is frequently found that married individuals have higher levels of life satisfaction. Ünal et al., (2001) stated in their study that married physicians had higher life satisfaction levels than single physicians. Kaydemir et al., (2005) found that marital happiness increased overall happiness and life satisfaction, while problematic marriages and incompatible marriages negatively affected mental and physical health. Çetinkaya (2004) emphasized that marital status affects life satisfaction and concluded that marital status has a positive effect on life satisfaction.

Yılmaz and Aslan (2013) examined teachers' life satisfaction and loneliness at work and found that life satisfaction showed a significant difference according to gender variable. Botha and Booysen (2013) examined the relationship between marital status and life satisfaction in South Africa. As a result of the research, they found that married individuals had higher life satisfaction. Diener et al., (1999) stated that married individuals have higher levels of happiness than unmarried individuals. There are studies indicating that marriage does not make a difference on life satisfaction. Yetim (1991) stated in his study that being married does not have a significant effect on an individual's life satisfaction. Similarly, Taş (2011) stated that there was no significant difference between marital status and life satisfaction in a study conducted on teachers. These studies are not similar to our research results. In our study, the higher life satisfaction of single individuals compared to married individuals can be explained by the fact that they have a hopeful expectation for the future and the sense of responsibility they undertake is lighter than married individuals, considering the age factor as well as social and cultural phenomena. Considering that young individuals are mostly single according to health status, the fact that their life satisfaction is higher is another issue that should be emphasized. In their study, Lubetkin et al., (2005) stated that quality of life scores decreased in older age groups, people with low-income levels and people with conditions such as diabetes, asthma and heart disease.

Say (2015) found that there was no statistically significant difference in the subscales of curiosity, Stretching and Embracing according to the marital status variable. Bahadır and Certel (2013) concluded in their study that the curiosity levels of single teachers were higher than married teachers. The high curiosity and exploration levels of single individuals are similar to our research findings. This situation can be said to be closely related to the energy of youth and the desire to explore and discover the unknown. When the research data are analyzed, the total scores of the participants regarding the LSS showed a significant difference according to the "age" variable. According to the results, it is seen that the total average scores of the participants in the "25 ≥ age" group are statistically significantly higher than the scores of the participants in the other four groups, and the scores of the participants in the "36-45 years" and "46-55 years" groups are statistically significantly higher than the total average scores of the participants in the "56 ≤ age" group.

Çevik and Korkmaz (2014) stated in their study that life satisfaction decreases with aging. Similarly, Sarıdemir (2015) concluded that life satisfaction decreases with increasing age. These studies are in line with our research results. Dockery (2003) reported in his study that youth energy and high expectations are effective in the high life satisfaction of young people. There are also studies indicating that life satisfaction does not change according to age variable. Latten (1989) found in his study that there is no specific age period in which individuals have low or high life satisfaction. Similarly, Kıvılcım (2014) stated in his study that life satisfaction levels did not differ significantly among the age groups formed. Apart from these studies, studies indicating that life satisfaction increases with aging have also been encountered. Ünal et al., (2001) found that individuals aged 40 years and older had higher life satisfaction than younger individuals. Daig et al., (2009) stated that life satisfaction did not differ in older people compared to other age groups. Heisel and Flett (2004) concluded that life goals are associated with high life satisfaction.

It was determined that the mean scores of the participants in the "25 ≥ age" group in the " Stretching " sub-dimension were statistically significantly higher than the participants in the "46-55 years" and "56 ≤ age" groups, and the mean scores of the participants in the "25 ≥ age" group in the " Embracing " sub-dimension were statistically significantly higher than the participants in the other three groups. In parallel with our research findings, Bahadır and Certel (2013), in a study conducted to determine the curiosity levels of teachers, observed that teachers between the ages of 23-30 were more curious than teachers between the ages of 31-40. Say (2015) concluded in his study that secondary school teachers' sense of curiosity did not show a statistically significant difference according to the age variable. In his study, Dindar (2018) stated that there was no significant difference in the sub-dimension of acquiring knowledge and controlling knowledge, while there was a significant difference in the self-confidence sub-dimension at the age of 23 and above. It was determined that the total mean scores of the participants in the "25 ≥ age" group regarding ESS were statistically significantly higher than the participants in the other three groups. When the research findings are evaluated together, we can say that the life satisfaction, curiosity and exploration levels of young individuals and the satisfaction they derive from activities are higher, while the level of curiosity, satisfaction with life and activities decreases with some problems that arise due to aging. The reason for this situation may be that young individuals are more open to innovations and more active in social life, have better health conditions and participate in recreational activities more than older individuals.

According to the research data, the total mean scores of the participants in the "LSS" and "ESS" showed a significant difference according to the variable of "place of participation in the activities". In the total mean scores of the scales where a significant difference was found, the scores of those who participated in the activities in "urban areas" were found to be statistically significantly higher. It was concluded that the " Stretching " and " Embracing " subscales of the "CEI" of the participants did not show a significant difference according to the "place of participation in activities" variable. Gümüş and Koç (2019) examined the psychological well-being of individuals according to their frequency of participation in parks and recreation areas in their study titled "recreation area preference and psychological well-being" and stated that although it was not significant, the psychological well-being of the participants changed

positively as the frequency of participation in parks and recreation areas increased. Today, many recreation areas built in urban areas stand out. Fresh air, green environment, and open space activities, which are the attractive features of rural areas, have started to move to city centers. In this direction, in the city of Erzurum, which is our research area, the increase in parks, gardens and recreation areas in recent years has caused the people of the city to spend more time in urban areas. It can be said that the sports halls, open fields, ski centers and indoor sports complexes built for winter sports in Erzurum, where the winter months are severe and long-lasting, increase the life satisfaction of the city's people in parallel with our research findings.

Kueh and Voon (2007) stated that the quality of a product or service is among the expectations of individuals when choosing a product or service, and that service quality expectations are positively related to uncertainty avoidance and long-term orientation. In this direction, the fact that the sports facilities built in Erzurum are qualified enough to meet the Winter Olympics has also increased the satisfaction levels of the people of the city. The results of the simple correlation analysis showed that there was a positive and low level statistically significant relationship only between the total mean scores of the LSS and the total mean scores of the ESS. Based on this result, we can say that as the satisfaction obtained from the activities increases, life satisfaction will also increase. Aydın et al., (2018), in their study to determine the effect of personality, interest and general satisfaction obtained from the activity on life satisfaction of individuals participating in a fitness program as a leisure time activity, found that extroverted personality trait has a direct positive effect on interest, activity satisfaction and life satisfaction. They also stated that interest and general activity satisfaction have a direct positive effect on life satisfaction, personality traits affect consumers' purchasing behavior and make a significant difference on activity satisfaction, which in turn affects their life satisfaction. Gürbüz and Gücal (2020) stated that the selection of personnel who are experts in their field, have high education quality and communication skills directly affects customers' perception of service quality, and as the frequency of participation of customers increases, their loyalty to the business increases and cognitive loyalty occurs. As a result of the research conducted by Sümbül et al., (2019) on people participating in nature sports, they stated that individuals with a high tendency to curiosity and exploration may differentiate their life orientation and consequently increase the life satisfaction level of the individual.

As a result, it was concluded that the participants felt their health status was generally good, their welfare level and leisure time duration were normal, they sometimes had difficulties in evaluating their leisure time, they spent their leisure time mostly in urban areas and participating in domestic activities, and they found recreation areas partially sufficient, It is seen that they get information about recreational areas by someone's recommendation, leisure time is considered as a time of rest and entertainment, the main reasons that lead them to recreational activities are the desire to be with friends, work efficiency and the idea of getting rid of monotony, and leisure time activities are more effective in solving social and cultural problems.

RECOMMENDATIONS

Considering the limitations of our research and the limitation of the sample section, it can be said that generalization cannot be made in terms of other provinces since this study was conducted in Erzurum city center. In order to evaluate the results in general, research on curiosity and exploration, event satisfaction and life satisfaction of individuals participating in activities in recreation areas in different cities will make positive contributions to the literature. In our research, curiosity and exploration, event satisfaction and life satisfaction scales were used. Considering the existence of many factors that can change the direction of the research in social sciences research, it is envisaged that using different scales in scientific studies from different perspectives can expand the results of the research.

Considering that the research was conducted in a certain period of time and that urbanization is developing rapidly with technological developments, it is important to conduct similar studies at certain time intervals. In this way, local governments and private enterprises can develop projects and services in line with the needs. Given that individuals choose different activities according to their personality traits, local institutions and private organizations planning wellness initiatives should offer or sponsor a variety of activities and programs so that individuals can maximize the benefits derived from physically active leisure time.

Married individuals should be directed to a number of activities and events that will increase their life satisfaction. These activities can be various games and activities that will bring couples closer to each other, strengthen the bond between them, and create a sense of achievement together. While organizing these games and activities, the cultural structure of the people should be taken into consideration and directing these people to activities such as folk dances will increase their life satisfaction.

Measures should be taken to organize recreational activities that provide health and fitness for elderly individuals and to ensure that these individuals have easy access to these areas, leisure of charge, together with trainers and adapted exercise programs adapted to age. In this sense, recreation leaders can be employed. Considering that physical activities both trigger the desire for curiosity and discovery and contribute positively to life satisfaction, public awareness-raising and encouraging activities should be emphasized.

Since individuals with high levels of curiosity and discovery prefer touristic activities and state that leisure time activities provide social and cultural benefits, culture and tourism enterprises should take measures to this end. In this direction, by organizing cultural trips, the socialization opportunities of individuals within a touristic trip will increase.

The curiosity and exploration levels of individuals who stated that recreation activities relax and increase work efficiency were found to be higher. Based on this result, employers in the public and private sectors should organize recreational activities for their employees and their families or direct their employees to these areas, which will lead to positive results in terms of job performance. In order for recreational areas to meet the expectations of the public, the

opinions and suggestions of experts such as recreation managers should be consulted when designing and planning these areas.

Increasing the number of walking and cycling paths will provide a suitable environment for a healthy life and will contribute positively in terms of costs. Implementing walking and cycling school bus programs, especially for educational institutions, will eliminate the security problem and ensure that physical activities are included in life from an early age. The lack of thermal facilities in the city, which is rich in geothermal resources, is striking. In order to revitalize thermal and health tourism, facilities that can attract tourists in the modern sense should be built.

Areas designed for physical activity should be closed and heated, taking into account winter conditions. In this way, continuity will be ensured in the transitions between seasons and distraction from activities will be prevented. The city center should be cleared of traffic as much as possible and areas suitable for walking should be created.

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Milli Bocce Sporcularında Dört Haftalık Solunum Kası Antrenmanının Solunum Kas Kuvveti, Fonksiyonları ve Performansa Etkisi*

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Öz

Bu çalışmanın amacı dört haftalık solunum kası antrenmanlarının (SKA) erkek bocce volo basamak sporcularında solunum fonksiyonları, solunum kas kuvveti ve basamak oyunundaki atış-isabet oranına etkisinin araştırılmasıdır. Çalışmaya gönüllü olarak 10 antrenman ve 8 kontrol olmak üzere toplam 18 erkek milli bocce volo basamak sporcusu katıldı. Katılımcıların spirometre cihazı ile solunum fonksiyonları ve solunum kas kuvveti ölçülerek kaydedildi. Optojump cihazı ile anaerobik performans, Yo-Yo IRT1 ile aerobik performansları test edildi. Antrenman grubuna POWERBreathe® cihazı ile dört hafta boyunca SKA uygulanırken, kontrol grubu rutin basamak antrenmanına devam etti. Uygulama sonrası tüm ölçümler tekrarlandı ve kaydedildi. Elde edilen bulgulara göre; antrenman grubuna uygulanan solunum kası antrenmanı sonrası solunum fonksiyonlarının FEV1/FVC, FEF%25-75 ve MVV değerlerinde istatistiksel olarak anlamlı bir farklılık görülmedi ($p>0,05$). Diğer yandan solunum fonksiyonlarının FVC, FEV1 değerlerinde ve solunum kas kuvveti MIP, MEP değerlerinde anlamlı bir farklılık görüldü ($p<0,05$). Benzer şekilde antrenman grubunda aerobik, anaerobik performans ve basamak oyunu atış-vuruş sayısını da anlamlı ölçüde artırdığı görüldü ($p<0,05$). Sonuç olarak bocce basamak sporcularında SKA'nın; FVC, FEV1 MIP, MEP değerlerinde, aerobik ve anaerobik performansta aynı zamanda atış vuruş sayısının artışında etkili olduğu gözlemlendi.
Anahtar kelimeler: Bocce volo, Solunum değerleri, Solunum kası antrenmanı, POWERBreathe

The Effect of Four-Week Respiratory Muscle Training in Respiratory Muscle Strength, Functions, and Performance on National Bocce Volo Players

Abstract

The aim of this study was to investigate the effects of four-week respiratory muscle training (RMT) on respiratory functions, respiratory muscle strength, and shot-to-hit ratio in the progressive discipline in male progressive athletes. 10 training group participants and 8 control group participants a total of 18 male national bocce athletes were included in the study. The participants' respiratory functions and muscle strength were measured and recorded with the Spirometer device. Anaerobic performance was tested with the Optojump device, and aerobic performance was tested with the Yo-Yo IRT1. The control group continued their routine progressive training while RMT was applied to the training group with the POWERBreathe® device for four weeks. After the application, all measurements were repeated and recorded. According to the findings obtained, after the respiratory muscle training was applied to the training group, there was no statistically significant difference in the respiratory functions FEV1/FVC, FEF%25-75, and MVV values ($p>0.05$). On the other hand, a significant difference was observed in the FVC, FEV1 values of respiratory functions, and respiratory muscle strength MIP and MEP values ($p<0.05$). Similarly, it was observed that aerobic, anaerobic performance and progressive shot number increased significantly in the training group ($p<0.05$). As a result, RMT in bocce progressive athletes showed that FVC, FEV1, MIP, and MEP values were effective in aerobic, anaerobic performance and increased the number of shots.
Keywords: Bocce volo, Respiratory functions, Respiratory muscle training, POWERBreathe

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GİRİŞ

Bocce, metal topu elle atarak palino adı verilen hedef topa yaklaşma veya bir hedef topu vurmaya programlı, kökeni çok eski zamanlara dayandığı bilinen rekabete dayalı bir spor dalıdır (Türkmen, 2011). Bocce, rekreasyonel bir amacı olmakla beraber fiziksel ve zihinsel zorluk barındıran ve kadın erkek her yaş grubuna hitap eden bir branştır (Pagnoni, 2010). Son zamanlarda popülaritesinin artmasıyla beraber, merak uyandıran bocce kendi içinde çeşitli disiplinlere ayrılır. Bunlar; petank, volo, raffa ve çim topudur (Türkmen, 2011). Bocce'nin volo disiplini altında yer alan basamak branşı beş dakika boyunca mekik koşusuna benzer nitelikler taşıyan, yüksek tempoyla yapıldığından dolayı dayanıklılığın ön plana çıktığı bir spor dalıdır (Türkmen, 2011). Öte yandan egzersiz ihtiyaçlarını karşılayabilmek ve devamını sağlayabilmek için gerekli olan oksijen (O_2) seviyesi, yüksek yoğunluklu egzersiz esnasında kasların O_2 ihtiyacından dolayı artmaktadır. Solunum sisteminin bu ihtiyacı karşılayabilmesi fizyolojik uyum göstermesi ile mümkün olabilir (Åstrand vd., 2003). Solunum aktif bir olaydır ve ilgili en büyük kas diyaframdır. Bu sebeple sporcular, özellikle yoğun egzersiz esnasında diyafram yorgunluğundan ötürü nefes darlığı yaşarlar ve bu da egzersiz performanslarının düşmesine neden olabilir. Solunum kaslarını geliştirmeye yönelik gerçekleştirilen antrenmanlar, egzersizden kaynaklı yorgunluk oluşma sürecini geciktirerek performansın daha etkili ortaya konmasını sağlayabilir (Romer ve Polkey, 2008). Solunum kası antrenmanları egzersiz sırasında solunum yoğunluğunu mümkün olan en az seviyeye düşürmek (Rozek-Piechura vd., 2020) solunum kaslarının kuvvetini ve aynı zamanda dayanıklılık kapasitesini arttırarak performansı geliştirmek amacıyla tasarlanmıştır (Sheel, 2002). Aerobik performansın solunum sistemi üzerine etkilerini ortaya koyan pek çok çalışma olmakla birlikte (Amann, 2012; Amonette ve Dupler, 2002) dayanıklılık gerektiren spor branşlarında solunum kaslarının egzersiz sırasında yorgunluğa karşı koyabilme yeteneği önem taşımaktadır (Dinardi vd., 2013). Profesyonel kürek sporcularına 4 hafta süren ve günde 2 kere maksimal inspirasyon basıncı (MIP)'in %50'sine ayarlanarak yaptırılan SKA'nın aerobik performansı olumlu seviyede etkilediği ortaya konulmuştur (Griffiths ve McConnell, 2007). Aerobik performansa olumlu etkisinin yanında SKA'nın benzer şekilde anaerobik performansa olan etkilerine de literatürde rastlamak mümkündür. Bazı araştırmalar profesyonel bisiklet sporcularına MIP'in %50'si ayarlı günde 2 kez ve 6 hafta devam eden SKA'nın, anaerobik çalışma kapasitesini 5 kJ (kilojoule) artırarak, katılımcıların daha yüksek güç çıkışlarını koruyabildiğini ortaya koymuşlardır (Johnson vd., 2007). Günümüze kadar yapılan bazı çalışmalar, SKA'nın yüzme (Kilding vd., 2010), bisiklete binme (Johnson vd., 2007), kürek çekme (Volianitis vd., 2001) veya koşu (Faghy ve Brown, 2017; Lomax vd., 2011) gibi farklı branşlarda performansı iyileştirdiğini ve artan hayati kapasite ve azalan rezidüel hacim gibi pulmoner fonksiyonda değişiklikler meydana getirdiğini göstermiştir (Esposito vd., 2010). Sporcuların performans düzeylerinin ortaya konabilmesi için aerobik ve anaeobik düzeylerinin tespiti önem taşımaktadır. Bir sporcunun, enerji üretiminde kullanılan ATP depolarını yeniden doldurma hızı, kişinin hem aerobik kapasitesi hem de maksimum oksijen tüketimi hızıyla ilişkilidir (Matwejew, 2004). Performans değerlerini ortaya koyabilmek adına aerobik kapasite ölçümünde Yo-Yo IRT 1 (Yo-Yo aralıklı toparlanma testi seviye 1) geçerliliği ve güvenirliği kanıtlanan bir saha testidir (Krustrup vd., 2006). Anaerobik kapasite ölçümünde dikey sıçrama testi literatürde kabul gören bir testtir (Özkara, 2004). Solunum kas kuvveti maksimal inspirasyon basıncı (MIP), maksimal ekspirasyon basıncı (MEP) ile ifade edilmektedir (Lomax ve McConnell, 2009). Solunum fonksiyon değerleri FVC (zorlu vital kapasite), FE V1 (zorlu

ekspirasyonun ilk saniyesindeki hava hacmi), FEF%25-75 (zorlu ekspirasyonun ortasındaki akım hızı), MVV (maksimum solunum kapasitesi) ile ifade edilmektedir (Mannino vd., 2003). Literatür incelendiğinde SKA'nın bocce branşındaki sporcuların solunum fonksiyonları, solunum kas kuvveti, aerobik ve anaerobik performans düzeyleri, basamak disiplinindeki müsabaka atış/vuruş sayılarına nasıl etki edeceğini gösteren bir çalışmaya rastlanmamıştır. Dolayısıyla bu çalışmanın amacı erkek bocce volo basamak sporcularında dört haftalık solunum kası antrenmanlarının solunum fonksiyonları, solunum kas kuvveti ve basamak oyunundaki atış-isabet oranına etkisini ortaya koymaktır.

METOT

Araştırma Modeli

Araştırma antrenman- kontrol gruplarının kullanıldığı, ön test ve son test ölçümlerden oluşan ve randomize kontrollü çalışma tasarımının kullanıldığı deneysel bir araştırmadır.

Evren-Örneklem

Araştırmaya Türkiye adına daha önce yarışmış erkek milli bocce sporcuları dahil edildi. Belirlenen katılımcı sayısı 10 antrenman 10 kontrol olmak üzere 20 sporcudur. Ancak daha sonrasında sakatlık nedeniyle 2 sporcu araştırma dışı bırakılarak çalışma 18 katılımcıyla tamamlanmıştır. Çalışmaya dahil edilecek bireyler belirlenirken antrenman yaşı 5 yılın üzerinde olan, solunum hastalığı bulunmayan, bocce volo disiplininde yarışıp milli olan sporcular değerlendirilmiştir.

Tablo 1. Katılımcıların fiziksel özellikleri (n=18)

	Grup				t testi	
	Antrenman		Kontrol			
	Ort.	SS	Ort.	SS	t	p
Yaş (yıl)	21,70	3,50	20,10	3,78	0,982	0,339
Boy (cm)	177,00	4,40	176,50	8,50	0,165	0,871
Ağırlık (kilogram)	73,40	11,98	68,80	7,57	1,026	0,318
VKİ (kg/m2)	23,48	4,06	22,10	2,26	0,94	0,36
VYO (%)	14,64	5,19	13,73	3,36	0,466	0,647

VKİ: vücut kütle indeksi, VYO: vücut yağ oranı, t=bağımsız örneklemler t testi

Veri Toplama Araçları

Deneysel Tasarım

Bu tez çalışması, Eryaman Türkiye Olimpiyat Hazırlık Merkezi'nde gerçekleştirildi. Katılımcıların boy, kilo,yağ yüzdesi ölçümleri yapıldıktan sonra uyum seanslarına alındılar. Bu seanslarda her bir katılımcıya solunum fonksiyonları testlerinde nefes kontrollerinin nasıl yapılacağı detaylı bir şekilde açıklandı. Anaerobik kapasite ölçümünde dikey sıçrama testi ve aerobik kapasite ölçümü için Yo-Yo test protokolü anlatıldı (Tablo 2).

Tablo 2. Çalışmanın akış şeması

1.	**Uyum seansı**	Solunum testleri uygulama anlatımı Sporcu Bilgi Anketi Bilgilendirilmiş Gönüllü Olur Formu	+	Dikey sıçrama ve Yo-Yo testi anlatımı
2.	**Uyum seansı (Antrenman Grubu)**	Solunum kas antrenmanı anlatımı ve POWERBreathe cihazı tanıtımı		
1.	**Ön Test Günü**	Basamak koşusu		
2.	**Ön Test Günü**	Solunum fonksiyonları Solunum kas kuvveti ölçümü	+	Dikey sıçrama ve Yo-Yo aerobik kapasite ölçümü
1.	**Son Test Günü**	Basamak koşusu		
2.	**Son Test Günü**	Solunum fonksiyonları Solunum kas kuvveti ölçümü	+	Dikey sıçrama ve Yo-Yo aerobik kapasite ölçümü

Vücut Kompozisyon Değerlindirmesi

Boy uzunluğu ölçümleri laboratuvar tipi bir ölçüm cihazı olan Seca boy ölçer kullanılarak gerçekleştirildi (Seca 213, USA). Biyoelektrik impedans analizi, vücuda hissedilmeyecek kadar düşük düzeyde elektrik akımı verilerek, vücudun bu akıma gösterdiği direnci (impedans) ölçen bilgi üretme temelli bir doku ölçüm yöntemidir (Mikkola vd., 2020).

Solunum Fonksiyon Testleri

Solunum fonksiyon testi (SFT) belirli bir zaman içinde aldığı ve verdiği havanın hacmi ile akışını bildiren fizyolojik bir testtir. Spirometre genel solunum durumunun değerlendirilmesinde kullanılan en önemli cihazlardan biridir (Miller vd., 2005). Bu test sporcuların solunum parametrelerinin değerlendirilerek, var olabilecek solunum sistemi problemlerini ortaya koymak amaçlanmaktadır. Sporcuların solunum fonksiyonu ve solunum kas kuvveti dijital spi-rometre (Pony FX Cosmed, Italy) ile değerlendirildi. Sporcular test öncesi ne yapmaları gerektiği hakkında bilgilendirildi. Sporcular test uygulanırken rahat pozisyona geçtiler. Test esnasında sonucun etkilenmemesi adına sporcunun burnu mandalla kapatıldı ve spirometre ağızlığını tamamıyla kenarlarda boşluk kalmayacak şekilde dudaklarıyla kapatmaları istendi. Spirometre ağızlığı takılıyken solunum manevraları uygulanarak testler yapıldı.Sporculara teste adaptasyon sağlayabilmeleri ve test sonuçlarını doğru alabilmek adına test öncesinde deneme yaptırıldı. Her test üç kez uygulanarak en iyi ölçüm skoru kullanıldı ve test tamamlandı (Giatsis vd., 2004). Sporcuların solunum fonksiyonlarını değerlerini saptamak için zorlu vital kapasite manevrası ve maksimal dakika ventilasyon testi kullanıldı (Lomax ve McConnell, 2009). Zorlu vital kapasite manevrası sırasında sporcudan önce derin bir nefes alması, nefesini alabildiği son noktada tutması ve ardından akciğerindeki tüm havayı hızlı, kuvvetli bir şekilde üflemesinden sonra en son noktada tekrar derin bir nefes alması istendi (Lomax ve McConnell, 2009). Test sonucunda elde edilen değerler; zorlu vital kapasite (FVC), 1. saniye zorlu ekspirasyon hacmi (FEV1), FEV1/FVC, ve zorlu ekspirasyon ortası akım hızı (FEF25-75) kaydedildi (Lomax ve McConnell, 2009). Maksimal dakika ventilasyon (MVV) testi uygulamasında sporcuya 12 saniye sürecek şekilde derin, kuvvetli ve hızlı bir biçimde arka arkaya nefes alıp vermesi söylendi. Test sonunda ise yaptırılan uygulamanın solunumsal alkaloza sebep olmasını önlemek adına sporcunun birkaç saniye nefesini tutması istendikten sonra MVV değeri elde edildi ve kaydedildi (Hall ve Guyton, 2001). Solunum kaslarının kuvvet değerlerini saptamak adına maksimum inspiratuar basınç (MIP) ve maksimum ekspiratuar basınç (MEP) testleri uygulandı. MIP testi için sporcunun öncelikle akciğerinde var olan tüm havayı boşaltması, ardından derin ve şiddetli bir tam nefes alması; MEP testi için akciğerlerinin tümünü havayla

doldurup ardından akciğerlerindeki havayı tamamen boşaltması; takiben derin, ve şiddetli bir tam nefes alması istenerek sonuçlar kaydedildi (Lomax ve McConnell, 2009).

Yo-Yo Aralıklı Toparlanma Testi (Yo-Yo IRT 1)

Katılımcıların aerobik kapasite düzeylerini ölçmek için Yo-Yo IRT 1 testi uygulandı. Test öncesi test esnasında yapmaları gerekenler hakkında bilgilendirme yapıldı. Katılımcılardan her bir koşu esnasında bip sesini duymadan önce belirlenmiş olan başlangıç ve bitiş çizgisine ulaşarak çizgilerde beklemeleri söylendi. Tükenme noktasına gelindiğinde veya iki defa bip sesini belirlenen sürede yetişememesi durumunda test sonlandırıldı (Castagna vd., 2006).

Dikey Sıçrama ve Anaerobik Güç Testi

Dikey sıçrama testinde OptoJump cihazı kullanıldı. Test eller belde ayaklar birbirine paralel ve dizleri minamal düzeyde kırarak dik bir şekilde yerle en az temas süresini sağlayarak mümkün olduğunca zıplayabileceği en yükseğe sporcuyu sıçratarak yaptırıldı. Katılımcı testi iki defa tekrarlamış ve en iyi sıçrama yüksekliği optojump ekranında bakılarak cm cinsinden yazılmıştır.

Solunum Kası Antrenmanları

Antrenman grubuna (10) POWERBreathe cihazı ile uygulanan antrenman tipik olarak, günde iki kez 30 kez tekrarlanan, bireyin maksimum inspiratuar ağız basıncının (MIP) ~%50'sinde açılacak şekilde ayarlanmış kapalı bir cihaza karşı nefes alıp vermeyi içerir. Antrenman grubuna SKA için, 10-250 cmH2O basınç ayarlı, farklı kademelere sahip POWERBreathe® Classic HR (IMT Technologies Ltd. Birmingham, UK) cihazı kullanıldı. POWERBreathe® cihazı MIP değerinin %50'sine (Nepomuceno Júnior vd., 2016) ayarlanarak haftalık bir kademe (10 cmH2O) (McConnell ve Romer, 2004) artırımla beraber sabah ve akşam aynı antrenman saatinde olması sağlanarak haftada 5 gün tekrarlanarak günde 2 kez yapılan antrenman 4 hafta boyunca sürdürüldü (Nepomuceno Júnior vd., 2016). Her antrenman biriminde sporcu 30 adet soluk alıp verdi ve günde 60 solunum döngüsüne ulaştı. Antrenman grubu SKA yaparken kontrol grubu çalışmadan önce belirlenen rutin basamak antrenman programını uygulamaya devam etti.

Verilerin Analizi

Bu çalışmada elde edilen istatistik analizler için SPSS 25.0 kullanıldı. Shapiro-wilk testi ile normal dağılış kontrolü yapıldı. Verilerde normal dağılış ile ilgili bir problem gözlenmedi. Veriler normal dağılım gösterdiğinden dolayı tekrarlayan ölçümler için varyans analiz yöntemi kullanıldı. Repeated Measure Anova yöntemiyle ön test – son test farkı, gruplar arası fark ve etkileşim incelendi. Etkileşim olmadığı değişkenlerde sadece tekrarlayan ölçümlerde varyans analizi ile sonuçlar değerlendirildi. Etkileşimin anlamlı bulunduğu değişkenlerde önce bazal değerler bağımsız 2 grup T testi ile 2 grup arasında karşılaştırıldı. Daha sonra 2 grup kendi içinde ön test – son test farkı bakımından eşleştirilmiş 2 grup T testi ile değerlendirildi. Son olarak bazal değere göre düzeltme yapılarak 2 grup arasında son test ölçümleri Co-varyans analizi ile karşılaştırıldı. Co-varyans analizi ile ayrıca en küçük kareler ortalamaları hesaplandı (LS Mean). Hipotez testlerinde, etkileşim için $p<0.1$, ortalamaların karşılaştırılması için ise $p<0.05$ önem seviyesi kullanıldı.

BULGULAR

Sporcuların solunum fonksiyonu ve solunum kas kuvveti değerleri, Tablo 3'te gösterilmiştir.

Tablo 3. Ölçüm değerlerinin gruplara göre ortalamaları

		Ön Test		Son Test		
	Grup	Ortalama	Std. Sapma	Ortalama	Std. Sapma	p
FVC (L)	Antrenman	4,89	0,559	5,06	0,508	0,033 [a]
	Kontrol	5,31	0,752	5,25	0,784	0,352 [a]
	p	0,213 [b]				<0,001[d]
	Grup	Ortalama	Std. Sapma	Ortalama	Std. Sapma	p
FEV1 (%)	Antrenman	4,03	0,360	4,22	0,520	0,047 [a]
	Kontrol	4,45	0,347	4,27	0,453	0,086 [a]
	p	**0,022 [b]**				<0,001[d]
	Grup	Ortalama	Std. Sapma	Ortalama	Std. Sapma	p
FEV1-FVC (%)	Antrenman	81,99	6,941	84,61	7,563	0,189 [a]
	Kontrol	84,38	8,574	82,35	7,476	0,244 [a]
	p	0,532 [b]				0,074 [d]
	Grup	Ortalama	Std. Sapma	Ortalama	Std. Sapma	p
FEF% 25-75 (L/s)	Antrenman	4,16	0,916	4,61	1,021	0,141 [a]
	Kontrol	4,58	0,892	4,34	0,913	0,019 [a]
	p	0,341 [b]				<0,001[d]
	Grup	Ortalama	Std. Sapma	Ortalama	Std. Sapma	p
MVV (L/d)	Antrenman	164,30	24,616	171,16	16,931	0,195 [a]
	Kontrol	148,61	36,808	137,16	24,595	0,181 [a]
	p	0,317 [b]				0,082 [d]
	Grup	Ortalama	Std. Sapma	Ortalama	Std. Sapma	p
MEP (cmH2O)	Antrenman	111,50	25,439	151,13	42,117	0,003 [a]
	Kontrol	114,70	21,323	105,50	18,441	0,033[a]
	p	0,775 [b]				0,000[d]
	Grup	Ortalama	Std. Sapma	Ortalama	Std. Sapma	p
MIP (cmH2O)	Antrenman	101,38	34,871	131,25	27,943	0,004 [a]
	Kontrol	100,80	27,967	92,40	25,396	0,029 [a]
	p	0,969 [b]				0,000 [d]

EKO: Kovaryans analizinden elde edilen En Küçük Karaler ortalaması; a: ÖnxSon test farkı, Eşleştirilmiş 2 grup t-Test; b: AntrenmanxKontrol Öntest, Bağımsız 2 grup t-Test; c: AntrenmanxKontrol SonTest, Kovaryans analizi; d: GrupxÖnxSon Test Etkileşimi

Sporcuların solunum fonksiyonu ve solunum kas kuvveti değerleri, antrenman ve kontrol gruplarında kovaryans analizleri Tablo 4'te gösterilmiştir.

Tablo 4. Gruplara göre kovaryans analizleri

FVC_ÖT = 5.1206 için EKO			
Grup	Ortalama	Std Hata	p
Antrenman	5,283	0,069	**0,038** [c]
Kontrol	5,069	0,061	
FEV1_ÖT = 4.2644 için EKO			
Grup	Ortalama	Std Hata	p
Antrenman	4,471	0,109	**0,020** [c]
Kontrol	4,065	0,096	
FEV1/FVC_ÖT = 83,3167 için EKO			
Grup	Ortalama	Std. Hata	p
Antrenman	85,599	1,729	**0,104** [c]
Kontrol	81,561	1,544	
FEF%25-75_ÖT = 4,3972 için EKO			
Grup	Ortalama	Std. Hata	p
Antrenman	4,815	0,197	**0,031** [c]
Kontrol	4,177	0,175	
MVV_ÖT = 155,5833 için EKO			
Grup	Ortalama	Std. Hata	p
Antrenman	166,66	5,147	**0,002** [c]
Kontrol	140,762	4,587	
MEP_ÖT = 113,2778 için EKO			
Grup	Ortalama	Std. Hata	p
Antrenman	153,022	6,876	**0,000** [c]
Kontrol	103,982	6,148	
MIP_ÖT = 101,0556 için EKO			
Grup	Ortalama	Std. Hata	p
Antrenman	131,013	4,761	**0,000** [c]
Kontrol	92,589	4,258	

EKO: Kovaryans analizinden elde edilen En Küçük Karaler ortalaması; a: ÖnxSon test farkı, Eşleştirilmiş 2 grup t-Test; b: AntrenmanxKontrol Öntest, Bağımsız 2 grup t-Test; c: AntrenmanxKontrol SonTest, Kovaryans analizi; d: GrupxÖnxSon Test Etkileşimi

Sporcuların performans değerlerinin antrenman ve kontrol gruplarında ortalama değerleri Tablo 5'te gösterilmiştir. Tablo 5 incelendiğinde; sporcuların saha performans değerlerine yönelik elde edilen ortalamaları arasındaki farkların, istatistiksel olarak anlamlı olmadığı görülmüştür ($p>0,05$).

Tablo 5. Sporcuların saha performans değerleri

		Ön Test		**Son Test**		
	Grup	Ortalama	Std. Sapma	Ortalama	Std. Sapma	p
ATIŞ	Antrenman	41,00	1,773	44,00	2,070	0,000 [a]
	Kontrol	41,90	2,283	41,60	2,221	0,279 [a]
	p	0,374 [b]				0,000 [d]
		Ön Test		**Son Test**		
	Grup	Ortalama	Std. Sapma	Ortalama	Std. Sapma	p
VURUŞ	Antrenman	28,13	2,642	34,13	2,696	0,000 [a]
	Kontrol	29,70	3,860	31,50	2,799	0,678 [a]
	p	0,341 [b]				0,000 [d]
		Ön Test		**Son Test**		
	Grup	Ortalama	Std. Sapma	Ortalama	Std. Sapma	p
VO2max (ml/kg/dk)	Antrenman	46,83	2,323	49,48	2,217	0,000 [a]
	Kontrol	45,54	1,257	46,02	1,254	0,001 [a]
	p	0,149 [b]				0,000 [d]
		Ön Test		**Son Test**		
	Grup	Ortalama	Std. Sapma	Ortalama	Std. Sapma	p
ANAEROBİK (kg/sn)	Antrenman	1001,51	142,029	1045,23	149,638	0,206
	Kontrol	928,27	124,630	952,05	127,541	
	p		**0,007**			0,377 [d]

EKO: Kovaryans analizinden elde edilen En Küçük Karaler ortalaması; a: ÖnxSon test farkı, Eşleştirilmiş 2 grup t-Test; b: AntrenmanxKontrol Öntest, Bağımsız 2 grup t-Test; c: AntrenmanxKontrol SonTest, Kovaryans analizi; d:GrupxÖnxSon Test Etkileşimi

Sporcuların performans değerleri, antrenman ve kontrol gruplarında kovaryans analizleri Tablo 6'da gösterilmiştir. Antrenman grubunda, FEV1/FVC, FEF ve MVV ölçüm ön/son test düzeyleri arasında istatistiksel olarak anlamlı bir farklılık bulunmamaktadır ($p>0,05$). Antrenman grubunda, elde edilen sonuçlara göre FVC, FEV1, MEP, MIP değerlerinde ön/son test ölçüm değerleri arasında istatistiksel olarak anlamlı bir farklılık görülmüştür ($p<0,05$). Antrenman grubunda atış/vuruş sayısında ve aerobik anaerobik performans değerlerinde ön/son test ölçüm değerleri arasında istatistiksel olarak anlamlı bir farklılık görülmüştür ($p<0,05$). Atış/vuruş sayısı, anaerobik performans ve aerobik performans son test ölçüm değerleri anlamlı derecede yüksektir ($p<0,05$). Kontrol grubunda, FVC, FEV1, FEV1/FVC,FEF MVV, MEP, MIP, ön/son test ölçüm değerleri arasında istatistiksel olarak anlamlı bir farklılık görülmemiştir ($p>0,05$). Kontrol grubunda, atış sayısı, vuruş sayısı, anaerobik performans ve aerobik performans ön/son test ölçüm değerleri arasında istatistiksel olarak anlamlı bir farklılık görülmemiştir ($p>0,05$).

Tablo 6. Antrenman ve kontrol grubu kovaryans analizi

ATIŞ_ÖT = 41,5000 için EKO			
Grup	Ortalama	Std. Hata	p
Antrenman	44,476	0,320	**0,000[c]**
Kontrol	41,219	0,285	
VURUŞ_ÖT = 29,0000 için EKO			
Grup	Ortalama	Std. Hata	p
Antrenman	34,753	0,483	**0,000[c]**
Kontrol	28,997	0,430	

EKO: Kovaryans analizinden elde edilen En Küçük Karaler ortalaması

TARTIŞMA VE SONUÇ

Sporcuların performans parametrelerinin geliştirilmesinde SKA'nın etkisini değerlendirebilmek için solunum ve egzersiz arasındaki ilişkiyi değerlendirmek önemlidir. Bunun için öncelikle POWERBreathe cihazı ile uygulanan SKA'nın hangi şekilde uygulanacağını ve standartını belirtmek gerekir. Çünkü SKA'nın solunum kasları üzerine etkisi buna bağlıdır (Shei, 2018). Literatürde bulunan araştırmalarda SKA ve bunun sağlık üzerindeki etkileriyle beraber (Duruturk vd., 2018; González-Saiz vd., 2017; Gosselink vd., 2011; Naranjo-Orellana ve Santalla, 2020) atletik performans (Rozek-Piechura vd., 2020; Shei, 2018) ve performansa olan etkileri (Archiza vd., 2018; Griffiths ve McConnell, 2007; Hartz vd., 2018; Johnson vd., 2007) incelendiğinde solunum kaslarını özel olarak güçlendirmek ve fiziksel dayanıklılık iyileştirmelerini elde etmek için günde 2 kez 30 maksimal inspirasyonun uygulanması ele alınmıştır. Ek olarak, maksimum güç yüzdesi ile elde edilebilecek tekrar sayısı arasında ters bir ilişki vardır. Bu nedenle, 30 maksimal inspirasyona dayalı SKA, MIP'in yaklaşık %50'sine karşılık gelen kuvvet performansının yoğunluğunu belirlemenin genel bir yolu olabilir. Sporcu önerilen 30 tekrarı rahat bir şekilde tamamlayabildiğinde, POWERBreathe cihazındaki mekanik direnç artar, bu da direncin ve SKA'nın aşamalı olarak elde edilen gelişmelere uyarlanmasını mümkün kılar (Fernández-Lázaro vd., 2021).

Literatürde farklı branşlarda SKA sonrası performans etkileri değerlendirilse de, bocce branşı sporcularında oluşturduğu etkiye dair bir araştırmaya rastlanamamıştır. Bu nedenle bu araştırma bocce basamak sporcularının SKA öncesi ve sonrasında solunum değerleri, solunum kas kuvveti, aerobik, anaerobik performans parametreleri ile beraber atış/vuruş sayısındaki etkisini araştırmaya odaklanmıştır. Elde edilen ana bulgular; SKA sonrası antrenman grubunda solunum fonksiyonu değerlerinden FEV1/FVC, FEF ve MVV ölçüm ön/son test düzeyleri arasında istatistiksel olarak anlamlı bir farklılık bulunmadığını ($p>0,05$), ancak FVC, FEV1, ve solunum kas kuvveti MEP, MIP değerlerinde ön/son test ölçüm değerleri arasında istatistiksel olarak anlamlı bir farklılık görülmüştür ($p<0,05$).

Aynı zamanda performans parametreleri incelendiğinde antrenman grubunda atış/vuruş sayısında ve aerobik anaerobik performans değerlerinde ön/son test ölçüm değerleri arasında istatistiksel olarak anlamlı bir farklılık görülmüştür ($p<0,05$). Atış/vuruş sayısı, anaerobik performans ve aerobik performans son test ölçüm değerleri anlamlı derecede yüksektir

($p<0,05$). Bu sonuçlar SKA'nın bocce basamak sporcuları üzerindeki etkileri incelendiğinde, bazı solunum parametreleri ve performansını iyileştirdiğini ortaya koymuştur. Çalışmamızın en büyük varsayımlarından biri olan basamak oyunu atış/vuruş sayısını SKA'nın artırabileceği doğrulanmıştır. Çalışmamızı destekler nitelikte SKA yaptırılan araştırmalar incelendiğinde solunum kaslarında çok kısa bir sürede kuvvette artma, üç hafta içinde soluk alıp verme sayısında azalma, aynı zamanda da 4 hafta boyunca sürdürülen egzersiz sonrasında sporcu performansında iyileşmeye raslanmıştır (Kilding vd., 2010; Volianitis vd., 2001).

Solunum kas kuvveti antrenmanları sonrası sporculardaki solunum kas kuvveti artışı (MIP, MEP) performansı etkileyebilir. Bunu destekleyen bir çalışmada profesyonel bisikletçilere yaptırılan 6 haftalık SKA ardından, 16 katılımcıdan oluşan profesyonel bisikletçilerin MIP'lerini %22 oranında iyileştirdiği belirlenmiştir. Artan solunum kas kuvvetinin bir sonucu olarak, maksimum egzersiz sırasında egzersiz hiperpnesinin tüm vücut VO_2'sine katkısı %11'den %8'e düşmüştür (Turner vd., 2012). Bu çalışma 6 haftalık SKA'nın yüksek yoğunluklu egzersizlerde solunum sisteminin O_2 maliyetini önemli ölçüde azalttığını ve egzersiz esnasında solunum kas sisteminin enerji gereksinimlerini azaltabileceğini ortaya koymuştur. Muhtemelen egzersiz hiperpnesinin O_2 maliyetini düşürmek, lokomotor egzersiz için mevcut olan kardiyak debi oranını arttırmıştır (Harms vd., 1998). Ek olarak, solunum kası metaborefleksinin büyüklüğü, solunum kası yorgunluğunu azaltarak zayıflatılabilir. 6 haftalık SKA'nın ardından, 20 km ve 40 km denemelerden sonra solunum kas fonksiyonundaki azalma (sıfır akış hızında ortalama maksimum inspiratuar ağız basıncı ve maksimum inspiratuar basıncının %30'unda inspiratuar akış hızı) görülmüştür (Romer vd., 2002). Egzersize bağlı solunum kası yorgunluğu antrenmandan sonra daha düşük olduğundan, performanstaki gelişmeler muhtemelen körelmiş bir solunum kası metaborefleksi ve lokomotor O_2 mevcudiyetinden kaynaklanmaktadır (Harms vd., 2000; McConnell ve Lomax, 2006). Yapılan bir çalışmada, 7 profesyonel erkek bisiklet sporcusuna 6 hafta boyunca yaptırılan SKA'nın performans üzerine olan etkileri incelenmiştir (Harms vd., 1997). Bu araştırma sonucunda sporcuların SKA sonrasında 1.3 ± 2.0 dakika daha uzun egzersiz yapabilme kapasitesinin ortaya çıktığını kanıtlamışlardır. Bu etkinin nedenlerini ise soluk alıp vermeyi sürekli olarak azaltmanın, önemli ölçüde daha uzun egzersiz toleransına yol açtığını, nefes alma işini artırmanın performansı kısıtladığını gözlemlediklerini belirtmişlerdir Bu bulgular, sürekli ağır egzersiz sırasında normal olarak karşılaşılan nefes alma işinin egzersiz performansı üzerinde önemli bir etkiye sahip olduğunu göstermektedir. Bu etkinin nedeninin çok faktörlü olduğuna ve yüksek düzeyde solunum kas çalışmasının solunum kas yorgunluğu üzerindeki doğrudan etkilerini ve algılanan yorgunluktaki azalma olduğunu ortaya koymuşlardır. Aynı zamanda Harms vd. (1997) bulguları sonucunda, solunum kası yükündeki değişikliklerin neden egzersiz performansını etkilemiş olabileceği konusunda potansiyel bir etkiye sahip olan üç tür etkiden bahsediyor. Bunlar, lokomotor kaslara O_2 taşınması (ve onlardan CO_2 taşınması), solunum kas yorgunluğu ve solunum ve/veya lokomotor kas eforu algısı üzerindeki etkileri içeriyor. Bu sonuçlara göre algılanan yorgunluktaki azalmanın sporcuların performanslarına etkisinden bahsetmek mümkündür. Başka bir araştırmada dinlenme sırasında solunum kası antrenmanı yapıldığında diyafram yorgunluk eşiğinin arttığını ortaya koymuştur ve bunun kan akışı gerekliliklerinden kaynaklandığı şeklinde yorumlanmıştır (Babcock vd., 2002). İstirahatte, diyaframa yeterli miktarda kan akışı sağlanabilirken, ağır egzersiz sırasında çalışan diyafram ve lokomotor kaslar arasında rekabet olabilir (Harms vd., 1998). Solunum kası antrenmanı sonrasında diyafram yorgunluk eşiğinin artmasına bağlı olarak sporcularda algılanan

yorgunluk seviyesi azalabilir ve performansta düşüş yaşanma ihtimalinin azalmasına neden olabilir. Pulmoner ventilasyon ile ilgili olarak, yoğun aerobik ve/veya uzun süreli fiziksel egzersizlerden sonra, solunum kaslarının kuvvet ve dayanıklılığındaki azalmanın bir sonucu olarak MIP ve MEP'de önemli düşüşlerin meydana geldiği kanıtlanmıştır (Martin ve Stager, 1981). Bu solunum faktörleri sporcuların performansını sınırlar (HajGhanbari vd., 2013). Bu nedenle SKA'nın performans üzerindeki olumlu etkilerinden bahsetmek mümkündür. MIP değeri diyafram kuvveti ile ilişkilendirilebilir (De Jesús Mora-Romero vd., 2014). Lomax ve McConnell (2003) ve Guy vd. (2014) tarafından yapılan çalışmalarda SKA sonrası %6.8 ile %21.5 arasında bir MIP iyileştirme aralığı ile atletik dayanıklılık geliştirmeleri elde ettikleri gözlemlenmiştir (Guy vd., 2014; Hartz vd., 2018; Lomax ve McConnell, 2003). 19 hentbol sporcusuyla yaptığı çalışma bize MIP'deki en büyük kazanımların (%54) daha uzun süreli (12 hafta) programda gerçekleştiğini göstermektedir (Hartz vd., 2018). MEP değeri, interkostal ve abdominal solunum kaslarının gücünü değerlendirir (De Jesús Mora-Romero vd., 2014). 12 haftalık SKA'dan sonra hentbol oyuncularının VO_{2max} değerinde önemli artışlar ve fiziksel aerobik dayanıklılık geliştirmelerine bağlı MEP'de %23 oranında artış gözlemlenmiştir (Hartz vd., 2018). Aynı şekilde, Griffiths ve McConnell (2007) profesyonel kürekçilerle 4 haftalık SKA sonrası MEP değerinde %31 oranında artışla beraber, VO_{2max}'ta ve anaerobik kapasitede iyileşmeler saptanmıştır. Sonuç olarak, SKA, interkostal ve/veya karın kaslarında daha yüksek bir kas gücüne yol açarak egzersiz sırasında sürekli bir kasılma oluşturarak yeterli ventilasyona izin verir ve solunum kasının etkinliğini arttırabilir (Aubier vd., 1981). VO_{2max}, vücudun soluduğu ve egzersiz esnasında kullandığı O2 miktarının karşılığıdır. VO_{2max} yoğunluklarının %70 ila 80 arasında olmasıyla, güç üretmek için kan laktat artışı önemli hale gelir ve enerji, anaerobik yolların ATP yeniden sentez prosedürleriyle ilişkilendirilerek yüksek VO_{2max} seviyelerine ulaşılmasına olanak tanıyabilir (Fernández-Lázaro vd., 2021). POWERBreathe cihazı ile yapılan SKA sonrası VO_{2max} değerlendirildiğinde bu parametre üzerinde önemli artışlar gösterdiği görülmektedir (Hartz vd., 2018). Özellikle Griffiths ve McConnell (2007)' nin yaptığı çalışmada VO_{2max} değerinde ortalama 1.58'lik bir artış görülmektedir. Bu nedenle, SKA'nın potansiyel olarak solunum kasının metabolik refleks mekanizmasında bir gecikmeyi tetikleyerek ve solunum dayanıklılığını artırarak VO_{2max}'ı artırdığından, egzersiz sırasında performans artışı sağladığını dile getirmek mümkündür. POWERBreathe cihazı aracılığıyla uygulanan SKA potansiyel olarak yorgunluk toleranslarını ve solunum etkinliklerini geliştirebilir, ve algılanan yorgunluğu geciktirebilir (McConnell ve Lomax, 2006). Aerobik güç ile solunum arasındaki ilişkiye bakıldığında, yapılan çalışmalarda sıklıkla solunum kası ve diyafragma yorgunluğu ile ilişkili olduğu bulunmuş, egzersiz sırasında solunum kaslarının metabolik ihtiyaçlarını karşılamak için kalp debisinin %14-16'sının kullanıldığını bildirmiştir (Harms vd., 1998). Ancak solunum kaslarındaki yükün artmasının metabolik talebi de arttırdığı bildirilmiştir. Örneğin araştırmalar, minimal üst solunum yolu obstrüksiyonunun bile solunum yükünü %50 artırdığını göstermektedir (Sheel vd., 2001).

Sonuç ve Öneriler

Bu araştırmada literatürde tedavi edici özelliği de kanıtlanmış olarn POWERBreathe cihazı ile yapılan solunum kası antrenmanlarının bocce sporcularındaki etkilerine bakılmıştır. Elde ettiğimiz bulgulara göre SKA antrenman grubunda dört hafta içinde bazı solunum fonksiyonları, solunum kas kuvveti, aerobik anaerobik performansa olumlu etkide bulunurken basamak koşusu performansında da anlamlı bir iyileşme sağlayabilmiştir. Antrenman grubunda kontrol grubuna oranla performans artışının nedeni diyafram yorgunluğunun gecikmesi, tur

sayısını arttırarak vuruş sayısına da katkıda bulunabilme olarak yorumlanmıştır. Antrenman grubundaki sporcuların atış sayısını arttırırken aynı zamanda, hedef vuruşunu da artırdığı gözlemlenmiştir. Antrenör ve uygulayıcılar, basamak performansını iyileştirmek amacıyla SKA ile gerçekleştirecekleri uygulamalardan fayda sağlayabilirler. SKA öncesi cihazda ayarlanacak kademe, verilecek dinlenme zamanı, vb. konularda bireysel yaklaşımların önem arz ettiği ve performansı etkileyebileceği gerçeği göz ardı edilmemelidir. Gelecek çalışmalar solunum sistemiyle beraber dolaşım sistemi etkilerini de değerlendirebilir. Ek olarak sporcular üzerinde yapılacak psikolojik çalışmalar SKA sonrası etkileriyle bağdaştırılıp çalışmalara dahil edilebilir.

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Navigating the Scholarly Arena: Examining Disparate Research Trends and Discrepancies Across Management, Economics, Sport Management, and Sports Economics Fields

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Abstract

To define the research paths in the fields of management, economics, sport management, and sports economics, this research undertook a comprehensive analysis. The research was based on profile analysis of the top five researchers in each field, with careful examination of variables including gender distribution, citation metrics, H-index, and publication volumes obtained from the Google Scholar database. Strikingly, a significant finding emerged, showing the overwhelming male predominance among the top five researchers across all studied domains. In addition, there were noticeable differences in the number of citations and H-index; management and economics had better metrics than their sports-centric counterparts, namely sport management and sports economics. This study is a significant tool for deciphering the complexities of research trends and discrepancies that exist within the management, economics, sport management, and sports economics fields. This investigation adds to the corpus of current knowledge while providing a basic comprehension necessary of these disparate but related domains.

Keywords: Content analysis, Research trends, Management aspects, Economics aspects, Citation index

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INTRODUCTION

The wide-ranging effects of the sports industry on politics, mass media, economics, and health have led to the burgeoning academic field of sport management (López-Carril et al., 2019). Over the last five years, sports economics has become a distinctly developed field, and sports economists have started to work in sport management Programs (Humphreys & Maxcy, 2007). A major portion of the national economy is also occupied by the sports economy, so professionals are needed to assess how the sports economy is developing (Li, 2022). In sports management, the economic aspect of sports has been given more attention. In addition, there has been the emergence of sport economics as a recognized subfield within the economics major (Gerrard, 2003).

Sports economics research is a successful and rapidly expanding field with a growing consolidation process, despite the fact that there has been a significant increase in attention given to these fields (Santos & Garcia, 2011). At various levels of human activities, researchers have been investigating and examining various aspects of management and economics in relation to sports. Sports economics research, for instance, focuses on institutional design, property rights, and market failures; this provides opportunities for economic analysis and highlights issues that remain unresolved in the sector (Zaytseva, 2015). Therefore, the academic and professional study of sports from a variety of angles, including sport management (López-Carril et al., 2019) and sports economics (Szymanski, 2003), has gained prominence. This realization stems from the growing awareness of how sports affect a nation's economy and the necessity of researching and examining the sports industry (Junresti Daya, 2022).

Recent years have seen an increase in the academic and professional study of sports from various angles, leading to a large number of papers pertaining to various disciplines like sports management, sports economics, and sports marketing (Núñez-Pomar et al., 2019). Over the past three decades, sport management has developed into a highly visible and respectable field of study (Zhang, 2015). Despite the growth in the number and size of the sport management academics, the value of research in the field continues to be equivocal in the minds of many scholars who question its academic rigor (James, 2018). The sports industry and the economic sector are currently the focus of research due to the sports development industry; however, as the sports industry develops quickly, so does society (Yuhao & Tian, 2023).

The emphasis on cooperation and open access in scientific research has led to a notable shift in the scientific community towards open science. Because they can be used to build on earlier research by reusing data created by other researchers, research data management and sharing have become essential (Elsayed & Saleh, 2018). More than ever, a thorough understanding of statistical standards for publication in scholarly sport management journals should be prioritized (Trail & James, 2016). Because they provide the most recent findings and accomplishments and serve as the primary publication channel for many scientific disciplines, scientific journals are especially valuable to researchers (Gholampour et al., 2019).

Within the broad domain of scholarly research, Google Scholar has become an indispensable resource, offering a comprehensive overview of scholarly contributions in a variety of fields. By navigating the digital landscape of Google Scholar, we aim to unravel the trends and notable contributors within the spheres of management and economics and also sport management and sports economics research. This comparative analysis highlights the dynamic interaction between these disparate but related fields in addition to shedding light on the researchers' evolving methodologies and thematic priorities.

The most extensive source for citation counts is Google Scholar. A number of other databases, like Web of Sciences and Scopus, only include citations within their database. Accordingly, citation counts in various databases would differ (Mondal et al., 2022). The citation index feature of Google Scholar is what makes it most useful. Google Scholar is a database of articles that includes a sub-list of later published resources that cite each article. Google Scholar shows who cited a given article at a later point in time. "Papers with numerous citations are typically ranked highest in Google Scholar, and they receive an additional boost if they are referenced by highly cited articles" (Butler, 2004). In addition, Google Scholar automatically extracts, evaluates, and displays citations as distinct results—even when the cited documents are not accessible online. Thus, it evaluates a document's popularity based on how frequently it has been cited in other documents. Typically, the results are displayed with the most frequently cited references at the top (Noruzi, 2005). Some non-scholarly citations (such as student handbooks, library guides, editorials, news articles, reviews, etc.) can be found in Google Scolar. While it is arguable that citing these sources or documents will demonstrate the impact or influence of an academic, it does not reflect research impact as these documents do not necessarily publish research findings (Onyancha & Ocholla, 2009). One of the most popular metrics of scientific output, the h-index (Hirsch, 2005), has gained popularity quickly due to its purported ability to make it easy to compare researchers' scientific accomplishments (Ball, 2007). The number of articles (h) written by an author that have at least h citations is known as the h-index (Hirsch, 2005).

The ongoing advancement of science has given researchers new avenues to pursue their work, and as a result, efforts to raise the stature of science and expand its influence across a range of research domains have persisted. On the other hand, the fields of sports management and economics research focuses on market failures, property rights, and institutional design, offering opportunities for economic analysis and identifying unsolved problems in the industry (Zaytseva, 2015), contributing to the academic discourse and fostering further exploration and investigation in these areas. In this way, comparing research projects from the management and sport management and economics and sports economics groups not only enables us to assess how these fields are doing now, but it also yields insightful information. This comparison highlights the advantages and disadvantages of each group. Since each of these topics has a significant influence on scientific advancement, it can help raise the standard of study and offer better recommendations for further advancement. Many studies around the world in the field of scientometrics and research trends analysis are carried out using bibliometric techniques to analyze a specific research area or a special journal. The purpose of

this content analyze was to investigate the researcher's profiles of the management and economics vs sport management and sports economics based on the Google scholar database in the 2023-11.

METHOD

The present study uses descriptive and quantitative content analysis to study the scientific and demographic pursuits of the top 5 researchers in each of the groups of management, economics, sport management and sports economics who have profiles on the Google Scholar platform and research interests. "Management" or "Sport Management" or "Economics" or "Sports Economics" have been used in their profile.

Google Scholar can help identify a collection of publications for a particular research topic (Zientek et al., 2018). Unlike conventional databases, this search engine automatically indexes academic web content and, as a source of data, analyzes open access (OA) levels in all countries and research fields (Martín-Martín et al., 2018). Compared to comparable interdisciplinary commercial databases such as Web of Science and Scopus, Google Scholar's coverage is much more comprehensive because it automatically parses the entire academic web instead of indexing specific sources (López-Cózar et al., 2019). Most scientists now choose it as their first choice when conducting a literature search due to its user-friendliness, wide coverage, and fast indexing speed. The present study included a complete review of the top 5 profiles based on the highest amount of citations in the four mentioned groups. In total, 20 researchers were carefully analyzed and examined. Based on the researchers' profile and their research interests, the keywords "label:management" or "label:economics" or "label:sports_economics" or "label:sport_management". To find researcher demographic information, three sources (Google Scholar pages, researchers' university pages, and researchers' pages in ResearchGate) and researchers' profiles in Google Scholar were used to review research-related information. Also, the criteria for checking the profile of verified accounts by the official email of the organization was, and the accounts that were not verified were not studied and were referred to the next person respectively. Finally, we reviewed and analyzed 20 profiles. A carefully designed coding sheet with complete instructions was provided to aid in data collection. The collected data were thoroughly analyzed using descriptive statistics. The key indicators that distinguish between specialized cases in the analysis units of this research are: "number of citations", "h-index", "demographic distribution", "gender distribution" and "number of published works". We reviewed the published works of researchers from 2020 to 2023-11-18.

This methodological approach guarantees the reliability and integrity of the collected data and enables a complete and accurate review of the scientific environment surrounding our research from the date in question. Finally, the data obtained from this research was analyzed using SPSS version 22 software and using descriptive statistics. Handling of citations and references was also done using EndNote20 software, and publish or perish software was also used for re-checking.

FINDINGS

In the quantitative-descriptive evaluation by researchers in the field of management, economics, sport management and sports economics, the principles and concepts related to this topic have been examined. Using analytical and statistical methods, this research has examined several features and characteristics of researchers' profiles for detailed analysis.

Table 1. Gender distribution among groups

	Gender					
	Male		Female		Total	
	n	%	n	%	n	%
Management	5	100	0	0	5	100
Sport Management	5	100	0	0	5	100
Economic	5	100	0	0	5	100
Sports Economics	5	100	0	0	5	100
Total	20	100	0	0	20	100

Based on the documented findings (Table 1), it was observed that in each of the studied groups, i.e. management, sport management, economics and sports economics, all five researchers of each group were all men. Therefore, according to our research, no female researchers were observed in any of the groups. It can be concluded that male researchers make up 100% of our study population.

Table 2. The demographic distribution of researchers

	Management		Sport Management		Economics		Sports Economics		Total	
	n	%	n	%	n	%	n	%	n	%
USA	3	60	3	60	4	80	1	20	11	55
Japon	0	0	0	0	1	20	0	0	1	5
Canada	1	20	0	0	0	0	0	0	1	5
Indonesia	1	20	0	0	0	0	0	0	1	5
Australia	0	0	0	0	0	0	1	20	1	5
Switzeland	0	0	0	0	0	0	1	20	1	5
South korea	0	0	0	0	0	0	1	20	1	5
Scotland	0	0	0	0	0	0	1	20	1	5
Spain	0	0	1	20	0	0	0	0	1	5
German	0	0	1	20	0	0	0	0	1	5

The findings of the actual demographic table (Table 2) gave us valuable information from our study. Based on the findings, it was observed that 60% of the management group researchers were from United States, 20% from Canada and 20% from Indonesia. In the study of the sport management group, it was observed that 60% of the researchers were United States, 20% were Spanish and 20% were from Germany. Also, the findings of the economics group showed that 80% of the researchers in this group were United States researchers and the remaining 20% were from Japan. And finally, in the study of the sports economics group, we found that 20% was related to United States, 20% was related to Australia, 20% was related to Switzerland, 20% was related to South Korea and 20% was related to Scotland. Also, the ranking order of tables 2 to 10 was based on the highest amount of citations in total.

Table 3. Citations and h-index of management and sport management researchers in the Google Scholar database

	Total citations (TC)	TC (Mean)	Total h-index (T h-index)	T h-index (Mean)
Management	956132	191226	567	113.4
Sport Management	70227	14045	296	55.6

Based on the findings (Table 3), it can be stated that the total number of citations of the management group was 956,132 with an average of 191,226 and the sport management group was 70,227 with an average of 14,045. Also, in the examination of the H index of the top 5 researchers of the management group, it was observed that the H index was equal to 567 with an average of 113.4, and also in the sport management group, the H index was equal to 296. Average 55.6 for the top five researchers. These detailed findings not only underscore the marked differences in citation metrics between the two groups, but also highlight the superior impact and scholarly impact of management research compared to its sport management counterpart.

Table 4. Citations and h-index of economics and sports economics researchers in the Google Scholar database

	Total citations (TC)	TC (Mean)	Total h-index (T h-index)	T h-index (Mean)
Economics	1369671	273934	582	116.4
Sports Economics	78323	15665	251	50.2

The findings (Table 4) showed that the total number of citations of researchers in the economics group was 1,369,671 with an average of 273,934, and in the sports economics group, the number of citations was 78,323 with an average of 15,665. Also, in the overall review, the H index of the top five researchers in the economics group was equal to 582 with an average of 116.4, and this statistic in the sports economics group for the top five researchers of that group was equal to 251 with an average of 50.2.

Table 5. 2020-2023 total scholars and total citations of management and sport management researchers in the Google Scholar database

	2020-2023 total scholars	2020-2023 total citations
Management	299	31719
Sport Management	218	2846

The findings (Table 5) demonstrated that from 2020 to 2023.11, the top five researchers of the management group had published a total of 299 works indexed in Google Scholar, and the total citations of these works were 31,719. Also, this statistic for the sport management group was 218 works and 2846 citations. These statistics illuminate the prolific academic contributions of both cohorts while highlighting noteworthy distinctions in the volume and impact of their respective research outputs.

Table 6. 2020-2023 total scholars and total citations of economics and sports economics researchers in the Google Scholar database

	2020-2023 total scholars	2020-2023 total citations
Economics	213	23837
Sports Economics	222	2892

The findings (Table 6) also showed that, like the previous table, from 2020 to 2023.11, the top five researchers of the Economics groups had 213 works with a total of 23,837 citations, and this statistic for the Sports Economics groups included 222 works with a total of 2,892 citations on the said date. Our research delineates the exponential expansion observed within these scientific domains, emphasizing the imperative for heightened investment in fundamental research endeavors. Furthermore, it underscores the pivotal role assumed by scientific output, particularly within institutions of higher education specializing in these disciplines.

DISCUSSION and CONCLUSION

Undertaking research activities is an essential foundational element for the gathering and sharing of knowledge. Through rigorous research, experimentation, and critical analysis, we uncover novel insights, challenge established paradigms, and extend the boundaries of human comprehension. By following a methodical approach, we can improve our understanding as a group and exchange our findings, adding to the body of knowledge that ultimately benefits society as a whole. Using Google Scholar has additional advantages beyond its free availability. Google Scholar is easy to use and straightforward. It is also very efficient because no additional registration steps are needed and information can be found instantly (Pitsolanti et al., 2017). In this sense, having easy access to Google Scholar can encourage scholars to prioritize publication quality over quantity in order to increase their impact through citations. In addition to focusing on citation counts, authors may be encouraged to use social media to promote their work (Jensenius et al., 2018).

Based on our findings from the gender distribution table, it was observed that all the top researchers in each of the four studied groups (Management, Sport Management, Economics and Sports Economics) were exclusively male. Notably, none of the top researchers in any of these categories included any female researchers. This gender-based analysis reveals a noteworthy disparity between the genders when it comes to highly accomplished research in particular academic fields. The lack of female researchers among leading contributors in these fields raises important considerations about gender representation and inclusion in academic excellence. In order to promote diversity and guarantee a more inclusive environment in academia, it is imperative that these disparities be addressed.

The findings from the distribution table of the population of researchers reveal that the United States leads in three categories: Management, Economics, and Sport Management, with the majority of top researchers listed. Specifically, in terms of population distribution, 80% of the researchers in our study in the Economics group, 60% in the Management group, 60% in the Sport Management group, and finally, 20% in the Sports Economics group were affiliated with the United States. As a result, among the researchers in each of the four groups included in our study, 55% were recognized as top United States researchers. A comparative analysis of the two groups, Management and Sport Management, in terms of the population distribution of researchers demonstrated that in both groups, 60% of the researchers were United States, while the remaining researchers hailed from countries such as Canada, Indonesia, Spain, and

Germany. Additionally, when examining the top researchers in the Economics and Sports Economics groups, it was noted that unlike the Economics group, where 80% of the top researchers were United States, the distribution in the Sports Economics group was appropriately diversified among five different countries. In summary, the Sports Economics group differed from the other three groups in that its top researchers showed a desirable distribution and dispersion, with each of the top five researchers coming from a different nation (the United States, Australia, Switzerland, South Korea, and Scotland).

Examining the findings of two groups of management and sport management showed that the total number of citations of the top five researchers of the management group is significantly higher compared to the total number of citations of the top researchers of the Sport Management group. Based on the results, it can be inferred that approximately 93.16% of the citations are attributed to researchers in the Management group, while 6.84% of the citations are associated with researchers in the Sport Management group. Furthermore, a clear disparity in the total h-index scores of researchers in each group was observed. Specifically, 65.7% of the cumulative h-index scores were related to the Management group, while 34.3% of the scores were linked to the Sport Management group. Despite the substantial difference in the number of citations, where the Management group has more than 18 times the citations of the Sport Management group, the comparison of the h-index values indicates a less than 3 times difference between the h-index scores of researchers in the Management group and those in the Sport Management group. This intriguing finding suggests that, despite the notable variation in citation counts, the h-index values, which account for both the quantity and impact of citations, display a more modest difference between the two groups.

Furthermore, based on the findings from the analysis of citation counts and h-index scores of top researchers in the Economics and Sports Economics groups, it was identified that the total number of citations for the top five researchers in the Economics group is significantly higher compared to the total number of citations for the top researchers in the Sports Economics group. This can be elucidated by the fact that approximately 94.59% of the citations are attributed to researchers in the Economics group, while only 5.41% of the total citation count is associated with the Sports Economics group. Upon scrutinizing the cumulative h-index scores of researchers in both the Economics and Sports Economics groups, it became apparent that 69.87% of the cumulative h-index scores were related to the Economics group, while 30.13% of the scores were linked to the Sports Economics group. Similar to the previous two groups, the disparity between these two categories, Economics and Sports Economics, is again more than 18 times, signifying a considerable abundance of citations in the field of Economics. However, when comparing the h-index values of researchers in the Economics group to those in the Sports Economics group, it is noteworthy that the difference is only slightly more than two-fold. Despite the substantial difference in citation counts, the h-index values, indicative of both quantity and impact, reveal a more nuanced contrast between the two groups.

In conclusion, it can be inferred that, in terms of citation counts, both the Management and Economics groups demonstrate a notable density of citations compared to their respective counterparts, Sport Management and Sports Economics. Furthermore, these groups outperform

their counterparts by having h-index statistics that are more than two-fold higher. This consistent pattern across all four groups suggests a robust influence of the Management and Economics disciplines, not only in the quantity but also in the impact of scholarly contributions. The findings emphasize the significance of these fields and their substantial contribution to the academic discourse, warranting further exploration and investigation.

In examining the number of published articles by the top five researchers in each of the Management and Sport Management groups from 2020 to November 16-18, 2023, interesting insights have emerged. According to the statistics compiled during this period, a total of 517 scholarly works were conducted. Among these, 57.83% belonged to the Management group, while 42.17% were associated with the Sport Management group. Furthermore, in assessing the citation count of these articles within this timeframe, it was revealed that the cumulative citation counts for both groups amounted to 34,565. Notably, 91.77% of these citations were attributed to the Management group, with the remaining 8.23% attributed to the Sport Management group. A noteworthy observation stems from the substantial difference in citation counts despite a relatively modest disparity in the number of published articles between the two groups (299 scholarly works in Management versus 218 in Sport Management). This marked difference underscores the significant scholarly impact of the Management group, with citations surpassing those of the Sport Management group by over 18 times during the specified timeframe.

In examining the number of published articles by the top five researchers in each of the Economics and Sports Economics groups from 2020 to November 16-18, 2023, interesting observations have emerged. The results indicated that, collectively, 435 research papers were published during this period, with approximately 48.97% of the works associated with the Economics group and 51.03% with the Sports Economics group. Additionally, the cumulative citation counts for both groups during this timeframe reached 26,729, of which 89.18% pertained to the citations of works from the Economics group, and 10.82% were attributed to the Sports Economics group. A notable and intriguing finding is that, despite the Sports Economics group having a higher number of published works (222 papers) compared to the Economics group (213 papers), the Economics group has a significantly greater number of citations for its works. This divergence in citation counts suggests a higher impact and influence of the Economics group's scholarly contributions within the specified timeframe.

In summarizing the findings and analysis presented in the paper, we conclude that the field of management and economics boasts a higher scholarly impact and citation density compared to that of sport management and sports economics. This indicates a well-established research tradition in the former, with possibly more extensive networks and academic influences. However, this disparity points toward untapped potential within the fields of sport management and sports economics, suggesting the necessity for increased support and research development in these areas. Moreover, the analysis identifies a concerning trend of gender disparity amongst top researchers, signaling the need for more inclusive and equitable research practices to enhance diversity and broad-mindedness in academic contributions. The significance of

recognizing diverse fields of study is not merely an academic exercise but an essential factor in supporting the overall growth of the disciplines.

While the research leverages Google Scholar and provides robust insights, the paper acknowledges certain limitations, including potential biases and the problematic nature of solely relying on databases that may not offer a complete picture of the scholarly landscape. The conclusion therefore encourages an expansion of research methodologies and the exploration of additional databases and metrics to encompass a more holistic understanding of the research impact in these fields.

In light of these conclusions, the paper suggests a twofold approach for the future: firstly, advocating for the advancement of sport management and sports economics through increased research investment and absorption into academic curricula; and secondly, pushing for the breakdown of existing gender barriers and the cultivation of a more inclusive scholarly community that accurately reflects the dynamic and varied nature of today's academia. By doing so, we can ensure the continuous growth and appreciation of scholarly contributions across all fields, ultimately contributing to the intellectual wealth and societal progression.

LIMITATIONS and FUTURE RESEARCH

The present research methodology hinges on the scrutiny of Google Scholar profiles, specifically focusing on the top five researchers in each group. However, it is crucial to acknowledge that this approach is not without potential limitations. Relying solely on Google Scholar profiles may yield findings that are incomplete or biased, given that not all researchers are necessarily represented on this platform. It can also be stated that these labels are only displayed as researchers' research interests in their profiles, and all their research may not be aligned with this title. Discrepancies may also emerge due to irregular updates or divergent usage patterns among those who do maintain profiles, introducing a layer of variability in the data. Moreover, the study's scope is confined to English-language keywords, specifically "management," "sport management," "economics" and "sports economics." This narrow focus may omit profiles utilizing these terms in other languages, thus introducing a linguistic bias and potentially distorting the representation of research impact within the field. Furthermore, it is imperative to acknowledge the limitations associated with the use of h-index figures. While these metrics provide quantifiable insights into the citation frequency of a researcher's work, they offer a restricted perspective on the substantive impact or quality of the research in question.

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

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Profesyonel Ligde Mücadele Eden İşitme Engelli Hentbolcularda Algılanan Stresin Saldırganlıkları Üzerindeki Yordayıcı Etkisinin İncelenmesi

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Öz

Bu araştırma, işitme yetersizliği olan profesyonel hentbolcuların algılanan stres ile saldırganlıkları üzerindeki yordayıcı etkisinin incelenmesi amacıyla gerçekleştirilmiştir. Nicel araştırma yönteminin kullanıldığı araştırmada, ilişkisel tarama modeli tercih edilmiştir. Araştırmaya 2022-2023 sezonunda profesyonel liglerde mücadele eden 46 kadın, 44 erkek olmak üzere toplam 90 hentbolcu katılmıştır. Veri toplama aracı olarak tanımlayıcı bilgi formu, Cohen vd., (1983) tarafından geliştirilen "Algılanan Stres Düzeyi Ölçeği" ve Buss ve Perry (1992) tarafından geliştirilen "Saldırganlık Ölçeği" kullanılmıştır. Elde edilen verilerin analizinde t-testi, ANOVA testi, korelasyon analizi ve algılanan stresin saldırganlık üzerindeki etkisinin tespiti için de basit doğrusal ve çoklu regresyon analizleri uygulanmıştır. Sonuçlar incelendiğinde yaş, cinsiyet ve eğitim durumu değişkenleri arasında anlamlı farklılıklar tespit edilmiştir. Araştırmada elde edilen bulgulara göre, erkeklerin kadınlara göre algıladıkları stres puanının daha yüksek olduğu tespit edilmiştir. Katılımcıların algılanan stres düzeyinin saldırgan davranışlar üzerinde orta ve pozitif yönde etkilediği, algılanan stresin saldırganlığın alt boyutlarını anlamlı olarak yordadığı tespit edilmiştir. Ayrıca profesyonel hentbolcuların algıladıkları stres ile saldırganlık davranışı arasında anlamlı bir ilişki olduğu görülmektedir. Sonuç olarak, stres derecesinin saldırgan davranış eğilimini etkilediği ve profesyonel hentbolcularda, algılanan stres düzeyi ile saldırgan davranışlar arasında anlamlı bir ilişki olduğu söylenebilir.
Anahtar kelimeler: İşitme Engelli, Hentbol, Stres, Saldırganlık

Examining the Predictive Effect of Perceived Stress on Aggressiveness in Hearing Impaired Handball Players Competing in the Professional League

Abstract

This research was conducted to examine the predictive effect of perceived stress on the aggression of professional handball players with hearing impairment. In the study where the quantitative research method was used, the relational screening model was preferred. A total of 90 handball players, 46 women and 44 men, competing in professional leagues in the 2022-2023 season, participated in the research. A descriptive information form, the "Perceived Stress Level Scale" developed by Cohen et al.'s (1983) and the "Aggression Scale" developed by Buss and Perry (1992) were used as data collection tools. In the analysis of the data obtained, t-test, ANOVA test, correlation analysis and simple linear and multiple regression analyzes were applied to determine the effect of perceived stress on aggression. When the results were examined, significant differences were detected between age, gender and educational status variables. According to the findings of the research, it was determined that men's perceived stress score was higher than women. It was determined that the perceived stress level of the participants had a moderate and positive effect on aggressive behavior and that perceived stress significantly predicted the sub-dimensions of aggression. Additionally, there appears to be a significant relationship between professional handball players' perceived stress and aggressive behavior. As a result, it can be said that the degree of stress affects the tendency for aggressive behavior and that there is a significant relationship between the level of perceived stress and aggressive behavior in professional handball players.
Keywords: Hearing impairment, Handball, Stress, Aggression

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GİRİŞ

Dünya genelinde engelli nüfusa ilişkin çeşitli verilerin bulunmasının ülkelerin engelli kişileri belirleme konusunda farklı yöntemleri kullandığını düşündürmektedir (Çondur vd., 2020). Yapılan son araştırma verilerine göre dünya üzerinde sayıları 1,5 milyarı bulan işitme yetersizliği olan bireylerin sayılarının gelecek dönemlerde hızla artış gösterebileceği tahmin edilmektedir (Keating, 2022). Dünya genelinde olan bu artışın, ülkemizde şu an sayıları 180 bine yakın olan bu azınlık grubun sayısına etkili bir artış getireceği düşünülmektedir (Durğun vd., 2023).

İşitme yetersizliği, yaşamın birçok evresinde ortaya çıkabilen ve kişide bazen tek bazen de iki kulağında hissedilen, gündelik hayata katılımı olumsuz yönde etkileyen bir yetersizlik durumudur (WHO, 2023). İşitme yetersizliğinin derecesinin hafif, orta ve derin düzeyde hissedilmesi, toplumsal uyum ve kişiler arası iletişimi etkileyen en temel faktördür. Gelişmiş ülkelere nazaran gelişimini tamamlamamış, gelişmekte olan ülkelerin başlıca problemleri arasında işitme yetersizliği olan bireylerin aldıkları eğitim ve sosyal imkânlar gelmektedir (Nemček, 2017). Eğitim ve sosyal yaşamdaki eksiklikler, işitme yetersizliği olan bireylerde diğer insanlarla kurdukları ilişkilerde problemler yaşamasına sebep olur (Belgin ve Dalgıç, 1996). Bu nedenle daha çok kendisi gibi yetersizlik durumunda olan kişilerle iletişime geçmeyi tercih etmeleri toplumsal uyum süreçlerini olumsuz etkiler (Tiryaki, 2000).

Sosyo-ekonomik gelişmelerin geçmişe oranla hızla ilerlemesi, insan hayatını etkileyen önemli süreçler meydana getirmiştir (Tarhan, 2014). İnsan hayatındaki bu hızlı gelişmeler; beraberinde stres, saldırganlık ve öfke gibi istenmeyen davranış kalıplarının artmasına neden olmuştur. Hayatımızın vazgeçilmez gerçeği olan stres kavramı, kişilerin özellikle çevresiyle etkileşiminden sonra görülen bir durumdur (Göksel ve Tomruk, 2016). Saldırganlık davranışı ise daha çok insanın kendisi dışında kişilere olan tahammül seviyesinin azaldığı durumlarda, o kişilere yönelik şiddet içerikli davranışların tümü olarak tanımlanır (Konter, 2006). Yaşamın her evresinde görülebilen şiddet eğilimleri, özellikle kızgınlık duygusuyla başkasına yönelik yapılan fiziksel ve sözlü olumsuz davranışlara dönüşmesi olarak tanımlanır (Liu vd., 2013).

Ülkemizin de taraf devletlerle imzaladığı Birleşmiş Milletler Engelli Haklarına dair Uluslararası Sözleşmesi engelli bireylerin toplumsal yaşama dâhil olmalarının yanı sıra; spor, sağlık ve rehabilitasyon gibi alanlarda düzenlemelerin engelliler açısından hayata geçirilmesi için gereken önlemlerin alınması hususunda taraf devletlere sorumluluklar getirildiğini belirtmiştir (Çelik, 2016). Bu önlemlerin başında sportif faaliyetler ilk sırada yer almaktadır. Özellikle yaşam becerilerinin kazandırlması ve iletişim dilinin geliştirilmesi açısında fiziksel aktiviteler oldukça önemlidir (Vidranski ve Farkas, 2015). Aktivite yoksunluğu sadece psikomotor beceri gelişimini değil aynı zamanda bilişsel ve sosyal alanlardaki gelişimi de olumsuz yönde etkilemektedir (Peñeñory vd., 2018). Yetersizlik durmundan etkilenen birçok birey, gerekli düzenlemeler sayesinde spor alanlarına ve faaliyetlerine katılım sağlayarak informal öğrenme yoluyla faydalar sağlamaktadır (Melo vd., 2019). Bu bağlamda işitme yetersizliği olan bireylere yönelik yapılan sportif ve sosyal alanlardaki uyarlamaların, bireylerin bilişsel ve motor beceri gelişimine olumlu katkı sağlayacağı düşünülmektedir.

Aktivite sayısını arttıran işitme yetersizliği olan bireylerin, günlük yaşantılarını rahat sürdürmelerini sağlayacak becerileri geliştirdikleri görülür (Zarrinkoob vd., 2021). Sağlıklı

bireylerle kıyaslandığında spor yoluyla elde edilen kazanımların daha fazla olduğu görülmektedir (Kumcağız ve Avcı-Çayır, 2018). Çeşitli spor uygulamaları sayesinde özel gereksinimli bireylerde engelliliğin yol açtığı dezavantajlı durumların önüne geçilmesi sağlanmaktadır. Bilişsel, psikomotor ve duyuşsal becerilerin gelişimine yarar sağlamasının yanı sıra sportif faaliyetlere katılan bu özel gruplar, yetersizlikle oluşan durağan yaşamdan uzaklaşarak aktif bir yaşam sürmektedirler. Böylelikle toplumsal uyum süreci hızlanarak, oynadığı rollerden keyif alan ve yaşam boyu spor olgusunu ilke edinen bireyler olarak bütünleştirme sürecinin hızlanması kolaylaşacaktır (Şirinkan, 2011). İşitme yetersizliği olan bireylerin istenilen düzeyde sportif performans vermeleri için fiziksel dayanıklılık kadar psikolojik etmenler de oldukça önemlidir. Özellikle yaşamın ilk dönemlerinden itibaren iletişim ve sosyal uyum açısından problemler yaşayan bu bireylerde istenmeyen davranışları tetikleyebilmektedir (Türk, 2022).

Çeşitli nedenlerle farklı ortamlarda ortaya çıkabilen saldırgan davranışların spor faaliyetlerinden ortaya çıkma olasılığı fazladır (Eroğlu vd., 2017). Spor aktivitelerinde görülen saldırgan eğilimler, birçok sebeple ortaya çıkabilen ve oyuncuların yanı sıra idareci ve taraftar gibi unsurların da içerisinde yer aldığı oyun kurallarına aykırı davranış biçimleridir (Acet, 2005). Bu nedenle spor faaliyetlerinde başarı sağlayan sporcu ve takımların özellikle öfke, gerginlik, stres ve saldırganlık gibi performansı olumsuz yönde etkileyecek parametrelere karşı ayrı bir çalışma programı uyguladıkları söylenebilir. Özellikle profesyonel anlamda sportif faaliyetlere katılan sporcularda başarıyı arttıran önemli etkenlerin başında psikolojik çalışmalar gelmektedir. Bu çalışmalar ile birlikte sporcularda olumsuz hissetmelerine neden olan özelliklerden uzaklaşması sağlanır. Aynı zamanda bireye ve çevresine zarar veren olumsuz duyguların spor uygulamalarıyla dışarıya atılmasıyla birlikte toplumsal entegrasyon süreci hızlanmış olur (Şeker, 2020).

Sportif faaliyetlere katılan bireylerde diğerlerine göre kızgınlık ve öfke gibi olumsuz duygulara karşı koyma becerisinin fazla olduğu ve bu beceriyi yaşamın diğer alanlarında sergiledikleri söylenebilir (Russell, 2003). Bunun yanı sıra spor faaliyetlerine katılan bireylerde kişiye olumsuz hissettiren stres, saldırganlık ve nefret gibi duygularda spor faaliyetlerine katılmayan bireylere göre azalma meydana gelir (Şenyüzlü, 2013). Bu durum işitme yetersizliği olan bireyler için de söylenebilir. Spor uygulamalarının çeşitliliği ve tedavi edici yönü işitme yetersizliği olan bireylerin olumlu benliğini geliştirici önemli bir etkendir (Melo vd., 2020). Düzenli spor uygulamalarına katılan işitme yetersizliği olan bireylerde ruhsal ve bedensel sorunların önüne geçilmesine katkı sağlayarak yaşam kalitesinin arttırıldığı görülür (Arslan, 2018).

Profesyonel liglerde mücadele eden sporcuların sportif performanslarını artırabilmeleri, stres kaynağı olabilecek çevresel faktörleri en aza indirebilmeleri sonucunda mümkün olabilmektedir (Gould vd., 1993). Sporcuların istenilen düzeyde başarı sağlayabilmeleri için zihinsel sağlıklarını korumaları ve güçlendirmeleri gerekmektedir. Sportif başarıyı olumsuz yönde etkileyebilecek durumlar arasında aşırı gerginlik, negatif düşünceler ve stresle başa çıkma zorluğu gibi etkenler bulunmaktadır (Alp, 2018; Ekstrand vd., 2003). Bu tür durumlar, sporcuların müsabaka sırasında aşırı stres yaşamasına neden olarak saldırganlık eğilimini tetikleyebilmektedir (Alp vd., 2014). Saldırganlık eğilimi, fiziksel müdahale ve sözlü ifadelerle

ortaya çıkan hem rakibe hem de sporcunun kendisine zarar verebilen bir eylem olarak karşımıza çıkmaktadır (Alp ve Ergül, 2018).

Salon sporları içerisinde hentbol; tempolu oyun yapısına ek olarak hız, çeviklik ve stratejik düşünce becerilerini aynı anda kullanma becerisi gerektiren, rekabetin ön planda olduğu bir spor dalıdır. Özellikle sporcuların yoğun fiziksel temas içerisinde olmaları ve uzun periyotlu antrenman süreci bir dizi fiziksel ve psikolojik etkiyi beraberinde getirebilmektedir (Assunção vd., 2018). Buna paralel olarak stratejik zorluklar ve kazanma isteği sporcular arasında stres ve agresif davranışların ortaya çıkmasına neden olabilmektedir. Alanyazın incelendiğinde, takım sporlarına öncelik veren bireylerin zihinsel dayanıklılığını arttırdığı, ayrıca müsabaka sırasında karşılaşılan zorluklarla başa çıkma ve sorun çözme yeteneklerini geliştirdikleri görülmektedir (Akıncı, 2020). Sportif faaliyetlere katılımın, olumsuz davranışların azaltılmasının yanı sıra toplumsal kabulün ve yakın arkadaş ilişkilerinin geliştirilmesi açısından da oldukça önemli olduğu görülmektedir (Akıncı, 2019). Yapılan araştırmalar incelendiğinde özellikle işitme yetersizliği olan sporcuların stres ve saldırganlık yönelimleri üzerine yeterli sayıda çalışmaya rastlanılmaması ve istenmeyen davranışların azaltılmasında sporun etkin rolü araştırmanın önemini arttırmaktadır. Bu araştırmanın amacı; işitme yetersizliği olan profesyonel hentbolcuların algıladıkları stresin saldırganlık üzerindeki yordayıcı etkisini incelemektir. Çalışmanın diğer bir amacı ise katılımcıların demografik özelliklerindeki stres ve saldırganlık seviyeleri arasındaki fark ya da ilişkiye yönelik sonuçları tespit etmektir.

Araştırmanın amacına yönelik aşağıda yer alan sorulara cevap aranmıştır;

1. İşitme yetersizliği olan profesyonel hentbolcuların stres ve saldırganlık düzeyleri nedir?
2. İşitme yetersizliği olan profesyonel hentbolcuların stres ve saldırganlık düzeyleri yaş, cinsiyet, eğitim durumuna ve spora başlama yılına göre değişim göstermekte midir?
3. İşitme yetersizliği olan profesyonel hentbolcularda algılanan stres, saldırganlığı anlamlı bir şekilde yordamakta mıdır?
4. İşitme yetersizliği olan profesyonel hentbolcularda algılanan stresin, saldırganlığın alt boyutları üzerinde anlamlı bir etkisi bulunmakta mıdır?
5. İşitme yetersizliği olan profesyonel hentbolcuların algıladıkları stres ve saldırganlık düzeyleri arasında bir ilişki var mıdır?
6. İşitme yetersizliği olan profesyonel hentbolcuların algıladıkları stres ile saldırganlığın alt boyutları ilişkili midir?

Araştırma bulgularındaki fark analizlerinde cinsiyet, yaş ve eğitim durumu değişkenlerindeki anlamlı farklılıklara ilişkin sonuçlara yer verilerek değerlendirilmeye alınmıştır.

YÖNTEM

Araştırma Modeli

İşitme yetersizliği olan profesyonel hentbolcuların algılan stres ve saldırganlık düzeylerinin incelendiği bu araştırmada, nicel araştırma modellerinden ilişkisel tarama modeli kullanılmıştır. İlişkisel tarama modelinin inceleme konusu; iki ya da daha fazla sayıdaki değişken arasındaki değişimin varlığını veya derecesini belirlemeyi hedefleyen araştırmalardır (Karasar, 2018).

Evren-Örneklem

Araştırmanın katılımcılarını, profesyonel liglerde yer alan ve 2022-2023 sezonu İşitme Engelliler Türkiye Hentbol Şampiyonasına katılan 120 sporcudan oluşmaktadır. Örneklem için G-Power 3.0.1 istatistik programı kullanılarak α değeri 0.05, etki büyüklüğü 0.55 ve Power (1-β) ise 0.80 alınarak minimum 84 kişiye ulaşılması gerektiği belirlenmiştir. Cohen'e (1992) göre d=0.80 seviyesinde olan örneklem sayısı, büyük bir etki gücüne sahiptir. Araştırma için rastgele örnekleme tekniklerinden biri olan basit rastgele örnekleme tekniği kullanılmış ve bu teknikle ulaşılan 90 hentbolcu araştırmanın çalışma grubunu oluşturmuştur. Bu örnekleme tekniğinde, evrenin içersinde seçilecek olan katılımcıların örneklem içerisinde yer alma olasılığı eşit ve birbirinden bağımsız olmaktadır (Ural ve Kılıç, 2005).

Tablo 1. Katılımcıların demografik bilgilerine ilişkin betimsel analiz

Değişkenler		**N**	**%**
Yaşınız	18-22	7	8
	23-27	44	49
	28-32	26	29
	33 ve üzeri	13	14
	Toplam	90	100
Cinsiyetiniz	Erkek	44	49
	Kadın	46	51
	Toplam	90	100
Eğitim Durumu	Lise	35	39
	Önlisans	34	38
	Lisans	21	23
	Toplam	90	100

Tablo 1 incelendiğinde araştırmaya katılan bireylerin bilgilerine ilişkin yüzde ve frekans dağılımları şöyledir: Katılımcıların 7'si (%8) 18-22 yaş, 44'ü (%49) 23-27 yaş, 26'sı (%29) 28-32 yaş, 13'ü (%14) 33 yaş ve üzeri yaş aralığındadır. Cinsiyet değişkenine bağlı olarak araştırmaya 46 kadın (%51), 44 erkek (%49) katılmıştır. Katılımcıların 35'i (%39) lise, 34'ü (%38) önlisans, 21'i (%23) lisans öğrenim durumuna sahiptir.

Veri Toplama Araçlar

Katılımcıların yaş, cinsiyet, eğitim durumu ve kaç yıldır spor yaptığı bilgilerinin alınması amacıyla araştırmacı tarafından hazırlanan Tanımlayıcı Bilgi Formu, kişinin yaşamındaki olayları ne kadar stresli olarak algıladıklarını ölçmek için Cohen ve diğerleri (1983) tarafından geliştirilen, Eskin ve diğerleri (2013) tarafından Türkçeye uyarlanan 10 madde ve tek boyuttan oluşan beşli likert tipte "Algılanan Stres Ölçeği" kullanılmıştır. Bu araştırma için ölçeğin Cronbach Alfa güvenirliği 0,73 olarak bulunmuştur. Katılımcıların saldırganlık seviyelerini tespit etmek için Buss ve Perry (1992) tarafından geliştirilen ve 34 madden oluşan 5'li likert tipi "Saldırganlık Ölçeği" kullanılmıştır. Can (2002) tarafından Türkçe'ye uyarlaması gerçekleştirilen ölçek; "fiziksel saldırganlık, sözlü saldırganlık, öfke, düşmanlık ve dolaylı

saldırganlık olmak üzere beş alt boyuttan" oluşmaktadır. Bu araştırma için ölçeğin Cronbach Alfa değeri 0,86 bulunmuştur.

Tablo 2. Güvenirlik analizi sonuçları

Ölçek	Cronbach Alpha Katsayısı
Algılanan Stres Ölçeği	0,868
Saldırganlık Ölçeği	0,738

Tablo-2'de yer alan bulgulara göre "Algılanan Stres Ölçeğinin" Crobach alpha güvenirliği 0,868, "Saldırganlık Ölçeğinin" Crobach alpha güvenirliği ise 0,738 olarak bulunmuştur. Yukarıda yer alan bulgulara göre araştırmada kullanılan ölçeklerin güvenilir olduğu görülmektedir.

Araştırma Yayın Etiği

Araştırma için Muğla Sıtkı Koçman Üniversitesi Sosyal ve Beşerî Bilimler Etik Kurulu 27.07.2023 tarihli 97 sayılı kararı ile etik kural onamı alınmıştır.

Verilerin Toplanması

Veri toplama aşamasında ölçek ve ölçek verilerini oluşturan tanımlayıcı bilgi formu, algılanan stres düzeyi ölçeği (ASÖ) ve saldırganlık ölçeğinde (SÖ) yer alan sorular çalışmaya katılan takımların antrenör ve idarecilerine araştırmacı tarafından gerekli bilgilendirmeler yapıldıktan sonra uygulatılmıştır. Sorulara ilişkin veriler 2022-2023 sezonunda İşitme Engelliler Türkiye Şampiyonasına katılan takımların sporcularına işaret dili eğitmeninden tercüme desteği alınarak online ve yüz yüze toplanmıştır.

Verilerin Analizi

Çalışma için toplanan veriler SPSS 24.0 bilgisayar programına girilerek analiz işlemleri gerçekleştirilmiştir. Ölçüm araçları için Cronbach alpha güvenirlik analizinden yararlanılmıştır. Verilerin nomral dağılım gösterip göstermediği tespit etmek için basıklık (kurtosis) ve çarpıklık (skewness) değerlerine bakılarak yorumlamaya geçilmiştir. Jondeau ve Rockinger (2003) ile Kalaycı'ya (2010) göre çarpıklık ve basıklık ölçüsünün ±3 aralığında değerler alması durumunda verilerin normal dağılım gösterebileceğini ifade edilmektedir. Bu sebeple araştırmada parametrik testler uygulanarak yorumlanmıştır. Demografik özellikleri yorumlamak için frekans ve yüzde analizi gerçekleştirilmiştir. Profesyonel hentbolcuların algıladıkları stres ve saldırganlık düzeyleri iki bağımsız grupta karşılaştırılmasında t testi, sayısal verilerin üç ve daha fazla bağımsız grupta karşılaştırılmasında ise varyans analizi (Anova) kullanılmıştır. ANOVA testi sonrasında değişkenler arasındaki farklılıkların hangi gruplar arasında olduğunu analiz etmek için scheffe karşılaştırma analiz yöntemi kullanılmıştır. Varyasların homojen dağılmadığı değişkenlerde welch testi, gruplar arasındaki farklılıkları çözümlemek için ise Games-Howell testinden yararlanılmıştır. Algılanan stres ve saldırganlık düzeylerinin arasındaki ilişkinin yönünü ve kuvveti pearson korelasyon analiz yöntemiyle tespit edilmiştir. Algılanan stresin saldırganlık üzerindeki etkisini basit doğrusal regresyon ve çoklu doğrusal regresyon analiz yöntemi kullanılmıştır. Verilerin analizinde anlamlılık düzeyi $p < 0,05$ düzeyi esas alınarak yorumlanmıştır.

Tablo 3. Ölçekler ve alt boyutlarından elde edilen puanlar

	n	Min.	Maks.	X	Ss.	Çarpıklık	Basıklık
Algılanan Stres	90	1,00	4,40	2,393	,620	,716	1,050
Saldırganlık	90	1,35	4,32	2,509	,522	,645	,896
Fiziksel Saldırganlık	90	1,00	4,38	1,973	,701	1,512	2,448
Sözel Saldırganlık	90	1,00	5,00	2,442	,871	,723	-,025
Öfke	90	1,29	4,71	2,914	,733	-,424	-,242
Düşmanlık	90	1,33	4,50	2,907	,502	,026	1,426
Dolaylı Saldırganlık	90	1,17	4,00	2,305	,585	,620	,296

Tablo 3'te "Algılanan Stres Ölçeği" çarpıklık (,716) ve basıklık (1,050) katsayıları ile "Saldırganlık Ölçeği" çarpıklık (,645) ve basıklık (,896) katsayıları yorumlandığında verilerin normal dağılımı görülmektedir. Ayrıca bulgular incelendiği zaman saldırganlık ölçeğinin alt boyutlarında da benzer sonuçların olduğu görülmektedir. Bunun sonucunda araştırma için toplanan veriler parametrik testler uygulanarak yorumlanmıştır.

BULGULAR

Bu bölümde çalışmanın amaçları belirtilen yöntemler doğrultusunda istatistiksel analizler tablolara dönüştürülerek yorumlanmıştır.

Tablo 4. Katılımcıların cinsiyet değişkeni t testi sonuçları

Değişken			n	X	Ss.	t	p
Algılanan Stres	Cinsiyet	Erkek	44	2.68	,74	4,836	,000*
		Kadın	46	2.11	,26		
Saldırganlık	Cinsiyet	Erkek	44	2.68	,65	3,270	,002*
		Kadın	46	2.33	,26		
Fiziksel Saldırganlık	Cinsiyet	Erkek	44	2,27	,85	4,261	,000*
		Kadın	46	1,68	,33		
Sözel Saldırganlık	Cinsiyet	Erkek	44	2,99	,89	7,388	,000*
		Kadın	46	1,91	,39		
Öfke	Cinsiyet	Erkek	44	2,87	,87	-,511	,611
		Kadın	46	2,95	,56		
Düşmanlık	Cinsiyet	Erkek	44	2,93	,65	,579	,565
		Kadın	46	2,87	,29		
Dolaylı Saldırganlık	Cinsiyet	Erkek	44	2,45	,76	2,450	,018*
		Kadın	46	2,15	,26		

***p<0.05**

Tablo 4 incelendiğinde katılımcıların cinsiyet değişkenine bağlı t-testi sonuçlarına ilişkin bilgileri içermektedir. Katılımcılar arasında erkek hentbolcuların algıladıkları stresin (x=2.68, p=,000<0,05) istatistiksel açıdan anlamlı düzeyde farklılaştığı tespit edilmiştir. Ayrıca saldırganlık düzeylerine göre cinsiyet değişkenine bağlı olarak farklılaşmanın (x=2.68, p=,002<0,05) istatistiksel açıdan erkek hentbolcular lehine olduğu saptanmıştır. Cinsiyet değişkenine göre saldırganlığın alt boyutlarından olan fiziksel saldırganlık (x=2.27, p=,000<0,05), sözel saldırganlık (x̄=2.99, p=,000<0,05) ve dolaylı saldırganlığın (x=2.45, p=,018<0,05) istatiksel olarak erkeklerin lehine olduğu görülmektedir.

Tablo 5. Katılımcıların eğitim durumuna ilişkin anova testi sonuçları

Değişken	Eğitim Durumu	n	x	Ss.	f	p	Fark
Stres Eğilimi	1)Lise	35	2,62	,67	1,793	0,08*	1-2 1-3
	2)Önlisans	34	2,36	,57			
	3)Lisans	21	2,10	,46			
Saldırganlık	1)Lise	35	2,63	,67	1,479	,234	-
	2)Önlisans	34	2,45	,47			
	3)Lisans	21	2,42	,15			
Değişken	**EğitimDurumu**	**n**	**x**	**Welsh**	**df_1**	**p**	**Fark**
Fiziksel Saldırganlık	1)Lise	35	2,26	11,565	2	,004*	1-3
	2)Önlisans	34	1,85				
	3)Lisans	21	1,67				
Sözel Saldırganlık	1)Lise	35	2,80	6,217	2	,000*	1-3
	2)Önlisans	34	2,39				
	3)Lisans	21	1,92				
Öfke	1)Lise	35	2,82	9,874	2	,078	-
	2)Önlisans	34	2,86				
	3)Lisans	21	3,12				
Düşmanlık	1)Lise	35	2,99	7,865	2	,093	-
	2)Önlisans	34	2,78				
	3)Lisans	21	2,96				
Dolaylı Saldırganlık	1)Lise	35	2,37	8,700	2	,126	-
	2)Önlisans	34	2,32				
	3)Lisans	21	2,15				

***p<0,05**

Tablo 5'te hentbolcuların eğitim durumlarına göre algıladıkları stres ve saldırganlık düzeylerine yönelik bilgiler verilmektedir. Bulgular incelendiğinde algılanan stres ile eğitim düzeyi istatiksel olarak anlamlı farklılık olduğu görülmektedir (p=,008<,05). Lise eğitim düzeyinde olan katılımcıların önlisans ve lisans eğitim düzeyinde olan katılımcılara göre algıladıkları stres düzeyinin daha fazla olduğu görülmektedir. Ancak "saldırganlık toplam puanlarında fark görülmemektedir (p=,234>,05). Saldırganlığın alt boyutlarından olan fiziksel saldırganlık (p=,004<,05) ve sözel saldırganlık (p=,000<,05) düzeylerinde ise anlamlı bir fark tespit edilmiştir.

Tablo 6. Katılımcıların yaş değişkenine ilişkin anova testi sonuçları

Değişkenler	Yaş	n	x	Ss.	f	p	fark
Algılanan Stres	1)18-22	7	3,25	,58	1,793	,000*	1-2, 1-3
	2)23-27	44	2,21	,53			
	3)28-32	26	2,38	,45			
	4)33 ve üzeri	13	2,53	,81			
Saldırganlık	1)18-22	7	2,99	,88	1,479	,038*	4-1, 4-2 4-3
	2)23-27	44	2,49	,40			
	3)28-32	26	2,50	,44			
	4)33 ve üzeri	13	2,29	,66			
Değişkenler	**Yaş**	**n**	**x**	**Welsh**	**df_1**	**p**	**Fark**
Fiziksel Saldırganlık	1)18-22	7	2,64	1,147	3	,354	-
	2)23-27	44	1,83				
	3)28-32	26	2,01				
	4)33 ve üzeri	13	1,99				
Sözel Saldırganlık	1)18-22	7	3,25	3,244	3	,042*	1-2
	2)23-27	44	2,31				
	3)28-32	26	2,42				
	4)33 ve üzeri	13	2,46				
Öfke	1)18-22	7	3,55	2,075	3	,136	-
	2)23-27	44	2,98				
	3)28-32	26	2,86				
	4)33 ve üzeri	13	2,43				
Düşmanlık	1)18-22	7	3,19	2,029	3	,142	-
	2)23-27	44	2,98				
	3)28-32	26	2,85				
	4)33 ve üzeri	13	2,60				
Dolaylı Saldırganlık	1)18-22	7	2,47	,259	3	,854	-
	2)23-27	44	2,31				
	3)28-32	26	2,30				
	4)33 ve üzeri	13	2,17				

***p<0,05**

Tablo 6'da hentbolcuların yaş değişkenine göre algıladıkları stres ve saldırganlık düzeylerine ilişkin bilgiler verilmektedir. Bulgular incelendiğinde algılanan stres (p=,000<,05) ve saldırganlık davraşında (p=,038<,05) yaş değişkenine göre anlamlı farklılıklar tespit edilmiştir. 18-22 yaş grubunda yer alan katılımcıların diğer yaş gruplarına göre algıladıkları stresin daha yüksek olduğu görülmektedir. Fiziksel saldırganlık alt boyutunda 33 yaş ve üzeri olan katılımcıların diğer yaş gruplarına göre fiziksel saldırganlık eğiliminin daha düşük olduğu görülmektedir. Ayrıca katılımcıların yaş değişkenine göre saldırganlığın alt boyutlarından olan sözel saldırganlık düzeyinde (p=,042<,05) istatistiksel olarak anlamlı farklılık tespit edilmiştir.18-22 yaş grubunda olan katılımcıların 23-27 yaş grubuna göre sözel saldırganlık boyutunun daha yüksek olduğu görülmektedir.

Tablo 7. Algılanan stres ile saldırganlık davranışı arasındaki korelasyon analizi

		Saldırganlık
Algılanan Stres	r	,479**
	p	,000
	n	90

***p<0,01**

Tablo-7'de algılanan stres ve saldırganlık düzeyi arasında korelasyon analizi uygulanmıştır. Hentbolcuların algıladıkları stres düzeyi ile saldırganlık davranşı ilişkisinin orta düzeyde ve pozitif yönde olduğu tespit edilmiştir (r =,479; p<0,01).

Tablo 8. Algılanan stres ve saldırganlığın alt boyutları korelasyon analizi

		Fiziksel Saldırganlık	**Sözel Saldırganlık**	**Öfke**	**Düşmanlık**	**Dolaylı Saldırganlık**
Algılanan Stres	r	**,531***	**,432***	**,292***	**,282***	**,324***
	p	0,00	0,00	0,005	0,007	0,002
	n	90	90	90	90	90

***p<0,01**

Tablo-8'de yer alan bulgulara göre, hentbolcuların algıladıkları stres ile saldırganlığın alt boyutları arasında korelasyon analizi uygulanmıştır. Araştırmaya katılan hentbolcuların saldırganlık alt boyutlarından öfke (r =,292; p<0,01) ve düşmanlık (r =,282; p<0,01) arasında pozitif yönde zayıf düzeyde bir ilişki olduğu tespit edilmiştir. Ayrıca dolaylı saldırganlık (r =,324; p<0,01), sözel saldırganlık (r =,432; p<0,01) ve fiziksel saldırganlık (r =,531; p<0,00) arasında ise pozitif yönde orta düzeyde bir ilişki olduğu görülmektedir.

Tablo 9. Algılanan stresin, saldırganlık davranışını yordamasına ilişkin regresyon analizi

Bağımsız Değişken	**Bağımlı Değişken**	**β**	**Standart Hata**	**Beta**	**t**	**p**	**Alt Limit**	**Üst Limit**
Algılanan Stres	(Sabit)	1,414	,364	-	3,885	,000	1,158	1,932
	Saldırganlık	,385	,111	,435	3,465	**,001**	,246	,560

Not: F(1, 88) =26,150, p=0,01; R²=0,229;Durbin Watson=1,656.

Tablo-9'da algılanan stresin, saldırganlık davranışına etkisine ilişkin yapılan regresyon analizinde modelin anlamlı olduğu ve profesyonel hentbolcuların algıladıkları stresin, saldırganlık davranışını anlamlı bir şekilde yordadığı ($F_{(1, 88)}$ =26,150, p=0,01) ve algılanan stres değişkeninin, saldırganlığın toplam varyansının %22,9'unu açıkladığı görülmektedir.

Tablo 10. Algılanan stres ile salırganlığın alt boyutlarına ilişkin çoklu regresyon analizi

Bağımsız Değişken	Bağımlı Değişken	B	Standart Hata	Beta	T	p	VIF	CI
Algılanan Stres	(Sabit)	1,414	,364	-	3,885	,000	-	1,000
	Fiziksel Saldırganlık	,385	,111	,435	3,465	**,001**	1,923	8,811
	Sözel Saldırganlık	,148	,087	,208	1,711	,091	1,806	10,400
	Öfke	,040	,113	,047	,355	,724	2,153	13,716
	Düşmanlık	-,058	,167	-,047	-,345	,731	2,220	14,663
	Dolaylı Saldırganlık	-,040	,127	-,038	-,315	,754	1,733	26,059

Not: F(5, 84) =7,537,p=0,01; Adj.R^2=0,269; Durbin Watson=1,811

Tablo-10'da algılanan stres ile saldırganlığın alt boyutları arasında yapılan çoklu regresyon analizi verilmiştir. Öncelikle çoklu regresyon analizi ön koşulları arasında yer alan bağımsız değişkenler arasında VIF (varyans artış faktörü) ve CI (durum indeksi) bulguları sonucunda çoklu bağlantılılık sorununun olmadığı tespit edilmiştir. Field'a (2009) göre VIF değerlerinin 10'dan, CI değerlerinin ise 30'dan küçük olması gerektiği savunulmaktadır. Ayrıca bağımsız değişkenlerin hata değerlerinin birbirinden bağımsız olup olmadığı (otokorelasyon) Durbin-Watson değerine göre yorumlanmıştır. İdeal değerin 1 ile 3 arasında olması gerektiğinin önerilmesi nedeniyle (Field, 2009) araştırmada tespit edilen 1,811 değeri sonucunda otokorelasyon problemi olmadığı görülmektedir. Ayrıca algılanan stresin, saldırganlığın alt boyutlarını anlamlı bir şekilde yordadığı (F=7,537, p=0,00) ve toplam varyansın yaklaşık %26,9'nu açıkladığı görülmektedir. Algılanan stresin, fiziksel saldırganlığı anlamlı olarak etkilediği (p<0,05), diğer alt boyutlarda ise herhangi bir etkinin olmadığı sonucuna ulaşılmaktadır (p>0,05).

TARTIŞMA VE SONUÇ

Araştırmaya katılan örneklem grubunun demografik özelliklerine ilişkin bulgular incelendiğinde cinsiyet değişkenine göre işitme yetersizliği olan kadın-erkek hentbolcuların algıladıkları stres ve saldırganlık arasında istatistiksel bir farklılık tespit edilmiştir. Erkek hentbolcuların algıladıkları stres ve saldırganlık düzeyinin daha yüksek olduğu ayrıca fiziksel saldırganlık, sözel saldırganlık ve dolaylı saldırganlık düzeylerinde de erkek hentbolcuların lehine istatistiksel olarak anlamlılık görülmektedir. Araştırma bulgularına benzer olarak Crocker ve Graham (1995) elde ettikleri bulgulara göre kadın sporcuların erkek sporculara göre algıladıkları stres düzeyinin yüksek olduğunu, Başaran ve diğerleri (2009) yapmış oldukları araştırmada kadın sporcuların müsabakada algıladıkları stresin erkek sporculardan yüksek olduğunu saptamışlardır. Göksu ve Kumcağız (2021) yapmış oldukları çalışmada kadın katılımcıların algılanan stres ölçeğinden aldıkları puanların cinsiyet değişkenine göre erkekler lehine anlamlı şekilde farklılaştığı sonucuna ulaşmışlardır. Duan ve Zhu (2020) pandemi döneminde kadınların daha fazla stres algıladıklarını, Wang ve diğerleri (2020) yapmış oldukları çalışmada kadınların stres düzeylerinin daha yüksek olduğunu, Acet (2001) yaptığı araştırmada erkek katılımcıların saldırganlık eğilimlerinin kadınlara göre çok daha yüksek olduğunu, Var (2008) yaptığı araştırmada erkek sporcuların saldırganlık düzeylerinin kadınlara göre daha yüksek olduğunu, Yılmaz (2013) öğrenciler üzerinde yapmış olduğu çalışmada saldırganlık düzeyleri açısından erkek öğrencilerin saldırganlık davranışlarının yüksek olduğu

sonucuna ulaşmıştır. Arslan (2016) tarafından yapılan araştırmada kadın öğrencilerin erkeklere göre algıladıkları stresi daha yüksek bulmuştur. Hızıroğlu (2018) yapmış olduğu araştırmada, katılımcıların cinsiyet değişkenine göre algılanan stres düzeylerinde anlamlı bir farklılık tespit edildiğini belirtmiştir. Başka bir çalışmada Yıldız (2018) araştırma sonucunda spor yapan işitme engelli bireylerde cinsiyet değişkenine göre fiziksel saldırganlık boyutunda erkek katılımcılar lehine istatistiksel açıdan anlamlı farklılıklar tespit etmiştir. Güler ve Özgörüş (2021) yapmış olduğu araştırmada erkeklerin saldırganlık düzeyleri ile fiziksel ve sözel saldırganlığın kadınlara göre daha yüksek olduğu sonucuna varmıştır. Yönet ve diğerleri (2016) ile Camadan ve Yazıcı (2017) yapmış olduğu çalışmalarda erkek öğrencilerin saldırganlık düzeylerini daha yüksek bulmuşlardır. Caz ve diğerleri (2015) yapmış oldukları araştırmada saldırganlığın alt boyutlarından biri olan fiziksel saldırganlık düzeyinde erkek katılımcıların lehine istatistiksel bir farklılaşma tespit etmişlerdir. Yaşartürk ve diğerleri (2022) yapmış oldukları araştırmada fiziksel saldırganlık düzeyinin erkek öğrencilerin puan ortalamalarının daha yüksek olduğu sonucuna ulaşmışlardır. Doğan ve Çötok (2020) yapmış oldukları araştırmada erkek üniversite öğrencilerinin fiziksel ve sözel saldırganlık düzeylerini kadın öğrencilere göre daha yüksek olduğunu bulmuştur. Qiu ve diğerleri (2020) yapmış olduğu araştırmada kadınların erkeklere oranla stres düzeylerinin daha yüksek olduğunu tespit etmiştir. Coulomb-Cabagno ve Rascle (2006) yapmış oldukları araştırmada erkek sporcuların saldırganlık eğilimlerinin daha fazla olduğunu tespit etmişlerdir. Araştırma sonucunda elde edilen erkek hentbolculara ilişkin bulguların alanyazında yer alan sonuçları desteklediği görülmektedir.

Örneklemi oluşturan katılımcıların eğitim durumu değişkenine göre algılanan stres ve saldırganlık davranışı arasında anlamlı bir farklılığa ulaşıldığı görülmektedir. Lise eğitim düzeyinde olan hentbolcuların önlisans ve lisans eğitim düzeyindeki hentbolculara oranla algıladıkları stresin daha yüksek olduğu görülmektedir. Eğitim düzeyinde saldırganlık davranışına bağlı anlamlı bir farklılık tespit edilmiş olmamasına rağmen, fiziksel saldırganlık ve sözel saldırganlık alt boyutlarında anlamlı düzeyde farklılık olduğu görülmektedir. Mbatha ve Mokwena (2023) yapmış olduğu araştırmada eğitim durumu ve demografik özelliklerin kişilerde stres düzeyini arttırdığı sonucuna ulaşmışlardır. Araştırmada elde edilen bulgulardan farklı olarak, Yıldız (2021) taekwondo sporcularının algıladıkları stres ve saldırganlık düzeyinin eğitim durumu değişkenine göre farklılaşmadığı ve Mazılı (2018) yapmış olduğu araştırmada sporcuların saldırganlık düzeylerinin eğitim durumları ile bir ilişkisinin olmadığı sonucunu tespit etmişlerdir. Araştırma kapsamında literatürde yer alan sonuçlardan farklı bulguların elde edilmesinin katılımcıların işitme yetersizliği durumu ile ilişkilendirilebileceği söylenebilir.

Katılımcıların yaş değişkenine göre elde edilen bulgular doğrultusunda algılanan stres ve saldırganlık düzeyi arasında bir fark olduğu ve bu farklılığın anlamlı düzeyde olduğu görülmektedir. Benzer olarak sözel saldırganlık düzeyinde, 18-22 yaş gurubunda olan katılımcıların 23-27 yaş grubunda olan katılımcılara göre saldırganlık düzeyinin daha yüksek olduğu görülmektedir. Özkatar-Kaya (2010) yapmış olduğu araştırmada katılımcıların yaşlarının artmasının saldırganlık eğilimini arttırdığı sonucuna ulaşmıştır. Mevcut araştırma sonuçlarına paralel olarak Işık ve diğerleri (2017) işitme yetersizliği olan sporcuların yaş düzeyleri arttıkça saldırganlık düzeylerinin azaldığını tespit etmiştir. Ayrıca Dalkılıç ve diğerleri (2013) yaşları 15-19 arasında olan katılımcıların diğer yaş gruplarına oranla

saldırganlık eğilimlerinin yüksek olduğu sonucuna varmıştır. Farias ve diğerleri (2021) yapmış oldukları araştırmada kişilerin stresinde yaşın önemli bir yordayıcı olduğu ve genç ebeveynlerin algıladıkları stresin daha fazla olduğunu belirtmektedirler. Akıl (2018) yapmış olduğu araştırmada yaş değişkeninin saldırganlık düzeyini etkilediği sonucuna varmıştır. Araştırmanın yaş değişkenine ilişkin bulguları alan yazındaki sonuçları destekler niteliktedir.

Araştırmaya katılan hentbolcuların algıladıkları stres düzeyi arttıkça saldırgan davranışların arttığı tespit edilmiştir. Yapılan regresyon analizi sonucunda, algılanan stresin saldırganlık üzerinde orta düzeyde pozitif bir ilişki olduğu gözlemlenmiştir. Algılanan stresin saldırganlık üzerindeki değişiminin %22,9'unun açıklandığı görülmektedir. Ayrıca katılımcıların algıladıkları stres düzeyi ile saldırganlık davranışı alt boyutları arasında yapılan çoklu doğrusal regresyon analizinde istatiksel açıdan anlamlı bir fark tespit edilmiştir. Algılanan stresin saldırganlık alt boyutları üzerindeki değişiminin %26,9'unun açıkladığı görülmektedir. Özdevecioğlu ve Yalçın (2010) yapmış olduğu çalışmada sporcuların stres düzeyleri arttıkça saldırganlık düzeylerinin de arttığını tespit etmiştir. Şahin (2017) 112 acil çalışanları üzerinde yapmış olduğu çalışmada algılanan stresin saldırganlığı anlamlı düzeyde yordadığını tespit etmiştir. Araştırmaya katılanların algıladıkları stres ile saldırganlık düzeyini tespit etmek için yapılan korelasyon analizi sonucunda algılanan stres ve saldırganlık davranışı arasında pozitif bir ilişki tespit edilmiştir. Bu sonuca paralel olarak algılanan stres ile saldırganlık ölçeği alt boyutları arasında pozitif yönde düşük ve orta düzeyde ilişki vardır. Fiziksel saldırganlık ve sözel saldırganlık arasında orta düzeyde pozitif bir ilişki, algılanan stres ile öfke, düşmanlık ve dolaylı saldırganlık arasında ise pozitif yönde düşük bir ilişki görülmektedir. Dalbudak (2012) yapmış olduğu araştırmada görme yetersizliği olan bireylerde stres düzeyinin artmasının saldırganlık davranışını pozitif yönde etkilediği sonucuna varmıştır. Grizzle (2016) yapmış olduğu çalışmada stres ve saldırganlık arasında bazı değişkenler aracılığıyla anlamlı ilişki olduğu sonucuna varmıştır. Reisel ve diğerleri (2010) ve St-Pierre ve Holmes (2010) yapmış oldukları araştırmalarda stres ve saldırganlık değişkenlerinin birbirini olumlu düzeyde etkileyen bir ilişki olduğu sonucunu tespit etmiştir. Koerber ve diğerleri (2023) tespit etmiş olduğu araştırma bulgusunda algılanan iş stresinin, ruh sağlığı ve saldırganlık davranışları arasındaki ilişkiye aracılık ettiği sonucuna ulaşmıştır. Dolayısıyla araştırmada elde ettiğimiz katılımcıların algıladıkları stres ile saldırganlık arasındaki pozitif ilişkiyi gösteren bulgularımız literatürde yer alan bulgularla benzerlik göstermektedir.

Sonuç olarak algılanan "stres ve saldırganlık davranışının cinsiyet, yaş ve eğitim durumu gibi değişkenler açısından" farklılaştığı tespit edilmiştir. Bunun sonucunda erkek hentbolcuların kadın hentbolculara göre algıladıkları stres ve saldırganlık davranışının daha yüksek olduğu tespit edilmiştir. Yaş değişkeni bulgularına göre algılanan stres ve saldırganlık düzeyi arasında anlamlı farklılık vardır. 18-22 yaş grubu hentbolcuların diğer yaş gruplarına göre algıladıkları stres ve saldırganlık düzeyinin daha fazla olduğu görülmektedir. 33 ve üzeri yaştaki katılımcıların diğer yaş gruplarından olan katılımcılara göre algıladıkları stresin daha az olduğu ve diğer tüm yaş gruplarından daha az saldırganlık eğilimi barındırdıkları görülmektedir. Yaşın ilerlemesiyle oluşan olgunluğun stres ve saldırganlık düzeyini etkilediği söylenebilir. Katılımcıların eğitim düzeyine göre algılanan stresin lise mezunu olan işitme yetersizliğinden etkilenen hentbolcularda daha fazla olduğu, algıladıkları stres düzeyi artmasının saldırgan davranış eğilimi göstermelerine sebep olduğu tespit edilmiştir. Bu sonuca paralel olarak eğitim durumuna verilen önemin artmasının istenmeyen davranışları önlemede etkili bir yol olduğu

düşünülebilir. Aynı zamanda algılanan stres ve saldırganlık eğilimi arasında pozitif ve orta düzeyde bir ilişki olduğu sonucuna varılmıştır. Sonuç olarak, stres derecesinin saldırgan davranış eğilimini etkilediği ve profesyonel hentbolcuların stres düzeyleri ile saldırganlık eğilimi arasında anlamlı bir ilişki olduğu söylenebilir.

ÖNERİLER

Bu araştırmada elde edilen bulgular işitme yetersizliği olan bireylerle çalışan antrenör ve uzmanlar için önem taşımaktadır. Doğuştan ya da sonradan oluşabilen ve yaşam kalitesini büyük oranda düşüren yetersizlik durumu istenmeyen davranışları tetikleyebilmektedir. Hayatın birçok alanını etkileyen bu uyumsal olmayan davranışlar spor müsabakalarında da sıklıkla karşımıza çıkmaktadır. Bu davranışların nedenlerini tespit etmek ve çözüm önerileri bulunması açısından işitme yetersizliği olan bireylere yönelik yapılacak araştırmalar çoğaltılmalıdır. Duygusal zeka becerilerin geliştirilmesine yönelik çalışmaların programlara eklenerek bireysel özellikler ve ihtiyaçlar dikkate alınmalıdır. Yetersizlik durmunun getirmiş olduğu dezavantajlı durumların ortadan kaldırabilmesi için sporculara; stres yönetimi, psikolojik danışmanlık, empati ve iletişim konularında eğitimler verilebilir. Böylelikle sporcuların stres ve saldırganlık düzeylerini etkileyen çevresel faktörlerin önüne geçilerek daha sağlıklı bir spor ortamı oluşturulabilir.

Bu çalışma farklı branşlarda ve geniş örneklem grubu ile tekrarlanabilir. Demografik bilgiler çoğaltılarak farklı hipotezler geliştirilebilir. İşitme yetersizliği olan bireylerin yaşamış oldukları zorlukların farkına vararak, toplumla bütünleştirme sürecini hızlandıran spor uygulamalarının çoğaltılması sağlanabilir. Spor tesislerinin erişim olanakları ve fiziksel imkanları düzenlemelerle uyumlu hale getirilmelidir. İşitme yetersizliği olan bireylerin katıldıkları uyarlanmış spor uygulamlarında görev yapan antrenör ve uzmanlara gerekli eğitim programlarının periyodik dönemlerde yapılması önerilmektedir.

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Araştırmacıların Katkı Oranı Beyanı: Araştırma Dizaynı-AYK, Verilerin Toplanması-AYK; TOM, istatistik analiz- TOM; Makalenin hazırlanması, AYK; TOM.

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Investigation of the Relationship Between the Self-Efficacy and Cognitive Flexibility of Karate Referees*

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Abstract

The present study aims to examine the relationship between the self-efficacy and cognitive flexibility of karate referees. A total of 138 referees, 88 male and 50 female, working in the Turkish Karate Federation participated in the study. The mean age of the referees was 38.09±13.43 years, mean body weight was 74.33±13.46 kg, mean height was 170.23±8.09 cm, and mean active refereeing period was 9.95±8.84 years. The Referee Self-Efficacy Scale developed by Myers et al. (2012) and adapted into Turkish by Karaçam and Pulur (2017) as well as the Cognitive Flexibility Scale developed by Martin ve Rubin (1995) and adapted into Turkish by Çelikkaleli (2014) were applied to the referees. Independent Samples T-test, One-Way ANOVA test, Pearson correlation test and descriptive statistics were applied to the data obtained. According to the results of the Pearson correlation analysis, a significant positive correlation was found between the referees' self-efficacy and cognitive flexibility levels ($p<0.05$). The results of the independent samples t-test showed that there was a significant difference in the level of self-efficacy between the males and females ($p<0.05$). Moreover, self-efficacy level was found to be significant in relation to refereeing class ($p<0.05$). In conclusion, it was determined in the study that the self-efficacy levels of the karate referees increased in parallel with their cognitive flexibility levels, the male participants had higher self-efficacy levels compared to the female participants, and self-efficacy levels increased in parallel with refereeing class.
Keywords: Karate, Referee, Self-efficacy, Cognitive flexibility

Karate Hakemlerinin Öz Yeterlikleri ile Bilişsel Esneklikleri Arasındaki İlişkinin İncelenmesi

Öz

Bu araştırmanın amacı; karate hakemlerinin öz yeterlikleri ile bilişsel esneklikleri arasındaki ilişkinin incelenmesidir. Araştırmaya Türkiye Karate Federasyonu'nda görev yapan 88 erkek ve 50 kadın olmak üzere toplam 138 hakem katılmıştır. Hakemlerin yaş ortalaması 38.09±13.43 yıl, vücut ağırlığı ortalaması 74.33±13.46 kg, boy uzunluğu ortalaması 170.23±8.09 cm, faal hakemlik süreleri ise 9.95±8.84 yıl olarak tespit edilmiştir. Hakemlere Myers ve ark. (2012) tarafından geliştirilen, Karaçam ve Pulur (2017) tarafından Türkçeye uyarlanmış Hakem Öz Yeterlik Ölçeği ve Martin ve Rubin (1995) tarafından geliştirilen ve Çelikkaleli (2014) tarafından Türkçeye uyarlanmış Bilişsel Esneklik Ölçeği uygulanmıştır. Elde edilen verilere Bağımsız Gruplar T-testi, Tek Yönlü ANOVA testi, Pearson korelasyon testi ve tanımlayıcı istatistikler uygulanmıştır. Pearson korelasyon analizi sonucuna göre hakem öz yeterlilik seviyesi ile bilişsel esneklik düzeyi arasında pozitif yönde anlamlı bir ilişki tespit edilmiştir ($p<0.05$). Bağımsız gruplar t-testi sonuçlarında ise öz yeterlilik seviyesinde erkeklerin kadınlara göre anlamlı bir farklılık gösterdiği tespit edilmiştir ($p<0.05$). Bunun yanı sıra öz yeterlik seviyesi hakemlik klasmanına göre de anlamlı bulunmuştur ($p<0.05$). Sonuç olarak, yapılan çalışmada karate hakemlerinin öz yeterlik seviyeleri arttıkça bilişsel esneklik düzeylerinin arttığı, erkeklerin kadınlara oranla öz yeterlilik seviyelerinin yüksek olduğu ve klasman arttıkça öz yeterlilik seviyesinin de yükseldiği tespit edilmiştir.
Anahtar kelimeler: Karate, Hakem, Öz yeterlik, Bilişsel esneklik

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INTRODUCTION

Self-efficacy and cognitive flexibility are of great importance in terms of having advanced levels of careful and accurate decision-making skills and the ability to manage stress internally in the best way possible (Tuero et al., 2002). Referees play a crucial role in the entire progression of a competition from beginning to end. In this process, it is very important for referees to make the most accurate decisions against fast changing positions that may develop during the competition, particularly in branches such as karate that involve contact. Karate is a Far Eastern-based combat sport that is identified with Japanese culture and is based on unarmed defense against controlled punching and kicking techniques (Çağlar, 2020). Since it is a fast and dynamic sports branch with a high level of competition, athletes need to react as quickly as possible to moves from the opponent (Anderson & Pierce, 2009). Due to the characteristics of karate, it is necessary for referees to possess developed self-efficacy and cognitive flexibility. These characteristics may vary depending on the classification and background of the referees (Guillén & Feltz, 2011). In karate, referees are divided into classifications. These are Prospective Referee, Regional Referee, National Referee and International Referee, respectively. Self-efficacy in referees refers to the individual's internal evaluation of their ability to successfully fulfill their duties and to solve or eliminate any problems encountered (Karaçam & Pulur, 2017). It is very important for referees to be confident, apply the rules in the best way and improve themselves in terms of self-efficacy.

Cognitive flexibility is defined as the ability to organize information processing strategies and acquisitions in order to respond to situations that may occur in one's surroundings (Adıgüzel, 2018; Kara et al., 2020). Especially considering the requirement of referees to decide quickly on different and unpredictable positions during the competition, it is necessary that their cognitive flexibility be at a sufficient level (Karadeniz, 2004).

For this reason, it is thought to be very important to determine the factors affecting cognitive flexibility, which is one of the determining factors of referee performance. In addition, it is thought that determining the relationship between referee self-efficacy and cognitive flexibility can be an important criterion, especially in referee training and especially in referee appointments. When the literature is examined, it is observed that there is not enough research on cognitive flexibility skills in both karate and other sports branches. It is thought that the research will contribute to the literature in order to emphasize the importance of cognitive flexibility in referees. In this context, the present study aims to investigate the relationship between the self-efficacy and cognitive flexibility levels of karate referees.

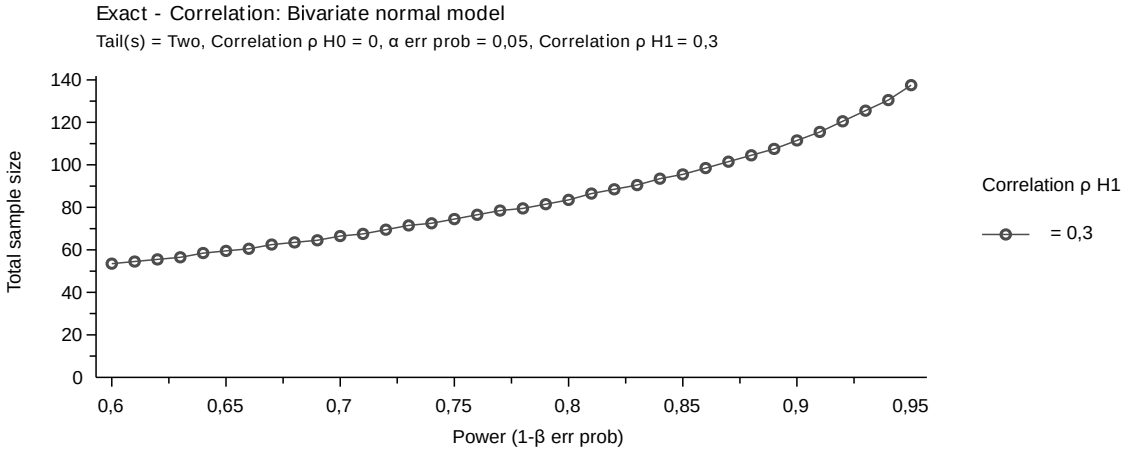
MATERIAL AND METHOD

Research Model

In this study, we used a quantitative and relational survey design. This type of experimental design aim to determine the existence and/or degree of change between two or more variables (Karasar, 2009). In addition, we used the criterion sampling method; purposive sampling is a sampling method that is suitable for individuals with specific, limiting and hard-to-reach individual characteristics (Erkuş, 2013).

Study Group

Power analysis method was used to determine the sample group of the research, and according to 95% confidence (1-α), 95% test power (1-β) and p=0.3 Pearson correlation analysis, it was determined that the number of samples for this research should be at least 138 (Graphic 1). A total of 138 referees (88 male and 50 female) from the Turkish Karate Federation constituted the study group. The mean age of the referees was 38.09±13.43 years, the mean body weight was 74.33±13.46 kg, the mean height was 170.23±8.09 cm, and the mean active refereeing period was 9.95±8.84 years.



Graphic 1. Power analysis result

Ethical Approval

The study was conducted in accordance with the Declaration of Helsinki and approved by the Ethics Committee of Gazi University (Code:E-77082166-604.01.02-626463). The participants were informed about the tests before the study. Participation in the study was voluntary and the subjects signed an Informed Consent Form.

Data Collection Tools

The Referee Self-Efficacy Scale with 18 items and 5 sub-dimensions and the Cognitive Flexibility Scale with 12 items were applied to the karate referees participating in the study. The scales were administered face-to-face.

Referee Self-Efficacy Scale: The Referee Self-Efficacy Scale was first developed by Myers, et al. (2012). The scale was adapted to Turkish by Karaçam and Pulur (2017) with an additional physical competence factor after a validity and reliability study. The Referee Self-Efficacy Scale is a Likert-type rating scale with 18 items and 5 sub-dimensions. The scale has five sub-factors, with 5 items on physical competence, 3 items on game knowledge, 3 items on decision making, 3 items on pressure and 4 items on communication. The rating options of the scale items are: "1-2 Low, 3 Moderate and 4-5 High". There is no reverse-scored item in the scale and high scores obtained from each item of the scale indicate that the self-efficacy in relation to that item is high in the individual. Cronbach's Alpha coefficients of the scale sub-dimensions ranged between .71 and .88, but were found to be .90 for the entire scale (Karaçam & Pulur, 2017). Within the scope of this research, Cronbach's Alpha coefficient was found to be .89 for the entire scale.

Cognitive Flexibility Scale: In order to measure the cognitive flexibility level of the students participating in the study, the Cognitive Flexibility Scale (CFS) developed by Martin and Rubin (1995) and its Turkish validity and reliability study by Çelikkaleli (2014) were used. The CFA is a Likert-type scale consisting of 12 items graded from (1) "Strongly disagree" to (6) "Strongly agree". Items 2, 3, 6 and 10 are reverse scored. High scores on the scale indicate high levels of cognitive flexibility. Cronbach's Alpha coefficients of this scale were found to be .74. (Çelikkaleli, 2014). Within the scope of this research, Cronbach's Alpha coefficient was found to be .79 for the entire scale.

Data Analysis

In order to evaluate the data obtained from the participants, Independent Sample T-Test, One-Way ANOVA Test, Pearson Correlation Analysis and descriptive statistics were applied in the SPSS 26.0 package program. The significance level for this study was determined as $p<0.05$.

FINDINGS

Table 1. The Relationship Between the Referees' Cognitive Flexibility and Self-Efficacy Scores

Variables	N	Mean	sd.	r	p
Self-Efficacy Total Score	138	85.35	6.01	.295	.001*
Cognitive Flexibility Total Score	138	60.14	7.89		

According to the analysis results in Table 1, a positive significant relationship was detected between the referee self-efficacy total score and cognitive flexibility total score ($p<0.05$).

Table 2. Comparison of the Referees' Self-Efficacy Scores by Gender

Variable	Gender	N	Mean	sd.	t	p
Self-Efficacy Total Score	Female	50	83.33	7.56	-2.472	.016*
	Male	88	86.46	4.65		

According to the analysis results in Table 2, it was determined that the self-efficacy scores of karate referees showed a significant difference according to gender ($p <0.05$).

Table 3. Comparison of the Referees' Cognitive Flexibility Scores by Gender

Variable	Gender	N	Mean	sd.	t	p
Cognitive Flexibility Total Score	Female	50	61.51	6.50	1.424	.157
	Male	88	59.38	8.51		

According to the analysis results in Table 3, it was determined that the cognitive flexibility scores of karate referees did not show a significant difference according to gender ($p>0.05$).

Table 4. Comparison of the Total Self-Efficacy Scores by Refereeing Class

Variable	Refereeing Class	N	Mean	sd.	f	p
Self-Efficacy Total Score	Prospective	25	83.71	6.75	3.203	.026*
	Regional	26	82.06	7.88		
	National	55	86.67	5.39		
	International	32	85.69	4.81		

According to the analysis results in Table 4, it was determined that the self-efficacy total score showed a significant difference according to the refereeing class ($p<0.05$).

Table 5. Comparison of the Cognitive Flexibility Total Scores by Refereeing Class

Variable	Refereeing Class	N	Mean	sd.	f	p
Cognitive Flexibility Total Score	Prospective	25	59.64	6.00	2.604	.055
	Regional	26	64.64	5.61		
	National	55	60.01	8.52		
	International	32	58.21	8.04		

According to the analysis results in Table 5, it was determined that the cognitive flexibility total score did not show a significant difference according to the refereeing class ($p>0.05$).

DISCUSSION AND CONCLUSION

In the study, when the concepts of self-efficacy and cognitive flexibility were examined, a significant positive relationship was found between the total scores of self-efficacy and cognitive flexibility ($p<0.05$). In this context, it was observed that the level of cognitive flexibility increased in parallel with self-efficacy. When the literature was examined, a limited number of studies directly involving two parameters were found. It was reported that the self-esteem of basketball referees in decision-making increased as their self-efficacy increased, their careful decision-making styles increased with increasing self-efficacy, and their procrastinating and panic decision-making styles decreased with increasing self-esteem in decision-making (Kılıç & Öner, 2019). Similarly, it was found that improving the parameters related to the cognitive processes of referees with different levels of experience in the branch of football is very important in terms of analyzing highly complex positions in the match and correct decision-making performances (Aslan et al., 2021). Therefore, when a general evaluation is made for karate referees, according to the data obtained in the study, as in other studies, it was seen that cognitive flexibility increased in line with self-efficacy while decision-making styles and self-esteem also increased in line with self-efficacy.

When the karate referees are evaluated according to their classifications, it is noteworthy that there is a significant difference between the self-efficacy levels of national and international referees. In a different study, the empathic tendencies and referee self-efficacy of volleyball referees were examined and according to the data obtained, it was determined that there was a difference between the degree of refereeing, empathic tendency and referee self-efficacy levels (Sevinç et al., 2021). In a similar study titled "Investigation of the Problem-

solving and Decision-making Skills of Karate Referees", no significant difference was found in the decision-making levels of karate referees based on the year of refereeing, but a significant difference was found based on gender and refereeing classification. In the same study, the problem-solving skills of karate referees were found to differ based on gender, years of refereeing and refereeing class, in parallel with this study. It was reported that increased seniority and refereeing experience had a positive effect on the decision-making and problem-solving skills of karate referees (Bektaş & Öztürk, 2022). These studies conducted on both volleyball and karate referees overlap with the results of the present study. As the level of classification and international competition officiating experience increased in referees, their self-efficacy levels increased in parallel.

No significant relationship was found between the refereeing classes according to the total score of cognitive flexibility ($p>0.05$). In previous studies examining referee classifications according to the cognitive flexibility levels of referees, no difference was found in terms of gender and educational status, knowledge level, attitude level, and behavior level with different classification types of football referees, in parallel with this study (Karslı, 2022). In another study, contrary to these two studies, basketball referees' perceived stress levels and levels of coping with stress were found to differ according to classification (Yılmaz, 2023). It was found that while the findings obtained from the study conducted on football referees supported this study, in the study conducted on basketball referees, it was determined that classification exhibited a positive difference.

There was a significant relationship between the total scores of referee self-efficacy and gender ($p<0.05$). However, there was no significant relationship between the cognitive flexibility total score and gender ($p>0.05$). When the literature was evaluated, according to a similar study conducted on volleyball referees, the self-efficacy level of volleyball referees was examined and it was determined that refereeing self-efficacy differed significantly according to gender, age, sport age, education level and refereeing classification ($p<0.05$). When this difference was evaluated, it was stated that gender, age, sport age and refereeing level were among the determinants of volleyball referees' self-efficacy levels (Koçak, 2019). According to a different study conducted on volleyball referees, the empathic tendencies and referee self-efficacy of volleyball referees were examined, and according to the results obtained, it was emphasized that gender was among the determinants of the empathic tendency and referee self-efficacy levels of volleyball referees (Sevinç et al., 2021). In this context, the fact that the self-efficacy levels of male karate referees were found to be high in the present study also supports the findings obtained in the studies in the literature.

In previous studies examining gender differences in referees, cognitive flexibility level and decision-making styles were examined and it was seen that male participants made more avoidant decisions compared to female participants (Atılgan & Tükel, 2019). In another study, on the contrary, the cognitive emotion regulation levels and decision-making skills of basketball referees were examined, and it was determined that female basketball referees tended to have a more procrastinatory decision-making style and that procrastinatory decision-making style differed according to gender (Ali, 2023). When the study results and information in the literature are evaluated, it can be said that the results are complex in terms of gender.

In conclusion, it was observed that the increase in the self-efficacy levels of karate referees tend to increase the level of cognitive flexibility. According to the classification evaluation, it was observed that the self-efficacy levels of karate referees with high classification who officiate internationally were remarkably high. When analyzed in terms of gender, it was found that males were statistically higher than females in self-efficacy and females were higher than males in cognitive flexibility, although not statistically significant. In the literature comparison, it is clear that the results for these characteristics exhibit complexity. In the general evaluation, it can be concluded that increasing the self-efficacy and cognitive flexibility levels of karate referees can reduce stressful and incorrect decision making. It can be suggested that referees with high refereeing class and high levels of self-efficacy and cognitive flexibility be assigned to competitions with high levels of stress where decision-making becomes difficult.

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

Authors' Contribution: All four authors have made a substantial and intellectual contribution to the study and approved it for publication.

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Effects of Tennis Training on Cognitive Control and Visuospatial Skills

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Abstract

The aim of this study was to examine the effect of accurate shot exercises in tennis on cognitive control and visuospatial skills. 15 sports science faculty student, 6 females and 9 males, aged between 18-22, with an average age of 18.53 were included in the research. Flanker Task and Spatial Visualization Test were applied to evaluate participants' cognitive control and visuospatial skills. Tennis training was performed once a week, for half an hour, with 500 hits (forehand and backhand) and an average of 2000 hits in four weeks. After performing the normality test and descriptive statistics, Wilcoxon Signed Rank Test was applied to compare the pre-test and post-test. The findings showed that there were significant differences between pre-test and post-test scores in the spatial visualization test ($p = 0.019$), correct response rate in the flanker task ($p = 0.02=$), and difference in reaction time between congruent and incongruent conditions in the flanker task ($p = 0.02$). Consequently, it can be concluded that tennis training significantly improved participants' cognitive control and visuospatial skills. The fact that tennis is a sport that requires the use of space and uses open skills may improve individuals' cognitive control and visuospatial skills.
Keywords: Tennis, Cognitive control, Visuospatial skills.

Tenis Antrenmanlarının Bilişsel Kontrol ve Görsel Uzamsal Beceriler Üzerindeki Etkisi

Öz

Bu çalışmanın amacı teniste isabetli vuruş çalışmalarının bilişsel kontrol ve görsel uzamsal beceriler üzerindeki etkisini incelemektir. Araştırmaya 18-22 yaşları arasında, yaş ortalaması 18.53 olan 6 kadın ve 9 erkek olmak üzere 15 spor bilimleri fakültesi öğrencisi dahil edilmiştir. Katılımcıların bilişsel kontrol ve görsel-uzamsal becerilerini değerlendirmek için Flanker Görevi ve Uzamsal Görselleştirme Testi uygulanmıştır. Tenis antrenmanı haftada bir gün, günde yarım saat, 500 vuruş (forehand ve backhand) ve dört haftada ortalama 2000 vuruş ile gerçekleştirilmiştir. Normallik testi ve tanımlayıcı istatistikler yapıldıktan sonra, öntest ve sontesti karşılaştırmak için Wilcoxon İşaretli Sıralar Testi uygulanmıştır. Bulgular, uzamsal görselleştirme testinde ön test ve son test puanları arasında ($p= 0.019$), flanker görevinde doğru tepki oranı ($p=0.02$), flanker görevinde uyumlu ve uyumsuz koşullar arasındaki tepki süresi farkı ($p=0.02$) açısından anlamlı farklılıklar olduğunu göstermiştir. Sonuç olarak, teniste isabetli vuruş çalışmalarının katılımcıların bilişsel kontrol ve görsel-uzamsal becerilerini önemli ölçüde geliştirdiği sonucuna varılabilir. Tenisin mekânın kullanımını gerektiren ve açık becerilerin kullanıldığı bir spor olması, bireylerin bilişsel kontrol ve görsel uzamsal becerilerini geliştiriyor olabilir.
Anahtar kelimeler: Tenis, Bilişsel kontrol, Görsel-uzamsal beceriler.

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INTRODUCTION

Motor skills and cognitive functions continue to develop throughout early childhood (Cristofori et al., 2019; Van der Fels, 2015). Improvements in cognitive functions are observed in individuals who engage in sports and exercise, both in the short term and in the long term (Davranche et al., 2009; Peiffer et al., 2015). Athletes often show improvements in cognitive functions such as cognitive control, visuospatial skills, and perception based on the type of sport. It has been found that athletes generally exhibit superior cognitive functions compared to non-athletes, and expertise in sports is associated with development of cognitive functions (Yongtawee et al., 2022).

Cognitive functions are important for sports performance as the sports require cognitive tasks such as decision making, planning and perception. One of the cognitive functions required for sport is cognitive control and visuospatial skills (Muinos & Ballesteros, 2018; Peiffer et al., 2015). Studies show that cognitive functions play a role in open skill and closed skill sports (Yongtawee et al., 2022). A study of elite volleyball players found that reaction times in cognitive control and visuospatial skills were shorter, and overall cognitive skills were more developed than non-athletes (Alves et al., 2013). Chiu et al., (2017) compared volleyball with running and swimming and concluded that the type of sport influences cognitive performance. Since volleyball is an unpredictable sport, volleyball players' cognitive control skills are more developed.

Boxers, shooters, football players, and non-athletes were compared in terms of cognitive flexibility, visuospatial skills, and information processing speed. It was investigated that cognitive functions varies according to the type of sport. Participants engaged in blocking sports like boxing shows more developed visuospatial skills and processing speed. Strategic sports like football are associated with enhanced cognitive flexibility skills and working memory, while static sports like shooting exhibits the fastest visuospatial information processing time (Yongtawee et al. 2022).

Athletes develop cognitive functions based on the open and closed skill sports they engage in (Chiu et al., 2017). Tennis is an open skilled sport and requires planning, perception, visual skills, and cognitive control (Ishihara et al., 2017). Studies comparing tennis players and non-athletes have shown that tennis players have more developed cognitive control, concentration, and selective attention skills (Pacesova et al., 2018).

The literature involves studies investigating cognitive functions in both individual and team sports (Ishihara et al., 2017; Nuri et al., 2013). However, there is a lack of research on whether target training on the tennis wall over a specific period improve visuospatial skills and cognitive control. Tennis course among the elective courses in faculty of sports sciences, includes practical applications in a limited time and in crowded groups. Therefore, in this research, the effects of accurate tennis shot exercises practiced once a week by participants who had never taken tennis lessons before were evaluated on visuospatial skills and cognitive control.

In this context, the research problem was formulated as "Do accurate tennis shots impact cognitive skills?" The research hypothesis assumes that, following four weeks of tennis

training, participants' levels of visuospatial skills and cognitive control will be higher compared to pre-test results. The aim of this research is to assess the changes in visuospatial skills and cognitive control resulting from four weeks of target training on the tennis wall in tennis.

METHOD

Research Model

This research is experimental research with a single group pre-test post-test model. Participants were evaluated at the beginning and end of the study to examine the effect of tennis training on visuospatial skills and cognitive control.

Study Group

After obtaining the necessary ethical permissions, participants were contacted and compliance with the Declaration of Helsinki was achieved. The sample of the research consists of 15 participants, six women and nine men, aged 18-22. The average age of the participants is 18.53±1.06.

The inclusion criteria for participants in this study are as follows:

- Participants must be between the ages of 18-22 as they are university students.
- Participants should be currently enrolled as students in the faculty of sports sciences.
- Participants should not hold ant licensing or national athlete status.
- Participants must be free from any physical injuries.
- Participants should not have prior experience or formal training in tennis.
- Participants should be willing to participate in the study voluntarily.

The exclusion criteria for participants in this study are as follows:

- Participants will be excluded from the study if they fail to complete the personal information form.
- Participants will be excluded if they choose not to participate voluntarily.

Ethical Approval

Prior to the study, ethics committee approval was obtained from Halic University Ethics Committee with the decision numbered 241 on 30/11/2022.

Data Collection Tools

In the study, a personal information form was used to obtain the demographic information of the participants such as age and gender. Cognitive control was assessed with Flanker Task, while spatial visualization was evaluated with Spatial Visualization Test. All assessments were performed twice (pre-test and post-test), both before and after 4-week tennis training program. The Flanker Task and Spatial Visualization Test were conducted at the Haliç University Sports and Exercise Psychology Laboratory.

Flanker Task

Flanker Task was designed by Eriksen and Eriksen (1974). The purpose of the task is for participants to react to one stimulus while ignoring the other. The Flanker Task has arrows arranged side by side. While responding to the target arrow in the center, the participant is asked to ignore the distracting arrow next to it. The reaction time between congruent and incongruent conditions is called the interference effect. In congruent conditions, all arrows are in the same direction as the direction of the central arrow. In incongruent conditions, the direction of the arrow in the center is different from the other arrows. The test was carried out in a digital environment. The participant's reaction time to the stimulus was recorded as a score. Flanker task sample is shown in Figure 1.

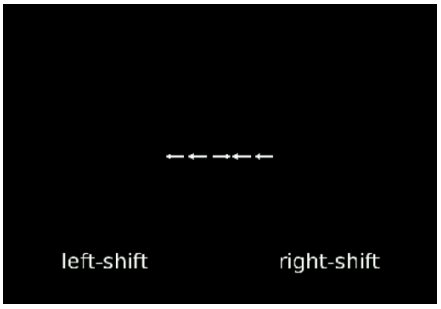

Figure 1. Flanker task incongruent condition

Spatial Visualization Test

Spatial Visualization Test is a 29-item scale developed by Sütçü and Oral (2019). The scale assesses two-dimensional and three-dimensional spatial visualization. The initial 14 items evaluate two-dimensional spatial visualization, while the remaining 15 items represent sub-dimensions assessing three-dimensional spatial visualization. The internal consistency coefficient was evaluated through KR-20. The KR-20 internal consistency coefficient for two-dimensional spatial visualization was .77, and the KR-20 internal consistency coefficient for three-dimensional spatial visualization was .78. It was found to be .78 for the overall test. Tests with a reliability coefficient of .70 and higher are considered reliable.

The test was carried out in a digital environment. Correct answers were counted as scores. One of the Spatial Visualization Test questions is in Figure 2.

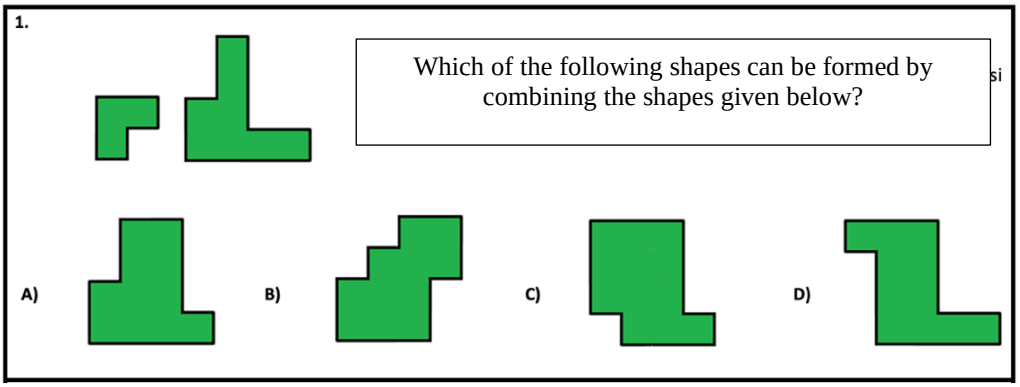

Figure 2. Spatial Visualization Test Question 1.

Procedure

The tests used in the study were performed at the beginning and end of the study. After confirming that participants voluntarily participated in the study, they participated in the Flanker Task and the Spatial Visualization Test.

In this study, Dyer Wall Test was used in the formulation of the training protocol implemented for 4 weeks. The purpose of Dyer Wall Test is measuring of tennis skills. Stopwatch, wall, tennis ball and rockets are used. A line is drawn on the wall (3 m high - 4.5 m wide). The line should be 91.7 cm above the floor. A boundary line is drawn 6 meters from the wall. The subject who starts the test is behind the boundary line and hits the wall for 30 seconds. After one attempt, 3 tests are performed. Each hit against the wall is one point and the total score of the 3 tests is evaluated (Dyer, 1935).

In our study, participants participated in wall training once a week for four weeks. Forehand and backhand strokes were performed by hitting on a line 6-9 meters away from the wall and 91 cm above the ground. Target training on tennis wall was performed once a week, for half an hour, with 500 hits (forehand and backhand) and an average of 2000 hits for four weeks. Program is prepared and given by the researcher who is an expert tennis coach and instructor for 20 years. At the end of four weeks, participants re-participated in the Flanker Task, Spatial Visualization Test. The study plan is given in Figure 3.

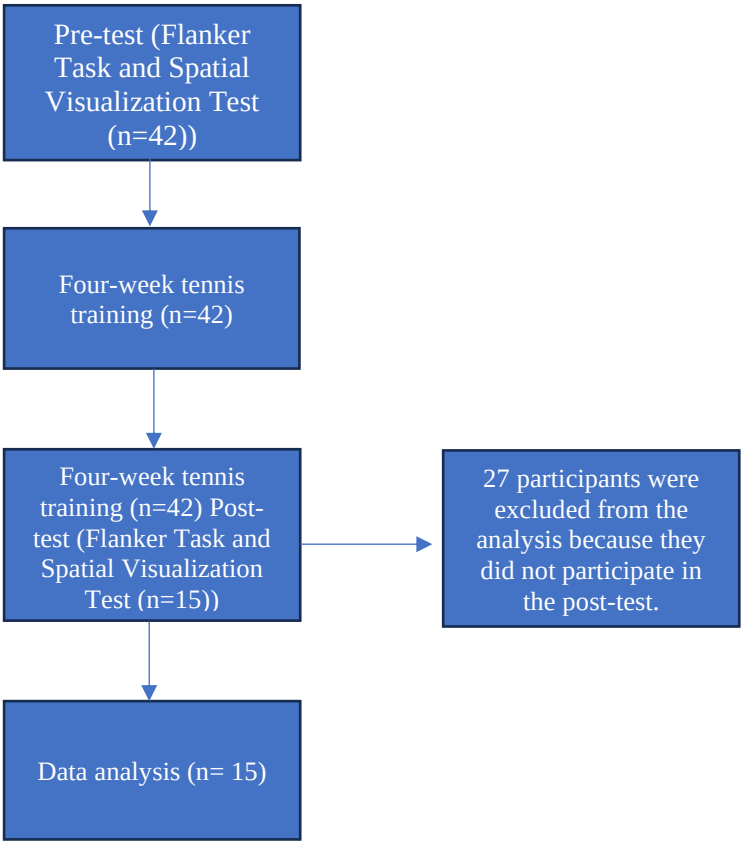

Figure 3. Study Plan

Data Analysis

IBM Statistical Package for the Social Sciences 28 (SPSS) was used to evaluate the data. Skewness and kurtosis values weren't between -2 and +2. Therefore, Wilcoxon Signed Rank Test, which is one of the nonparametric tests, was applied to compare the pre-test and post-test. Data were evaluated at $p < 0.05$ confidence interval. Alpha was set at .05, effect sizes are classified as small, moderate, and large effects, calculated in terms Cohen's d with values 0.20, 0.50 and 0.70.

FINDINGS

Table 1. Descriptive information about participants

N= 19		Min.	Max.	Mean	SD
Female (n=6)	**Weight (Kg)**	52	75	58.50	8.96
	Height (Cm)	160	174	168	4.84
	Body Mass Index (Kg/m^2)	17.18	26.57	20.64	3.64
Male (n=9)	**Weight (Kg)**	62	80	68.89	5.6
	Height (Cm)	170	185	177.67	5.63
	Body Mass Index (Kg/m^2)	20.31	25.61	21.83	1.71

There were six female (40%) and nine male (60%) participants in the study. Participants were 18 (n= 10), 19 (n= 4) and 22 (n=1) years old (M=18.53, SD =1.06). Descriptive information about participants is given above (Table 1).

Table 2. Differences in the correct response rate in flanker task

Pre-Test-Post-Test	n	Mean Rank	Sum of Ranks	Z	p
Negative Ranks	1	7	7	-2.319	**0.020***
Positive Ranks	10	5.90	59		
Ties	0				

***p<0.05**

In the study, the pre-test and post-test scores of the participants from the Flanker task and the Spatial Visualization test were compared. According to the findings, there were significant differences in the correct response rate for the flanker task (p=0.020) between the pre-test and the post-test (Table 2).

Table 3. Difference between the congruent and incongruent conditions in the flanker task

Pre-Test-Post-Test	n	Mean Rank	Sum of Ranks	Z	p
Negative Ranks	10	10	100	-2.272	**0.023***
Positive Ranks	5	4	20		
Ties	0				

***p<0.05**

It was observed that there were significant differences between the pre-test and post-test in the reaction time in difference between the congruent and incongruent conditions (p=0.023) in the Flanker task (Table 3). According to the findings, no significant difference was found between the Flanker task reaction time, congruent condition response time, and incongruent condition response time in pre-test and post-test measurements (p >0.05).

Table 4. Spatial visualization test

Pre-Test-Post-Test	n	Mean Rank	Sum of Ranks	Z	p
Negative Ranks	3	4	12	-2.351	**0.019***
Positive Ranks	10	7.90	79		
Ties	0				

***p<0.05**

There were significant differences between the pre-test and post-test in the Spatial Visualization test (p= 0.019) (Table 4). There were 10 participants whose spatial visualization score increased after four weeks of tennis training, 2 of the participants whose spatial visualization score did not change before and after training, and 3 participants whose spatial visualization score decreased after training compared to pre-test. A statistically significant difference was found between the mean rank scores of the participants in the research group before and after the training (p<0.01). It shows that the effect size of this detected difference is r= 0.15. The difference has a small effect, and this effect explains 24% of the total variance (R^2 = 0.15 = .024).

DISCUSSION

Cognitive Control

In this study, the effect of four-week target training on tennis wall on cognitive control and spatial visualization skills was evaluated in individuals who had never had tennis training before. According to the findings, there is a significant difference between the pre-test and post-test in the correct response rate for the Flanker task. After four weeks target training on tennis wall, the correct response rate on the Flanker task increased.

Pacesova et al., (2018) concluded that tennis players scored higher on the Stroop test, indicating that their cognitive control skills were more developed compared to the non-tennis-playing control group. Consequently, engaging in tennis was associated with enhanced cognitive control skills. Tennis, requiring both physical and cognitive efforts, affects cognitive functions such as decision-making, planning, and cognitive control during training. Tennis training is likely to contribute to the improvement of individuals' cognitive skills (Ishihara et al., 2017). The increasing number of correct responses in the Flanker task indicates enhanced cognitive control skills. Tennis training can be an effective method to improve cognitive control.

Another significant finding of the study is the decrease in the reaction time difference between congruent and incongruent conditions in the Flanker task during pre-test and post-test measurements. Decreasing reaction time indicates that individuals responded to both

conditions in similar times, demonstrating improved reaction times in response to incongruent conditions. This improvement is indicative of the development of cognitive control skills in individuals (Eriksen & Eriksen, 1974). Engagement in physical activities demanding cognitive functions, such as tennis, reduced reaction times to incongruent conditions and leads to improved cognitive control skills.

Overall, the research suggests that targeted tennis wall training positively influences cognitive control and spatial visualization skills in individuals without previous tennis experience. This suggests that tennis training includes cognitive tasks such as cognitive control and it can be improved with practice. It can be said that the findings obtained in the study are in line with the studies in the literature (Drolette et al., 2012, Ishihara et al., 2017, Ishihara et al., 2018). In tennis, individuals need to pay attention to both the ball and the opponent. Therefore, they need to make quick decisions, ensure hand-eye coordination, and think strategically (García-González et al., 2014). It can be said that tennis training improves cognitive control skills. Sports-related characteristics provide the development of executive functions (Ishihara et al., 2018).

Visuospatial Skills

In some sports, athletes need to use the space around them effectively. In a study conducted by Glavas (2020), the relationship between visuospatial skills, technical-tactical skills and sports performance in football players was emphasized. Additionally, research on table tennis players conducted by Peng et al., (2022) concluded that long-term training improves the visuospatial processing ability of individuals, leading to neuroplasticity in the right hemisphere.

In this study, four-week target training on tennis wall improved spatial visualization skills of individuals. Participants were asked to complete tennis training using a specific space for four weeks. The participants performed the assigned task in this place. The fact that tennis is a sport that requires field use and open skills may improve the visual skills of individuals (Gökçe et al., 2021). According to the findings, making forehand and backhand shots in a certain space may require the individual to use the space. Visuospatial skills are the ability to understand and visualize the relationships and positions between objects (Sato et al., 2022). In tennis trainings, following the speed, direction, and spin of the ball, predicting the opponent's movements and shooting requires the use of visuospatial skills. During practice, players follow the movements of the ball. This skill supports individuals to make a shot by analyzing the position of the ball. Therefore, it is necessary to use visuospatial skills (Guo et al., 2016).

Recommendations

In this study, a four-week tennis training was conducted to evaluate the effect of tennis training on cognitive functions. According to the findings, tennis training improves cognitive control and spatial visualization. The research has strengths and limitations. One of the strengths of the study is that the participants had no tennis experience. This made it possible to investigate the effectiveness of tennis training on cognitive functions. Therefore, it can be said that the effect obtained is due to tennis training. Considering that being a national athlete may be a confounding variable that may affect the research findings, not being a national athlete was added as a criterion. The comparison of cognitive control and plasticity between novice and experienced athletes and the assessment of executive functions in experienced athletes is

recommended. The fact that the study was an experimental study and the addition of a four-week training period to the participants supported the effect of tennis training on cognitive control and spatial visualization. However, the small sample size and the absence of a control group are limitations of the study. It may be recommended to repeat similar studies with a larger sample. One of the limitations is the study is that the study was designed as a single-blind study. Researcher knows that all participants have received tennis training.

Practical Implications

Previous studies have emphasized that there is a relationship between sport performance and cognitive functions (Kalén et al., 2020). This study provides evidence that four-week tennis training improves cognitive functions such as cognitive control and visuospatial skills. Four-week tennis training made differences in terms of response rate and reaction time between the congruent and incongruent conditions in Flanker Task and Spatial Visualization Test. It means target trainings on tennis wall improves cognitive control and visual skills. Based on this study, it can be said that the elective tennis course taken at university has a positive effect on cognitive skills. In this context, positive effect of long-term sports training on cognitive functions is also important for public health. If individuals start tennis in early stages of life, it can reveal positive results in terms of the development of cognitive skills in the long term. It is known that improved cognitive functioning is associated with improved sports performance in both open and closed skill sports. Therefore, it is important for athletes to include cognitive functions in the development of sports performance. Cognitive training can be added to athletes' programs.

Conflict of Interest: As the authors of the article, we declare that there is no personal or financial conflict of interest within the scope of the study.

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Examining the Involvement Level of People who Practise Karate

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Abstract

This study aims to determine the participants' level of involvement who are engaged in karate in Adana and whether this involvement differs according to the demographic variables of the people. The data were collected from karate clubs in Adana via a survey. Analyses were carried out on 268 valid surveys. According to the analysis results, the participants' involvement in karate shows significant differences according to marital status, age, how many years karate has been practised, how often karate is practised and going out of province for karate purposes. Besides, while the dimension with the highest mean of the scale of involvement in karate sport is "Attraction" ($\bar{x}$=4,54), the dimension with the lowest average is "Identity Expression" ($\bar{x}$=3.57). Lastly, the general average of the scale items is $\bar{x}$=4,01. Based on this, it can be interpreted that the participants' interest in karate is generally high. These results highlight the positive tendencies of individuals involved in karate and underline the attractiveness and importance of the activity in their lives.
Keywords: Physical activity, Exercise, Karate, Personal involvement

Karate Sporu Yapan Kişilerin Karate Sporuna Olan İlgi Düzeylerinin İncelenmesi

Öz

Bu çalışmanın amacı, Adana ilinde karate sporuyla uğraşan kişilerin karateye olan ilgi düzeylerinin belirlenmesi ve bu ilginin kişilerin demografik değişkenlerine göre farklılaşıp farklılaşmadığının tespit edilmesidir. Veriler, oluşturulan bir anket yardımıyla Adana'da bulunan spor salonlarından toplanmıştır. Analizler, kullanılabilir 268 anket üzerinden gerçekleştirilmiştir. Analiz sonuçlarına göre katılımcıların karate sporuna olan ilgileri; medeni duruma, yaşa, kaç yıldır karate sporu yapıldığına, ne sıklıkla karate sporu yapıldığına ve karate sporu amaçlı il dışı seyahate çıkmaya göre anlamlı farklılıklar göstermektedir. Ayrıca, karate sporu ilgilenim ölçeğinin en yüksek ortalamaya sahip olan boyutu "Çekicilik" ($\bar{x}$=4,54) boyutu iken, en düşük ortalamaya sahip olan boyut ise "Kendini İfade" ($\bar{x}$=3,57) boyutudur. Son olarak, ölçek maddelerinin genel ortalaması $\bar{x}$=4,01'dir. Buradan hareketle, genel olarak katılımcıların karate sporuna olan ilgilerinin yüksek olduğu yorumu yapılabilir. Bu sonuçlar, karate sporuyla uğraşan bireylerin olumlu eğilimlerini vurgulamakta ve sporun yaşamlarındaki çekiciliğini ve öneminin altını çizmektedir.
Anahtar Kelimeler: Fiziksel aktivite, Egzersiz, Karate, Kişisel ilgi

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INTRODUCTION

Karate, a martial art with a long history and a global follower, has a special place in the sports world by contributing to personal health, social interaction and physical fitness (Chaabene et al., 2012). Despite being one of the traditional Japanese martial arts and its history going back to centuries, it could be argued that Karate in Türkiye is relatively new (Bozkurt, 2014). Karate originated on the Japanese island of Okinawa and has become a global phenomenon practiced by millions of people worldwide (Susila et al., 2022). Among countless sports disciplines, karate has not only carved out a special place for itself with its rich history, cultural significance, and widespread international participation, but has also begun to play an increasingly vital role in the multifaceted world of sports tourism (Jakhel, 2019).

In an era shaped by the search for global connections and different leisure experiences, the tie between sports and tourism has emerged as a prominent and developing phenomenon (Kim et al., 2015). Sports tourism is a rapidly growing type of tourism that makes significant contributions to the economies of many countries and communities around the world, covering various sports disciplines (Petrovic, 2020). Sports tourism, the combination of travel and sports, has become a critical driver of economic, cultural and social development of a country. According to the World Tourism Organization (WTO), sports tourism accounts for approximately 10% of the global tourism industry, making a significant contribution to job creation, infrastructure development and local economic growth (WTO, 2020). In addition, in line with the 2023 targets of the Türkiye Tourism Strategy, sports tourism is included as one of the alternative tourism types prioritized in planning studies (Akyol & Akkaşoğlu, 2021). International karate competitions and tournaments have now become major events that attract large crowds and television viewers. For example, 982 athletes from 105 countries worldwide participated in the most recent World Karate Championships in 2021 (WKF, 2021). Such high-profile competitions are a major motivator for sports tourism, as karate enthusiasts travel great distances to support their nation or idol. It is estimated that international karate events generate tens of millions of dollars per year in tourism revenue for host countries through expenditures on accommodation, meals, transportation and paraleisure activities (Daniels & Norman, 2003). Understanding how individuals become interested in karate and how this interest varies among different demographic groups provides valuable insight into the local importance of the activity and broader implications for the field of sports studies. The findings of the research make significant contributions to the existing body of knowledge. The study examines the karate community in Adana, aiming to determine the participants' interest levels in karate and to determine whether these levels differ according to certain demographic variables. Analyses based on 268 valid surveys reveal interesting insights into the dynamics of karate participation in Adana. These findings not only enrich our understanding of sport participation, but also have the potential to inform targeted strategies for promoting and developing karate in Adana and similar communities.

Physical fitness and performance are important elements of karate training. Molinaro et al. (2020) evaluated the effects of kata and kumite techniques on physical performance in elite karate competitors. The findings showed that these karate practitioners exhibited superior

jumping ability compared to non-karate practitioners. Additionally, a review article by Navickaite and Thomas (2022) examined the requirements of elite adult Kyokushin style karate and offered training recommendations based on a needs analysis. In this review, the importance of strength and conditioning for karate practitioners is emphasized.

Cognitive functioning and emotional well-being are also areas of interest in karate research. Jansen and Dahmen-Zimmer (2012) investigated the effects of cognitive, motor and karate training on the cognitive functions and mental states of elderly individuals. The study concluded that karate training has positive effects on cognitive functioning and emotional well-being in the elderly population. Additionally, Russo and Ottoboni (2019) conducted a systematic review on the perceptual-cognitive skills of those involved in combat sports, including karate practitioners. The research emphasized the importance of cognitive abilities such as decision-making and attention processes in combat sports performance.

The perceived benefits and risks associated with karate participation have also been examined in comparison with other sports. Limpo and Tadrist (2021) developed a scale to measure the perceived benefits and aggression-related risks of karate and football. The research found that karate is perceived to have greater physical, emotional, cognitive and social benefits compared to football. Additionally, findings showed that perceived benefits were positively associated with athlete participation and quality of life.

Studies examining the psychological aspects of karate are also included in the literature. Vveinhardt and Kaspare (2022) examined the relationship between mindfulness practices and the psychological state and performance of Kyokushin karate practitioners. Research has found that mindfulness practices are positively associated with psychological health and performance in karate practitioners. Núnez-Barriopedro et al., (2021) investigates the effect of happiness on the loyalty of karate practitioners. This study highlights the importance of psychological well-being and engagement in developing loyalty and commitment among athletes. Understanding the psychological factors that contribute to the success and satisfaction of karate practitioners informs training programs and athlete support systems.

There are also studies that provide information on related issues such as tourism, marketing and cultural heritage that can be applied in the context of karate. Jamal and Getz (1995) discuss cooperation theory and community tourism planning that may be relevant when considering the organization and planning of karate events or tournaments. According to the researchers, understanding the dynamics of inter-organizational relationships and planning at the community level can contribute to the development and success of karate as a martial art. Pike and Page (2014) provide a narrative analysis of the literature on destination marketing organizations that may be valuable when examining the marketing strategies and branding efforts of karate events or training centres. According to the study, karate organizations can effectively promote their sport and attract people's attention by understanding the principles of destination marketing.

The aim of the study is to determine the interest level of people who practice karate and to determine whether this interest differs according to the demographic variables of the people. In the research conducted for this purpose, data was obtained through a survey. In addition to demographic questions, this survey also includes a scale to measure the participants' level of interest in karate.

METHOD

Research Model

In the present study, the correlational and descriptive research method are used as the research method.

Study Group

The population of the research consists of people interested in karate in Adana. Since the exact number of people practicing karate in Adana cannot be determined clearly, it was aimed to reach the minimum sample number of 384 by applying the unlimited universe formula. For this purpose, the necessary data for the study was collected from people who practice karate in Adana, by attending to karate clubs over a period of 3 months, through the introduction of surveys on a voluntary basis. However, during the research, there were times the club owners were rather reluctant for the survey to be filled out and karate practitioners did not want to participate in the research despite permission. For these reasons, analyses were conducted on 268 usable surveys obtained from participants who voluntarily wanted to participate in the research.

Ethical Approval

Ethics approval was obtained from Çukurova University Ethics Committee on 28/12/2023.

Data Collection Tools

The original scale that was used was developed by Kyle et al. (2007) and translated into Turkish by Gürbüz et al. (2018) includes 15 questions measuring interest, 5 dimensions (attraction, importance, social relationship, identification, self-expression), and the response categories of the scale items start from "1: Strongly Disagree" to "5: Strongly Agree." It has been subjected to a 5-point rating going up to. Based on a number of similar studies and their limitations, Kyle et al. (2007) designed and tested a modified involvement scale using data that were collected from the campers visiting national forest in Southern California. Since then, their study was cited more than 100 times and inspired further research in sports and tourism related activities such as skiing, fishing, travelling, birdwatching and so on.

Data Analysis

As stated, Kyle et al.'s (2007) study was adapted to karate and the reliability and validity of the scale was also tested. First of all, the Alpha Reliability coefficient of the 15-item leisure activity interest scale used in the research was calculated as 0.769. The reliability coefficients

of the scale were calculated by randomly dividing the scale into two and the sample into two, and also according to the odd and even numbered scale items, and it was found that all of them were above 0.700. For this reason, it was concluded that the scale is "reliable" (Alpar, 2013: 849). Then, confirmatory factor analysis (CFA) was applied to test the validity of the scale. CFA results revealed a good model fit with a chi-square value of 131.867, 76 degrees of freedom ($p<.001$) and $x2/df=1.735<5$ (Hair et al., 2010). In addition, other goodness-of-fit statistics are also among the reference values ($0.90 < CFI < 1$, $0.90 < NFI < 1$, $0.90 < IFI < 1$, $0.95 < TLI < 1$, $RMSEA < 0.08$) (Hair et al., 2010). Goodness of fit results for CFA results are presented in Table 1.

Table 1. Confirmatory factor analysis measurement model goodness of fit statistics

Goodness of Fit Indices	Results
$x2 / DF$	1.735
Comparative Fit Index (CFI)	0.940
Normed Fit Index (NFI)	0.917
Incremental Fit Index (IFI)	0.942
Tucker-Lewis Fit Index (TLI)	0.967
Root Mean Square Error of Approximation (RMSEA)	0.052

Following the validity of the statistics, t test statistics showing the significance of the relationship between latent variables and observed variables, standardized load values showing the strength of the relationship between the observed variables and latent variables, and descriptive statistics for the confirmatory factor analysis model to examine the margins of error of the observed variables are given in Table 2.

Table 2. Descriptive statistics for the confirmatory factor analysis measurement model

Dimensions and Items	Std. Load Rating	Tolerance	R^2	t
Attractiveness				
1. Karate is one of the most fun things I do.	0.866	0.115	0.751	3.643
2. Karate is very important to me.	0.549	0.392	0.201	10.899
3. Karate is one of the most satisfying things I do.	0.714	0.387	0.509	7.929
Giving importance				
4. I think most of my life revolves around karate.	0.544	0.621	0.602	11.146
5. Karate has a central role in my life.	0.780	0.348	0.608	2.351
6. If I were to choose another free time activity instead of karate. I would have to seriously rethink it.	0.520	0.854	0.103	10.710
Social Relationship				
7. I enjoy talking about karate with my friends.	0.715	0.605	0.512	7.868
8. I met most of my friends because of karate.	0.682	0.546	0.466	8.418
9. Practising karate gives me the opportunity to be with my friends.	0.645	0.650	0.416	9.092
Identification				
10. When I practice karate, I am truly myself.	0.651	0.714	0.423	8.617
11. I identify with people and images related to karate.	0.735	0.545	0.541	6.811
12. When I practice karate, I don't have to worry about how I look.	0.502	0.853	0.252	10.251
Self Expression				
13. When you see a person practice karate, you can tell a lot about that person.	0.666	0.778	0.444	7.675
14. Practising karate says a lot about who I am.	0.826	0.419	0.682	3.684
15. When I practice karate, people see me the way I want them to see me.	0.530	0.968	0.281	9.992

From Table 2, it can be seen that the standardized loading value of each item is greater than 0.50 and the t values are greater than 1.96. Therefore, it was seen that there was no item that needed to be removed from the scale. From Table 1, it is possible to say that the scale, which validity of statistics are observed to be among the reference values, hence has a valid structure.

FINDINGS

88.1% of the participants in the study are men and 44% are 40 years old and over. 74.3% of the participants are married, 45.1% are high school graduates, and 32.1% are karate coaches. Of the participants, 43.3% of whom have been interested in karate for 11-20 years, 36.2% practice karate every two days. In addition, while the rate of those traveling out of town for karate purposes is 86.2%, 57.1% of the survey participants have memberships in more than one club for karate. Details of the findings regarding the demographic variables of the participants are given in Table 3.

Table 3. Distribution of participants by demographic characteristics

Variable	Frequency	%	Variable	Frequency	%
Gender			**Marital status**		
Male	236	88.1	Married	199	74.3
Woman	32	11.9	Single	69	25.7
Education level			**Duration**		
Primary education	35	13.1	1-10 years	20	7.5
High school	121	45.1	11-20 years	116	43.3
Associate degree	35	13.1	21-30 years	109	40.7
Undergraduate and above	77	28.7	31 years and above	23	8.6
Age			**Frequency**		
18-28 years old	73	27.2	Every day	42	15.7
29-39 years old	77	28.7	Every other day	97	36.2
40 years and above	118	44.0	Once in three days	63	23.5
Job			Once a week	66	24.6
Athlete	71	26.5	**Out of Province Travel**		
Coach	86	32.1	Yes	239	86.2
Student	49	18.3	No	37	13.8
Referee	30	11.2	**Club Membership**		
Other	32	11.9	Yes	153	57.1
			No	115	42.9
TOTAL	**268**	**100**	**TOTAL**	**268**	**100**

After revealing the demographic profile of the participants in the research, the sub-dimensions of the interest in karate scale were determined. It was investigated whether there was a significant difference according to the marital status of the participants. Table 4 presents the

results of the T-test, which was conducted to reveal whether the dimensions of interest in karate differ according to marital status.

Table 4. Comparison of participants' karate interests in terms of marital status

	Marital status	n	X̄	Sd	t	p
Attractiveness	Married	199	4.51	0.59	0.431	0.67
	Single	69	4.55	0.65		
Giving importance	Married	199	4.22	0.59	0.058	0.95
	Single	69	4.22	0.70		
Social Relationship	Married	199	3.92	0.84	0.460	0.65
	Single	69	3.86	0.88		
Identification	Married	199	3.81	0.87	0.248	0.80
	Single	69	3.78	0.79		
Self Expression	Married	199	3.68	0.89	2.042	**0.04***
	Single	69	3.42	0.99		

***p≤0.05**

According to the T-test results, it was found that only the "Self-Expression" sub-dimension of the participants' involvement dimensions showed a significant difference according to marital status ($p < 0.05$). Looking at Table 4, married participants assigned a higher mean to the self-expression dimension than single participants. From the averages, it is understood that married people see karate as a way of self-expression more than single people.

The T-test results, which question whether interest dimensions differ according to the situation of traveling outside the city of residence for karate purposes, are given in Table 5.

Table 5. Comparison of participants' karate interests in terms of traveling

	Out of Province Travel	n	X̄	Sd	*t*	p
Attractiveness	No	37	4.54	0.53	0.183	0.86
	Yes	231	4.52	0.62		
Giving importance	No	37	3.11	1.57	5.077	**0.00****
	Yes	231	4.06	0.95		
Social Relationship	No	37	4.06	0.75	1.212	0.23
	Yes	231	3.88	0.87		
identification	No	37	3.96	0.96	1.078	0.23
	Yes	231	3.77	0.83		
Self Expression	No	37	3.64	1.25	0.462	0.72
	Yes	231	3.56	0.90		

****p≤0.01**

According to the t-test, it was found that only the "Caring" sub-dimension of the participants' involvement dimensions showed a significant difference according to their traveling status ($p < 0.05$). Looking at Table 5, the average of the answers given to the questions regarding the

importance dimension of the participants who have travelled out of the province for karate purposes is higher than the average of the participants who have not travelled out of the province for karate purposes. Based on this finding, it can be concluded that people who have travelled outside the province for karate purposes attach more importance to karate.

ANOVA was conducted to determine whether the research participants' interest in karate differed in sub-dimensions according to their age. ANOVA results are summarized in Table 6.

Table 6. Comparison of participants' karate interests by age

	Age	**n**	**X̄**	**Sd**	***f***	**p**
Attractiveness	18-28	73	4.51	0.66	0.268	0.76
	29-39	77	4.49	0.51		
	40+	118	4.55	0.62		
	Total	268	4.52	0.60		
Giving importance	18-28	73	3.82	1.23	0.845	0.43
	29-39	77	4.05	0.93		
	40+	118	3.91	1.13		
	Total	268	3.93	1.10		
Social Relationship	18-28	73	3.86	0.80	0.291	0.75
	29-39	77	3.88	0.74		
	40+	118	3.95	0.95		
	Total	268	3.91	0.85		
identification	18-28	73	3.64	0.72	4.515	**0.01****
	29-39	77	3.83	0.90		
	40+	118	4.02	0.91		
	Total	268	3.86	0.87		
Self Expression	18-28	73	3.39	0.94	1.776	0.17
	29-39	77	3.64	0.92		
	40+	118	3.64	0.99		
	Total	268	3.57	0.96		

****p≤0.01**

According to Table 6, it was found that only the "Identification" dimension showed a significant difference according to age ($p<0.05$). According to the homogeneity of variances (Levene) test, since the variances were homogeneous, the Gabriel test (Mayers, 2013: 180), one of the Post-Hoc tests, was applied to see which groups there were differences. The results of multiple comparisons between groups are given in Table 7.

Table 7. Identification dimension multiple comparison (gabriel) table by age

			Average Difference	**Level of Meaning**
Identification	40 years and above	18-28 years old	0.380	**0.01****

****p≤0.01**

According to Table 7, participants aged 40 and over have a higher identification average than participants aged 18-28. According to this result, it can be said that relatively older people identify themselves more with karate.

The ANOVA result, which was conducted to determine whether the participants' interest in karate changes significantly depending on how long they have been practising karate, is shown in Table 8.

Table 8. Comparison of participants' karate interests according to duration

	Duration	**n**	**X̄**	**Sd**	***f***	**p**
Attractiveness	1-10 years	20	4.30	0.88	2.849	**0.04***
	11-20 years	116	4.54	0.58		
	21-30 years	109	4.49	0.60		
	31 years and above	23	4.81	0.30		
	Total	268	4.52	0.60		
Giving importance	1-10 years	20	3.45	1.56	1.749	0.16
	11-20 years	116	3.93	1.04		
	21-30 years	109	4.04	0.97		
	31 years and above	23	3.80	1.43		
	Total	268	3.93	1.10		
Social Relationship	1-10 years	20	3.80	0.91	3.273	**0.02***
	11-20 years	116	3.96	0.79		
	21-30 years	109	3.77	0.89		
	31 years and above	23	4.35	0.80		
	Total	268	3.91	0.85		
Identification	1-10 years	20	3.85	0.76	5.292	**0.00****
	11-20 years	116	3.70	0.81		
	21-30 years	109	3.91	0.94		
	31 years and above	23	4.45	0.57		
	Total	268	3.86	0.87		
Self Expression	1-10 years	20	3.20	1.07	1.637	0.18
	11-20 years	116	3.52	0.94		
	21-30 years	109	3.67	0.88		
	31 years and above	23	3.68	1.22		
	Total	268	3.57	0.96		

***p≤0.05, **p≤0.01**

According to the ANOVA results, considering how many years the participants have been practicing karate, significant differences are observed in the dimensions of "Attractiveness", "Social Relationship" and "Identification". In order to see which groups there are differences, the multiple comparison results are presented in Table 9.

Table 9. Interest multiple comparison (gabriel) table by duration

			Average Difference	p
Attractiveness	31 years and above	1-10 years	0.51159	**0.03***
Social Relationship	31 years and above	21-30 years	0.57413	**0.01****
identification	31 years and above	11-20 years	0.75387	**0.00****
		21-30 years	0.53490	**0.02***

***p≤0.05**

From Table 9, it can be seen that the participants who have been practising karate for 31 years or more have higher scores on the attractiveness dimension than those who have been practising karate for 1-10 years, on the social relationship dimension than those who have been practising karate for 21-30 years, and on the identification dimension than those who have been practising karate for 11-20 years and 21-30 years. From this finding it is concluded that people who have been practicing karate for relatively longer years find this activity more attractive, develop their social relations with this it, and identify themselves more with karate.

Finally, in the difference tests, ANOVA was conducted to determine whether the research participants' interest in karate differed according to the frequency of doing karate. ANOVA results are included in Table 10.

Table 10. Comparison of participants' interests according to the frequency of doing karate

	Frequency	n	X̄	Sd	*f*	p
Attractiveness	Every day	42	4.34	0.75	3.828	**0.01****
	Every other day	97	4.47	0.66		
	Once in three days	63	4.69	0.50		
	Once a week	66	4.62	0.46		
	Total	268	4.54	0.61		
Giving Importance	Every day	42	3.80	1.09	1.111	0.35
	Every other day	97	3.96	0.96		
	Once in three days	63	3.78	1.40		
	Once a week	66	4.10	0.97		
	Total	268	3.93	1.10		
Social Relationship	Every day	42	3.78	0.88	1.300	0.28
	Every other day	97	3.83	0.92		
	Once in three days	63	3.96	0.73		
	Once a week	66	4.05	0.83		
	Total	268	3.91	0.85		
Identification	Every day	42	3.98	0.71	0.669	0.57
	Every other day	97	3.80	0.96		
	Once in three days	63	3.93	0.89		
	Once a week	66	3.80	0.81		
	Total	268	3.86	0.87		
Self Expression	Every day	42	3.60	0.75	1.826	0.14
	Every other day	97	3.67	0.89		
	Once in three days	63	3.65	1.11		
	Once a week	66	3.34	0.99		
	Total	268	3.57	0.96		

****p≤0.01**

According to Table 10, it was found that only the "Attractiveness" dimension showed a significant difference according to the frequency of practising karate ($p<0.05$). In order to see which groups this difference exists between, the multiple comparison results are given in Table 11.

Table 11. Attractiveness dimension multiple comparison (gabriel) table by frequency

			Average Difference	p
Attractiveness	Once in three days	Every day	0.35185	**0.02***

***p≤0.05**

According to Table 11, participants who practice karate every three days have a higher average attractiveness than participants who practice it every day. Based on this, it can be interpreted that people who practice karate every three days find karate more attractive than people who practice karate every day. On the other hand, according to the results of a difference test, the dimensions of interest in karate do not show significant differences according to gender, membership status in karate clubs, profession, and education level ($p>0.05$).

Finally, descriptive statistics were used to determine the interest levels of the participants in the research towards karate. Descriptive findings regarding the scale items are shown in Table 12.

Table 12. Descriptive findings regarding the karate sport interest scale

Dimensions and Items	Average	Std. Dev.
Attractiveness	**4.54**	**0.61**
1. Karate is one of the most fun things I do.	4.64	0.68
2. Karate is very important to me.	4.52	0.71
3. Karate is one of the most satisfying things I do.	4.41	0.89
Giving importance	**3.93**	**1.10**
4. I think most of my life revolves around karate.	4.32	0.81
5. Karate has a central role in my life.	4.21	0.94
6. If I were to choose another free time activity instead of Karate, I would have to seriously rethink it.	4.13	0.98
Social Relationship	**3.91**	**0.85**
7. I enjoy talking about karate with my friends.	4.08	1.12
8. I met most of my friends because of karate.	3.85	1.02
9. Practising karate gives me the opportunity to be with my friends.	3.78	1.06
Identification	**3.86**	**0.87**
10. When I practice karate, I am truly myself.	3.87	1.13
11. I identify with people and images related to karate.	3.55	1.10
12. When I practice karate, I don't have to worry about how I look.	3.98	1.07
Self Expression	**3.57**	**0.96**
13. When you see a person practice karate, you can tell a lot about that person.	3.73	1.19
14. Practising karate says a lot about who I am.	3.53	1.15
15. When I practice karate, people see me the way I want them to see me.	3.58	1.16
GENERAL	4.01	0.49
n = 268		

When the expressions in the scale are examined in Table 12, the three items with the highest mean are; “Karate is one of the most fun things I've ever done.” ($\bar{x}$=4.64), “Karate is very important to me.” ($\bar{x}$=4.52) and “Karate is one of the most satisfying things I have done.” It is

understood that ($\bar{x}$=4.41). On the other hand, the statement with the lowest mean was " Practising karate says a lot about who I am." ($\bar{x}$=3.53), when we look at the standard deviation values, the biggest deviation is "When you see a person practising karate, you can tell a lot about that person." It can be seen in the statement. It is understood from Table 12 that the dimension with the highest average on the basis of dimensions is the "Attractiveness" dimension ($\bar{x}$=4.54). The dimension with the lowest average is the "Self-Expression" dimension ($\bar{x}$=3.57). Additionally, the overall average of the scale items is $\bar{x}$=4.01 out of 5. Based on this, it can be interpreted that the participants' interest in karate is generally high.

DISCUSSION

The aim of the research is to determine the interest level of people who practice karate in Adana and to determine whether this interest differs according to the demographic variables of the people. According to the analysis results, it was found that among the participants' involvement dimensions, only *the Self-Expression* sub-dimension showed a significant difference according to marital status. It is understood that married people see karate as a way of expressing themselves more than single people. Although they did not show interest in karate or the self-expression sub-dimension linearly, Kim and McKenry (2002) and Williams (2003) studies investigated the effect of marital status on participation in different sports contexts. Supporting the results of the current study, they found that married people had more positive psychological well-being and higher motivation to participate in sports than single people did. On the other hand, Leon-Guereno et al. (2020) study concluded that marital status did not have a significant effect on the motivation to participate in marathon running.

According to another finding, it was determined that only *the Importance* sub-dimension showed a significant difference according to travel status and it was concluded that people who travelled outside the province for karate purposes gave more importance to karate. The fact that the importance sub-dimension shows a significant difference according to the travel situation is evidence that this activity is the priority of those who are involved in karate more comprehensively and perhaps more determinedly. *The identification* dimension showed a significant difference according to age. It was concluded that relatively older people identify themselves more with karate. Witte et al. (2016) similarly observed that the cognitive functions and emotional well-being of the elderly, whose commitment to karate increased with age, improved significantly.

According to the results of the research, it has been revealed that people who have been practicing karate for longer years find karate more attractive, improve their social relations with it and identify themselves more with karate. According to Fuller and Lloyd (2019), practicing martial arts for a long time has positive effects on various psychological factors, including interest in sports, social relationships and self-definition.

The Attractiveness dimension of the Karate Interest Scale showed a significant difference according to the frequency of practising karate. It was concluded that people who practice

karate every three days find karate more attractive than people who practice karate every day. Less frequent but still consistent participation may lead to a greater sense of excitement and anticipation, which may increase the perceived attractiveness of the activity. On the other hand, those who practice every day may become more accustomed to routine, potentially leading to a decrease in perceived attractiveness. According to other difference test results, the dimensions of interest in karate do not show significant differences according to gender, membership status in karate clubs, profession and education level.

Finally, descriptive statistics were used to determine the interest levels of the participants in the research towards karate. When the scale expressions are examined, the three items with the highest mean; *Karate is one of the most fun things I do* , *Karate is very important to me* , and it turns out that *Karate is one of the most satisfying things I do* . These findings generally give a clue that the participants have a positive attitude towards karate. Participants see karate as a fun, important and satisfying activity. Such positive perceptions can be effective in encouraging continued participation, motivation, and long-term participation in karate. From a practical perspective, this information is valuable for karate instructors, clubs and organizations. They can use this information to highlight the fun and rewarding aspects of karate when promoting it. Emphasizing the fun, importance and satisfaction experienced by participants can attract newcomers and keep existing practitioners interested.

On the other hand, the statement with the lowest mean is *"Practising Karate says a lot about who I am.*" The low mean score for this statement indicates that the study participants, on average, did not strongly identify their personal identity with karate. Participants may participate in karate primarily as a hobby or physical activity rather than as a deeply ingrained part of their identity. Additionally, individuals may have multiple interests and activities that contribute to their self-concept and karate may not be a top priority. This result also highlights the diversity of motivations and reasons for engaging in karate among participants.

On the basis of dimensions, it was observed that the dimension with the highest average was *the Attractiveness* dimension and the dimension with the lowest average was *the Self-Expression dimension.* In Bozkurt's (2015) study, which investigated the effect of personal commitment in fitness training, the attractiveness dimension also came to the fore and the participants agreed that fitness training was important for them, that it was very satisfying, and that they enjoyed it very much. Additionally, the overall average of the scale items is $\bar{x}$=4.01 out of 5. Based on this, it can be interpreted that the participants' interest in karate is generally high.

These results highlight the positive tendencies of individuals involved in karate and underline the attractiveness and importance of the activity in their lives. Capitalizing on this high level of interest can contribute to the growth and sustainability of karate as a martial arts. Given the generally high levels of interest, karate organizations and clubs may hold open events, workshops or introductory classes to attract more participants. A sense of community and camaraderie can be strengthened among karate practioners. Social interactions, activities and support networks can be encouraged that can further increase the sense of belonging and personal significance associated with karate. Feedback can be obtained regularly from

participants to understand their changing interests and expectations. Other suggestions include expanding facilities in Adana, hosting regional or international events and collaborating with local communities to further engage and educate individuals in karate.

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Research Ethic Informations: Çukurova University Ethics Committee approved the study protocal.

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The Excellent Symbol in Sports: Pierre de Coubertin's Rings

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Abstract

Baron de Coubertin, the founder of the modern Olympic Games, made many attempts to make the games more effective and recognizable. One of these attempts is the design of the Olympic flag, because there was a need for a visual symbol. The idea of Olympism created by Coubertin aims to interlock the world with the bonds of love and friendship as a result of the unity of mind, soul and body. This ideal which also constitutes the meaning infrastructure of the rings, is coded on six different colors and five rings. It can be said that the intellectual origin of the rings is based on the institutions Coubertin was in and on some symbols and visuals he witnessed. The rings first appeared in two letters Coubertin sent to a close friend. They were then formally announced in a written declaration in 1913 and introduced at the 1914 Paris convention. The flag was first waved at a sporting event in Egypt, at a non-Olympic event. After that the usage areas of the rings expanded considerably. The Olympic Games in Antwerp in 1920 and in Paris in 1924 increased the popularity of the flag and it was used in many different places. The officialization of the flag also promoted the flag ritual over time. The attempt to associate the ring symbol with the ancient Olympic Games remained a mistake. The aim of the study is to bring to the forefront the birth and developmental stages of the world's most popular flag, the Olympic flag with five rings, along with the ideas, contradictions, and disagreements found in the literature on the subject, and to provide a clearer and more understandable chronological structure.
Keywords: Ancient olympics, Modern olympics, Olympic flag, Olympics rings

Sporda Zirve Sembol: Pierre de Coubertin'in Halkaları

Öz

Modern olimpiyatların kurucusu Baron de Coubertin, oyunları daha etkili ve tanınır hâle getirmek için birçok girişimde bulundu. Bu teşebbüslerden biri de görsel sembole duyulan ihtiyaçtan dolayı olimpiyat bayrağının tasarımıdır. Coubertin tarafından oluşturulan Olimpizm fikri insanın zihin, ruh, beden birliğinin sağlanması sonucunda dünyayı sevgi ve dostluk bağlarıyla birbirine kenetlemeyi hedeflemektedir. Halkaların anlam alt yapısını da oluşturan bu ideal altı farklı renk ve beş halka üzerinde kodlanmıştır. Halkaların fikrî kökeninin Coubertin'in içinde bulunduğu kurumlara, tanık olduğu bazı sembollere ve görsellere dayandığı söylenebilir. Halkalar ilk kez Coubertin'in yakın bir dostuna gönderdiği iki mektupta ortaya çıktı. Daha sonra 1913'te yazılı bir beyan ile resmi olarak açıklandı ve 1914 Paris kongresinde tanıtıldı. Bayrak ilk kez olimpiyat dışı bir etkinlikte Mısır'da düzenlenen bir spor organizasyonunda dalgalandı. Bu süreçten sonra halkaların kullanım alanları ciddi manada genişledi. 1920 Anvers ve 1924 Paris Olimpiyatları bayrağın popülaritesini artırdı ve bayrak birçok farklı yerde kullanıldı. Bayrağın resmiyet kazanması, zamanla bayrak ritüelini de teşvik etti. Halkalı sembolün antik olimpiyat oyunlarıyla ilişkilendirilme çabası ise büyük bir yanılgı olarak kaldı. Çalışmanın amacı, dünyanın en popüler bayrağı olan beş halkalı olimpiyat bayrağının doğuşunu, gelişim evrelerini, konu ile ilgili literatürün barındırdığı fikirleri, çelişki ve anlaşmazlıkları gündeme taşıyıp, kronolojik olarak daha net ve anlaşılır bir yapıya kavuşturmaktır.
Anahtar Kelimeler: Antik olimpiyatlar, Modern olimpiyatlar, Olimpiyat bayrağı, Olimpiyat halkaları

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INTRODUCTION

Many organizations today need a symbol to reach a wider audience and gain recognition. People who see the logo immediately understand who or what it is referring to and what message it is conveying. In this context, some symbols have been used for thousands of years. Labarum is one of the ancient symbols said to have helped Emperor Constantine win the Battle of Milvian Bridge. Everyone knows the Christian Cross and the Islamic Crescent. The Coca-Cola logo, the Mercedes star, the Red Cross and the Red Crescent symbol are among the most well-known. On the other hand, there are forbidden symbols such as the swastika of the Nazis, the German National Socialists and the yellow Jewish star. Symbols are also frequently used in the field of sports. For example, Ferrari which is one of the champions of Formula 1, has a very famous logo. The flag with the Olympic ring used for the modern Olympic Games, which is considered the most important sporting event, occupies the top spot among sports logos (Lennartz, 2002).

The flag was designed by Pierre de Coubertin. Pierre de Coubertin was born on January 1, 1863 in the French aristocracy, and embraced the liberty, equality and fraternity values of the French Republic as a young adult. Subsequently, he turned to sports and played a pioneering role in French educational reform by enabling French youth to be acquainted with English sports through education. He became an advocate for a universal system that would allow not only French youth but also ordinary people in the world to benefit from the privileges of sports. The system advocating the soul, body and mind integrity had the goal of bringing humanity together for world peace, friendship, and brotherhood.

In this direction, he proposed the idea of the Olympic Games during the Sorbonne Congresses in 1892 and 1894, and in 1896, he started the first modern Olympic Games in Athens which is the place of birth of the Ancient Olympics. Then, he proved that sports are a common heritage of the world by organizing the 1900 Paris and 1904 St. Louis Olympics. The common heritage's need for a universal symbol led Coubertin to the invention of the flag (Olympics, t.y.a). Conceived and drawn by Pierre de Coubertin himself, the symbol consists of five interlaced rings. Three of these rings are located at the top; the other two are located at the bottom. The rings at the top, from left to right, are blue-black-red, and the rings at the bottom are yellow green (Anonymous, 1913a).

The International Olympic Committee (IOC) was founded in 1894, and the first Olympic Games were held in 1896. On the other hand, the flag was designed and introduced after a long period of nineteen years. This move can be considered as delayed, and the sources do not provide clear evidence on the issue. In the literature, there is no confession of Coubertin in this regard. One of the possibilities that does not go beyond guesses is that the IOC and Coubertin postponed the design of the symbol because of other issues and problems related to the Olympic Games. The Games are generally under the control of National Olympic Committees (NOC) and international sports federations. In addition, many problems, such as the violation of the principle of amateurism, the inclusion of women in the Games, and the desire of the Greeks to monopolize the Games, are still waiting to be solved. There are serious conflicts, especially with the Greeks.

Coubertin designed the logo of the Union of French Societies of Athletic Sports (USFSA) *(Union des Sociétés Françaises de Sports Athlétiques)* in 1890 and created a symbol consisting of two interlocking rings (Anonim, 2000: 595). In this context, it is unlikely that Coubertin did not consider designing a logo for the Olympic Games. He certainly had an idea in mind for a logo design. However, it is believed that Coubertin may have postponed this for a while because of the problems mentioned above (Anonymous, 1913a).

It can be said that the design of the Olympic flag is one of the most convenient actions of Coubertin who encountered many oppositions and challenges during the creation and organization of the Olympic Games. There were no objections to the flag and it was accepted immediately. It is not entirely clear whether Coubertin consulted while designing it, but the design has an interesting and unknown history. However, it is much more interesting that the Olympic flag which has a higher recognition level than the national flag of many countries in the world, has been the subject of numerous studies in foreign literature, but it has not been used in any independent article in Turkish literature. From this point of view, it is believed that the research will be a unique reference source and will fill an important gap in the Olympic flag.

The literature shows us that the history of Coubertin's ring flag goes back much earlier than thought. And again, we see in the literature that this idea dates back to years before the idea of the Olympics existed, and that many different examples activate and affect Coubertin's subconscious. In the decades after this accepted symbol gained popularity, it was also put forward that the symbol was not consistent with Coubertin's formal and semantic expressions. Our research will bring these ideas back into focus, the contradictions, and inconsistencies they contain. Thus, readers will see the chronological phases of the design of the Olympic flag more clearly. Due to the method of document analysis that we have used in our research, we have referred to Coubertin's original texts in particular.

CONCEPTUAL FRAMEWORK

The Connection Between Pierre de Coubertin's Rings and the Ancient Olympics

In the late 1950s, two British writers, Lynn and Gray Poole, visited the Delphi Stadium and saw a stone with familiar symbols engraved on its edges, and they published a photograph with a comment describing it as an ancient altar at Delphi in their book *"History of the Ancient Olympic Games"*:

"In the stadium at Delphi, there is a stone altar on which is carved five rings symbolic of the…. timing for the celebrated games. The design of the five circles on the Delphi altar is today the symbol of the Olympic Games. The circles form a link between ancient and modern Olympics" (As cited in Barney, 1992).

Robert Knight Barney visited the Greek archaeological site of Delphi for the fifth time in early August 1984. During this visit, he saw a stone with carved symbols on it but still visible towards the end of his tour of the area. After examining the symbols more closely, Barney realized that this symbol was the five rings of the modern Olympic movement (See Figure 1).

Figure 1. The "Stone" in Delphi (Barney, 1992).

Considering that the stone at Delphi has eroded and faded over time, it is tempting to think that Pierre de Coubertin might have been by those used in ancient times. Even if not the stone at Delphi, he may have been inspired by a similar one at Olympia, a place he visited more than once in his life or even the sacred sanctuary of his heart's final resting place (Barney, 1992).

General explanations for the origin of the Olympic rings go against the alleged historical link between the five-ring symbol of the modern Olympic movement and the ancient Olympic Games, as well as widely accepted legend that the five-ring symbol is three thousand years old (VanWynsberghe & Bowling, 1994). Recent studies also support this argument (Barney, 1992). This confusion results, in part, from an altar located at Olympia and more recently at the International Olympic Academy near Olympia. This altar has five interlocking rings (See Figure 2). In addition, there is a stone located in Delphi that also has these five rings (See Figure 1). According to Young (1985), it would be a great mistake to refer to any of these altars as the origin of the three-thousand-year-old association between the ancient and modern Olympic Games (As cited in VanWynsberghe & Bowling, 1994). This is because both altars are products of "Nazi propaganda" dating back to the 1936 Berlin Olympics (VanWynsberghe & Bowling, 1994). The person who caused this mistake was Carl Diem who was the main organizer of the 1936 Berlin Olympics. According to Young (1985), the 1936 Olympic Games Committee, under the direction of Carl Diem, organized and implemented a plan to conduct a torch run from the point where the sacred fire was lit in Altis, adjacent to the Ancient Olympia Stadium, to the large Olympic stadium in the suburbs of Berlin. Diem and his supporters are masters of ritual and symbolism. They took every opportunity to organize

Figure 2. The "Diem-stone" in Delphi (Barney, 1992)

the Berlin Games in an atmosphere and environment reminiscent of the ancient Olympic Games. The route of the torch run starts in Olympia in the Peloponnese, going through northern Greece to the Danube, then to Austria and finally to Germany. Diem who recognized the athletic and religious importance of Delphi in ancient times, planned to lead the torch from Athens to the west, to Delphi, and he planned special ceremonies in the ancient stadium on the top of the sacred temple of Apollo on Mount Parnassus. The theatrical decorations designed by Diem for the ceremonies in the stadium in Delphi were placed on the Olympic structures at the western end and in the starting area of the stadium. After the ceremonies were completed, the torchbearers run towards the northern points. However, the stone with the rings remains for years on the thresholds of the ancient starting line (Barney, 1992). According to Grombach (1980), symbols with four and five interlocking rings were found on marble blocks and doors from the fifth century BC at Olympia (As cited in Barney, 1992). However, these interlaced rings which ancient Greek artists used as decorative elements, bear no resemblance to the modern Olympic rings. It has also not been proven that the interlocking ring motifs from ancient times were symbols of the ancient Olympic Games. Coubertin visited the Olympia region many times, but it is obvious that the design of the logo with the five rings was the result of brainstorming in the late nineteenth century and not directly based on the symbolism of the ancient Olympic Games (Barney, 1992).

The Origin of the Coubertin Rings

It can be said that the sources of inspiration and building blocks that led Coubertin to brainstorm were laid as early as the 1880s. Some studies conducted about the Olympic rings suggest that fairs, exhibitions, museums, tours, newspapers, magazines, souvenirs and various commercial advertisements served Coubertin as reference sources.

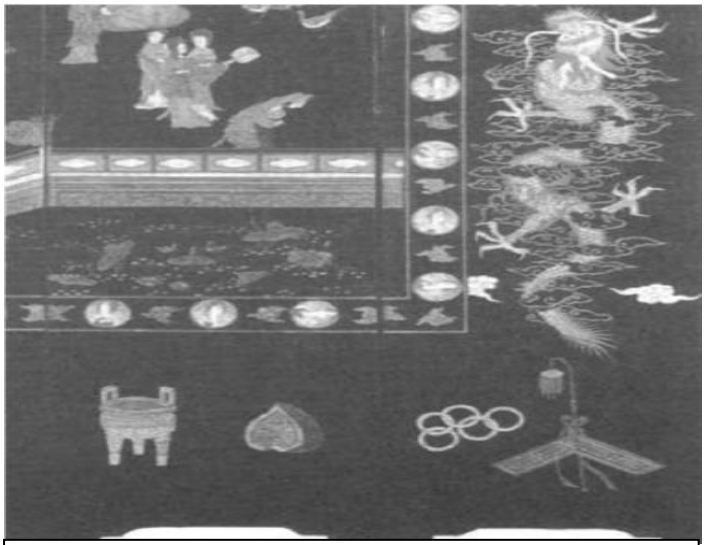

Figure 3. Detail of a Japanese standing shade with the five rings (from: KOPPLIN, *Lackkunst*, 105-106, as cited in Lennartz, 2002).

From a broader perspective, it is possible to see that symbolic rings are used in different communities with different forms and meanings. A Japanese folding screen from 1710, depicting a festive gathering of women and children in the great palace areas (210x320), has five interlaced rings on its lower right corner as a decorative element, almost identical to the Olympic symbol (See Figure 3). This artwork is currently on exhibit at the Museum of Japanese Lacquer Art in Münster, Germany (Lennartz, 2002). When we examine the relationship between East Asia and the five rings based on this artwork, we come across *"The Book of Five Rings"* by Miyamoto

Musashi, a Japanese swordsman from 1645. This book contains five different books written about Kenjutsu and martial arts in general.

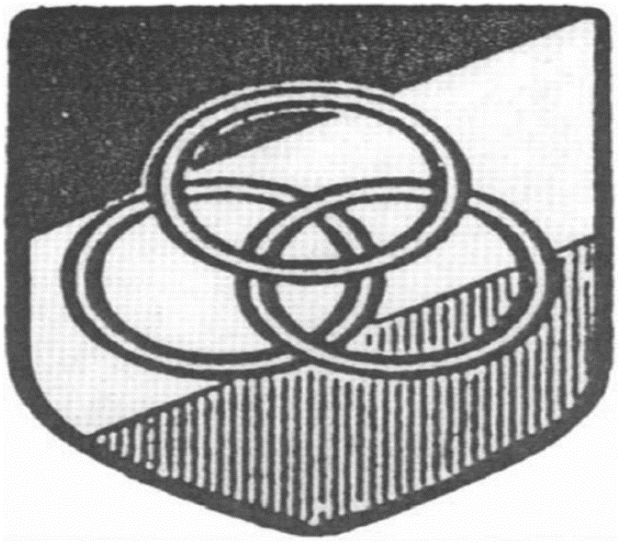

Figure 4. Logos of the firms Krupp (Lennartz, 2002)

The Krupp company has used a logo since 1875 that shows stylized rail wheels with three interlaced rings, with two rings at the bottom and one ring at the top (See Figure 4). With this design, Krupp participated in the 1889 and 1900 world exhibitions and received numerous awards. It is likely that Coubertin saw this logo (Lennartz, 2002).

Two separate clubs which were established in 1882, *"French Racing Club" (Racing Club de France)* and *"French Stadium Club" (Stade Français)* decided to merge in 1887 and formed the *"Union of French Running Associations" (Union des Sociétés Françaises de Course a Pied)* (McAloon, 1981: 157). According to Young (1985), this union later merged with the *"Committee for the Propagation of Physical Exercises" (Comité pour la Propagation des Exercises Physiques)*, for which Pierre de Coubertin served as secretary general in the early 1890s and took the name USFSA applying various sports disciplines together. Coubertin becomes president of the union (McAloon, 1981: 157-158; Vanwynsberghe & Bowling, 1994). The USFSA logo consists of two interlaced rings. These rings symbolize the two different associations that merged (Barney, 1992). The symbol has the inscription *"LUDUS PRO PATRIA" (Play for Your Country)*. The athletes of this association carried this emblem both in competitions and later in the Olympic Games (See Figure 5) (Lennartz, 2002). In the first marathon run which took place near Athens, French athlete Albin Lermusiaux who was a member of the USFSA took part in the race with this logo on his chest (Barney, 1992). According to the information given by Coubertin's great nephew, Geoffrey de Navacelle, Coubertin designed the logo in 1890. The two rings of the USFSA may have become a small model for the five rings of the Olympic logo (Anonymous, 2000: 595).

Figure 5. Logo of the USFSA (Lennartz, 2002).

Dunlop, a United Kingdom-based company, placed an advertisement for bicycle tires in the Radfahr Chronik newspaper in 1896. There is a drawing in

the middle of the advertisement that covers the whole page. The four angels that are connected by ribbons with inscriptions *"Africa, America, Asia, Europe"*, represent the four continents, and the angels hold four interlaced bicycle tires while flying (See Figure 6). The Australian continent is not represented in this image. Another issue of Radfahr Chronik newspaper from the same year includes a bicycle advertisement given by Acatene company. This advertisement shows a total of 33 aristocrats, including Baron de Coubertin as a reference (See Figure 7). From this point of view, Coubertin may have seen and memorized the advertisement of Dunlop (Lennartz, 2002).

Figure 6. Dunlop advertisement with five rings (from: Radfahr-Chronik 9[1896]62, p. 646, as cited in Lennartz, 2002).

Figure 7. An advertisement of the firm Acatène refering to Baron de COUBERTIN (from: Radfahr-Chronik 9[1896]61, p. 933, as cited in Lennartz, 2002).

The First Appearance of the Olympic Rings

The Olympic movement had no symbol when the Sports Congress convened by Coubertin in Sorbonne between June 16 and 23, 1894, decided to restart the Olympic games on 23 June. Like many sports federations and organizations, the IOC undoubtedly needed a symbol of recognition. However, the idea of a flag was first presented at the twelfth session of the IOC in Luxembourg in 1910. In this session, Theodore Cook who was the organizer and artistic executor of the 1908 London Olympic Games, presented a flag model and medal design. Although it is not known what the design looks like, a commission including Godefroy de Blonay, Jules de Muszha, Clarence von Rosen and Eugenio Brunetta d'Usseaux discussed this design. The commission held a meeting and submitted a proposal to the general assembly, but it was not approved. Coubertin allowed the matter to be postponed (Lennartz, 2002). Cook's proposal was not brought up during the 1911 Budapest and 1912 Stockholm IOC sessions and it was rejected during the 15th session in Lausanne in May 1913 (Anonymous, 1913b). Considering the

literature reviews and Coubertin's character, it is understood that he wanted to design this important symbol himself and worked on it during this process.

The Olympic rings are seen for the first time as printed in their form in the upper left corner of a letter Coubertin wrote to Godefroy de Blonay on July 15, 1913. This letter is the first document found in the IOC archives that contains the rings. The second document containing the rings is another letter Coubertin wrote to Blonay on August 6, 1913 from the Hotel Quellenhof. An attempt was made to draw similar rings with a pen under the logo at the top left of the letter. This person could be either Blonay (Lennartz, 2002) or Coubertin.

Coubertin first officially described the Olympic rings in writing, without using pictures, in his article *"1914 Emblem and Flag"* in the August 1913 issue of Revue Olympique, the official publication of the IOC. Coubertin writes in the article as follows:

"The emblem selected to illustrate and represent the 1914 world congress which was to place the final seal on the restoration of the Olympics began to appear on various preliminary documents: five rings linked at regular intervals, their various colours - blue, yellow, black, green and red - standing out against the white of the paper. These five rings represent the five parts of the world now won over to Olympism, ready to accept its fruitful rivalries. In addition, the six colours combined in this way reproduce the colours of every country without exception. The blue and yellow of Sweden, the blue and white of Greece, the tricolor flags of France, England, the United States, Germany, Belgium, Italy and Hungary, and the yellow and red of Spain are included, as are the innovative flags of Brazil and Australia, and those of ancient Japan and modern China. This, truly, is an international emblem. It was made to be turned into a flag, and the look of the flag would be perfect. It is a light, appealing flag, a delight to see fluttering in the wind. Its meaning is largely symbolic. Its success is assured, to the point that after the Congress it can continue to be raised on solemn Olympic occasions. However, this may turn out, the celebrations of 1914 now have the eurythmic messengers they needed to announce them. The great poster; the first copies of which have been given to the national Olympic Committees and which continues to be available to them, met with immediate general admiration. The reduction to post card format is equally successful for that medium. The five rings and their various applications will also be deeply appreciated.

Are these five rings solidly riveted together? Will war someday shutter the Olympic framework? This is an issue we have been asked about before, and since the occasion presents itself; we are pleased to respond. Olympism did not reappear within the context of modern civilisation in order to play a local or temporary role. The mission entrusted to it is universal and timeless. It is ambitious. It requires all space and all time. One must acknowledge that its initial steps immediately marked it out for that future. That being the case, war can merely delay, not stop, its advancement. As the preamble of the Regulations for the next Congress state, 'an Olympiad may fail to be celebrated, but neither the order nor the interval may be changed'. If God forbid, the Seventh or Eighth Olympiads were unable to be celebrated, the Ninth Olympiad would be held. If bloody memories, still too fresh, made it impossible to hold the necessary celebrations in one part of the world, there will be people on the other side of the world ready to honour the eternal youth of humanity.

In addition, a more sporting conception of war - the word is not inappropriate - is becoming predominant. This will not make the heated exchange any less harsh, but it will make the aftermath somewhat more easily tolerated. People will learn a great lesson from the athlete: hatred without battle is not worthy of man, and insult without blows is utterly unbecoming.

Perhaps we have strayed from our topic. Let us return to it, repeating that war cannot influence the future of the Olympics. Once peace is restored, the International Committee will be at its post ready to continue its worldwide work. That is why the new emblem eloquently evokes both conquered terrain and guaranteed endurance" (Anonymous, 1913a).

Coubertin's article on the Olympic flag aroused great interest in the sports world (Lennartz, 2002). Angelo Bolanaki (Anonymous, 1963), appointed by Coubertin as Secretary General of the Egyptian National Olympic Committee, asked Coubertin for permission to wave the Olympic flag at the opening of the Chatsby Stadium in Alexandria on April 5, 1914, within the framework of the first Panegyptian Games. At this request, Coubertin had a flag made - probably in Paris - and sent it to Egypt (Lennartz, 2002). The Olympic flag was waved there for the first time (Anonymous, 1964). There are no known pictures of the flag waving in Egypt, but Bolanaki wrote in his work *"History of Sports in Egypt" (Histoire du Sport en Egypte)* that the flag is fluttering in the wind (Lennartz, 2002).

The Paris Congress (June 13-23, 1914) and the Development of the Rings

The idea of Olympism, in which the idea of the unification of the world is encoded in rhetoric, is symbolically surrounded in practice by five colored rings. Given the period, this call was great value (Anonymous, 2002). But the effort to unite the world through sport was unfortunately interrupted by the bells of war. At the beginning of the 20th century, nationalism was strong and tensions between certain countries were high (Anonymous, 2002). World War I which began on July 28, 1914, was to shake the entire world and drive societies apart for four years. Millions of people would face death, famine, and displacement (Eyquem, 1966: 207). Coubertin sensed the growing dangers. Ironically, just one month before the war, the Paris Congress was convened to celebrate the twentieth anniversary of the foundation of the Olympic Games, and Coubertin presented the flag there in detail (Clastres, 2013).

However, there was a serious mistake by the printer in printing the logo which Coubertin considered very important and paid careful attention to, on the invitations for the music and dance performances at the congress on June 14, 1914 (with two rings on top and three below). (Lennartz 2002; Pierre de Coubertin…, 2000: 595).

During the congress held under the IOC, the Olympic flag was waved on June 15, 1914 (Lennartz, 2002; VanWynsberghe & Bowling, 1994). Coubertin couldn't attend because of a sudden illness and could not witness the flag waving. The special train that was going to take the members of the Congress to Maintenon Castle on June 19 was carefully prepared by the management of the State Railways. The locomotive was decorated with Olympic flags and a plate dated 1894-1914. The Maintenon station was also decorated with Olympic flags. On the evening of June 21, the Barones de Schoen gave a party in honour of the Congress. Five rings of the Olympic flag, with a large, illuminated design, stand in the middle of an elaborately lit garden. On June 22, President Raymond Poincare and his wife, Madame Poincare held a garden party in honor of the Elysee Palace, decorating the entire garden with Olympic flags. (Anonymous, 1914).

Twenty years later, on October 9, 1935, Coubertin wrote a letter to Albert Berdez, Secretary General of the IOC. In this letter, he conveyed the reactions of his colleagues in the IOC to the symbol and other developments at the twentieth-anniversary congress in Paris. This letter was taken from the IOC archive, and it is as follows:

"Dear Colonel Berdez, the significance of the importance of the five coloured rings representing on a white background all colours of the world only became clear when the flag was created. Before 1913 my colleagues who had rejected the ideas of a ceremonial entry, oath, opening and closing phrase and who had only started changing their views after Stockholm, would have gone against a unification of gymnastic. They were opposed to any opinion of this kind. I let Brunetta who was an exception concerning these views present a flag that was completely overloaded and complicated. One restricted himself to observing it without discussing it. Towards the beginning of 1914 I then presented my deeply symbolic flag (the five continents united by the Olympism and the colours of all nations) after having carefully reconsidered the proportions in regard to the background. I had the flag made in the Bon Marché (a machine bad to be constructed solely for its fabrication). I think nearly 500 flags were made. I covered most of the costs via the festivities of Paris. Thus, I was given a free hand as to what I spent money on. Only at the festivities in the Trocadéro did the IOC have to make a contribution. The flag appeared for the first time two days before the commencing of the festivities at a celebration organised by the Count de Bertier and his wife in the Bois de Boulogne on Saturday June 13, 1914. On Monday 15 the flag could be seen by a large number of people in the Amphitheatre Richelieu. On the 17th it accompanied the president Poincaré at the 20th anniversary being borne by six boy scouts. It decorated the engine and the train station of [at the outing of June 19, in short, it was everywhere, and many members of the congress took a flag back home with them.

In 1915 it was in the town hall of Lausanne on the occasion of determining the seat, and 1916 at the IOC-day it had the central location at a place of honour during the exhibition in San Francisco. Thus, it was not introduced in Antwerp as de Blonay writes in 1928 making a rare mistake which I have already had to correct several times. I think that you will see these details in the Olympic Memories, but I think that it has been good anyway to again send you a detailed summary that you can hand on to Diem the way it is." (Anonymous, 1914; The Berdez Letter, 1935, as cited in Lennartz, 2002).

It is thought that the flag was originally intended to be waved for the first time in 1916 in Berlin during the Olympic Games. However, because of World War I, this could not be realized (Anonymous, 2002). Coubertin received a second request to use the flag. The flag was hoisted on March 18 during a sporting event at an exhibition in San Francisco in the spring of 1915 (International Olympic Committee Day), (Anonymous, 1964). A badge with the Olympic rings was also given at the same event (Lennartz, 2003). Between April 5 and 8 1919, during the celebrations of the twenty-fifth anniversary and the seventeenth session, the flag was hoisted in the university hall (Anonymous, 1964).

The long-awaited big day for the Olympic flag finally arrived on August 14, 1920. During the opening ceremony of the Olympic Games VII in Antwerp in Belgium, the flag with the rings fluttered in the wind (Anonymous, 1964). It is estimated that this flag was three by six meters (Lennartz, 2002). After the equestrian games, the Belgian NOC gave the IOC an Olympic flag embroidered on silk as a commemoration of the Games. Coubertin asked the officials of the Antwerp municipality to keep this flag and hand it over to the authorities in Paris in 1924. During the closing ceremony, the Olympic flag was lowered in company with the sounds of trumpets and cannon shots, similar to the opening ceremony. In the meantime, *"cantata"* by

Pierre Benoist was performed by 1,200 musicians. The 1920 Antwerp Games, in which no effort was spared to closely combine art and sport, thus come to an end on September 12, 1920 (Anonymous, 1957: 50-51).

In the first edition of the *"Olympic Charter"* published by Coubertin in 1921, the following is written under the heading of flags:

"As in all Olympic venues, there should be many Olympic flags among the flags of the participating nations in the stadium. During the Games in the stadium, a large Olympic flag should fly on a central pole, which is raised when the opening of the Games is announced and lowered when the closing is announced. On the other hand, each confirmed victory should be celebrated by raising the flag of the nation of the winning athlete on such a pole. With music, the national anthem of that nation is played, and audience stands up and listens." (Anonymous, 1921: 10).

In the same edition, it also is stated about the closing ceremony as follows:

"The Olympic flag is lowered from the central pole by being greeted with a salute of five cannon shots, and the choirs sing the final cantata. At the same time, the President of the International Committee presents the mayor of the host city with the satin embroidered Olympic flag, originally donated by the Belgian Committee in 1920 and received by the representative of the previous host city of the Games. This flag should be kept in the town hall until the next Olympic Games." (Anonymous, 1921: 12).

Coubertin added these new practices to the rituals of the opening and closing ceremonies and probably made them himself, along with many other things (Lennartz, 2002).

The Olympic rings won a great victory at the Olympic Games VIII in Paris in 1924. The rings were not only on numerous flagpoles in the stadiums but also on posters of the Games, building walls, curtains of the offices of the organizing committee, accreditations, and tickets. Each of the staff, athletes and journalists had an Olympic logo. After a short speech by Comte Justinien de Clary who appeared on the podium covered with a large Olympic flag, the French President made the opening speech of the Opening Ceremony. Later, Geo Andre took the Olympic oath on the same podium. The Olympic flag can then be seen in photos taken during the Winter Sports Week in Chamonix, where the Winter Olympic Games I would be held (Anonymous, 1925: 85, 715, 732, 791, 821).

After IOC President Coubertin's speech at the closing ceremony on July 27, a flag ceremony was held for the first time in the form known today. It is stated in the report of the French NOC as follows:

"The trumpets of the Republican Guard played. The Olympic flag was lowered after being saluted with five cannon shots. Then the Greek, French and Dutch flags were lowered, respectively and the singers began to sing Auber's "La Muette: The Mute Girl" and Ambroise Thomas's "Hymne à la France: French National Anthem". Meanwhile, the President of the International Olympic Committee presented the President of the Paris City Council with the satin embroidered Olympic flag, donated by the Belgian Olympic Committee in 1920 and received from the Mayor of Antwerp, to be kept in the Paris Town Hall until 1928 when the Olympic Games IX would be celebrated."

The President of the Paris City Council Maurice Quentin later gave a speech in which he gushed about the importance of the Olympic flag with several sentences. He expressed that the flag symbolized the high values becoming prominent in sporting competitions and that it was an honour to keep it in Paris for four years (Anonymous, 1925: 615).

In 1925, the Olympic rings were used in philately for the first time. The Czechoslovak Post Office used stamps with the Olympic rings from April 8 to May 9, 1925, to promote the Olympic Congress VIII, held in Prague from May 29 to June 4, 1925 (Lennartz, 2003). The Swiss NOC frequently used the Olympic rings, as did the French NOC at the 1924 Olympics in Paris (Lennartz, 2002).

After Paris, the Olympic flag was displayed on the advertisements and official posters of the 1928 Winter Olympics II in St. Moritz. The organizers of these games also added the Olympic rings to the Olympic medals, commemorative medals, and certificates of achievement. This situation subsequently became a tradition for winter games. The American NOC is probably the first institution that included the rings in its emblems and thus on the uniforms of its athletes (Lennartz, 2002). The flag handover ceremony in Paris took place in the stands, but it took place in the middle of the stadium during the 1928 Olympic Games in Amsterdam in order to allow everyone to see it (Anonymous, 1928: 915).

The Portuguese NOC sought financial support to send its Olympic group to Amsterdam and received support from the national post offices. In 1928, 15- and 30-centavos stamps with the Olympic rings were affixed to all mails (Schmidt & Schneider, 1958, as cited in Lennartz, 2002). Since then, the rings have been used on almost all Olympic stamps, and in case of their absence, the stamps are referred to as "stamps without rings" (Lennartz, 2002).

For many years, the flag was accepted in the form proposed by Coubertin and flew on the poles in many member countries and Olympic Games. In 1957, another version was officially approved by the IOC Executive Board. When the IOC which separated the rings from their intersections and made them independent rings considered this decision a mistake in 2010, they returned to the original, seamlessly interlaced design, fulfilling Coubertin's vision (Olympics, t.y.b).

A Discussion on the Meaning of the Rings

According to VanWynsberghe & Bowling (1994), the common misconception that the symbol of the five rings and its colors were meant to represent the participation of the continents in the Olympic Games is not accurate. The main purpose of Coubertin regarding this symbol was not to represent the continents (VanWynsberghe & Bowling, 1994). According to Young (1984), it is disputed whether the flag shows five continents or six continents (As cited in VanWynsberghe & Bowling, 1994). There is no record of any athlete from Antarctica who participated in the Olympic Games, either before or after 1914. Therefore, there is no reason to believe that Antarctica was included in the colour scheme of the logo. The number of continents Coubertin could include is five, but, as Coubertin himself acknowledged, the number of colours is six (VanWynsberghe & Bowling, 1994).

According to Young (1985), the rings may symbolize the five Olympic Games that were played before the Paris Congress of 1914. According to Barney (1992), as claimed in many contemporary Olympic publications, Coubertin did not intend each colour to represent a continent. Instead, the white background of the flag and the green, red, yellow, black, and blue rings represent at least one of the colours of the flags of each nation that was represented at the first five Olympic Games. In Coubertin's article *"1914 Emblems and Flags"* which is mentioned in detail above, it is seen that he expressed ideas in this regard (Anonymous, 1913a; Anonymous, 2000: 594-595).

According to Barney (1992), if the rings really symbolize the continents of the world, why is Africa not mentioned? Africa was not part of the logo scheme, at least not in Coubertin's thoughts about the Olympic Games. It is true that white South Africans competed in the Olympic Games, but these athletes competed under the auspices and representation of Great Britain from the beginning. Until the 1950s, they were forced by European colonial establishments in the African continent to become independent, and thus real African participation in the modern Olympic games was allowed (Barney, 1992).

On the other hand, in a letter written by Coubertin to Albert Berdez on October 9, 1935, the word "continent" is mentioned. The relevant section of the letter is as follows:

"At the beginning of 1914, having carefully reconsidered the proportions in the background, I presented my profound and symbolic flag (the colors of the five continents and of all the nations united by Olympism)" (Letter to Berdeze, 1935, as cited in Lennartz, 2002).

According to Miller (1979: 194), the Olympic rings symbolize the unity of the five continents and the gathering of athletes from all over the world in the spirit of justice, fair competition and friendship, which are the ideals preached by Coubertin.

In his book "Olympic Memoirs" he wrote in 1931, Coubertin speaks about the subject as follows:

"The commemoration at the Sorbonne, attended by all the ambassadors, presided over by the Head of State, and at which more than a hundred addresses or telegrams were delivered by monarchs, seeming heirs, governments, universities and associations, was crowned by the performances of famous Swedish singers who had come to Paris for the festivals. The Olympic flag which was recently printed in large numbers and highly acclaimed, was presented to the public for the first time. This snow-white flag, consisting of interlaced blue, yellow, black, green and red rings, represented the five continents brought together by the Olympic Games and reflected the colors of all nations." (Coubertin, 1931: 144).

In the 1948 report of the American NOC, the *"unity of color and continent"* is mentioned. The relationship is as follows:

- Blue: Europe
- Yellow: Asia
- Black: Africa
- Green: America
- Red: Australia

The related report gives the relationship between colours and continents, but there is confusion here. In the literature, the color green represents Australia, while the color red represents America. However, this report states the opposite (Anonymous, 1949: 14)

Paleographer, research director at the School of Applied Advanced Studies (Ecole Pratique des Hautes Etudes) and expert in symbolic systems, especially dynastic coats of arms, sigillography and color symbolism, Michel Pastoureau, noted that there was a matching between color and continent. In his book, *"Green: The History of a Color"* Pastoureau says the following:

"Another somewhat different example is the green that represents Oceania in the series of Olympic rings. There it is a matter of an athletic color that was not chosen but imposed. The rings had been established on paper in 1912-1913, but events made it so that they could not be flown on the Olympic flag until the Olympic Games in Anvers in 1920. Each ring represents one continent and possesses its color: red for America, yellow for Asia, black for Africa, blue for Europe, and green for Oceania. The first three colors seem to have been chosen according to ethnic considerations (and also perhaps slightly racist ones): red for the continent of the redskins, yellow for that of the yellow peoples, and black for that of the blacks. The other two, though, are trickier to interpret. Blue, associated with Europe, appears to be an old cultural legacy; blue has been Europe's favorite color since the eighteenth century, and it is also the color other societies around the globe use to symbolize it. But where does the green for Oceania come from? Why this choice? Oceania has no special relationship, either natural or cultural, to with this color. In fact, it was a matter of elimination. Five of the six basic colors were already taken-four for the first four rings and white for the background of the flag-only green remained for the fifth ring. Oceania became green and seems gradually to be forming an attachment to this color, chosen for it by solemn European gentlemen who had never set foot on its soil and who probably had no intention of ever doing so. First imposed from without, green was nevertheless accepted by Oceania, and is now embraced and proudly displayed on the playing fields." (Pasteureau, 2014: 216).

CONCLUSION

The claim that the idea of the Olympic rings originated in the ancient period is false based on the research conducted and the results presented. The attempt to trace the origin of the rings back to the ancient period reflects a theatrical scenario presented by Carl Diem. From a young age onwards, Pierre de Coubertin's wandering and exploratory nature enabled him to see and memorize many things, as well as to improve his intellectual perspective and expand his knowledge. Fairs, exhibitions, museums, congresses, conferences, the reading of books, newspapers and magazines, sports activities and corporate responsibility allowed him to realize the largest sports organization in the world. All this experience and knowledge led to the creation of the globally recognized symbol of the Olympic flag, consisting of five interlaced rings. The flag was inspired by various ring figures and elements. Coubertin's first logo experience can be seen in the symbol of the USFSA, which can be considered the precursor of the Olympic flag. The transition from the emblem with two rings to the global flag with five rings is directly related to the ideology of Olympism.

The Egyptian Olympic Committee raised the first logo, which was used in a letter to his close friend Godefroy de Blonay, and Coubertin ceremoniously presented it to the sporting community at the Paris Congress of 1914 on the occasion of the 20th anniversary of the Olympic Games. Thus, the flag began to become a symbol with the potential for popularity

worldwide. However, the great war slowed it down to some extent. The 1920 Games in Antwerp and the 1924 Games in Paris contributed to the flag gaining the value it deserved and becoming the most popular flag in the world. The logo became a symbol used widely in various sporting events, postage stamps, postcards, store signs, clothes, flags, accreditations, etc.

With the spread of the famous logo, several debates and four different interpretations emerged about the meaning of the rings and colors:

- The rings represent the continents.
- The rings represent the continents, and each continent has its own color.
- The rings symbolize the nations that participated in the five Olympic Games before 1913 and the colors symbolize at least one color from the flags of those nations.
- The rings represent the continents. The colors symbolize at least one color from the flags of all countries. There is no correspondence between color and continent (as Coubertin stated).

From Coubertin's own statements, we can see that the idea of a *"continent-color matching"* is a misunderstanding. Black: Africa, yellow: No specific connection between color and Asia was found in primary sources. From Coubertin's own writings, we can conclude that the rings represent the five continents participating in the games. Also, according to Coubertin, the six colors used represent the flags of all nations without exception. In this case, both the rings and the colors symbolize the unity of the world in terms of continents and nations, but they do not confirm color-continent matching. There is no current evidence to support the claim that Coubertin made such an assignment.

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