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The Effect of Plyometric Training on Some Motoric and Technical Parameters in 13-15 Age Soccer Players

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Abstract

The aim of this study was to examine the effect of regular plyometric training on some motoric and technical parameters of young soccer players in addition to regular soccer training. A total of 25 male volunteers (13 training group, 12 control group) aged between 13-15 studying at Konyaspor Infrastructure Soccer School participated in the study. The training group followed an 8-weeks, 2 days a week and 30 minutes plyometric training program in addition to the regular soccer training. The control group players continued their normal soccer training. In order to determine some motoric and technical characteristics of the players body weight of all participants were recorded before and after the study. Also vertical jump, standing long jump, T agility test, 20 meter sprint, speed dripling test, and Mor-Christian shot ability test measurements were taken. SPSS 22.0 IBM statistical package program was used to evaluate the data obtained within the scope of the research. In order to determine the difference between the groups, t test was used in independent groups and paired sample t test was used to compare the pre-test and post-test values. According to the research findings when the pre-test and post-test values of the training and control groups were compared, only a significant difference was observed in the dribbling values at the beginning of the study, but at the end of 8 weeks there was a statistically significant difference in agility, shot and dribbling values in favor of the training group ($p < 0.05$). In addition, it was found that there was a statistically significant difference between the pre-test and post-test values of all the parameters of the players who participated in the training group ($p < 0.05$), but there was no statistically significant difference in the control group ($p > 0.05$). As a result, it can be said that plyometric exercise applied in addition to regular soccer training has positive effect on some motoric and technical characteristics of 13-15 age soccer players.

Keywords: Soccer, Strength, Plyometric Training,

13-15 Yaş Futbolcularda Pliometrik Antrenmanların Bazı Motorik ve Teknik Parametreler Üzerine Etkisi

Özet

Bu çalışmanın amacı düzenli olarak uygulanan futbol antrenmanlarına ek olarak sekiz hafta süreyle yapılan pliometrik antrenmanların genç futbolcuların bazı motorik ve teknik parametreleri üzerine etkisinin incelenmesidir. Araştırmaya, Konyaspor Altyapı Futbol Okulu'nda eğitim gören, yaşları 13-15 arasında değişen toplam 25 gönüllü erkek (13 antrenman, 12 kontrol) futbolcu katılmıştır. Antrenman grubunu oluşturan sporculara düzenli olarak uygulanan futbol antrenmanlarının yanı sıra 8 hafta, haftada 2 gün ve 30 dakika pliometrik antrenman programı uygulanmıştır. Kontrol grubunu oluşturan sporcular ise normal futbol antrenmanlarına devam etmişlerdir. Sporcuların performansla ilgili bazı motorik ve teknik özelliklerini belirlemek amacıyla tüm katılımcıların çalışma öncesi ve sonrası vücut ağırlığı belirlenmiş ayrıca dikey sıçrama, durarak uzun atlama, T çeviklik testi, 20 metre sürat, sürat dripling testi ve Mor- Christian şut yetenek test ölçümleri alınmıştır. Araştırma kapsamında elde edilen verilerin değerlendirilmesinde, SPSS 22.0 IBM istatistik paket programı kullanılmıştır. Gruplar arasındaki farklılığı belirlemek için bağımsız gruplarda t testi, ön test ve son test değerlerinin karşılaştırılmasında ise bağımlı gruplarda t testi kullanılmıştır. Verilerin ortalama ve standart sapmaları verilmiş ve araştırmada anlamlılık düzeyi $p < 0,05$ olarak kabul edilmiştir. Araştırma bulgularına göre antrenman ve kontrol grupları ön test-son test değerleri karşılaştırıldığında, çalışma başlangıcında sadece dripling değerlerinde anlamlı bir fark görülürken, 8 hafta sonunda çeviklik, şut ve dripling değerlerinde antrenman grubunun lehine istatistiksel olarak anlamlı bir farklılık olduğu tespit edilmiştir ($p<0,05$). Ayrıca antrenman grubuna katılan sporcuların tüm parametrelerinin ön test-son test değerleri arasında istatistiksel olarak anlamlı bir farklılık olduğu tespit edilirken ($p<0,05$), kontrol grubunda istatistiksel olarak anlamlı bir farklılık olmadığı belirlenmiştir ($p>0,05$). Sonuç olarak düzenli futbol antrenmanlarına ek olarak uygulanan pliometrik antrenmanların futbolcuların bazı motorik ve teknik özelliklerine olumlu etkisinin olduğu söylenebilir.

Anahtar Kelimeler: Futbol, Kuvvet, Pliometrik Antrenman.

INTRODUCTION

Today, one of the most important phenomena is sports activities. Soccer, with the largest number of supporters and participants, is the most popular one of the sports events. (1,12). In order for athletes to achieve a successful performance in all branches, their physiological and physical characteristics must be suitable for the sports branch they do. Therefore, the main goal of every player and coach is to increase performance (76). Physical structure is positively affected when speed, strength, flexibility, resistance and power are combined with performance variables (1, 6).

The achievement of high levels of sportive performance in soccer and the best display of technical skills specific to soccer depend on the bio-motor characteristics of soccer players. (32). In order to increase the performance of athletes to the next level, it is recommended that motoric features should be developed with appropriate training programs (18). Soccer is handled with an intermittent activity profile with metabolic contributions from both aerobic and anaerobic systems (52). In the soccer, improving performance has an important place since athletes must perform activities such as slowing down, acceleration and change direction very rapidly by using short recovery times while cover distances of 10-13 km during the match (17, 40, 59, 75).

Some training models are applied to improve performance (15, 67). The plyometric training model is one of them (57). When it comes to plyometric model, it comes to mind as a tool that enables the nerve-muscular system to start generating power as soon as possible and to create a tight bridge between speed and power by improving this ability (37). In this method, in which jumping and throwing methods are used to improve sportive performance, it is aimed to increase the explosive power at the end of fast eccentric contraction. The plyometric training method consists of a series of explosive movements to bring the muscles to the highest level in the shortest time (12).

It has been reported that plyometric studies will be beneficial especially in sports branches such as soccer, volleyball, handball, and basketball, where explosive force is a priority (41). This training model, which has an important place among the training programs of young soccer players, is seen as a training model that allows the gradual use of effective, fun, and resistant loads that are important for the development of some motoric properties required for the soccer. Moreover, plyometric training is a method in which many different movements are performed without the need for expensive equipment and a large field. (9,10, 14, 23, 73). It is known that using plyometric training to improve sprint performance and strength is important for development (13, 24, 72). Plyometric training is reported to improve and enhance people's neuromuscular functions, as well as increase strength to perform the next movement by using their natural elastic components to stretch and reflex (37, 38). Plyometric training is also seen as a method that allows soccer players to improve in technically (60, 63, 71). In this context, it is important to provide training for the physical structure, technical and tactical skills of the athlete, starting with the children in the infrastructure teams. In the literature, there are studies reporting that plyometric studies applied in soccer, where explosive force is a priority, positively affect the performances of athletes both technically and motorically (20, 39, 50, 51). However, contrary to these studies, there are studies showing that plyometric training does not affect the performance of soccer players (33, 35).

The aim of this study is to determine the effect of plyometric training applied together with soccer training for eight weeks on some motoric and technical parameters of young soccer players and to provide guidance to trainers and athletes for training planning.

MATERIAL AND METHOD

A total of 25 male soccer players, aged 13-15, being trained at Konyaspor Youth Soccer School voluntarily participated in the study. Athletes are composed of participants who have been continuing their football training for 1 year. Participants were divided into 2 groups; training group (n:13) and control group (n:12). Groups were randomly designed. In addition to the regular soccer trainings applied to the athletes who make up the training group. A 30-minute plyometric training program was applied for 8 weeks, 2 days a week. The athletes in the control group continued their normal soccer training.

Ethical and Legal Format of Research: Before the study, the purpose of the study and the tests to be applied were explained in detail to all participants, and the necessary permission was obtained from the Konyaspor Soccer School Coordinatorship before the study. Moreover, participants related to the study were asked to fill in a written voluntary participation form. Necessary permission was obtained from the

families of the participants. For this study, the approval of Selcuk University Faculty of Sport Sciences Non-Interventional Clinical Research Ethics Committee was obtained. (Date-14/01/2019, Number of Decisions-08).

Applied Measurements and Tests: In calculating the age of the athletes, the birth dates were taken as years. The height (m) and body weight (kg) of the participants were determined using a scale with height measure. In order to determine some motor and technical characteristics related to performance, vertical jump test was applied to all participants before and after the study to determine the vertical jump strength, and their anaerobic power was determined by calculating in kg-m/sec using the Lewis formula (21). The standing long jump test (27) to determine jump distances, the 20-meter running test (3) to determine the sprint speed, and the agility T test to measure their agility were applied (47, 53). Moreover, a speed dribbling test station was prepared to determine the athletes' ability to coordination with the ball against time and their durations were recorded with a stopwatch (8). In addition, the Mor-Christian shooting test was applied to measure the shoot-through rate of soccer players and the successful ones were recorded by scoring according to the shots hit (69). The obtained values are presented in tables and compared. The trainings and measurements in our study were carried out at the Konyaspor Youth Soccer School field. The soccer players were informed about the tests and they were allowed to practice. Each test was administered to all participants twice with full rest, and the best time was recorded.

Plyometric Training Program: Along with the regular soccer training sessions applied to the participants in the training group, a plyometric training program consisting of the following movements, 2 days and 30 minutes a week, was applied for 8 weeks (Table 1). The training program was applied with a 1-2 minute rest interval and a single set. The control group continued their normal soccer trainings.

Table.1: 8-week plyometric training program applied to the training group

Weeks	Exercise Type	Repeatition
1. Week	Double Foot Jump (Jumping without using the arms)	10
	Double Foot Jump (Jump using arms)	10
	One Leg Side Jump	10
	Side Jump Over Obstacle	10
	Box Drill With Hoop	10
2. Week	Side Jump Over Obstacle	15
	Box Drill With Hoop	15
	Cross The Hoop With The Right Leg	10
	Cross The Hoop With The Left Leg	10
	Horizontal Jump With Right Leg	10
3. Week	Cross The Hoop With The Right Leg	15
	Cross The Hoop With The Left Leg	15
	Horizontal Jumping with Right Leg	15
	Horizontal Jumping with Left Leg	10
	Side Jump With Hoop	10
4. Week	Horizontal Jumping with Left Leg	15
	Side Jump With Hoop	15
	Change of direction with long jump	10
	Jumping Over the Cone Changing Direction with Sprint	10
	Cone Jumping with 180° Rotation	10
5. Week	Change of direction with long jump	15
	Jumping Over the Cone Changing Direction with Sprint	15
	Cone Jumping with 180° Rotation	15
	Hexagon Exercise	10
	Pushing the Body Up by Switching Feet	10
6. Week	Hexagon Exercise	15
	Pushing the Body Up by Switching Feet	15
	Barrier jump	10
	Depth Jump with One Leg	10
	Speed Jumping	10
7. Week	Jump Over The Barrier	15
	Depth Jump with One Leg	15
	Speed Jumping	15
	Depth Jump Between Barriers (Right foot)	10
	Depth Jump Between Barriers (Left foot)	10
8. Week	Depth Jump Between Barriers (Right foot)	15
	Depth Jump Between Barriers (Left foot)	15
	Depth Jump Between Barriers (Double Foot)	10
	Double Foot Jump (Jumping without using the arms)	15
	Double Foot Jump (Jump using arms)	15

Statistical Analysis

SPSS 22.0 IBM statistical package program was used to evaluate the collected data. T test was used in independent groups to detect the difference between groups and Paired Simple T test was used to compare pre-test and post-test values. The data were summarized by giving mean and standard deviations, and the level of significance in the study $p < 0.05$ was accepted.

RESULTS

The average age of the athletes in the training group was determined as 13.69 ± 0.85 years, the average height was 1.57 ± 0.08 m, the average age of the control group was 13.25 ± 0.45 years, the average height was 1.59 ± 0,07 m.

Table 2. Comparison of training and control groups pretest values for dependent variables

Variables	Groups	x̄± SD	t	95% CI	p	ES
Body weight (kg)	Training Group	49,01 ± 12,54	0,32	-0.91 - 0.65	0,75	0,12
	Control Group	47,75 ± 5,84				
Vertical Jump (cm)	Training Group	29,15 ± 5,22	0,01	-0.31 - 1.27	0,99	0.47
	Control Group	29,16 ± 7,96				
Anaerobic Power (kgm/ sec)	Training Group	592,54 ± 165,3	-0,21	-0.69 - 0.87	0,83	0.08
	Control Group	604,64 ± 109,5				
Horizontal Jump (cm)	Training Group	170,38 ± 22,03	0,77	-0.48 - 1.09	0,45	0.30
	Control Group	177,00 ± 21,03				
20 meters speed (sec)	Training Group	3,87 ± 0,26	0,88	-1.17 - 0.41	0,39	0.37
	Control Group	3,78 ± 0,21				
Agility (sec)	Training Group	11,99 ± 0,70	0,42	-0.63 - 0.94	0,68	0.15
	Control Group	12,10 ± 0,71				
Shoot (point)	Training Group	30,76 ± 20,06	0,64	-1.06 - 0.51	0,53	0.27
	Control Group	26,33 ± 13,80				
Dribbling (sec)	Training Group	30,48 ± 3,16	3,21	-2.14 - -0.42	0,00*	1.28
	Control Group	27,10 ± 1,89				

*: p<0,05, x̄: Mean, SD: Standard Deviation, CI: Confidence Interval, ES: Effect Size

In the comparison of training and control group pre-test values for the variables of body weight, vertical jump, anaerobic power, standing long jump, 20-meter speed, agility, and shooting of the athletes participating in the study, it was found that there was no statistically significant difference between the two groups (p > 0.05). On the other hand, only the dribbling variable of the training group was found to be statistically significantly higher than the control group (p <0.05) (Table 2)

Table 3. Comparison of the post-test values of the training and control groups regarding the dependent variables.

Variables	Groups	x̄± SD	t	95% CI	p	ES
Body weight (kg)	Training Group	49,06 ± 11,52	0,38	-0.93 - 0.63	0,71	0.15
	Control Group	47,67 ± 5,49				
Vertical Jump (cm)	Training Group	34,07 ± 7,73	0,14	-0.86 - 0.70	0,89	0.07
	Control Group	33,66 ± 6,67				
Anaerobic Power (kgm/sn)	Training Group	636,25 ± 189,23	0,35	-0.92 - 0.64	0,73	0.14
	Control Group	613,94 ± 119,33				
Horizontal Jump (cm)	Training Group	170,38 ± 22,03	0,05	-0.76 - 0.80	0,96	0.02
	Control Group	178,17 ± 21,54				
20 meters speed (sec)	Training Group	3,75 ± 0,26	0,20	-0.69 - 0.87	0,84	0.08
	Control Group	3,77 ± 0,20				
Agility (sec)	Training Group	11,41 ± 0,65	2,53	0.17 - 1.84	0,02*	1.00
	Control Group	12,11 ± 0,73				
Shoot (point)	Training Group	49,23 ± 16,74	3,54	-2.29 - -0.54	0,00*	1.41
	Control Group	28,00 ± 12,79				
Dribbling (sec)	Training Group	30,09 ± 3,22	2,85	-1.99 - -0.29	0,01*	1.14
	Control Group	27,07 ± 1,82				

*: p<0,05, x̄: Mean, SD: Standard Deviation, CI: Confidence Interval, ES: Effect Size

It was found that there was no statistically significant difference in the comparison of the training and control groups in the post-test values of the variables of body weight, anaerobic power, vertical jump, and

long jump with standing and 20 meters speed of the athletes participating in the study (p> 0.05). On the other hand, it was found that there was a statistically significant decrease in agility and dribbling post-test values in the training and control groups and a significant increase in the shooting test (p <0.05) (Table 3).

Table 4. Comparison of the pretest-posttest values of the dependent variables of the training group.

Variables	Training Group	$\bar{x}$ ± SD	t	95% CI	p	ES
Body weight (kg)	Pretest	49,01 ± 12,54	-0,13	-1,09-0,96	0,90	0,03
	Posttest	49,07 ± 11,52				
Vertical Jump (cm)	Pretest	29,15 ± 5,22	5,46	-6,15-2,15	0,00*	1,25
	Posttest	34,07 ± 7,73				
Anaerobic Power (kgm/sn)	Pretest	592,54 ± 165,29	-4,41	-65,3- -22,0	0,00*	1,22
	Posttest	636,25 ± 189,23				
Horizontal Jump (cm)	Pretest	170,38 ± 22,03	2,61	-13,4-1,20	0,02*	0,72
	Posttest	177,69 ± 22,03				
20 meters speed (sec)	Pretest	3,87 ± 0,26	2,73	0,02-0,22	0,02*	0,75
	Posttest	3,75 ± 0,26				
Agility (sec)	Pretest	11,99 ± 0,70	5,08	0,33-0,82	0,00*	1,40
	Posttest	11,41 ± 0,65				
Shoot (point)	Pretest	30,77 ± 20,05	3,47	29,4- -5,97	0,01*	0,91
	Posttest	49,23 ± 16,74				
Dribbling (sec)	Pretest	30,48 ± 3,16	2,55	0,02-0,70	0,03*	0,64
	Posttest	30,09 ± 3,23				

*: p<0,05, $\bar{x}$: Mean, SD: Standard Deviation, CI: Confidence Interval, ES: Effect Size

A statistically significant difference was found between the pre-test values and the post-test values in all parameters studied, except weight (p <0.05) (Table 4).

Table 5. Comparison of the pretest-posttest values of the dependent variables of the control group.

Variables	Control Group	$\bar{x}$± SD	t	95% CI	p	ES
Body weight (kg)	Pretest	47,75 ± 5,84	0,42	-031-046	0,68	0,12
	Posttest	47,67 ± 5,49				
Vertical Jump (cm)	Pretest	29,16 ± 7,96	2,03	-2,60- 0,43	0,07	0,45
	Posttest	33,66 ± 6,66				
Anaerobic Power (kgm/ sec)	Pretest	604,64 ± 109,51	-1,91	-0,20- 1,42	0,08	0,55
	Posttest	613,94 ± 119,33				
Horizontal Jump (cm)	Pretest	177,00 ± 21,03	2,02	-2,27- -0,05	0,07	0,66
	Posttest	178,16 ± 21,53				
20 meters speed (sec)	Pretest	3,78 ± 0,21	2,02	-0,00- 0,04	0,07	0,63
	Posttest	3,76 ± 0,20				
Agility (sec)	Pretest	12,11 ± 0,71	0,08	-0,02- -0,02	0,94	0,02
	Posttest	12,11 ± 0,73				
Shoot (point)	Pretest	26,33 ± 13,80	1,45	-3,67- 2,00	0,18	0,18
	Posttest	28,00 ± 12,79				
Dribbling (sec)	Pretest	27,11 ± 1,89	0,36	-1,42 0,19	0,72	0,10
	Posttest	27,08 ± 1,82				

* p<0,05, $\bar{x}$: Mean, SD: Standard Deviation, CI: Confidence Interval, ES: Effect Size

When the pre-test and post-test values of the control group participating in the study were compared, it was determined that there was no statistically significant difference in all parameters studied (P> 0.05) (Table 5).

DISCUSSION AND CONCLUSION

In the study that we conducted, the effect of the regular eight-week plyometric training program applied on some motoric and technical parameters of 13-15 year old soccer players was examined and in all parameters of the training group (vertical jump, standing long jump, anaerobic power, 20

meters speed, agility, shooting and dribbling) It was observed that there was a statistically significant difference in the post-test values compared to the pre-test values ($p < 0.05$) (Table 4), while there was no significant difference in the control group ($p > 0.05$) (Table 5).

When the results of the study were evaluated, there was no statistically significant difference in the body weight of the training and control groups. The reason for this can be said that the training method we use is not a training aimed to change body weight. Literature research conducted support our study (36, 48, 63).

With regular training, increases occur in the physical and physiological parameters of athletes (28, 70). It has been reported that in the soccer branch where explosive force is a priority, plyometric studies have been reported to positively affect the performances of athletes by improving their motoric characteristics such as jumping and explosive force (39, 40, 50, 51, 59).

Determining the vertical jump distance is extremely important in improving the explosive performance of athletes (5). In our study, when the pre-test and post-test values of the training group were compared, it was observed that the vertical jump score post-test values increased compared to the pre-test values ($p < 0.05$). Although there was an increase in the control group, no statistically significant difference was found ($p > 0.05$). As a result of these results, it can be concluded that the plyometric training program performed in addition to the soccer training applied regularly at vertical jump distances is more effective than the soccer training applied alone. The vertical jump measurement results we obtained in our study support the studies presented in the literature. Kobal et al. (34) found a significant increase in the vertical jump performance of the subjects in their study titled "The effects of different strength and plyometric training combinations on the physical performance of elite young soccer players." In their study, Asadi et al. (4) examined the effects of maturation on jumping ability and sprint adaptation to plyometric training in young soccer players and observed that there was a significant change in the vertical jump performance of the subjects. Similar to the results of the above studies, it was reported in studies conducted in different age groups that a significant increase was found in the vertical jump value as a result of the plyometric training applied to soccer players (22, 44, 46, 54, 61, 62). Contrary to these studies, there are studies reporting that there is no significant change between the vertical jump distances before and after the applied training and do not show parallelism with our results (11, 19, 25, 56). Another finding of our study, a statistically positive increase was shown in the values of long jump by standing, thanks to the plyometric training applied in accordance with the results of the studies in the literature. In the studies conducted, positive results were obtained in the long jump performances of the athletes with the plyometric training applied to young soccer players for different durations (13, 66). Ramirez et al. (49) conducted a single-blind randomized controlled study in young soccer players to compare the effects of 7-week plyometric jump training on components, and in this study conducted in 3 groups of 38 people, they found significant improvements in their long jump performance.

Soccer is characterized by an intermittent activity profile with metabolic contributions from both aerobic and anaerobic systems. (52). Although the energy system used in soccer matches is generally aerobic energy system, it is known that the attacks made during the match take place in the anaerobic energy system and these movements are the determining element of the match. Many methods are used to determine the dominant anaerobic performance in high intensity muscle activities lasting between a few seconds or minutes, and vertical jump distance is used to determine short-term anaerobic power among these methods. (68). In this study, the anaerobic power of the athletes were calculated by using vertical jump distances. Brown et al. (16) stated that the average anaerobic power values of young people aged 15 years were between 49.4 and 60.4 kgm / sec. Ferley et al. (20) found that the anaerobic power values of the athletes showed a positive improvement in their study where they combined sprint interval, plyometric and strength training on 46 soccer players between the ages of 13-18 for 8 weeks. In another study, after plyometric training applied 3 days a week for eight weeks,

significant results were obtained in anaerobic power values in favor of the experimental group when the experimental and control groups were compared (26). In our study, it is observed that the anaerobic power values of young soccer players are compatible with the above literature data. While the arithmetic mean of anaerobic power values of the training group before training was 592.54 ± 165.3 kgm/sec, this value increased by 636.25 ± 189.23 kgm/sec after training and was found to be statistically significant ($p < 0.05$). While the pre-training value of the control group was 604.64 ± 109.52 kgm/s, this value was determined as 613.94 ± 119.33 kgm/s after training, and no statistically significant difference was observed ($p > 0.05$). Considering that anaerobic performance is an important feature in many sports, our results show that it is beneficial to include plyometric training in the training periodization of trainers who are interested in the strength and conditioning of young athletes (2).

Soccer players tend to run and change direction during the game. Speed performance is also necessary for this and has an important place for performance in soccer in terms of physical and technical skills (29). As a result of the study of the training group that participated in the plyometric training program we applied in this study, a positive improvement was observed in the 20-meter speed values compared to the pre-study ($p < 0.05$), while no significant difference was found in the control group ($p > 0.05$). Ronnestad et al (58) divided the players into three groups and applied only sprint training to the first group, and plyometric training to the second group with sprint training. The third group continued only with soccer training as the control group. As a result of the study, significant differences were determined in the speed values in both training groups compared to the control group, but no significant difference was found between training groups. Beato et al. (13) found significant improvements in sprint performances after 6 weeks of training in their research, in which they examined the effects of plyometric and directional training on speed and jumping performance in elite young soccer players. Contrary to these studies, there are studies reporting that 10 m and 20 m sprint distances do not create a significant change between the groups after plyometric study (33, 65). Considering the results of this study and the literature, it is concluded that in most of the studies, significant results were obtained in the sprint performance of the athletes in the plyometric training group, and that the plyometric trainings were better than classical training.

While the athletes are performing movements with or without the ball during the match, the athlete should be trained in agility and reaction time in order to do and develop it in the best way (7, 31). In this study, T agility test was applied before and after the exercise to determine the agility of the athletes. At the beginning of the study, it was determined that the agility values of all participants were similar to each other, but at the end of the study, there was a statistically significant difference in the agility post-test values between the training and control groups. As a result of the study, a positive improvement was observed in the agility scores in the pre-test and post-test comparison of the training group, while no significant difference was found in the control group. Renfro (55) In his study, which examined the effect of plyometric training on the agility performance of athletes, he found that after 8 weeks of training, there was an improvement in agility values compared to before training. Negra et al. (42) reported positive increases in the agility performances of athletes between groups in their study, in which they examined the effects of plyometric training on the physical fitness components of young male soccer players. Similarly, Sheikh and Hassan (64) evaluated the agility performance of the athletes, who were divided into 3 groups, aged between 18-22, consisting of 45 male volleyball players, and found that they showed positive increases among the groups.

The soccer has an important popularity for young people and children. In order for these children to be good athletes, it is recommended that their skills such as dribbling, passing and shooting should be developed within the trainer in accordance with a certain program (30, 45). In this study we conducted, dribbling, and shooting skills of all participants were measured. While a positive improvement was observed in the dribbling scores of the training group of our study, as in the other variables, in the comparison of pre-test and post-test, there was no statistically significant difference in the control group. Winarko (74), in a study he conducted on 40 soccer players, found that the plyometric training applied significantly increased the dribbling speed of the participants. In another study, Nurudin (43) states that in young soccer players aged 16-18 years, plyometric training increases the dribbling speed of the players and recommends that coaches use exercises such as box jumps to improve this

technical skill. In another study examining the effect of plyometric training on the technical actions of 26 pubertal soccer players during the season, a significant improvement was found in shooting performance (60). These studies presented in the literature indicate that plyometric applications have a positive effect on dribbling and shooting skills and are in parallel with the findings of the present study

The results we obtained in our study are generally compatible with the literature, although there are contrary opinions. The reason for the studies that are not in line with our results can be shown as the method of application, duration, intensity of the training, anthropometric characteristics and gender factors of the individuals who were trained. In line with all these results, it was determined that plyometric training applied in addition to soccer training positively affected some motoric and technical parameters of soccer players aged 13-15. In this context, it can be said that if plyometric studies are included in soccer training, it will be beneficial in the development of some performance values of the athletes.

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The Effects of 10-Week Reformer Exercises on Postural Impairment and Physical Parameters

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Abstract

In this study, the effects of 10-week reformer pilates exercises on possible scoliosis and some physical parameters were investigated. Twenty-three sendanter women with a mean age of 29.13 ± 4.47 years participated in the study. A reformer pilates exercise program consisting of 60-minute sessions for 10 weeks/3 days was applied to the participants. Possible scoliosis and sit-reach flexibility tests were performed by taking the measurements of the participants height, body weight, chest, waist, hip and left leg circumference. All tests and measurements were carried out before starting the 10-week exercise program and after the 10-week program was completed. The data obtained from the study were analyzed using the SPSS 15.0 package program. The normality distribution of the data was made by the shapiro-wilk test. All parameters showing normal distribution were tested with one-way anova. According to the results of the data, a statistically significant decreases was found between the pre-post test data of scoliosis, body weight, body mass index, body fat ratio, chest-waist-hip-right-left leg circumference ($p<0.05$). There was a significant increase in sit-reach test results ($p<0.05$). As a result, it is possible to talk about the positive effect of our exercise program on posture disorders and physical parameters, it can be applied in this age group.

Keywords: Reformer pilates, Scoliosis, Flexibility, Body mass index.

10 Haftalık Reformer Egzersizlerinin Postür Bozukluğu ve Fiziksel Parametreler Üzerine Etkileri

Özet

Bu çalışmada 10 haftalık reformer pilates egzersizlerinin olası skolyoz ve bazı fiziksel parametreler üzerindeki etkileri araştırıldı. Çalışmaya yaş ortalaması 29.13 ± 4.47 yıl olan 23 sedanter kadın katıldı. Katılımcılara 10 hafta/3 gün boyunca 60 dakikalık seanslardan oluşan reformer pilates egzersiz programı uygulandı. Katılımcıların boy, vücut ağırlığı, göğüs, bel, kalça ve sol bacak çevresi ölçümleri alınarak olası skolyoz ve otur-uzan esneklik testleri yapıldı. Tüm testler ve ölçümler 10 haftalık egzersiz programına başlamadan önce ve 10 haftalık program tamamlandıktan sonra yapıldı. Çalışmadan elde edilen veriler SPSS 15.0 paket programı kullanılarak analiz edilmiştir. Verilerin normallik dağılımı shapiro-wilk testi ile yapılmıştır. Normal dağılım gösteren tüm parametreler tek yönlü anova ile test edilmiştir. Verilerin sonuçlarına göre skolyoz, vücut ağırlığı, vücut kitle indeksi, vücut yağ oranı, göğüs-bel-kalça-sağ-sol bacak çevresi ön son test verileri arasında istatistiksel olarak anlamlı azalma bulundu ($p<0.05$). Otur-eriş testi sonuçlarında anlamlı bir artış vardı ($p<0.05$). Sonuç olarak egzersiz programımızın duruş bozukluklarına ve fiziksel parametrelere olumlu etkisinden bahsetmek mümkündür ve bu yaş grubunda uygulanabilir.

Anahtar Kelimeler: Reformer pilates, Skolyoz, Esneklik, Vücut kütle indeksi.

INTRODUCTION

Pilates; It consists of more than 500 exercises ranging from beginner level to advanced level performed with mat work or pilates devices. These devices are: cadillac, wunda chair, reformer, barrel, spine corrector (19). Reformer; It is a tool that works against spring resistance with a sliding carrier, bar and ropes. The most important feature of this tool is that the studies are against springs, not against gravity (23). The main purpose of exercising on the reformer is to strengthen the body, as well as to give the body the right flexibility within the framework of its current potential, to correct posture disorders, and to remain loyal to the principles of fluent movement at an appropriate pace by keeping the correct breathing in control during all these practices (16). Pilates exercises have been included in general sports activities and rehabilitation programs in recent years (2).

Scoliosis is generally defined as the lateral curvature of the spine in the frontal plane. It is a pathology that can lead to cardiopulmonary complications if it progresses as well as causing deformation in the body. The cause of 75-80% of scoliosis cases is unknown (idiopathic), it emerges unnoticed over time in a normal healthy child and progresses with skeletal development (12, 13). Pilates has gained a popular place in both fitness and rehabilitation, although there is little scientific evidence about the possible benefits of pilates exercises in achieving postural symmetry. It is thought that pilates exercises can be recommended to reduce physical fall risk factors, as it has been observed that it reduces thoracic kyphosis even slightly in healthy elderly people and that balance, mobility and postural stability improve significantly (20, 7).

The effects of pilates exercises on chronic pain, scoliosis treatment, osteoarthritis treatment, mobility in hospitalized patients, activity development, flexibility and body composition in gymnasts have been the subject of research in a limited number of studies (25, 26, 18). In the literature, there are studies showing that pilates exercises improve flexibility and body composition (6, 9, 11).

Body composition is a key element of a person's health and physical fitness profile. Obesity is a serious health problem that decreases life expectancy by increasing the risk of developing coronary artery diseases, hypertension, type II diabetes, pulmonary diseases that cause obstruction, osteoarthritis and some types of cancer. Too little fat is also a health risk because the body needs a certain amount of fat for normal physiological functions (21). Long-term lack of movement in the human body causes some functional abilities not to be used as desired, which leads to many diseases (obesity, blood pressure, diabetes, cardiovascular diseases, heart attack, etc.). It is known that exercise and an active lifestyle have a very important role in preventing such diseases. Exercise, which is likened to a drug that improves human health, is reported to improve body composition and physical fitness parameters when done regularly (8). In this study, the effect of reformer pilates exercise program on posture disorders and some physical parameters was examined. With the data we have obtained, it can be said that the exercise program that individuals can easily apply can be beneficial in protecting their posture health.

METHOD

23 healthy sedentary women (n = 23) with an average age of 29.13 ± 4.47 who attended the pilates center participated in the study voluntarily. Exercises were performed in a private gym under the supervision of expert trainers. All participants were informed about the study and a voluntary consent form was signed. The physical activity levels of the volunteers were evaluated by filling in the "International Physical Activity Questionnaire (IPAQ)" (17), and those with a metabolic equivalent (MET) <600 were included in the study.

Training Protocol

A reformer pilates exercise program was applied to the participants for 10 weeks / 3 days (Table 1). The exercises were carried out between 9:00 - 10:30 in the morning. Exercises started with 10 minutes of warm-up movements and finished with 10 minutes of cooling movements. Sessions lasted 60 minutes. All participants were verbally motivated during the exercise, and the movements were implemented fluently and accurately by expert trainers.

Scoliosis and sit-lie flexibility tests were performed by taking the measurements of the participants' height, body weight, chest, waist, hip and left leg. All tests and measurements were carried out by applying a full rest 1 day before the 10-week exercise program and 1 day after the 10

week exercise program. Participants were warned to avoid strenuous physical activity for 10 weeks.

Table 1. Reformer pilates exercise program

Exercises	Rep	Set	Intensity (%)	Time (minute)	Frequency (week)
Double Leg Press	10	3	%40-60	60	3
Feet in Starps	10	3	%40-60	60	3
Froggie	10	3	%40-60	60	3
Standing Abduction	10	3	%40-60	60	3
Bridge	10	3	%40-60	60	3
Chest Fly	10	3	%40-60	60	3
Pulling Straps	10	3	%40-60	60	3
Lunge Stretch	10	3	%40-60	60	3
Teaser	10	3	%40-60	60	3
The Half Swan	10	3	%40-60	60	3
The Gift	10	3	%40-60	60	3
Twist Stomach	10	3	%40-60	60	3

Anthropometric Measurements

In our study, body weight, fat percentage and body mass index (BMI) were measured with the Tanita-TBF 300 (Japan) device. Height was measured with Seca 769 (Hamburg, Germany). Chest, waist, hip and left leg measurements were recorded at 0.1 cm sensitivity level, while the participants were measured in a standing upright position using a tape measure.

Sit-Reach Flexibility Test

Participants sat with their knees extended in full extension and their heels firmly resting on the test box. They put their right hand on their left hand with their long fingers evenly and were asked to reach forward as far as they could stretch their hands along the measuring board without bending their knees, and wait 2 seconds at the last point where they reached out. The score (in centimeters) is the greatest distance the fingertips come into contact with across the toes. The measurement was repeated three times and the highest value was recorded (4).

Adam's Forward Bend Test

It is a fast and reliable test to diagnose scoliosis. The participant is first asked to stand upright and then lean forward 90 degrees from the waist. In the meantime, knees and toes should be straight, and there should be 10 cm distance between the feet. The palms of the hands should face each other, the arms should hang down loosely. The curvature of the spine was evaluated with the Scoliometer (Orthopedic Systems Inc., Hayward, CA). Suspected scoliosis is diagnosed if one side of the rib cage and / or lower back shows asymmetry. If this curvature is more than 10 degrees, it should be evaluated radiologically (24).

Statistical analysis

The data obtained from the study were analyzed using the SPSS 15.0 package program. The normality distribution of the data was made by the shapiro-wilk test. All parameters showing normal distribution were tested with one-way analysis of variance. All parameters of the participants were shown as minimum, maximum, mean and standard deviation. Significance value was accepted as $p < 0.05$.

RESULTS

Descriptive parameters of the participants are shown in Table 2.

Table 2. Descriptive parameters of participants

Parameters	Minimum	Maximum	Mean±SD
Age (years)	22.00	40.00	29.13±4.47
Height (cm)	155.00	177.00	165.21±5.59
Body weight (kg)	49.00	90.50	70.42±12.89
Body mass index (kg/cm^2)	19.60	32.00	25.66±3.98
Body fat (%)	17.40	43.30	33.24±7.22

The comparison of the pre and post test values of the 10-week reformer pilates exercises is shown in Table 3. According to this; There was a statistically significant

difference between the pre-post test data of scoliosis, body weight, body mass index, body fat ratio, sit-lie down, chest-waist-hip-right-left leg circumference measurements ($p < 0.05$).

Table 3. Comparison of the pre and post test values of the participants

Parameters	Pre Test		Post Test		p
	Min-Max	Mean±SD	Min-Max	Mean±SD	
BW (kg)	49-90.50	70.42±12.89	48-86.20	67.72±11.16	.01*
BMI (kg/cm²)	16.60-32	25.66±3.98	19-29	24.19±3.35	.00*
Body fat (%)	17.40-43.30	33.24±7.22	17.40-41	31.73±6.75	.00*
Sit-reach (cm)	7-23	13.82±4.01	10-33	21±5.94	.00*
Possible scoliosis (°)	5-9	6.91±1.41	2-7	4.30±1.18	.00*
Chest circumference (cm)	78-117	93.69±8.99	77-110	89.04±7.49	.00*
Waist circumference (cm)	71-104	82.86±8.03	62-88	74.95±7.40	.00*
Hip (cm)	91-129	105.86±10.44	85-118	99.82±8.40	.00*
Left leg (cm)	60-75	58.56±12.80	48-71	56.69±5.36	.00*
Right leg (cm)	59-76	58.12±11.52	49-71	56.55±6.21	.00*

*p<0.05; BW: Body weight, BMI: Body mass index.

DISCUSSION

It is stated that sedentary life, which has an important effect on human health, is at a higher level in women and causes a serious decrease in daily energy consumption with the advancement of age. In recent years, the effect of pilates, which is a very popular exercise approach especially among women, on postural disorder and some physical parameters has been investigated. In a study, the effects of pilates reformer exercises on thigh circumference measurement and hamstring flexibility in sedentary women were examined. As a result of an exercise program performed for 8 weeks/3 days, it has been found that it is beneficial by causing an increase in the flexibility of the posterior thigh muscles-hamstring (14). Another study examined the effects of pilates reformer exercises on body weight, muscle circumference, and flexibility. As a result of the exercise program applied to volunteering women for 6 weeks/2 days; It was reported that there was a decrease in thigh circumference, lower leg and body weight values, and an increase in upper arm, flexibility and hand grip strength values (15). Emery et al. (2010) investigated the effects of a 1-hour pilates training program twice a week on arm-body posture, strength and flexibility. He applied Pilates exercise to his studies. As a result of the study, it was reported that the Pilates training program was effective in improving abdominal strength, stabilizing the upper spine posture as well as the central posture (10). In another study, the effects of 8-week reformer pilates exercises applied to sedentary women on body composition and some physical fitness parameters were examined. As a result, it was determined that 8-week reformer pilates exercises significantly improved body fat percentage, circumference measurements (leg, hip, waist and chest regions) and physical fitness parameters (flexibility, balance, strength, body fat percentage) (1). Aslan (2019) examined the effect of 3 months/week 2 days, 90 minutes mat and reformer pilates training program on body composition. When the pre-test and post-test values were compared, it was found that there was a significant difference in chest circumference, waist circumference, abdominal circumference, hip circumference, right arm circumference, left arm circumference, right leg circumference, left leg circumference, body weight and BMI in both groups. (3). In another study, it was reported that 8-week reformer pilates exercises had a positive effect on flexibility and accelerated weight loss in women (22). Bastik and Cicioğlu (2020) reported that 8-week mat and reformer pilates exercises have positive effects on waist-hip ratios and body compositions of middle-aged sedentary women (5).

In this study, a statistically significant difference was found between the pre-post test data of scoliosis, body weight, body mass index, body fat ratio, flexibility, chest-waist-hip-right-left leg

circumference measurements of 10-week reformer pilates exercises. When our results are compared with the study results in the literature, it is possible to talk about the positive effect of pilates exercises on posture disorders and body composition.

RESULTS

Regular participation of the person in pilates exercises can be used effectively in the positive change of body composition, in the treatment of posture disorders, and in gaining flexibility. In Pilates exercises, the benefits of both mat work and different training models with pilates devices have been shown in the studies in the literature. In the exercise program we applied in this study, there was a significant decrease in scoliosis, body weight, body mass index, body fat ratio, chest-waist-hip-right-left leg circumference measurements, and a significant increase in the sit-reach test in sedentary women whose mean age was 29.13±4.47 years. has created. It is possible to say that the exercise program we applied had positive effects on the parameters we examined.

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Comparison Of Balance Performances Of Athletes From Different Sports Branches

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Abstract

This study aimed to investigate the comparison of the dynamic balance performances of basketball and football players. Ten male basketball players (age 17,60±0,69 years, height 1,90±0,04 cm, body weight 87.80±9.19 kg) and ten male football players (age 17,50±0,97 years, height 1,78±0,04 cm, body weight 74,50±12,04 kg) voluntarily participated in the study. Both groups's athletes continue to train actively in their sports clubs. Biodex Balance System (BBS, Biodex Medical Systems Inc., Shirley, NY) was used to test dynamic balance, and three index scores were recorded as an overall stability index (OSI), an anterior-posterior stability index (APSI), and a medial-lateral stability index (MLSI). Mann Whitney U Test, non-parametric tests, was used to compare both groups and the significance level was set at $p < 0.05$. Results. There were no significant differences between groups in terms of OSI and APSI but MLSI was significantly different in favor of the football group ($p<0.05$). It can be concluded that football players can exhibit better dynamic balance than basketball players.

Keywords: Balance, Football, Basketball, Dynamic.

INTRODUCTION

The ability to balance is defined as keeping the whole body in balance and maintaining the situation during and after the body's displacement (7). It is known that the balance skill, which forms the basis of performance and is at the center of conditioning skills, plays an important role in the successful display of many sports skills, in changing direction, stopping, starting, holding, moving the object, and maintaining a certain position of the body (2). The ability to balance is defined as keeping the whole body in balance and maintaining the situation during and after the body's displacement The human ability to maintain balance can be defined as a determining factor in the development of other motor systems (8).

Balance control is a complex motor skill that includes the integration of sensory inputs as well as the planning and implementation of flexible movement patterns (9). The integration of

information from the sensor systems provides information about the person's orientation in order to maintain posture control in the space that allows for regulatory reflexive movements (5). However, sensory inputs are not solely responsible for maintaining postural control. Postural stability depends on the integrity of the muscle mass, the efficiency of the systems within the central nervous system, and the complete neural pathways for motor control (10). Static and dynamic balance or postural stability is defined as the ability to control the body's center of gravity on the base of support (Woollacott et al., 1986)(17). Dynamic balance can be thought of as providing or maintaining balance in some movements or on unstable surfaces (11).

Sportive exercises challenge the body's postural control systems specific to the branch and improve postural adaptations in order to complete sportive movements effectively (14). Studies indicate that the improved balance in experienced athletes may be a result of repetitive exercises that affect motor responses or may result from training experiences (3). Balance performance plays a great role in sports branches and especially dynamic, is one of the most important motor skills (13). There are not enough studies comparing the dynamic equivalent of sports branches that require different skills (according to the author's knowledge). In this study, it was aimed to determine and compare the dynamic balance levels of two different sports branches with different structural features.

MATERIAL AND METHOD

Subjects

Twenty male athletes who were still actively doing sports and who agreed to participate in the study voluntarily participated in the study. The research group was selected from 10 basketball (age 17,60±0,69 years, height 1,90±0,04 cm, body weight 87.80±9.19 kg) and 10 football athletes (age 17,50±0,97 years, height 1,78±0,04 cm, body weight 74,50±12,04 kg). Participants were informed about the aim and the risks of the study. All participants were provided with written informed consent. The study was approved by the local ethics committee (Protocol number 70, 19.10.2020, Ethics Committee of Selcuk University, Faculty of Sports Science, Konya, Turkey).

Experimental Design

Participants were taken to the sports science faculty laboratory at 10.00 am. Participants were warned not to participate in any exercise in the past 48 hours until the end of the test section. Subjects were applied to standard warm-up including stretching movements. Following that, participants' dynamic balances were taken by Biodex Balance System (BBS, Biodex Medical Systems Inc., Shirley, NY).

Dynamic Balance Testing

The participant's dynamic balances were measured with open eyes. Two tests were performed on each participant to get used to the measurement instrument before the measurement. Then dynamic balance measurement was made for the dominant leg. Subjects were subjected to a balance test on one foot by holding their hands on the shoulders of the crossed position after standing on the BBS's mobile platform. The level of difficulty of the measuring instrument was set to "Level 4" for the OE condition. The other leg did not touch the ground and participants were not allowed to look at the BSS monitor. The test duration was 20 seconds and the participants were asked to keep their balance as much as possible during the test. 3 separate balance scores were obtained after the automatically completed test [Overall Stability Index (OSI), Anterior-Posterior Index (APSI), Medio-Lateral Index (MLSI)]. Higher balance scores mean worse balance performance (15).

Statistical Analysis

The Shapiro-Wilk test is used to check a data set for normality to make parametric tests applicable. Balance performance data from the dynamic balance measurement were analyzed with the Mann Whitney U Test (basketball vs. football). All statistical tests were performed using the software package SPSS version 24.0 (SPSS Inc., Chicago, IL, USA). An alpha value of <0.05 was considered to be statistically significant.

RESULTS

Table.1. Comparison of Basketball and Football Player's Dynamic Balance Performance

Parameters	Groups	Mean	Std. Deviation	P value
Age	Basketball	17,60	0,69	0,46
	Football	17,50	0,97	
Height (m)	Basketball	1,90	0,04	***0,00**
	Football	1,78	0,04	
Body weight (kg)	Basketball	87,80	9,19	***0,01**
	Football	74,50	12,04	
OSI (score)	Basketball	3,98	0,65	0,08
	Football	3,27	1,51	
APSI (score)	Basketball	2,82	0,54	0,21
	Football	2,49	1,24	
MLSI (score)	Basketball	2,11	0,48	***0,00**
	Football	1,47	0,44	

OSI= Overall Stability Index; APSI= Anterior–Posterior Stability Index; MLSI= medial–lateral stability index. * Significant differences ($P < 0.05$).

When table 2 is examined, it is seen that the basketball group is statistically significantly higher in terms of height and body weight but not in age. While the OSI and APSI values did not differ significantly between the two groups, the football group was found to be significantly better in MLSI. Although there is no statistically significant difference, the values of the football group seem to be better in numerical APSI and OSI values.

DISCUSSION

Dynamic balance is among the factors limiting performance in some branches, and rapid adjustment of sport-specific balance is expressed as an important skill. Dynamic balance is defined as the ability to maintain or regain position on an unstable surface (16). In branches such as football and basketball, the type of branch-specific muscle activity is effective on balance performance (18). Therefore, in this study, it was aimed to determine and compare the dynamic balance levels of two different sports branches with different structural features. As a result of the study, while there was no significant difference between the groups in OSI and APSI balance parameters, a significant difference was found in favor of the football group in the MLSI parameter.

According to Akgöl (1), Berger et al.; It has been stated that the human body can be likened to an inverted pendulum and because the body's center of gravity can be lowered into the support surface, therefore, the balance of short individuals is more difficult to maintain. In addition, Akgöl (1) stated that taller athletes had better balance performance in his study. In this study, it was found that although the height of the basketball group was statistically higher, their balance performance was more unsuccessful than the football group. These results of the study contradict with Akgöl (1). On the other hand, Erkmen et al. (8) stated in their study that as the height increases, the dominant and nondominant static balance scores increase, that is, the short athletes are more successful in maintaining their balance. These results are similar to the results of Era et al. (6). In addition, it was determined that as the bodyweight increased, the static balance scores also increased, and the increase in body weight affected the balance performance negatively. In this study, it was found that the body weights of the basketball group were statistically higher than the football players. This information supports our study results.

Kariyawasam et al. (12) compared the balance parameters of basketball and football players in their study and stated that the balance performance of basketball players was better than football players in their study. While the balance parameter used in the study of Kariyawasam et al. (12) was static balance, it was the dynamic balance parameter used in this study, and the difference is thought to be due to this. Bressel et al. (4) compared the dynamic balance performance of basketball players and football players in their study and it was found that the dynamic balance performance of the football players was statistically higher. It has been emphasized that the test is closer to football because the elements such as passing and shooting are frequently performed on one foot in the nature of the football game, and the dynamic balance performance of the football players was, therefore, could be better than the basketball players. However, no direct evidence supports this claim (4). Similarly, in the presented study, football players showed better dynamic balance performance than basketball players.

CONCLUSION

It can conclude that basketball players displayed inferior dynamic balance to soccer players.

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Comparison of different recovery methods after an acute training session on aspartate aminotransferase activity and some hematological indicators of blood in women runners

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Abstract

Introduction: The aim of this study was comparison of different recovery methods after an acute training session on Aspartate Aminotransferase (AST) activity and some hematological indicators of blood in women runners. The present study was applied and quasi-experimental. The statistical population of this study consisted of semi-professional female athletes in athletics (runners) in Tehran. Sampling was done by simple random sampling, so that after informing and inviting interested people and passing the preliminary stages, 30 people were selected from the runners as a research sample and these people were randomly divided into 3 groups of 10 person: group active running recycling, passive recycling group and sports massage were included. They ran 200 meters (short distances) on the track after a 2-hour training session of 25 seconds. In this study, one-way analysis of variance was used. The results of this study showed that there was no significant difference between the three types of recycling methods (inactive, double soft, massage) in changes in the factors of AST, iron. However, there was a significant difference between the three types of recycling methods (inactive, double soft, massage) in hematocrit changes. The recycling method can be used after the athletics competition.

Keywords: Aspartate Aminotransferase (AST), women runners, recovery, intense activity, blood.

Kadın koşucularda aspartat aminotransferaz aktivitesi ve kanın bazı hematolojik göstergeleri üzerine akut bir antrenman seansından sonra farklı iyileşme yöntemlerinin karşılaştırılması

Özet

Bu çalışmanın amacı, kadın koşucuların aspartat aminotransferaz aktivitesi ve bazı hematolojik parametreler üzerine akut bir antrenman seansından sonra farklı toparlanma yöntemlerinin etkisini değerlendirmektir. Bu çalışma uygulamalı ve yarı deneysel olarak yapılmıştır. Bu çalışmanın istatistiksel popülasyonu, Tahran'daki atletizmde (koşucular) yarı profesyonel kadın sporculardan oluşuyordu. Örnekleme basit tesadüfi örnekleme ile yapılmış olup, ilgili kişileri bilgilendirip davet ettikten ve ön aşamaları geçtikten sonra koşucular arasından araştırma örneklemi olarak 30 kişi seçilmiş ve bu kişiler rastgele 10'arlı 3 gruba ayrılmıştır: grup Aktif koşu geri dönüşümü, pasif geri dönüşüm grubu ve spor masajı dahil edilmiştir. 25 saniye süren 2 saatlik antrenmanın ardından atletizmde 200 metre mesafe kat ettiler. Bu çalışmada tek yönlü varyans analizi kullanılmıştır. Bu çalışmanın sonuçları, aspartat aminotransferaz, demir faktörlerindeki değişikliklerde üç tür geri dönüşüm yöntemi (inaktif, çift yumuşak, masaj) arasında önemli bir fark olmadığını göstermiştir. Ancak hematokrit değişikliklerinde üç tip geri dönüşüm yöntemi (inaktif, çift yumuşak, masaj) arasında önemli bir fark vardı. Geri dönüşüm yöntemi atletizm yarışmasından sonra kullanılabilir.

Anahtar Kelimeler: Aldolaz enzimi, kadın koşucular, iyileşme, yoğun aktivite, kan.

INTRODUCTION

Athletes are exposed to cellular damage by hard practicing and races, causing increasing amount of metabolic waste (1). Some changes occur in muscle tissues by becoming tired and perhaps body can't have the opportunity to come back in exercising periods to initial condition and it will decrease the efficiency (2, 3). Noticing to the recovery periods and faster coming back to the common condition have special importance because small physical damages in physical activities and even in some matches that has too much foot hits are unavoidable (4). Coming back into inadequate condition after one practice session can cause unacceptable action on next session and long-time repeated unsuitable recoveries can cause tiredness and finally make an over training situation (5-7).

In the types of recoveries like active recovery, inactive recovery and massage were always noticed (1). Active recovery and massage mostly had been noticed by coaches and athletes in types of after activity recoveries (8). Active recovery causes increase of blood flow and concludes faster initial condition come back (9-10). Much research has been done on the benefits of active recovery and several reasons have been stated in this regard, including facilitating muscle blood flow, helping to excrete lactic acid, facilitating oxygenation of active tissues, and so on (11). A lot of researchers reported the helpful effects of active recovery on tiredness and athletic actions in comparison with inactive recovery (12-13). On the other hand, massage has vast healing and relaxing usage in matches for physical readiness before match, between two matches and coming back to initial condition after match (14). Some of the best benefits of sports massage are the positive effects on sport action (15, 2), reducing the time of coming back to initial condition after activity (16), reducing the muscle tension (17) and restoring the energy resources by increasing blood flow (18) causing improvement for the next match. So, the type of recovery could affect on the athletes' success by reducing indicators of cellular damage (13).

Considering to that the liver is one of the main body organs that has special importance in adjusting hormone functions and metabolism during the rest, exercising and coming back to initial condition using different enzymes, one of the most used diagnostic enzymes is "Aspartate Aminotransferase" (AST) that increases after exercising and muscular damage (21, 22). Various factors, including exercise, affect the secretion of liver enzymes (AST) in the body, and the response to each depends on the intensity and duration of exercise (25). This enzyme exists in most body cells especially in heart and liver cells and in less amounts in kidneys and muscles. This enzyme is in group of Transaminase enzymes. AST catalyzes the interconversion of aspartate and α-ketoglutarate to oxaloacetate and glutamate. Inasmuch as the cellular pathogenesis indicators begin to producing and secreting abnormally, if this problem (increasing cellular damaging indicators) stays at high amount after exercising or match, it affects the athlete's efficiency. One of the symptoms of fatigue is the presence of AST enzyme in liver enzymes. These information's mean that choosing and using the correct recovery form probably can have positive effects in this case. Fatigue is due to changes that occur first in the muscle and then in the chemical factors in the blood serum of athletes. These changes are due to the production of waste products that are the end product of energy production machines. Performance is better, especially during short periods of high-intensity fatigue training, which usually limits the athlete's performance and delays the desired result..

According to the theoretical foundations, the effects of active recovery on inactive recovery are proved but there are some questions: How to do active/inactive recovery? In which indexes should we check the effects? And on which athletes should we apply the exercise protocols? In Saensirisuwan et al., research in 1998 (28) on young male boxers with an increasing activity time until they get exhausted, results meaningful increasing amount of AST enzyme comparing to the controlled group. Ajami Nezhad et al., in 2014 (21) have found that the amount of Hemoglobin rises after doing aerobic exercises for a while but other liver indexes including AST doesn't change meaningfully comparing to the controlled team. Shojaaldin et al., in 2017 (29) have found that there's no meaningfully statistic differences between active recovery and walking under water on muscular damages like AST and creatine kinase of football players after a set of matches. Inasmuch as

there's no information about comparing different ways of recovery after on session of hard exercise on the activity of the female runners' AST enzyme, in this research the indexes of cellular and tissue pathogenesis like hematological indexes (Iron, serum, Hematocrit, WBC, RBC and Hemoglobin) and AST will be examined.

Materials and Methods

Study Participants

This is an applied and semi empirical research which has been done in steps. The statistical community of research includes female runners of Tehran. 30 semi-professional women were chosen on their own will. The reason for using semi-professional runners can be pointed to the relative fitness of the body, lower body resistance to fatigue and inflammatory indicators of the liver compared to professional runners.

Demographic character forms (physical activity and sport history, health assessment and medical history) and standard valid laboratory equipment like fridge, centrifuge, and Elisa (to measure biochemical blood indexes) are used to collect the information's. The research is semi-empirical that has been done in field-experimental way via pre-test-post-test plan. Before doing the plan, the anthropometric and demographic data have been measured and recorded using assessment tools.

Study Intervention

Due to limited access to professional runners (having a contract with professional clubs), among the semi-professional female runners, 30 people in the range of 18-24 (average: 21.34±2.32) years old and 161-175 (average: 169.126±4.112) centimeters and 54-68 (average: 62.113 ± 4.217) kilograms have been chosen. They randomly put into 3 teams (running active recovery, massage inactive recovery and sitting inactive recovery) depend on age range, diet controlling (not being in any special diet), health history (not having any special disease) and physical activity history. First of all, it has been explained that they must have fast around 10-12 hours. All of the runners were doing their special exercises for 2-3 hours 3 days a week. The people participated in a 120 min special track and field session with 85% of maximum capacity heart rate before the official match. The exercise schedule has been done; includes 15 min warm up, 45 min special running exercise, 5 min hard 200 meters (short distances) running exercise with 80-85% of maximum capacity heart rate (30). The active recovery group ran slowly on the treadmill for 20 minutes at 55% of maximum heart rate. AST enzyme is used to evaluate the indicators of muscle damage that indicate fatigue (31). In the following, the pre-test measuring and blood sampling has been done and the samples has been sent to laboratory to test the intended indexes. then, on the match day, all 3 teams have joined and immediately after the match, sampling has been done and the teams begin to do their special recoveries that had been chosen before and immediately, the third sampling has been done right after the recoveries.

Statistical Analysis

using the Kalmogroph-Smirnoff test for checking normality of data, one-way analyze of variance for checking differences between averages to check the changes between groups in meaningful (P=0.05) level using the SPSS22 software package the informations have been analyzed.

Results

In table 1, the pre-test and post-test and after recovery data are reported.

Table 1. pre-test post-test and recovery periods of components.

Variable	Measuring time	Groups		
		Rest group	Slow Running Group	Massage group
White blood cell	Before practice	6530±1137	5930± 771	6890± 1312
	After practice	8660± 982	8310±662	9490± 1236
	After recovery	6190±1525	6490/± 593	7400±1401
Red blood cell	Before practice	5.73±0.61	5.73±0.67	5.19±0.82
	After practice	6.34±0.75	5.89±0.69	5.96±1.05
	After recovery	6.19±0.63	5.70±0.63	5.67±0.90
Hemoglobin	Before practice	15.21±2.00	15.54±2.07	13.85±2.22
	After practice	17.45±2.46	18.88±2.18	16.41±2.95
	After recovery	16.70±2.49	15.69±2.11	15.25±2.47
blood Iron	Before practice	98.70±44.97	122.30±48.75	118.90±52.43
	After practice	117430±31.75	137.60±34.84	146.20±45.73
	After recovery	115.10±34.50	124.20±34.62	142.30±45.67
Hematocrit	Before practice	46.23±5.49	46.68±5.94	41.63±6.68
	After practice	53.22±6.25	47.97±6.10	49.31±8.86
	After recovery	50.80±6.61	47.36±5.90	45.91±7.45
ASD	Before practice	26.80±7.25	26.61±7.03	26.17±7.22
	After practice	31.87±6.68	32.17±6.46	31.93±6.91
	After recovery	27.81±6.89	29.32±6.02	29.22±6.29

Table 2. one-way analysis of variance results in post-test

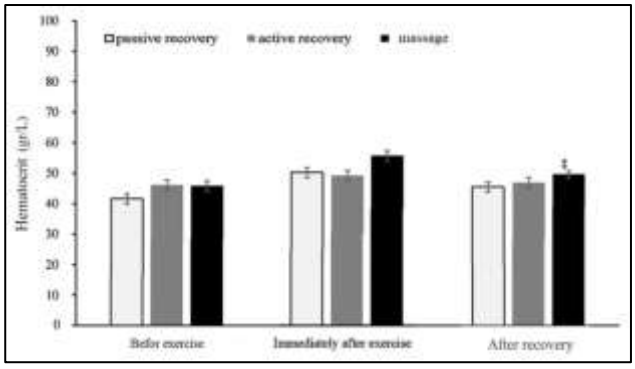
Variable	Statistical index	SS	DF	MS	F	P
White blood cell	Between groups	7646000	2	3673000	3.75	0.03
	Within groups	26400000	27	977851		
	Total	33750000	29			
Red blood cell	Between groups	1.17	2	0.58	0.92	0.41
	Within groups	17.22	27	0.63		
	Total	18.39	29			
Hemoglobin	Between groups	12.75	2	74.41	1.44	0.25
	Within groups	176.67	27	51.66		
	Total	189.42	29			
Hematocrit	Between groups	148.82	2	73.47	1.41	0.27
	Within groups	1394.98	27	52.68		
	Total	1543.80	29			
Blood Iron	Between groups	4371.46	2	2185.73	1.52	0.23
	Within groups	38830.40	27	1438.16		
	Total	43201.86	29			
ASD	Between groups	70.20	2	35.10	0.21	0.80
	Within groups	4418.60	27	163.65		
	Total	4488.80	29			

Considering to that there was no meaningful changes in amount of Hematocrit (F=1.44, P=0.25), Iron (F=1.52, P=0.23), WBC (F=0.92, P=0.41), Hemoglobin (F=0.97, P=0.39) and AST (F=0.21, P=0.80) of all 3 teams but there was meaningful changes in WBC (F=3.75, P=0.03) in post-test.

Table 3. *one-way analysis of variance results to check 3 types of recovery effects on components*

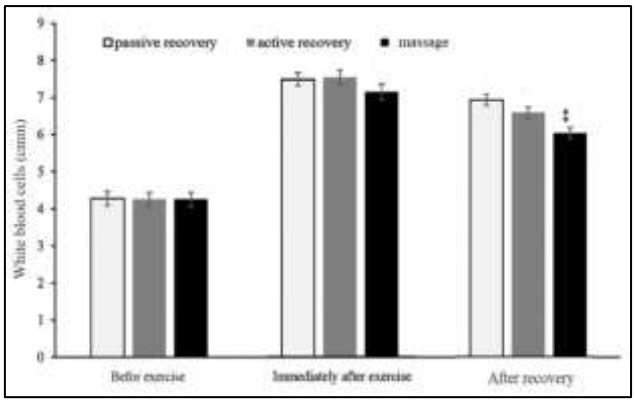
Variable	Statistical index	SS	DF	MS	F	P
White blood cell	Between groups	7348382	2	3674191	3.75	0.04
	Within groups	26390000	27	977358		
	Total	33740000	29			
Red blood cell	Between groups	0.12	2	0.06	0.77	0.47
	Within groups	2.21	27	0.08		
	Total	2.33	29			
Hemoglobin	Between groups	4.74	2	2.37	4.52	0.02
	Within groups	14.15	27	0.52		
	Total	18.90	29			
Hematocrit	Between groups	40.06	2	20.03	4.10	0.02
	Within groups	131.72	27	4.87		
	Total	171.79	29			
Blood Iron	Between groups	720.06	2	360.03	1.54	0.23
	Within groups	6281.40	27	232.64		
	Total	7001.46	29			
ASD	Between groups	27.46	2	13.73	1.24	0.30
	Within groups	297.50	27	11.01		
	Total	324.96	29			

As you can see in table 3 that the differences of all 3 teams between post-test and recovery have been calculated and then the averages have been checked by one-way ANOVA. Some meaningful differences have been seen between the effects of 3 groups on Hematocrit (F=4.10, P=0.02), WBC (F=3.70, P=0.04) and Hemoglobin (F=4.52, P=0.02) of the semi-professional female runners.



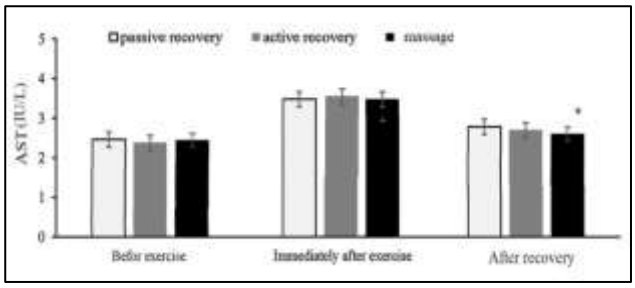
‡ There's meaningful difference between massage and other types of recovery.

Chart 1. the changes of Hematocrit comparison between 3 different types of recovery



‡ There's meaningful difference between massage and other types of recovery.

Chart 2. the changes of WBC comparison between 3 different types of recovery



Meaningful difference with pre-test (P>0.05)

Chart 3. the changes of AST comparison between 3 different types of recovery

The LSD test results have shown that there are meaningful differences between the massage recovery team with soft running and passive rest in amount of Hematocrit (P=0.009), WBC (P=0.01) and Hemoglobin (P=0.01). No difference has been seen in changes of Iron (F=1.54, P=0.25), RBC (F=0.77, P=0.47) and AST (F=0.10 and P=0.54) of semi-professional female runners.

Discussion

The research has been done to compare the effects of different types of recovery on AST and some other hematological indexes. The results have shown that the amount of AST reduces after implementing the protocols which is not a meaningful change and it is congruent to Kinoshita and Fealy (29, 32, 33); They have reported that there's no meaningful increase of liver enzymes after the exercise and on the other hand, there are meaningful differences in Hematocrit, WBC, Hemoglobin but it wasn't congruent to Saengsirisuwan et al., (28) results. Perhaps it could be attributed to athletes' readiness and gender differences and the sports (Boxing, Track and Field). The capability of athlete to do the daily exercises depends on how fast he/she can comeback ti initial condition by replacing the body liquids, storing energy and healing damaged muscle tissues (34). Recovery after a long-time activity has a complicated process but it can be in 3 levels. First level called fast level happens in first 30 min after exercising. Next one is the mid-term level that lasts about 2 hours after exercise, and in the end, it is the long-term level that happens in last 20 hours before next session (35). Many body organs are under the pressure during a match or a session of exercise like the liver, muscular system, active muscles, nervous system, hormone system, muscular glycogen and triglyceride and energy system. It is obvious that the recovery during or after exercising has great effects on restoring the lost amount of energy, blood pH, muscles, body temperature and etc (36). By the way, Baraghmadi and Abdollahpour Darvishani (37) have reported that optimizing the initial condition comeback after exercise and match is helpful for exercise or next performance of elite athletes or competitive athletes for a period of time, according to their research in 2020.

There are some differences between 3 types of massage, passive rest and soft running recovery after running exercises of semi-professional female runners in some hematological indexes. The result of LSD test has shown there are meaningful differences between the soft running team and passive rest in blood hemoglobin (P=0.009) that is congruent to Ajaminejad et al., 2014 results (21). Also, there is no meaningful difference between 3 types of recovery in changes of AST and Iron and RBC. The results of Davis's research in 2020 (38) shows that massage isn't directly effective on recovery and athletes' activities. Malekzade in 2013 (1) has represented that the amount of active hybrid recovery effects and sport massage on tiredness indicators, understanding tiredness and feeling more strength are other types of recovery. (13). Also, the results of Nobahar and Mirdar in 2012 (39) indicates that the amount of AST has meaningfully increased after day 1, 4 and 7 of exercise and after 24 hours of rest has shown an impressive decrease and only showed meaningfully difference after exercise day. The researchers have concluded that not paying attention to the appropriate recovery time for work hardness, could maybe lead to reducing the efficiency and muscular damage.

The results were inconsistent to many other research results such as Best (40) in 2008 that is maybe because of the other interfering factors that we could point to the athlete's readiness, recovery time and etc. the results of Best have shown that sport massage is meaningfully effective for restoring skeletal muscle after a hard time exercise. Monedero and Donne have represented in 2000 that they compared the level of initial condition comeback in 4 conditions including passive rest, combination massage, active rest with massage and active rest. They conclude that the combination of massage and active recovery reduces the execution time meaningfully. Also, active recovery and hybrid recovery causes the drainage of the venous blood but none of them effects the heart rate (41). Noticing to the fact that the physical activities could make tissue and cellular damages and these damages could increase the membrane permeability and releasing the cell enzymes (42), a lot of methods could be given such as stretching moves,

massage, ice compress, anti-inflammatory drugs, anti-oxidants, immersion in cold and hot water and recovery using electrical stimulation to compensate those damages (43, 5). The athletes believe that the recoveries and massages have positive effects on their activities and reduce the initial condition comeback time after tiredness results the improving in the next performance in next match (44). Some of the massage effects -without noticing to subject's health condition- are increasing the oxygenation and feeding cells and tissues, releasing endorphin, physical and mental relaxation and feeling becoming better, relaxation and perfection (45).

Conclusion

Noticing to the results, there are meaningful differences between 3 types of recovery in hematocrit, WBC and hemoglobin, using active soft running recovery after track and field matches is suggested. Also noticing to the research results, there's no meaningful difference between 3 types of recovery in Iron, RBC and AST. So, using all 3 recoveries is suggested. In the end, according to the results, performing different methods causes improving the recovery process in athletes. By the way the certain opinion needs more researches on the subject.

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Examining the Relationship Between Foot Length and Ankle Muscle Strength in Swimmers

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Abstract

The aim of this study is to examine the relationship between foot length and isokinetic muscle strength of the ankle plantar and dorsiflexor muscles in swimmers. A total of 53 competitive swimmers, 18 women and 35 men, were included in the study. The athletes' foot length was assessed by calipers, and their ankle plantar and dorsiflexor muscle strength was evaluated with an isokinetic dynamometer. Spearman correlation analysis was used to examine the relationship between athletes' foot length and ankle isokinetic muscle strength. There was a moderate relationship between the foot length of the athletes and the isokinetic muscle strength of the ankle plantar and dorsiflexor muscles at an angular velocity of 60 ° / sec ($r = 450/347$; $p < 0.05$); there was a moderate correlation between the isokinetic strength of the ankle plantar flexor muscles at 180 ° / sec angular velocity ($r = 403$; $p < 0.05$); It was determined that there was no relationship between the isokinetic muscle strength of the ankle dorsi flexor muscles at an angular velocity of 180 ° / sec ($r: 0.145$; $p > 0.05$). As a result of our study, it was determined that the strength of the ankle plantar and dorsi flexor muscles increased as the foot length increased in swimmers. Based on this result, the idea that foot length can affect ankle muscle strength in swimmers has emerged. However, some studies are needed to examine the effect of this relationship on swimming performance.

Key words: Anthropometry, Isokinetic, Sports, Athlete.

Özet

Yüzücülerde Ayak Boyu ile Ayak Bileği Kas Kuvveti Arasındaki İlişkinin İncelenmesi

Bu çalışmanın amacı yüzücülerde ayak boyu ile ayak bileği plantar ve dorsifleksör kaslarının izokinetik kas kuvveti arasındaki ilişkinin incelenmesidir. Çalışmaya 18 kadın 35 erkek olmak üzere toplam 53 müsabık yüzücü dahil edildi. Sporcuların ayak boyu kaliper ile, ayak bileği plantar ve dorsifleksör kas kuvveti izokinetik dinamometre ile değerlendirildi. Sporcuların ayak uzunluğu ile ayak bileği izokinetik kas kuvveti arasındaki ilişkiyi incelemek amacıyla Spearman korelasyon analizi kullanıldı. Anlamlılık düzeyi $p<0,05$ olarak alındı. Sporcuların ayak boyu ile ayak bileği plantar ve dorsifleksör kaslarının 60°/sn açısal hızdaki izokinetik kas kuvveti arasında orta derecede ilişki olduğu ($r=450/347$; $p<0,05$); ayak bileği plantar fleksör kaslarının 180°/sn açısal hızdaki izokinetik kuvveti arasında orta derecede ilişki olduğu ($r=403$; $p<0,05$); ayak bileği dorsi fleksör kaslarının 180°/sn açısal hızdaki izokinetik kas kuvveti arasında ilişki olmadığı belirlendi ($r:0,145$; $p>0,05$). Çalışmamız sonucunda yüzücülerde ayak uzunluğu arttıkça ayak bileği plantar ve dorsi fleksör kasların kuvvetinin arttığı belirlendi. Bu sonuca dayanarak yüzücülerde ayak uzunluğunun ayak bileği kas kuvvetini etkileyebileceği fikri ortaya çıkmıştır, ancak bu ilişkinin yüzme performansına etkisini araştıracak çalışmalara ihtiyaç vardır.

Anahtar kelimeler: Antropometri, İzokinetik, Spor, Sporcu.

INTRODUCTION

Swimming; It is a branch of sports that includes many factors such as physical strength, technical skills, coordination, rhythm and correct technique (28). Swimming performance in swimmers is associated with various anthropometric, biomechanical and physical components (20). Swimming performance depends on force generation, and therefore strength and speed parameters are important in training a swimmer (14). Stronger athletes perform better in competitions (9, 33, 35). Motoric features such as muscular flexibility and performance, sensory features such as proprioception, physical and anthropometric features such as range of motion and extremity length are among the factors affecting muscle strength (8, 15, 20, 30, 33). For this reason, the factors affecting muscle strength, muscle strength, and the relationship between muscle strength and swimming performance in swimmers have been frequently studied (6, 23, 25).

Anthropometry is a field of science that generally size and shape the physical properties of the human body with various measurement methods and make a classification by revealing the physical structure features (1, 8, 30). On the other hand, sports anthropometry determines the physical characteristics of athletes and examines both the general and special conditions of their physical development specific to the sport branch (11). Structural and anthropometric features play a role in sports success (20). It has been reported that successful athletes with degrees in swimming generally have a tall body type with long extremities and broad shoulders (13). In addition, it is stated that the anthropometric effect should be taken into account when comparing sprint performance and skill description in swimmers, since anthropometric differences have an acceptable effect on sprint performance in young swimmers (26, 34).

It is accepted that muscle strength positively affects sports performance in all sports branches (21). The relationship between anthropometric parameters that will be able to affect muscle strength and muscle strength, and the relationship of these parameters with sports performance has been investigated in many studies (4, 13, 18, 22, 27). It has been reported that the anthropometric properties of the extremities in swimmers affect sports performance (4, 29, 32, 35) and there is a relationship between lower-upper extremity muscle strength and swimming performance (17). In addition, foot length is an anthropometric parameter that is frequently evaluated due to its possible effect on performance in swimmers (4, 35). In the light of this information, it is thought that anthropometric properties can affect muscle strength, and in this case sports performance will also be affected. Although there are some studies in the literature examining the relationship between some anthropometric features and sports performance (12, 24, 26, 29), studies examining the relationship between foot length and ankle circumference muscle strength in swimmers are limited. In addition, there is no study investigating the relationship between foot length and ankle isokinetic muscle strength in swimmers. Therefore, the aim of our study is to examine the relationship between foot length and the isokinetic muscle strength of the ankle plantar and dorsi flexor muscles in swimmers.

MATERIAL METHOD

The study was conducted in the Sports Training Health and Research Center. Necessary information was given to the athletes participating in the study about the tests, and verbal and written consent was obtained from the athletes and the legal representatives of the athletes under the age of 18. The study was conducted in accordance with the 2008 Helsinki Declaration Principles, and the necessary approval was obtained from the University Social and Human Sciences Ethics Committee (2019/328/52).

Inclusion criteria in the study; Being a contestant swimmer, not having any acute or chronic injury, and volunteering to participate in the study. Having any history of injury or injury related to the ankle and having a history of surgery related to the lower extremity are the criteria for exclusion from the study.

The study was carried out with both lower limbs of a total of 53 swimmers, 18 women and 35 men. It was determined that the average age of the athletes included in the study was 16.13 ± 1.57 years, the average body weight was 63.02 ± 8.04 kg, the average height was 1.72 ± 0.08 m and the average body mass index was 21.27 ± 1.74. kg / m2 (Table 1).

Table 1. Demographic information of the athletes

N: 53	X ± SD	Minimum	Maximum
Age (year)	16,13±1,57	14	21
Body weight (kg)	63,02±8,04	47,4	80,8
Height (m)	1,72±0,08	1,57	1,93
BMI (kg/m²)	21,27±1,74	17	25,01

BMI: Body mass index, **X ± SD:** arithmetic mean ± standard deviation

After the demographic information such as date of birth, height and body weight of the athletes are obtained, ankle anthropometry evaluation is performed with a caliper on the first day; On the second day, the isokinetic muscle strength evaluation of the ankle plantar and dorsi flexor muscles was performed with the IsoMed 2000 isokinetic dynamometer.

Foot Length Assessment: Foot length assessment was measured with calipers, standing while the feet were bare and transferring equal weight to both feet. As a result of the measurement, the distance between the longest toes of both feet and the heel was recorded in cm.

Ankle Muscle Strength Measurement: Isokinetic muscle strength of the ankle plantar and dorsiflexor muscles was measured with the IsoMed 2000 (D. & R. Ferstl GmbH, Hemau, Germany) isokinetic dynamometer. Before starting the measurement of muscle strength, the athletes were exercised with a reciprocal arm leg ergometer at 60-70 rpm for 10 minutes as a warm-up exercise (SFITCI Systems Inc. Oklahoma, USA). The measurement was made in the supine position and during the measurement, the athletes were stabilized with stabilization bands over the waist, proximal femur and tibia. The Pivot point is set to be the lateral malleolus of the ankle. Three repetitive warm-up and understanding movements were performed before each movement and speed. During the measurements, athletes were verbally encouraged. The isokinetic strength of the dominant and non-dominant ankle plantar and dorsiflexor muscles was measured as concentric-concentric with 5 repetitions at an angular velocity of 60 ° / sec and 15 repetitions at an angular velocity of 180 ° / sec. As a result of the measurement; Peak force [peak torque (PT)] and relative peak force (PT / kg) values of the ankle plantar and dorsiflexor muscles were obtained separately at 60 ° / sec and 180 ° / sec angular velocities.

Statistical analysis

Statistics of the study were made using SPSS 20.0 program. Descriptive statistics of all variables were determined. Analytical methods (Kolmogorov-Smirnov / Shapiro-Wilk's test) were used to define whether the variables were normally distributed or not. It was determined that the variables did not show a normal distribution, and Spearman correlation analysis was used to examine the relationship between variables. Variables were represented as arithmetic mean ± standard deviation (X ± SD) and minimum-maximum values. Statistical error level was determined as $p < 0.05$.

RESULTS

The isokinetic strength data of the foot length, ankle plantar and dorsiflexor muscles of the athletes are shown in Table 2.

Table 2. Foot length, ankle isokinetic muscle strength data of athletes

N: 106			X ± SD	Minimum	Maximum
Foot length (cm)			23,02±3,41	8,8	28,2
Isokinetic muscle strength	**60°/ sec**	**PF (PT) (N)**	112,49±24,30	66,1	167,4
		PF (PT/W) (N/kg)	1,78±0,32	1,17	2,74
		DF (PT) (N)	25,52±5,99	8,4	37,3
		DF (PT/W) (N/kg)	0,40±0,07	0,17	0,58
	18°/ sec	**PF (PT) (N)**	76,59±16,79	33,9	114,4
		PF (PT/W) (N/kg)	1,21±0,23	0,61	1,8
		DF (PT) (N)	9,56±9,63	0,21	25,2
		DF (PT/W) (N/kg)	10,05±10,08	0,17	26,1

PT: Peak torque, PT / W: Relative peak torque, PF: Plantar Flexor, DF: Dorsi Flexor, X ± SD: arithmetic mean ± standard deviation, N: Newton.

It was determined that there was a moderate relationship between the foot length of the athletes and the isokinetic muscle strength of the ankle plantar and dorsiflexor muscles at an angular velocity of 60 ° / sec ($r = 450/347$; $p < 0.05$); there was a moderate correlation between the isokinetic strength of the ankle plantar flexor muscles at an angular velocity of 180 ° / sec ($r = 403$; $p < 0.05$); there was no relationship between the isokinetic muscle strength of the ankle dorsi flexor muscles at an angular velocity of 180 ° / sec ($r: 0.145$; $p > 0.05$) (Table 3).

Table 3. Relationship Between Foot Length and Ankle Muscle Strength

N=106			Foot Length cm)	
			r	p
Isokinetic muscle strength	60°/sec	PF (PT)	0,450*	**0,001**
		DF (PT)	0,347*	**0,001**
	180°/sec	PF (PT)	0,403*	**0,001**
		DF (PT)	0,145*	0,139

* Spearman Correlation Test, PT: Peak torque, PT / W: Relative peak torque, PF: Plantar Flexor, DF: Dorsi Flexor.

DISCUSSION

Muscle strength can be defined as the capacity to produce maximum force with a specific muscle or muscle group (5). Muscular strength affects sports performance regardless of any sport branches, and is therefore frequently studied in athletes. As a result of our study that we carried out to examine the relationship between foot length and the isokinetic muscle strength of the ankle plantar and dorsiflexor muscles in swimmers, it was determined that the ankle isokinetic muscle strength increased as the foot length increased.

Swimming performance is highly dependent on muscular strength, speed and explosive force (14, 31). For this reason, it is aimed to increase muscle strength with land training outside the water to increase swimming performance (31). The relationship between muscle strength, physical fitness parameters and sports performance is frequently investigated (7). It is stated that anthropometric properties are among the parameters that affect muscle strength (17, 35). In the literature, it is stated that there is a relationship between anthropometric characteristics and sports performance in athletes (3, 16), and similarly, anthropometric characteristics affect sports performance in studies conducted with swimmers (18, 29, 35). However, there are different information about how anthropometric characteristics affect sports performance (19, 29, 35). In some studies, it has been shown that there is a positive relationship between anthropometric characteristics and swimming performance (29, 35), while in others there is no relationship between anthropometric characteristics and swimming performance (18, 19). In this study, the relationship between foot length and ankle muscle strength (35), which directly affects swimming performance, was examined. In our study, it was determined that as the foot length increased, the isokinetic muscle strength of the ankle plantar and dorsi flexor muscles at an angular velocity of 60º / sec and the ankle plantar flexor muscles at an angular velocity of 180º / sec increased. We think that this situation is caused by the resistance of the foot against water in the plantar and dorsi flexion movement as the foot length increases. In the literature, it is stated that as the foot length increases in athletes, the ankle muscle strength increases, and this may affect sports performance (10). In parallel with the results of our study, there is information in the literature that the use of paddle increases ankle muscle strength in swimmers (2). In a study, it was concluded that the use of medium, large and very large fins affects the force-time curve and changes the swimming speed, and the paddle sizes may be beneficial for the development of force in the water (2). However, in another study conducted with swimmers, it was stated that the ankle muscle strength especially increased the stroke speed (35). As a result of study, the fact that ankle muscle strength increases as the foot length increases parallels this information existed in the literature.

With our study, it was determined that a large foot length will positively affect muscle strength. However, although it has been determined that foot length is associated with muscle strength, more studies are needed to examine the effect of this relationship on swimming performance. As a result of our study, we think that foot length can be considered as an anthropometric selection criterion for optimal swimming performance in swimmers, since the strength of muscle, which is important in sports performance, is related to foot length.

The limitations of our study are that different anthropometric properties such as athletes' swimming performance, leg length, foot width / surface area and other parameters such as lower extremity muscle strength were not evaluated in our study. However, the fact that the ankle plantar and dorsi flexor muscle strength was evaluated with an isokinetic dynamometer makes our study strong.

CONCLUSION

As a result of our study, it was determined that as the foot length increased in swimmers, the foot muscle strength increased. The ankle muscle strength of the athlete with a long foot may be excessive. Based on this result, the idea has emerged that foot length may affect ankle muscle strength in

swimmers, but further studies are needed to investigate the effect of this relationship on swimming performance.

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Comparison of the Cognitive Skills of Adolescent Basketball Players and Sedentary Adolescents

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Abstract

Starting basketball/sports at young ages, participating in practices and games for years improves children in various subjects. Chronic exercise provides a physical and physiological improvement, while also supporting cognitive development significantly. The aim of this study is to apply some cognitive tests that we think reflects some cognitive skills to both athlete and sedentary adolescents compare and evaluate these test results. Twenty-two licensed male adolescent basketball players ($\bar{x}$:15.59 ±.66 age) and 13 sedentary adolescents ($\bar{x}$: 15.08 ±.76 age, 5 female) who did not exercise in their daily routine participated in the study. All participants were aged between 12 and 18. Three different cognitive skill tests (Mackworth Clock Test, Timewall Test and Change Detection Test) were applied among the participants via the "Psychology Experiment Building Language Test Battery" on a laptop computer, and the results were recorded. When the findings were analyzed, the results of the Change Detection Test comparisons showed that the athletes' times of completing the whole test and their times of response to each question were shorter than those of the sedentary adolescents (both $p<0.01$). When the timing scores were analyzed according to the comparisons of the Timewall Test, it was seen that the athletes were significantly more successful ($p<0.01$). According to the results of the Mackworth Clock Test comparisons, the athletes' correct reaction rates and reaction times were significantly better (both $p<0.001$). In this study, some cognitive performances of the basketball player and sedentary adolescents were tested and compared to each other. Athletes are continuously exposed to a cognitive process during a practice or a game, and furthermore, they need to make a decision quickly under stress and pressure. As a result of this situation. it might be thought that adolescent athletes may have better cognitive performance than their sedentary peers since they always use these cognitive skills during practices and games for years.

Keywords: Basketball, Cognitive Performance, Reaction Time, Cognitive Tests

Adölesan Basketbolcuların Bilişsel Becerilerinin Spor Yapmayan Yaşıtları ile Karşılaştırılması

Özet

Çocukların küçük yaşlardan itibaren spora/basketbola başlamaları, yıllarca antrenman yapmaları ve müsabakalara çıkmaları onları birçok konuda geliştirmektedir. Kronik egzersiz fiziksel ve fizyolojik gelişim sağlamanın yanı sıra önemli bir şekilde bilişsel gelişimi de desteklemektedir. Bu çalışmanın amacı da bazı bilişsel yetenekleri yansıtacağını düşündüğümüz bilişsel testleri hem sporcularda hem de spor yapmayanlarda uygulayarak sonuçlarının karşılaştırılması ve değerlendirilmesidir. Araştırmaya yaşları 12-18 arasında lisanslı olarak basketbol oynayan 22 ($\bar{x}$15,59 ±,66 yaş) erkek adölesan sporcu ve günlük yaşantısında spor yapmayan 13 ($\bar{x}$15,08 ±,76 yaş, 5'i kız) sedanter adölesan katılmıştır. Katılımcılara bir diz üstü bilgisayarda "Psychology Experiment Building Language Test Bataryası" ile üç farklı bilişsel beceri testi (Mackworth Clock Test, Timewall Testi ve Change Detection Testi) uygulanmış ve sonuçları kaydedilmiştir. Sonuçlar değerlendirildiğinde Change Detection Testi için yapılan karşılaştırmalar sonucunda sporcuların, sedanterlere göre tüm testi tamamlama süreleri ve tek bir soruyu cevaplama süreleri anlamlı olarak daha kısa bulunmuştur (İkisi de $p<0,01$). Timewall Test için yapılan karşılaştırmalar sonucunda zamanlama skorları değerlendirildiğinde ise sporcuların anlamlı olarak daha başarılı olduğu görülmüştür ($p<0,01$). Mackworth Clock Test için yapılan karşılaştırmaların sonucuna göre ise sporcuların doğru tepki verme oranları ve reaksiyon zamanları anlamlı olarak daha başarılıdır (İkisi de $p<0,001$). Bu araştırmada basketbolcu ve sedanter adölesanların bazı bilişsel performansları ölçülmüş ve birbiri ile karşılaştırılmıştır. Sporcular bir antrenman ya da müsabaka sırasında sürekli olarak bir bilişsel sürece maruz kalmaktadırlar, ayrıca sporcuların baskı altında ve stres durumunda da hızlı bir şekilde karar almaları gerekmektedir. Bu durumun sonucu olarak, sporcuların bilişsel yetilerini yıllar boyunca antrenmanlarda ve müsabakalarda sürekli kullanmalarından dolayı, spor yapmayan yaşıtlarına göre daha iyi bir bilişsel performansa sahip olabilecekleri düşünülebilir.

Anahtar Kelimeler: Basketbol, Bilişsel Performans, Reaksiyon Zamanı, Bilişsel Testler

INTRODUCTION

Basketball is a team sport that is played by two teams of five players each (30). In a basketball game each player plays in their own specific position. There are some determined roles and responsibilities for these positions. Players are expected to play suitably for these roles, and they take part in physical training on these positions throughout years starting with childhood. Every position has characteristics that are sometimes similar and sometimes different to others. These positions are indicated with numbers and names as: Number 1 = PG, Point Guard, Number 2 = SG, shooting guard, Number 3 = SF, small forward, Number 4 = PF, power forward and Number 5 = C, center (1). Although there are five different positions in basketball, the duties of these positions may be examined under three groups based on their similarities. Some researchers have examined these positions as guards, forwards, and centers (1,11,20). Starting with their initiation to playing basketball at early ages, athletes are directed towards playing in these positions in a short time, and as years pass, they start to increase both their physical and cognitive development by gaining expertise in these positions. The effects of exercise on physical and cognitive functions have been demonstrated in previous studies (6).

Basketball is a complex sports branch where motoric and mental characteristics are on a high level (1). It is a sensory branch that requires a fast communication. Most importantly, the branch of basketball necessitates an excellent skill of perceiving and applying the game in players. That's why, in a game like basketball that constantly flows, the capacity to make the correct decisions in moments is as important as physical performance.

Previous studies showed that chronic exercise increased cognitive performance and academic success (2). In parallel with these studies, it is thought that basketball players may reach sports-related and academic success with the effects of chronic training and competitions.

There is a complicated relationship between exercise and cognitive performance. Changes are observed in cognitive load depending on the selected cognitive task and type of exercise (19). It has been reported in previous studies that, while there are increases or decreases in some cognitive performances in relation to exercise, there are no changes in others (9,18,34). Additionally, research results also show that a good physical condition or exercising increases academic performance (29).

Kamijo et al. (18) examined the effects of exercise intensity on information processing in the central nervous system. They applied the "go/no-go reaction time" test, which is a cognitive test, on 20 male participants at the ages of 22-23 in resting and after low-, moderate- and high-intensity exercise with a cycle ergometer. At the end of the study, while it was determined that attention decreased because of high-intensity exercise, it increased followed moderate-intensity exercise, and it did not change significantly after low-intensity exercise, it is a matter of curiosity what these results would at lower ages.

Although a program specific for cognitive performance is not included in the training contents of athletes in the branch of basketball, it is considered that they are more inclined towards some cognitive loads due to the nature of basketball-specific positions, and their cognitive skills may be more developed than their sedentary peers. It was reported that this situation was also reflected on the academic lives of adolescents (2).

It was hypothesized that adolescent basketball players' cognitive skills might be better than their sedentary peers. If this hypothesis of ours turns out to be accurate, because of assessing cognitive performances in terms of both athlete selection and academic success at early ages, it may be possible to train athletes and adolescents appropriately by guiding them correctly. This way, their probabilities of becoming more successful in their sports or academic lives may be increased.

The purpose of this study is to apply cognitive tests that we think will reflect some cognitive skills (sustained attention, perception, timing, reaction time) on both athletes and sedentary individuals, compare the results and make recommendations regarding both academic and sports-related life.

MATERIAL METHOD

Participants and Experimental Protocol

While determining the number of participants required for the study, the minimum required number of participants for an independent-samples

t-test with a significance level of 0.05, power of 0.80 and confidence interval of 0.95 was calculated via PASS (NCSS, Kaysville, Utah, USA) (8,26). As a result of this calculation, the minimum number of participants per group was determined as 17, but problems were experiencing in reaching sedentary participants due to the conditions of the COVID-19 pandemic. In consequence, the study included 22 male adolescents who had been playing basketball as licensed athletes for at least 3 years ($\bar{x}$: 15.59±.66 age) and 13 sedentary individuals who did not take part in exercise in their daily lives ($\bar{x}$: 15.08±.76 age, 5 female) at the ages of 12-18. As in the case of previous studies, the analyses conducted between the male and female participants did not show any effect of sex on cognitive performance (31).

The heights and weights of the participants were recorded, and their body mass index (BMI) values were calculated. The participants were then explained the tests in detail before implementations, and 3 different cognitive skill tests (Mackworth Clock Test, Timewall Test and Change Detection Test) were applied in the same order for each participant on a laptop computer using the "Psychology Experiment Building Language (PEBL) Test Battery" (24,27). No particular interval was given between the tests. Measurements were taken within the same hour of the day from all participants (2.00-4.00 PM). After each test, the participants were asked to score their experiences of how difficult they found the test on a scale of 1 (simplest) to 10 (most difficult). At the end of this process, the Ratings of Perceived Mental Exertion (RPE-M) of the participants for each test were determined (17). As the participants were under the age of 18, signed documents showing that they volunteered to participate were collected from their legal parents. This study was approved by the Non-interventional Studies Ethics Committee of Dokuz Eylül University with the decision numbered 2019/21-31 and dated 04.09.2019. The research procedures of this study were followed in compliance with the ethical standards of the Declaration of Helsinki.

Cognitive Tests

Change Detection Test (CDT): The participant is expected to notice a circle that disappears or whose color, dimension or position changes within a flashing pattern consisting of circles with different dimensions and colors displayed on the screen (Figure 1). The participant needs to freeze the screen when they notice the change and mark the change by clicking on the position where they observed the change. The reaction times of the participants, their numbers of correctly identified changes and their times of completing the test were analyzed (28).

Figure 1: Change Detection Test

Mackworth Clock Test for Sustained Attention (CT): Along a circular path consisting of small circles, a red light moves in one direction by flashing (Figure 2). Whenever the light skips a position, the participant needs to notice this and press the button in the shortest time possible. The test measures sustained attention, vigilance and reaction time and takes an average of one minute to complete (21).

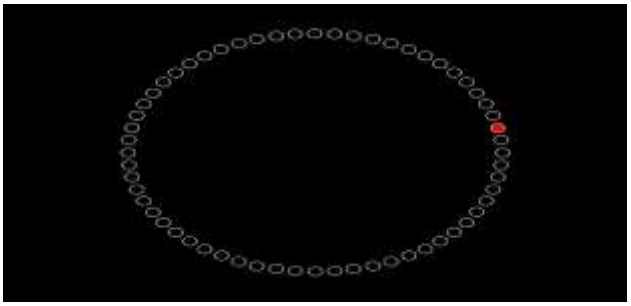

Figure 2: Mackworth Clock Test

Timewall Test (TT): The participant is expected to predict the time when a green rectangle with a width of 0.5 cm moving downwards with a constant velocity hits the ground behind a wall covering the lower third of the screen and press the button when they think it hits the ground (Figure 3). This test assesses visual-spatial perception. The differences between the reaction times of the participants and the target time and the ratios of these differences to the target time were calculated, and the reaction times were assessed as "Early Press", "Late Press" and "Great Accuracy" (13).

Figure 3: Timewall Test

Data Analysis

The normality tests that were conducted on the data did not show a normal distribution. Therefore, non-parametric tests (Mann Whitney U test, and Wilcoxon Signed-Rank test) were used in the analyses. The level of significance was taken as $p<0.05$ for all analyses.

RESULTS

This study included 22 male adolescents who had been playing basketball as licensed athletes for at least 3 years ($\bar{x}$: 15.59±.66 age) and 13 sedentary individuals who did not take part in exercise in their daily lives ($\bar{x}$: 15.08±.76 age, 5 female) at the ages of 12-18. The descriptive and demographic information of the participants is given in Table 1.

Table 1. Descriptive and demographic information of the participants

	Sedentary Adolescents (n=13)				**Adolescent Basketball Players** (n=22)			
	Min.	**Max.**	**X̄**	**SD±**	**Min.**	**Max.**	**X̄**	**SD±**
Age (years)	14	16	15.08	.76	14	16	15.59	.66
Height (cm)	155.00	178.00	166.92	7.27	174.00	196.00	188.36	5.80
Weight (kg)	41.00	71.00	55.76	8.69	56.00	107.00	77.36	11.63
BMI (kg/m²)	17.07	23.03	19.91	1.98	17.28	29.64	21.77	2.79
Years of License	0				3	8	5.68	1.64
CDT RPE-M	6	9	7.54	.967	6	10	7.82	.95
CT RPE-M	2	5	3.69	.855	1	8	3.27	1.57
TT RPE-M	4	7	5.62	.870	2	7	4.73	1.63

X̄= Mean, SD±= Standard Deviation, BMI= Body Mass Index, CDT= Change Detection Test, CT= Clock Test, TT= Timewall Test, RPE-M= Ratings of Perceived Mental Exertion

As a result of the comparisons made for the Change Detection Test results, the times of the basketball players to complete the entire test and their times of answering each question were significantly shorter than those of the sedentary adolescents (respectively, p=0.007 and p=0.001, Table 2). No significant difference was found between the groups in terms of the numbers of correct answers. Accordingly, the adolescent athletes reached the same number of correct answers in a shorter time than the sedentary adolescents.

Table 2. Change Detection Test Result

	Whole Test Completion Time (min.)		**Single Trial Response Time (sec.)**		**Number of Correct Answers**	
	Sedentary	**Athlete**	**Sedentary**	**Athlete**	**Sedentary**	**Athlete**
X̄	6.66±1.35	5.44±1.29	15.59±2.94	11.98±2.60	13.07±1.38	14.09±2.65
Z	-2.646		-3.090		-1.399	
Sig. (p)	0.007*		0.001*		0.16	

X̄=Mean, ±= Standard Deviation, *p<0.01

As a result of the comparisons made for the Timewall Test results, it was observed that the numbers of the sedentary adolescents to press the button early were significantly higher (p=0.004, Table 3). In the assessment of the numbers of excellent timings, the adolescent athletes were found to be significantly more successful (p=0.005, Table 3). These results showed that the adolescent athletes had better timing skills than the sedentary adolescents, and they did not hurry to respond to the tests.

Table 3. Timewall Test Results

	Number of Early Presses		Number of Late Presses		Great Accuracy Numbers	
	Sedentary	**Athlete**	**Sedentary**	**Athlete**	**Sedentary**	**Athlete**
X̄	9.77±3.24	6.05±3.72	1.46±.77	1.36±1.29	8.77±3.56	12.59±3.31
Z	-2.794		-.604		-2.748	
Sig. (p)	0.004*		0.546		0.005*	

X=Mean, ±= Standard Deviation, *p<0.01

As a result of the comparisons made for the results of the Mackworth Clock Test, the correct reaction rates of the athletes were found to be significantly higher (p<0.001, Table 4). In terms of the reaction times, the adolescent athletes had significantly shorter values (p<0.001, Table 4). These results showed that the reaction times and sustained attention levels of the adolescent athletes were better than those of the sedentary adolescents.

Table 4. Mackworth Clock Test Results

	Correct Reaction Rate (%)		Reaction Time (sec.)	
	Sedentary	**Athlete**	**Sedentary**	**Athlete**
X̄	87.96±6.44	94.87±3.31	.60±.22	.37±.80
Z	-3.692		-3.209	
Sig. (p)	<0.001*		<0.001*	

X=Mean, ±= Standard Deviation, *p<0.001

Ratings of Perceived Mental Exertion (RPE-M)

The participants were asked to assess the difficulty of the tests on a scale of 1 to 10. When the scores they reported were compared, no significant difference was found between the sedentary and adolescent athletes (Figure 4). These results demonstrated that both groups had the same level of difficulty in the tests, but the adolescent athletes coped with this difficulty better and received better results.

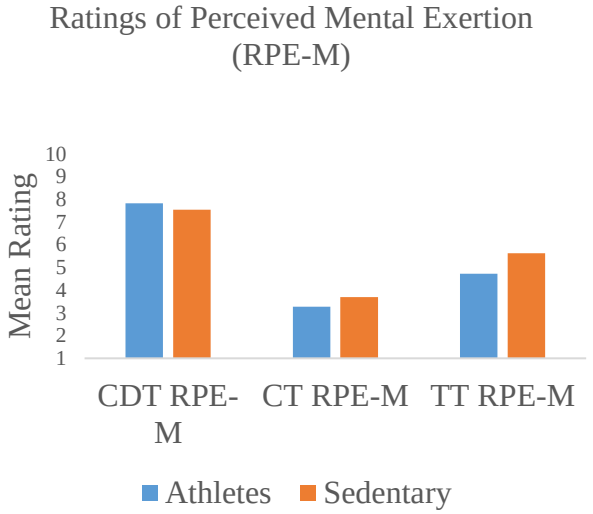

Figure 4. Ratings of Perceived Mental Exertion (CDT=Change Detection Test, CT= Clock Test, TT= Timewall Test, RPE-M = Ratings of Perceived Mental Exertion)

DISCUSSION

This study aimed to evaluate the cognitive performances of adolescents who took part in basketball with a license and sedentary peers those who were not involved in sports in their daily lives. The findings of the study showed that there were differences between the cognitive performances of the athletes and the sedentary adolescents. It is thought that, because of training for years, the cognitive capacities of athletes who start sports/basketball at early ages required by the branch of sports also increase. As in many sports branches, capacities such as being able to sustain attention, reaction time, being able to perceive what one sees fast, selective attention and timing skills are also prominent in basketball. These cognitive

capacities are those that are used and made a priority not only during a training session or a competition but also in all areas of life.

As shown by Ursula et al., it was reported that chronic exercise influences cognitive performance and academic success (32). Similarly, it was seen in this study that the cognitive performance levels of the basketball players among the adolescents increased because of chronic training. Additionally, as shown in previous studies, it is believed that the academic success levels of basketball players would also increase because of chronic training (32,33). For example, when students are taking examinations throughout their academic lives, they need to be able to focus on examination questions for long periods of time. Their chances of becoming more successful in these examinations may be increased by improving these attention skills of theirs. Thus, these cognitive capacities that are developed with sports may also allow both athletes and sedentary individuals to become more successful in their sports-related and academic lives. Among previous studies, there are those that have compared several different characteristics of adolescent athletes and sedentary adolescents including their physical fitness, body compositions, anthropometric properties, and social skills (4,10). In addition to these, there are also studies that have examined the cognitive test performances of athletes in different branches (16). However, the number of studies directly examining cognitive performances between sedentary adolescents and adolescent athletes is highly limited. In this context, it is believed that this study will make a significant contribution to the literature.

In the recent literature, the number of studies examining the effects of acute exercise on cognitive performance is constantly increasing (3,12,15). The current literature shows that there is a complicated relationship between exercise and cognitive performance. Changes are observed in cognitive performance based on the selected cognitive capacities, cognitive tasks, and exercise types (19). It has been reported in previous studies that, while there are decreases or increases in some cognitive performances based on exercise, there are no changes in some others (9,18,19). Studies investigating the physiological effects of different types of exercise on the brain have found that blood circulation in the brain increases during an acute exercise (5,22). A relationship has been found between increased brain blood circulation and cognitive performance, and the positive effects of exercise on brain functions have been demonstrated in many studies (14,23,25). However, the effect of chronic adaptation on cognitive performance has not been clarified in the literature yet. Previously Kamijo et al. (18) investigated the effects of exercise intensity on information processing in the central nervous system. They applied the "go/no-go reaction time" test, which is a cognitive test, on 20 male participants at the ages of 22-23 in resting and after low-, moderate- and high-intensity exercise with a cycle ergometer. At the end of the study, while it was determined that attention decreased as a result of high-intensity exercise, it increased followed moderate-intensity exercise, and it did not change significantly after low-intensity exercise, it is a matter of curiosity what these results would at lower ages. In this study, the chronic effect of exercise in adolescent age groups was evaluated, and when the results were interpreted, it was observed that long-term exercise had a positive effect on many cognitive performance categories. Furthermore, in light of this information, it is thought that chronic basketball training may be effective in the development of several different cognitive capacities (sustained attention, perception, timing, reaction time).

Although athletes in the branch of basketball do not specifically take part in cognitive training, as a requirement of the sport and nature of basketball-specific positions, it is seen that they are more inclined towards some cognitive loads and have more developed cognitive skills in comparison to their sedentary peers because of their long-term training. It was stated that regular long-term training has a positive effect on the neural structural development of the brain (7). Based on this, it is considered that athletes may show a more successful cognitive performance compared to their sedentary peers.

The literature review did not reveal any study, which examined the RPE-M data of cognitive tests applied on adolescents involved in basketball (CDT, CT, and TT). Therefore, it is believed that our study will provide a valuable contribution to the literature. In this study, when the RPE-M data were examined, it was observed that both groups had the same levels of difficulty in the same cognitive tests, and there was no significant difference between them in terms of RPE-M. These findings revealed that, because of chronic training, the adolescent athletes could overcome tasks with high RPE-M more

successfully than their sedentary peers, and they became more successful in cognitive tasks with the same difficulty levels. Additionally, in this study, the cognitive tests were applied in the same order in each participant, and the durations of the cognitive tests differed. It is recommended for future studies to compare the RPE-M values of cognitive tests in settings where the cognitive tests are applied on participants in a randomized order, and the durations of the tests are standardized.

According to the sample size calculation, the minimum number of participants per group was determined as 17. And 22 male adolescent basketball players were included in the study. However, due to the COVID-19 pandemic situation, 13 sedentary adolescents were included in the study instead of a minimum number of 17. And this may be considered as a limitation of the study. For this reason, future studies carried out with an adequate number of participants are recommended by the authors.

CONCLUSION

Consequently, in this study, some cognitive performances of adolescent basketball players and sedentary adolescents were measured and compared to each other. Athletes are constantly exposed to a cognitive process during a training session of a competition, and they must make decisions fast under pressure and stress. It is believed that, as they had used these cognitive capacities of theirs for years throughout training sessions and competitions, the adolescent athletes had better cognitive performance than their sedentary peers. Cognitive processes become prominent not only in sport-related life but also in social, daily, and academic life. Therefore, it is thought that introducing individuals to sports from early ages will be important in terms of the development of their cognitive performance and academic success. For the above-mentioned reasons, it is recommended that children start playing basketball to improve their cognitive abilities as well as physical abilities. Moreover, in terms of player development, it might be beneficial for basketball coaches to add cognitive development training to their long-term training plans.

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An Examination of Cultural Intelligence Changes of University Students Participating in Sport-Based Erasmus Plus Youth Projects

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Abstract

This research aims to evaluate the changes in the cultural intelligence among those students who participate in Erasmus Plus Youth Projects based on sport. The group of the research consists of 39 students who study different departments in Nevşehir Hacı Bektaş Veli University and have not been abroad by any reason before. Cultural Intelligence Scale, developed by Ang et al. and adapted into Turkish by Gökhan Arastaman, has been implemented on the research group through a pre-test before their participation in the projects and a post-test after their participation in the project. For the analysis of the data collected during the research, SPSS 21.0 has been used. In the analysis of the data such descriptive statistics as arithmetic mean, frequency, standard deviation and percent values have been taken into consideration. Whether the data of the both scale distributed normally has been evaluated in order to determine if parametric analyses would be implemented. The research data have been observed to distribute normally. Accordingly, parametric analyses have been decided to be implemented to see if the data vary according to the demographic traits of the participants. T test has been implemented for the evaluation between two groups. Data of the analysis has revealed that participation in the Erasmus Plus Youth Project based on sport has a positive impact on the cultural intelligence, with all its subdimensions, of the university students.

Keywords: Sport, Erasmus Plus, Cultural Intelligence.

INTRODUCTION

In a world that is becoming more and more global with each passing day, the coexistence of different cultures, the designs of the era, emerges as a system that is expected to be realized (8). All of the cultural features that distinguish individuals and societies that differ from each other with different dimensions can be expressed as cultural differences.

Individuals with different cultural backgrounds always try to stay in touch, live together, work under one roof and create common values. In this respect, there are many methods for managing cultural differences and for individuals to perceive cultural variables and keep up with the communication that emerges within these variables. One of these is cultural intelligence. Cultural intelligence enables individuals to accept and adapt

to cultural diversity, to communicate with individuals from different cultures, and to develop appropriate reaction skills against different cultural behaviors. A high level of cultural intelligence is required to adapt to a variety of cultural environments. Thanks to cultural intelligence, individuals can easily adapt to multicultural life and lead a high quality of life.

Cultural intelligence can be expressed as a type of intelligence discovered as a result of different studies on social intelligence. Cultural intelligence is a kind of intelligence that is respectful, understanding, tolerant and non-prejudiced towards different cultures and individuals in these cultures, and provides the opportunity to make sense of different states and movements caused by cultural diversity. Cultural intelligence has four main components: cognitive, metacognitive, motivational and behavioral cultural intelligence. Thanks to cultural intelligence, people and societies can easily attribute meaning to the behaviors of individuals from different cultures (8). Cultural intelligence is a mechanism that facilitates individuals' adaptation to different cultures (9). Strong cultural intelligence creates facilitating effects on individual and organizational issues such as increasing mutual communication and interaction in different cultural situations, eliminating conflict between individuals from different cultures, creating a functional teamwork environment and expanding the capacity for mutual understanding (11). In this context, it can be stated that the ability of individuals from different cultures to communicate effectively with each other has become one of the most important skills of today.

Erasmus Plus Programs are carried out in order to increase intercultural communication and interaction and establish cooperation between countries in education, social, health, sports, technology and many other issues to realize these elements at a young age, and to increase the capacity of tolerance to differences within the framework of mutual understanding (3). Erasmus Plus Program includes the fields of education, training, youth and sports. With the Erasmus Plus Program, activities are offered to individuals to acquire new intercultural skills, to strengthen their self-development (13) and to continue their future lives in different countries, different cultures and different societies. During the program, learning spaces do not consist only of classrooms; young people continue to learn while looking for a place to shelter themselves, trying to understand the language of the country they are in, making new friendships, getting lost on the street, exploring libraries. In this regard, the program has high social content (12). The program keeps all participants in intercultural communication and interaction, even if not at the same level. Individuals participating in the program are in a learning process in which they are constantly active and in an uninterrupted intercultural communication throughout the program.

In this study, "the positive and negative effects that may arise in the cases of cultural intelligence of students studying at university level" has been examined with the purpose of examining the changes in the cultural intelligence phenomenon as a result of the participation of undergraduate students studying at Nevşehir Hacı Bektaş Veli University (NHBVÜ) in the 2018-2019 academic year in the sports-based Erasmus Plus youth project and revealing whether the students differ according to some personal variations.

MATERIALS AND METHODS

This research is structured using quantitative research methods and techniques. The research group consists of 39 students who studied at NHBVU who went to Croatia, Portugal and Greece with the sports-based Erasmus Plus youth project in 2018 and who have not traveled abroad for any reason before. The personal information form presented by the researcher includes information about the students' gender and known foreign language variables.

Within the scope of the research, the cultural intelligence scale was applied to the students. Cultural Intelligence Scale was developed by Ang et al. (1) and adapted to Turkish by Gökhan Arastaman (2). The scale originally contains 20 items. The scale has four sub-dimensions: Metacognitive, Cognitive, Motivational and Behavioral. Items 1, 2, 3, 4 measure Metacognitive Cultural Intelligence, Items 5, 6, 7, 8, 9, 10 measure Cognitive Cultural Intelligence, Items 11, 12, 13, 14, 15 measure Motivational Cultural Intelligence, Items 16, 17, 18, 19, 20 measure Behavioral Cultural Intelligence. 5-Likert type scale was answered by the participants. The average of the answers given by the participants is planned to reflect the level of ability they have in the relevant dimension of cultural intelligence. Higher scores will indicate higher related skill.

The data collection tools used in the study were applied to the university students who constituted the research group. The questionnaire applied before going abroad was evaluated as pre-test, and the questionnaire applied after going abroad was evaluated as the post-test.

SPSS 21.0 program was used to analyze the data collected in the study. In the analysis of the research data, descriptive statistics such as arithmetic mean, frequency, standard deviation and percentage values were examined. In order to determine whether parametric analysis will be performed for this study, it was first examined whether the data of both scales showed normal distribution. As a result of the analysis, kurtosis value was found as -0.437 and skewness value as -0.374.

The skewness and kurtosis values obtained for the cultural intelligence scale as a result of the normal distribution analysis are found to be between -2 and +2. Accordingly, we can say that the research data show a normal distribution (7). According to these results, parametric analysis was deemed appropriate to determine whether the research data differ according to the demographic characteristics of the participants. T test was applied for the evaluations between the two groups.

RESULTS

Table 1. Demographic Information

		f	%
Gender	Female	16	41,0
	Male	23	59,0
Faculty	Literature	2	5,1
	Education	3	7,7
	Nursing	1	2,6
	Law	1	2,6
	English Teaching	7	17,9
	Management	3	7,7
	Engineering	8	20,5
	Sports Sciences	3	7,7
	History	3	7,7
	Medicine	2	5,1
	Tourism	2	5,1
	International Relations	4	10,3

41.0% of the students participating in the study are women and 59.0% are men. 20.5% of the students study in engineering, 17.9% in English teaching, 10.3% in international relations and 7.7% in sports sciences. Students of other departments are less distributed.

Table 2. Metacognitive Dimension Mean and Standard Deviation Values

	N	PRE-TEST		POST-TEST	
		$\bar{X}$	SS	$\bar{X}$	SS
1. I am aware of the cultural information I use when interacting with people from different cultural backgrounds.	39	2,77	0,48	3,67	0,48
2. I adjust my cultural knowledge when interacting with people from a culture unfamiliar to me.	39	2,87	0,52	3,59	0,55
3. I am aware of my cultural knowledge that I use in cross-cultural interactions.	39	2,77	0,48	3,67	0,53
4. I check the accuracy of my cultural information when interacting with people of different cultures.	39	2,95	0,46	3,77	0,54
Total		**2,84**	**0,49**	**3,67**	**0,52**

For the metacognitive dimension consisting of 4 items, the pre-test average x = 2.84 ± 0.49, while the post-test average was x = 3.67 ± 0.52. Accordingly, we can say that the cultural intelligence of the students belonging to the metacognitive dimension significantly increased after going abroad.

Table 3. Cognitive Dimension Mean and Standard Deviation Values

	N	PRE-TEST		POST-TEST	
		$\bar{X}$	SS	$\bar{X}$	SS
5. I know the legal and economic systems of other cultures.	39	2,95	0,72	3,92	0,53
6. I know the rules of other languages (e.g. vocabulary, grammar).	39	3,36	0,96	4,13	0,70
7. I know the religious beliefs and cultural values of other cultures.	39	3,05	0,65	4,05	0,39
8. I know the marriage structures of other cultures.	39	2,26	0,59	2,36	0,58
9. I know the arts and crafts of other cultures.	39	2,97	0,71	3,90	0,55
10. I know the way other cultures express non-verbal behavior (gestures and facial expressions).	39	3,03	0,90	3,95	0,69
Total		**2,94**	**0,76**	**3,72**	**0,57**

The pre-test average for the cognitive dimension of cultural intelligence, which consists of 6 items, was x = 2.94 ± 0.76, while the post-test average was x = 3.72 ± 0.57. Accordingly, it can be said that there is a significant increase in the cultural intelligence of the students participating in the study belonging to the cognitive dimension after going abroad.

Table 4. Motivational Dimension Mean and Standard Deviation Values

	N	PRE-TEST		POST-TEST	
		$\bar{X}$	SS	$\bar{X}$	SS
11. I enjoy interacting with people from different cultures.	39	4,15	0,63	4,64	0,54
12. I feel confident to mingle with people of a culture foreign to me.	39	3,46	0,79	4,28	0,69
13. I am confident in dealing with the stress I will experience in the process of adapting to a new culture.	39	3,26	0,99	4,13	0,70
14. I like to live in a culture that I am a foreigner to.	39	3,62	0,81	4,31	0,57
15. I am confident in getting used to shopping conditions in a different culture.	39	3,26	0,68	3,92	0,77
Total		**3,55**	**0,78**	**4,26**	**0,65**

For the motivational dimension of cultural intelligence, which consists of 5 items, the pre-test average is x = 3.55 ± 0.78, while the post-test average is x = 4.26 ± 0.65. We can say that there is a significant increase in the cultural intelligence of the students belonging to the motivational dimension after they go abroad.

Table 5. Behavioral Dimension Mean and Standard Deviation Values

	N	PRE-TEST		POST-TEST	
		$\bar{X}$	SS	$\bar{X}$	SS
16. I use my speaking behavior (e.g. tone of voice, accent, etc.) according to the needs of intercultural communication.	39	3,08	0,77	4,08	0,70
17. I pause or remain silent depending on the situation to adapt to different intercultural situations.	39	2,38	0,85	2,00	0,73
18. I can change my speaking rate according to the needs of intercultural interaction.	39	3,08	0,74	3,92	0,66
19. I can change my non-verbal behavior according to the requirements of intercultural interaction.	39	3,13	0,73	3,92	0,70
20. I can change my facial expressions according to the needs of intercultural interaction.	39	3,18	0,68	4,03	0,71
Total		**2,97**	**0,76**	**3,59**	**0,70**

For the behavioral dimension of cultural intelligence, which consists of 5 items, the pre-test mean is x = 2.97 ± 0.76, while the post-test average is x = 3.59 ± 0.70. We can say that there is a significant increase in the cultural intelligence of the students belonging to the behavioral dimension after they go abroad.

Comparison of Pre-Test and Post-Test Results of Cultural Intelligence Scale

Table 6. T Test Analysis Results Showing Pre-Test and Post-Test Comparison of Students' Cultural Intelligence Level

	Abroad	N	$\bar{X}$	SS	P
Metacognitive	Yes	39	3,67	0,46	0,000 **
	No	39	2,84	0,43	
Cognitive	Yes	39	3,72	0,35	0,000 **
	No	39	2,94	0,61	
Motivational	Yes	39	4,26	0,53	0,000 **
	No	39	3,55	0,68	
Behavioral	Yes	39	3,59	0,51	0,000 **
	No	39	2,97	0,53	

According to the results of the t test analysis, the levels of the metacognitive cultural intelligence dimension (x = 2.84), the levels of cognitive cultural intelligence dimension (x = 2.94), the levels of motivational cultural intelligence dimension (x = 3, 55), the levels of cultural intelligence dimension (x = 2.97) showed a significant increase after coming from abroad (x = 3.67) (x = 3.72) (x = 4.26) (x = 3.59).

Reliability Analyses

The alpha coefficient (Cronbach α) varies between 0 and 1 and values of 0.80 and above are satisfactory internal consistency reliability.

Table 7. Cronbach A Internal Consistency Values Obtained In This Study For The Cultural Intelligence Scale

	Cronbach α	N of Items
Cultural Intelligence Scale	0.946	20
Metacognitive dimension	0.948	4
Cognitive dimension	0.881	6
Motivational dimension	0.918	5
Behavioral dimension	0.778	5

The Cronbach α internal consistency value of the cultural intelligence scale consisting of 20 items used in this study was determined as 0.946. The values obtained show that the reliability of the scale is quite high.

DISCUSSION

In this study, it can be said that there is a high level of positive correlation between the cultural intelligence of the students who are subject to the research before participating in an Erasmus Plus youth project abroad and their level after participating in the project. Similarly; In various studies conducted by Ang and Van Dyne (1), Eisenberg et al. (5), Engle and Crown (6), Wood (15) and Köse (10), it was also concluded that the experience abroad was positively associated with cultural intelligence level. Through this project, it can be stated that the students' presence abroad improves their capacity to recognize and understand different cultures, and increase their competence to respect different cultural values and live with these values at the same time.

Yağcı et al. (14) stated that student and youth exchange programs abroad, such as the Erasmus Program, directly contribute to the development of cultural intelligence. Köse (10) stated that the time period spent abroad with the Erasmus Program did not affect metacognitive and motivational cultural intelligence, but negatively affected cognitive and behavioral cultural intelligence. The reason for this negative change is thought to be that the longer the time spent abroad, the less the ability to recognize and understand cultural differences. It can be said that a positive significant change occurred in all sub-dimensions of the cultural intelligence of the students participating in the study, since this research includes youth projects that are among the shorter-time programs compared to the studies involving programs with longer periods. In the study by Demirel and Demir (4); A positive and significant relationship has emerged in the cultural intelligence levels of all university students abroad with the Erasmus Program learning mobility, however, considering the gender variable, it is seen that the level of development in all sub-dimensions of cultural intelligence in women has a higher average score than the level of development in men. When an overall assessment is made; although various results have been obtained in similar studies, we can state that the results of the studies in this field are in parallel with our research.

As a result of our research, it is easier to develop and actively use cultural intelligence as a result of intercultural interactions. Individuals with cultural intelligence will be able to overcome the problems they may encounter in multicultural environments and see cultural diversity as a beneficial factor both personally and socially. Since individuals can easily adapt to societies that are foreign to them, thanks to their cultural intelligence, it can be predicted that they will gain added values such as education, finding a job and establishing a new life. Individuals with high levels of cultural intelligence are generally thought to be more successful, more social, more understanding and more intellectual throughout their lives. For this reason, participation in youth projects carried out within the scope of Erasmus Plus Program is of great importance to the development of cultural intelligence and studies are carried out to increase this participation.

In the context of the importance of coexistence with people from different cultures in the development of the phenomenon of cultural intelligence, environments and opportunities with more international programs and projects can be created at universities, especially for university students.

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Analyzing the Alexithymia Scores of University Students Who Do and Do not Do Sports

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Abstract

This study is conducted to analyze the differences in the alexithymia scores of university students who do and do not do sports. In total, 365 university students participated voluntarily in the study. 189 (106 men and 83 women) of them were licensed for at least 2 years in a team or individual sports branches, and 176 (98 men and 78 women) of them did not do sports. In order to reach the data of the study, the personal information form which is developed by researchers, and the Toronto alexithymia scale with 20 questions developed by Bagby et al. in 1994 (2) and adapted into Turkish by Güleç et al.(10) have been used. According to the results of the research, no significant differences were found in the total alexithymia scores and the sub-dimensions of Difficulty in Recognizing Emotions, Difficulty in Expressing Emotions, and Extraverted Thinking in accordance of the gender of university students who do and do not do sports.

Keywords: Alexithymia, athlete students, university students

Spor Yapan ve Yapmayan Üniversite Öğrencilerinin Aleksitimi Puanlarının İncelenmesi

Özet

Bu çalışma, spor yapan ve yapmayan üniversite öğrencilerinin aleksitimi puanlarındaki farklılıklarını araştırmak amacıyla yapılmıştır. Çalışmaya takım ya da bireysel spor dallarında en az 2 yıl boyunca lisanslı olarak spor yapan 189 (106 erkek ve 83 kadın) ve spor yapmayan 176 (98 erkek ve 78 kadın) olmak üzere toplam 365 üniversite öğrencisi gönüllü olarak katılmıştır. Araştırmanın verilerine ulaşmak için araştırmacılar tarafından geliştirilen kişisel bilgi formu, Bagby ve arkadaşlarının 1994 yılında geliştirdiği, Güleç ve arkadaşlarının Türkçe uyarlamasını 2009 yılında yaptığı 20 soruluk Toronto aleksitimi ölçeği kullanılmıştır. Araştırma sonucuna göre spor yapan ve yapmayan üniversite öğrencilerinin cinsiyetlerine göre toplam aleksitimi puanları ve Duyguları Tanımada Güçlük, Duyguları İfade Etmede Güçlük, Dışa Dönük Düşünce alt boyutlarında anlamlı farklılıklara rastlanmamıştır.

Anahtar kelimeler: Aleksitimi, sporcu öğrenciler, üniversite öğrencileri

INTRODUCTION

Alexithymia has been translated into our language as the absence of words for emotions. Although it was initially put forward to explain the symptoms seen in psychosomatic patients, it is emphasized that it is frequently seen not only in these patients but also in other mental and physical diseases. The most distinctive features of people who suffer from alexithymia are that they have difficulty recognizing their emotions and expressing them. They have difficulties in their emotional functioning and interpersonal relationships. They look like they came from another world. They have trouble making connections between feelings and thoughts and expressing them. As a result of the studies, alexithymic features and symptoms are grouped under four main headings: difficulty in recognizing, distinguishing, and expressing emotions, lack of daydreaming, operational thinking, and eccentric cognitive structure (5).

Introduced by Sifneos in 1973, alexithymia is defined as difficulties in identifying and expressing one's own emotions (14, 18). Alexithymia is demonstrated as difficulty in identifying feelings and distinguishing between bodily sensations of emotional arousal and feelings, difficulty in expressing one's feelings to others, and manifested by limited processes and extroverted cognitive style. (19). It has been reported that heart rate, respiratory effort, temperature, itching, pain, fatigue, hunger, thirst, satiety, and emotional touch are observed as alexithymic symptoms (7).

Although there are not many studies on alexithymia, the available data show that alexithymia can cause many neuropathological conditions and decrease the success rates of individuals who do sports. In another study, Barlow et al. reported that there is a relationship between alexithymia and the probability of sports accidents in healthy athletes (3). It has been found that risk-taking behavior in high-risk sports activities is closely related to alexithymia (16). In a study, it was determined that female athletes who do high-risk physical activities such as skydiving and mountaineering in their free time are more alexithymic than women who do not do risky sports and women who do risky sports professionally (6).

It has been determined that athletes who have difficulty in defining and expressing their emotions are more likely to experience emotions and take more risks (3).

It can be thought that sport, which is used as a socialization tool, can also be used as a tool that can prevent the development of the individual's alexithymic personality traits and prevent the person from feeling lonely. This research was carried out in order to observe the changes in the alexithymia scores of university youth through sports and to shed light on the results to be obtained by other researchers.

METHOD

This study was approved by Selcuk University Sports Sciences Ethics Committee

(Approval number: 2021-109)

Working Group:

A total of 365 university students voluntarily participated in this study. Their mean age was $\bar{x}$ = 22.23 ± 1.82, and 189 of them were actively engaged in sports, and 176 of them were not. In addition, besides the personal information form developed by the researchers, the Toronto alexithymia scale with 20 questions developed by Bagby et al. in 1994 and adapted into Turkish by Güleç et al. in 2009 was applied to the participants.

Analysis of Data:

The data obtained from the participants were transferred to the SPSS 13.0 program, and it was determined whether there were missing and incorrect data entries. After the data analysis, the total scores of alexithymia in participants were calculated, and parametric tests were preferred since the data obtained did not deviate excessively from the normal distribution. Descriptive statistical analysis was made for the demographic information of the students participating in the research, and independent groups t-test was used for two independent groups.

FINDINGS

In the marketing literature, value is evaluated by the ratio of the perceived utility to the perceived sacrifice as a result of the consumption of a product or service by the consumer (48). Zeithaml (1988) defines perceived value as the general assessment of a product's utility in relation to what the consumer pays for and receives for a product (67). It draws attention as being the most important structure in understanding consumer behavior, especially in the service industry (31). While some researchers in the literature evaluate perceived value from a single dimension, others claim that it is more complex (13) and state that it is multi-dimensional (8,30,60). This is the second reason for the unclarity about perceived value. According to Sheth et al. (1991), perceived value consists of social, emotional, functional, epistemic, and conditional value dimensions (57). According to Sweeney and Soutar (2001), it is a three-dimensional structure with functional, social, and emotional dimensions (60). According to Grönroos (1997), it is two-dimensional, cognitive, and emotional (30). Boksberger & Melsen (2011) investigated perceived value in terms of societal, transaction-specific, and end-state values (12). Details of the value investigated in three contexts are presented in Table 1.

Table 1. "The generel nature of perceived value" (12).

	Gender	N	Average	SS	t	p
Difficulty in Recognizing Emotions	Female	83	15.42	5.55		
	Male	106	15.63	6.12	-212	.712
Difficulty in Expressing Emotions	Female	83	12.83	3.82		
	Male	106	13.02	3.73	-601	.419
Extroverted Thinking	Female	83	19.87	3.20		
	Male	106	21.68	3.41	-415	.617
Total Alexithymia	Female	83	51.07	9.64		
	Male	106	52.18	10.83	-573	.533

No significant difference was found in the total alexithymia scores of university students engaged in sports (t= -.573, p> .05). Moreover, the average differ by gender in difficulty in recognizing emotions (t= -.212, p> .05), difficulty in expressing emotions (t= -.601, p> .05) and extraverted thinking (t= -.415, p> .05).

Table 2. The t-test table of the total and sub-scales of the students who do not sport

	Gender	N	Ortalama	SS	t	p
Difficulty in Recognizing Emotions	Female	98	16.47	4.62	.985	.162
	Male	78	16.05	6.11		
Difficulty in Expressing Emotions	Female	98	11.04	3.82	-0.22	.970
	Male	78	11.01	3.41		
Extroverted Thinking	Female	98	20.11	2.95	1.921	0.73
	Male	78	23.12	3.22		
Total Alexithymia	Female	98	50.24	9.63	-.121	.912
	Male	78	50.83	11.12		

No significant difference was found in the total alexithymia scores of university students who did not do sports (t= -.121, p> .05). Moreover, the mean score of difficulty in recognizing emotions (t= -.985, p> .05), difficulty in expressing emotions (t= -.0.22, p> .05) and extraverted thinking (t= 1.921, p> .05) differed by gender.

DISCUSSION AND CONCLUSION

In this study, no significant difference was detected in the scores of alexithymia and subscales of university students who do sports. When it comes to other studies conducted on this subject, different results have been encountered. Özdemir et al.,(2011) in their study on orienteering athletes, did not find a significant difference according to their gender. In the studies conducted by Batıgün and Büyükşahin (2008) and Ünal (2005), no significant difference was found between the alexithymic scores of the athletes and their genders. In their study, Tingaz and Güvendi (2020) did not find any significant differences in the scores of alexithymia and subscales according to the gender of athlete students studying at the Faculty of Sport Sciences (20).

Zekioğlu et al. (2014) in their study examining the alexithymia and emotional intelligence levels of people who do sports, detect that there was a difference between men and women in the total scores of alexithymia and in the sub-dimensions of Difficulty in Expressing (23) Emotions and Extraverted Thinking and that the mean scores of women were lower than the scores of men in these two sub-dimensions. Demir (2018) found in his study that the alexithymia scores of disabled athletes were higher than those of disabled individuals who do not do sports (8).. It can be suggested that the reason for higher alexithymia scores in disabled athletes compared to non-athletes may be related to higher depression, anxiety, and psychological stress (9). In the literature review on the subject, there are studies that show similarities with the results obtained in this study, as well as studies that do not show parallelism with the results obtained.

No significant difference was found in the scores of alexithymia and subscales of university students who do not do sports. Unal (2005) did not find any difference between the alexithymic scores of male and female students in his study on a group of university students (21). In their research Batıgün and Büyükşahin (2008) in accordance with this subject, looked at the alexithymia scores of the participants in terms of the gender variable and conclude that there was no significant difference.(4) There are also studies in the international literature reporting that there is no significant difference between gender and alexithymic scores (11, 13, 22).

Although the limited number of studies related to our topic and the unclarity of the results, the available literature in general shows that there is an intense relationship between alexithymia and exercise. While Manfredi and Gambarini. (2015) reported a relationship between alexithymia and exercise addiction (12). Allegre et al. (2007) found more pronounced alexithymic features in expert swimmers who previously trained 22 hours a week compared to amateur swimmers who trained 6 hours a week (1). Price and . Bundesen (2005), on the other hand, observed that parachute athletes showed more alexemitic characteristics than other athletes (17).

As a result, although there is no statistical difference in the alexithymic scores of the athletes as a result of the research, the monitoring of alexithymic features in athletes requires a comprehensive investigation of the subject. It is thought that the evaluation of sportive activity with physiological, social, and psychological concepts will make an important contribution to the development of the individual and society.

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The Effect Of Different Flexibility Studies On Performance Of Taekwondo

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Abstract

In order to be successful in Taekwondo, the athlete must have optimum flexibility in order to maintain his strength and speed, to attack and defend, to apply a combined technique, to minimize the injury rate and to recover quickly afterwards. Muscle groups that are not sufficiently flexible can affect performance negatively. Flexibility exercises have become indispensable for training programs not only for athletes in taekwondo, but also for athletes of all levels and branches. The athlete must have a comprehensive ROM to be able to perform taekwondo-specific techniques efficiently. In addition to benefiting athletic performance, flexibility also has general health-improving effects. According to the existing literature, in order for flexibility studies to be beneficial, the working method and performance status should be well determined. In parallel, we can say that adjusting the number of set-repeats, the auxiliary materials used, the variety of movements according to the characteristics of the sample group and the motoric feature that is desired to be developed can be beneficial for performance development.

Keywords: Flexibility, taekwondo, static, dynamic, PNF

INTRODUCTION

The word meaning of Tae in Taekwondo is: manual techniques, Kwon: techniques with feet and Do: means path, method, philosophy (1). Taekwondo branch became an Olympic branch in 1994 (2). Today, approximately 70 million people from 208 countries participate in this branch (3) and it is among the most popular combat sports in the world (4).

Taekwondo training is long-term, innovative and requires starting from a young age (2). Due to its structure, Taekwondo involves versatile movements (mid-level and high-level kicks, rotary kicks). In taekwondo, where technical diversity is high, long-term training is required for making technical combinations and applying these techniques in the form of attacks and counterattacks.

Since Taekwondo is an innovative branch, it maintains its popularity by making changes in the protective equipment, competition systems and competition rules used by the athletes in competitions (2). In the competitions, the athletes compete with a system called the manual system, where the referees evaluate the athletes by scoring. Nowadays, competitions are organized with a system called electronic scoring system and the protective equipment used by the athletes. Thanks to this system, athletes are no longer evaluated by the judgment of a referee. In this system, the athletes compete with the electronic body protector (seugard) they wear on their bodies, the electronic

foot protectors they wear on their feet, and the electronic head protectors (helmets) they wear on their heads. In this system, where the hit intensities of the athletes are adjusted according to their weight and age categories, the athletes score points with the correct technique and the techniques they use on the body protector or the helmet in the head area with appropriate pressure. When a hit is made with the right technique and sufficient pressure intensity, the score is reflected on the scoreboard via the electronic system. In addition, the changes include the scoring of the techniques. The point values of the techniques applied to the head area and the technical rotary hits have increased. For example; while hits to the head area were evaluated with 1 point in the previous rules, these hits are evaluated as 4 points and rotary hits are evaluated as 5 points in the current rules. Parallel to this, this rule change encourages athletes to be more technical and flexible.

Taekwondo requires great flexibility in the lower extremities due to technical-tactical application and competition rules (5,6). Furthermore, the athletes must have both dynamic and static flexibility to apply attack-counterattack techniques and to recover quickly after technical application (7). Effective flexibility is very important for taekwondo. Adequate joint flexibility is required to maximize performance. Flexibility is also an important component in talent selection and screening for the taekwondo branch.

RESEARCH METHOD

This study covers the literature studies conducted to investigate the effect of flexibility exercises on the performance of taekwondo players spread over a wide period covering the years 1970-2020, mainly in the 2000s. In this study, the micro-analysis method, compiled from literature research that covers information and interpretation of results, by comparison, was used. EBSCOhost, PubMed and Google Scholar databases were used in the literature search.

Flexibility (Mobility)

It is defined as the wide range of motion of a joint or joint group (8). According to Akandere (9), flexibility is the ability of a joint to reach its maximum range of motion. According to another definition, it is the ability to apply movements in different directions and wide angles as much as the joints allow (10). According to Chandler et al. (11), the athlete can move a joint through a normal range of motion without undue stress on the muscle-tendon unit.

The American College of Sports Medicine (12) identifies flexibility as the fourth important element of physical fitness. Nieman (13) also accepts flexibility as an important parameter of physical fitness. Flexibility is considered important in neuromuscular tensions and therapy work (14,15).

Although flexibility is one of the basic motor features, it is a feature that should be started to be trained in childhood. It is accepted as an important feature for increasing performance in sports (16). Flexibility is the basic element of training programs, while it is also important to have high-level motor skills (17). If flexibility is not developed well, it becomes difficult to learn branch-specific movements and the injury risk increases. At the same time, the movement angle is negatively affected and causes a decrease in quality in the application of combined movements. The flexibility level is at its best between the ages of 3-7, despite no training. Between the ages of 7-13, it is in good condition, between the ages of 12-15 it is in poor condition.

Although flexibility is one of the main factors in determining performance and athletic abilities, it should be included in training programs. Flexibility is the only physical feature that reaches its maximum in childhood and deteriorates in parallel with increasing age (18).

Flexibility exercises have many benefits in terms of athlete performance (19-21). These are;

It decreases the rate and severity of the injury.

It helps to delay fatigue.

It increases mobility and skill level.

It helps to extend the sports life of an athlete.

It helps an athlete to feel mentally good.

It is effective in preventing and delaying muscular pains (22,23).

Increased muscle flexibility helps to perform a movement more efficiently, prevent or minimize injuries and increase performance (24-27)

Flexibility Development Methods

Effective flexibility studies can be considered as one of the basic tools to maximize performance. However, the right flexibility development methods must be used to positively affect the performance.

Before starting to work, it is important to warm up, do stretching before-during-post-exercise, and comply with the stretching-waiting periods by the procedure.

The primary target of a flexibility exercise is the connective tissue. Effective procedures require controlling sensory mechanisms by inhibiting muscle spindle receptors and stimulating golgi tendon organs, resulting in less resistance to soft tissue stretching (28). The following methods are widely used for effective flexibility development (29).

Active Method

Static method

Ballistic method

Passive Method

PNF (Combined) Method

1. Active Method

This method is the ability of an athlete to maximize a joint through muscular activities. This method expresses both the bending-loosening of the agonists and the force generation of the antagonists. In the static method, the sub-title of the active method, the individual must bring the two parts of the body closer to each other and wait for 6-12 seconds. According to M.Alter, static stretching is to stretch a muscle (or muscle group) to its furthest point and then maintain this position. Static stretching can reduce electrical activity and help significantly reduce muscle pain (22,30). In the ballistic method, which is another sub-title, first one section and then the other section becomes active. In this method, body parts are operated through oscillations and rapid movements (31). Most athletes and trainers use the static method more, considering that the ballistic method causes muscle contractions (18,29).

Ballistic stretching has 4 disadvantages. These are;

It exceeds the stretching limits of tissues (32).

The energy need is higher (32).

It increases the risk of pain in the muscles and may cause shortening of the muscle length (31,32).

It initiates the stretch reflex and can cause small tears in the connective tissues (33).

2. Passive Method

It is a method of stretching by supporting a position taken by the individual with another part of the body, an apparatus, the help of a partner or the use of weights. For example, raising his/her leg and keeping that position with his/her hand (32). This method can be applied to the ankle, hip, shoulders and wrist joints. The use of weights is not recommended for the hips and spine. However, it is recommended to adjust the amount of weight and gradually increase it to be applied for ankle, knee and shoulder joints (33).

3. PNF (Combined) Method

The PNF method (Proprioceptive Neuromuscular Facilitation) includes specific stretching techniques that utilize reflexes and neuromuscular principles to relax tensed muscles. It is known to be one of the fastest and most effective methods currently known to increase static-passive flexibility. In this method, passive stretching and isometric stretching techniques are combined to achieve maximum static flexibility. PNF refers to any of the techniques where the muscle group is passively stretched, then contracted isometrically against resistance while in the stretched position, and then passively stretched again through the resulting range of motion. This method usually requires the assistance of a partner to resist isometric contraction and then passively hold the joint through its increased range of motion. The PNF method is not recommended for children and people whose bones continue to grow. PNF stretching helps strengthen muscles. It is an ideal method to increase passive flexibility as well as active flexibility. PNF stretching is a very strenuous exercise and it is recommended not to do more than once a day for a particular muscle group (32).

Issues To Be Considered In Flexibility Studies

There are some points athletes and coaches should pay attention to for planning or implementing flexibility exercises. Some of these are as follows (34):

Flexibility exercises should be focused on the main muscle groups that are actively used in sports.

In general, results can be obtained from training programs, but individual flexibility studies should be given importance.

Flexibility exercises should be done in 10-20 minutes.

Except for extremely flexible athletes, daily optimum flexibility exercises should be given importance to other athletes.

Flexibility exercises should be included before and after training.

Excessively flexible athletes should not try to increase their flexibility levels further.

The dosage of flexibility exercises should be increased gradually and the athlete should be mentally prepared for this situation.

Flexibility exercises should include more static stretching exercises.

Jumping and sudden movements should be avoided in flexibility exercises.

In flexibility exercises, both directions (right-left) should be exercised equally.

While the exercising area is in a tense position, it should be released slowly.

Flexibility exercises should be continued on an ongoing basis (season or off-season).

For the body to be integrated into flexibility exercises, the exercises must be carefully placed in the training program (30).

DISCUSSION AND RESULT

In this section, the types of exercises, the number of repetitions, the materials used in the study, the scope of the study, the sample group and the results of the studies on the relationship between flexibility exercises and performance are given.

In 2012, Rashad Khalil (35) investigated whether static and PNF stretching exercises on 20 female taekwondo players aged 17-18 years had an effect on taekwondo-specific techniques on a range of motion and physical skills. As a result, the PNF stretching method showed a significantly more significant difference than the static stretching method on physical skills and range of motion variables.

In his research, Choi (36) examined how 8-week static and PNF stretching exercises affect flexibility and jumping performance. 28 (n=14 static stretching group, n=14 PNF stretching group) taekwondo players studying at the university participated in the study. In the study, while knee joint range differed significantly in both groups in two stretching types, jump performance also differed within the group ($p<.05$). In the comparison between the static stretching group and the PNF group, a significant difference was found only in jumping performance. As a result, both static stretching and PNF stretching help improve performance.

Taekwondo athletes may not be able to perform strong and targeted strokes without adequately developing the flexibility of the body, shoulder and leg joints. Good flexibility is required for adequate optimization of the leg, abdomen, shoulder and waist muscles (37). Based on this, Paramitha et al. (38) conducted a study to examine the effect of flexibility training on the dollyo chagi (a technique performed with the head to the foot) technique. 8 men and 8 women actively participating in competitions were included in this study. In the study, 16 training sessions were performed by including static-dynamic stretching, and active-passive warm-up. Data were analyzed using a video analysis application with kinovea and a 120 FPS handheld camera. According to the results of the analysis, it has been reported that the study has an effect of 15.4% on the flexibility of the Dollyo Chagi technique. In addition to this, the researchers found that static stretching, one of the stretching techniques used in the study, was the most effective method for increasing flexibility.

In a study conducted to examine the contribution of increasing flexibility to performance in taekwondo, it was reported that short-term static and PNF stretching exercises can increase flexibility without reducing performance. On the other hand, they found that long-term dynamic stretching exercises also improve flexibility without contributing to performance. For taekwondo, it is recommended that an appropriate warm-up in aerobic type followed by short-term (6-10 sec) static and PNF stretching 3-5 days a week is appropriate. Performing these practices in the warm-up and separate flexibility training sessions can make taekwondo-specific techniques more efficient and stronger (1).

Alemdaroğlu et al. (39) investigated the acute effects of different stretching types on sprint performance in taekwondo players. 12 male athletes were included in the study. Athletes were given ballistic, static and PNF stretching exercises every 3 days. Before and after the stretching exercises, the athletes were made to do two 20 m sprints with maximal loading. According to the types of stretching, after the sprint performance, the static and PNF stretch values returned to normal after 15

minutes, and the ballistic stretch value returned to normal after 5 minutes. According to the results of the study, it was concluded that the acute effects of PNF and static stretching may negatively affect sprint performance, while ballistic stretching affects less. Therefore, it is recommended not to do PNF or static stretching just before the sprint performance.

In his study, Kok (40), examined whether dynamic and PNF stretching affected the flexibility and technical hitting skills of athletes aged 18-25 (n=45) who have just started taekwondo. Athletes were divided into 3 groups as PNF stretching group (n=15), dynamic stretching group (n=15) and control group (n=15). In the pre-test results of PNF, dynamic stretching and control groups, no significant difference was found in terms of flexibility and technical striking skills scores of all tests. According to the post-test results of the PNF stretching group, a significant difference was found between the dynamic stretching group and the control group on technical striking skills, but no significant difference was found for the flexibility test. In the dynamic stretching group post-test results, significant differences were reported on flexibility and technical striking skills.

Aksoy (41) used Whole Body Vibration, a modern exercise technique, in his study to examine whether it affects some physical parameters (strength, flexibility and agility) of taekwondo players. 23 athletes (n=11 control group, n=12 whole-body vibration training group) with an age average of 22.12±1.93 years voluntarily participated in the study. Before starting the training, a sit-reach test was applied to both groups. Whole-body vibration training was given to the training group for 10 weeks as 3 days a week. No training was given to the control group. Statistically significant differences were reported in the training group flexibility parameter in the group comparisons made at the end of the study.

14 athletes in the 14-17 age range voluntarily participated in the study, in which the effect of static and dynamic stretching exercises on vertical jump performance was investigated. Different stretching protocols developed by Gelen (42) were used. Jumping (each athlete made 3 attempts) tests were applied 4-5 minutes after each stretching exercise. There was no significant difference in the parameters of the squat jump, drop jump and front jump after stretching exercises performed by the athletes (43).

Yarım et al., (44) investigated the effect of different warm-up methods and static stretching exercises performed with these warm-up methods on isokinetic strength in the lower extremity. 26 female taekwondo athletes with an average age of 20 were included in the study. In the study, three different warm-up protocols were applied to the participants. Firstly, 10-minute running protocol, secondly dynamic warm-up, and thirdly dynamic warm-up and static stretching exercise protocol were applied. As a result of the study, it was concluded that the dynamic warm-up and stretching exercise protocol was the method that greatly affected the performance among these three protocols applied to the participants.

As a result of the studies, it is recommended to apply different flexibility methods regularly. However, it is recommended to apply some flexibility methods before and after the competition, taking into account the factors such as positive and negative effects on different parameters, and how much they affect performance. It has been determined that short-term static and PNF stretching exercises contribute positively to flexibility without reducing performance. In conclusion, the findings of the present review found that all methods contributed positively to overall flexibility. In addition, it is thought that the results of this research can be used as basic data in the development of effective exercise programs to improve the athletic performance of athletes.

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The Effect of the First Goal on the Score of the Match and Home Advantage in Football: Analysis of Turkish Super League and 1st League in Pre-Pandemic and Pandemic Periods

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Abstract

The present study was conducted to examine and analyze the home advantage in the Turkish Soccer Super League and TFF 1st Soccer League matches played pre-pandemic and pandemic periods. The study data that were obtained by evaluating the results of the competitions played in the last two seasons (2019-2020 and 2020-2021) were analyzed by using the number of matches won by the teams as the home and away teams, the effects of the first goal scored on the score of the match, and the home advantage. The data obtained in this way were recorded in the SPSS 18.0 programme, was then interpreted by calculating the frequency and percentage values. In the last two seasons that were examined, as the pre-pandemic period, the home advantage was found to be 53.57% in a total of 486 matches in the Super League and TFF 1st League in the 2019-2020 season, and the home advantage value was 52.42% in the Super league, and 54.37% in the TFF1 League. In the 2020-2021 season, which has been continued during the pandemic process, the percentage of total home advantage in 420 matches in the Super League and 306 matches in the TFF 1st League was found to be 50.64%, and the percentage of home advantage values decreased to 50.79% in the Super League and 50.43% TFF 1st Soccer League. Pre pandemic period, after the first goal scored by the home teams in the competitions in the 2019-2020 season, 61.11% of the matches in the TFF 1st League, and 72.97% in the Super League ended with a win; and in the 2020-2021 season of the pandemic period, 74.52% of the matches ended with a win in the Super League, and 77.85% of them resulted in a win in the TFF 1st League. As a result, the rate of leaving the football pitch with a win after the first goal in the matches played in both the Super League and the 1st League was found to be quite high. Based on this viewpoint, it can be argued that the first goal scored in football competitions is an important factor affecting the result directly. However, it is considered that the spectator factor plays an important role in the home advantage in football based on the fact that the home advantage values of the football teams decreased in the season played with spectators compared to the values in the games played in the season without spectators.

Keywords: Football, Pandemic, Match Analysis, Goal, Home Advantage.

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Futbolda İlk Golün Maçın Skoruna Etkisi ve Ev Sahibi Olma Avantajı: Pandemi Öncesi ve Pandemi Dönemi Türkiye Süper Lig ve 1. Ligin Analizi

Özet

Bu çalışma, Türkiye Futbol Süper Ligi ve TFF Futbol 1. Liginde pandemi öncesi ve pandemi dönemi oynanan müsabakalarda, ev sahibi oma avantajının incelenerek analiz edilmesi amacıyla yapılmıştır. Son iki sezon zaman diliminde (2019-2020 ve 2020-2021 sezonu) oynanan müsabakaların sonuçları değerlendirilerek elde edilmiş olan araştırma verileri, takımların ev sahibi ve deplasman takımı olarak maç kazanma sayıları, atılan ilk golün maçın skoruna etkisi ve ev sahibi olma avantajı gibi teknik parametrelerin analizi yapılarak incelenmiştir. Elde edilen veriler SPSS 18.0 programında kaydedilmiş, frekans ve yüzde değerleri hesaplanarak yorumlanmıştır. İncelenen son iki sezonda, pandemi öncesi dönem olarak, 2019-2020 sezonunda Süper lig ve TFF 1. ligde oynanan toplam 486 müsabakada ev sahibi olma avantajı %53.57 olarak belirlenirken, bu süreçte, ev sahibi olma avantajı değerleri Süper ligde %52.42; TFF1. Ligde %54.37 olarak bulunmuştur. Pandemi sürecinde devam eden 2020-2021 sezonunda, Süper ligde 420 müsabaka ve TFF 1. ligde 306 müsabakada toplam ev sahibi olma avantajı yüzdesi %50.64 olarak belirlenirken, bu süreçte, ev sahibi olma avantajı değerleri yüzdesi Süper ligde %50.79'a, TFF 1. Ligde ise %50.43'e gerilemiştir. Pandemi öncesi 2019-2020 sezonunda oynanan müsabakalarda iç sahada ev sahibi takımların attıkları ilk gol sonrası, TFF 1. Ligde maçların %61.11'i, Süper Ligde ise %72.97'si galibiyetle biterken, pandemi dönemi 2020-2021 sezonunda, Süper Ligde maçların %74.52'si, TFF 1.Ligde ise %77.85'i galibiyetle sonuçlanmıştır. Sonuç olarak, hem Süper Lig hem de 1.Ligde oynanan maçlarda atılan ilk gol sonrası müsabakadan galibiyetle ayrılma oranı oldukça yüksek bulunmuştur. Bu noktadan hareketle, futbol müsabakalarında atılan ilk golün sonuca doğrudan etki eden önemli bir faktör olduğu söylenebilir. Diğer taraftan, futbol takımlarının seyircili oynanan sezondaki ev sahibi olma avantajı değerlerinde seyircisiz oynanan sezondaki maçlarda ortaya çıkan değerlere göre düşüş yaşanmasından yola çıkarak, futbolda ev sahibi olma avantajı üzerinde seyirci faktörünün önemli bir rol oynadığı düşünülmektedir.

Anahtar kelimeler: Futbol, Pandemi, Maç Analizi, Gol, Ev sahibi olma avantajı.

INTRODUCTION

"Goal" is the biggest expression of the game in football because the winner of a match is determined by the team that scores the most goals. For this reason, it is very important to understand how goals are scored, their frequency, and the way they occur especially when the low number of goals scored in competitions is considered (17). Goal is also the key to success for teams. The analysis of all matches played in a major football tournament is considered as an important variable allowing multiple evaluations (12). The "home" advantage is another very important variable as well as the goal, which is one of the most important criteria in the football branch.

The advantage of playing at home, which can also be expressed as playing the games infield in competitive sports branches, is considered as an important factor, which must be considered. This will allow us to know what effect the infield or outfield competition has on the outcomes of sports competitions (14). Playing a football match infield or outfield can affect the athletes in the team positively or negatively (8). Football teams generally achieve more success in home matches (25).

It is an already known fact for a very long time that the home advantage is a very important criterion in football in determining the result of a match (19). The importance of home advantage was shown in many team sports including football. It was reported in previous studies that the support of the fans of the home team is a possible causal factor, and plays a very important role in the effects of referees in the decision-making process (5). Although the results of many previous empirical studies were not conclusive, it is believed that mass support has a particularly powerful effect in most sports. Also, although the size of the large audience does not seem to be a relevant factor, the effect of audience behaviors on competitors has been proven difficult to be detected (28).

There are some factors affecting the performance at significant levels, such as the audience, referee, weather and pitch conditions, and the performance level of the opponent has significant effects on the success or failure of teams (15). Courneya & Carron (4) reported that the home advantage in football is highly effective on the performance of a team in addition to the abovementioned factors. In this context, the purpose of the present study was to examine and analyze the home advantage in the Turkish Super League and TFF 1st League matches played before and after the pandemic. Based on this viewpoint, the results of the competitions played in the last two seasons (i.e. 2019-2020 and 2020-2021) were evaluated by analyzing the technical parameters e.g. the number of matches won by the teams as home and away teams, the effect of the first goal scored on the score of the match, and the home advantage.

METHOD

The matches played in the Turkish Football Super League and TFF 1st League in the 2019/2020 and 2020/2021 seasons were analyzed in the present study, which was analyzed as two separate periods, the pre-pandemic and pandemic period matches were examined in terms of the home advantage, the effect of the first goal scored in the home and away fields on the score of the match, and the average points per match variables. The ethical approval of the study was received from the Non-Interventional Clinical Research Ethics Committee of the Faculty of Sports Sciences of Selcuk University with the decision number 126 on 30.09.2021.

The data of the last two seasons of the competitions played in the Turkish Football Super League and TFF 1st League in the 2019/2020 and 2020/2021 seasons were evaluated in the study based on datas which can be accessed on the offical website of the Turkish Football Federation. In this respect, a total of 486 matches were played in the 2019-2020 season, 234 in the Super League and 252 in the 1st League. A total of 726 games were played in the pandemic period 2020-2021 season, 420 matches in the Super League, and 306 in the TFF1 League. In this respect, a total of 1212 matches played in the last two seasons of both leagues were examined in the scope of the study.

In the Turkish Super League, the period until the 26th week of the 2019-2020 season (13-16 March 2020) is taken as the pre-pandemic period. During this period (before the pandemic), 234 matches were played in the Super League. In this season, 252 matches were played in the TFF 1st League until the 28th week (14-16 March 2020).

Point system in soccer: According to the "Points Method System", 3 points are given to the winning team in the competitions, and 1 point to the draw teams. No points are awarded to the losing team (27).

Home Advantage: In the calculation of the home advantage values, the points of the teams as the home team in a completed season were evaluated as the percentage of the total of the points in the matches played both as the home team and the away team (18, 19, 20).

Data Analysis: All the data obtained in the study were recorded in the SPSS 18.0 program, and the frequency and percentage values of these data were calculated and interpreted.

RESULTS

The findings obtained in the study are given in this part. Turkish Super League and TFF 1st League competitions were examined for the 2019-2020 and 2020-2021 seasons; and in this respect, the home advantage of the teams, the effect of the first goal scored in the infield and outfield on the score of the match, and the average points per match were determined and presented in tables and graphics.

Table 1. The effect of the first goal scored in the home field pre-pandemic period and during the pandemic period on the score of the match and the average score per game

Season	League	W	%	D	%	L	%	Home Field Total Number of matches	Average score per match
2019-2020	Super League	81	72.97	21	18.92	9	8.11	111	2.59
	TFF 1.League	55	61.11	28	31.11	7	7.78	90	2.14
	TOTAL	136	67.66	49	24.38	16	7.96	201	2.27
2020-2021	Super League	158	74.52	39	18.39	15	7.07	212	2.42
	TFF 1.League	116	77.85	16	10.73	17	1.40	149	2.44
	TOTAL	274	75.90	55	15.23	32	8.86	361	2.43
W: Win D: Draw L: Loss		2019-2020: Pre Pandemic Period				2020-2021: Pandemic Period			

When the matches that were concluded with a win, loss, or draw after the first goal scored by the home teams were evaluated in the competitions, it was found that 81 wins (72.97%) and 21 draws (18.92%) were achieved with the first goal scored by the home teams in the competitions played in the Super League in the 2019-2020 Season, and the average of points per game was 2.59. There were 55 wins (61.11%) and 28 draws (31.11%) with the first goal scored by the home teams, and the average score per match was 2.14 in the competitions played in the TFF 1st League in the 2019-2020 season before the pandemic. The teams had 158 wins (74.52%) and 39 draws (18.39%) with the first goal scored in the home field in the Pandemic period 2020-2021 Season Super League, and the average score per game was 2.42. In the TFF 1st League, in the competitions played in this season, after the first goal that was scored by the home teams in the home field, 116 matches were won (77.85%), 16 matches ended in draw (10.73%), and the average score per game was 2.44.

Table 2. The effect of the first goal scored in the away field pre-pandemic period and during the pandemic period on the score of the match and the average score per game

Season	League	W	%	D	%	L	%	Away Field Total Number of matches	Average score per match
2019-2020	Super League	52	57.14	26	28.57	13	14.29	91	2.00
	TFF 1.League	51	54.26	28	29.78	15	15.96	94	1.93
	TOTAL	103	55.68	54	29.19	28	15.13	185	1.96
2020-2021	Super League	118	62.43	41	21.69	30	15.87	189	2.09
	TFF 1.League	90	69.23	20	15.38	20	15.38	130	2.23
	TOTAL	208	65.20	61	19.12	50	15.67	319	2.15
W: Win D: Draw L: Loss		2019-2020: Pre Pandemic Period				2020-2021: Pandemic Period			

When the matches end in a win, loss, or draw after the first goal scored by the away field teams in the competitions, it is seen that there were 52 wins (57.14%) and 26 draws (28.57%) in the first goal scored in the matches played in the away field in the Super League of the 2019-2020 Season, and the average score per game in the competitions was found to be 2.00. There were 51 wins (54.26%) and 28 draws (29.78%) in the first goal scored by the TFF 1st League teams in the matches played in the away field in the same season, and the average score per game was found to be 1.93 in these competitions. In the Super League in 2020-2021 Season, there were 118 wins (62.43%) and 41 draws (21.69%) with the first goal scored in the outfield, and the average score per game was found to be 2.09 in these competitions, and there were 90 wins (69.23%) and 20 draws (15.38%) with the first goal scored by the TFF 1st League teams in the matches played in the away field in the same season, and the average score per game was found to be 2.23 in these competitions.

Table 3. Home advantage pre-pandemic period and during the pandemic period

		Home team	Away team	Home - Away teams		
Season	**League**	**W**	**W**	**D**	**Total number of matches**	**Home Advantage (%)**
2019-2020	Super League	101	68	65	234	52.42
	TFF 1.League	109	59	84	252	54.37
	TOTAL	211	127	148	486	53.57
2020-2021	Super League	174	128	118	420	50.79
	TFF 1.League	132	109	67	306	50.43
	TOTAL	306	237	185	726	50.64

W: Win D: Draw 2019-2020: Pre Pandemic Period 2020-2021: Pandemic Period

It was observed in the study that although the home advantage value was found to be 52.42% in the 2019-2020 season of Super League before the pandemic, this decreased to 50.79% in the 2020-2021 season in the pandemic period. Although the home advantage value was found to be 54.37% in the 2019-2020 season before the pandemic in the competitions in the TFF 1st League, it was found that this value decreased to 50.43% in the 2020-2021 season in the pandemic period.

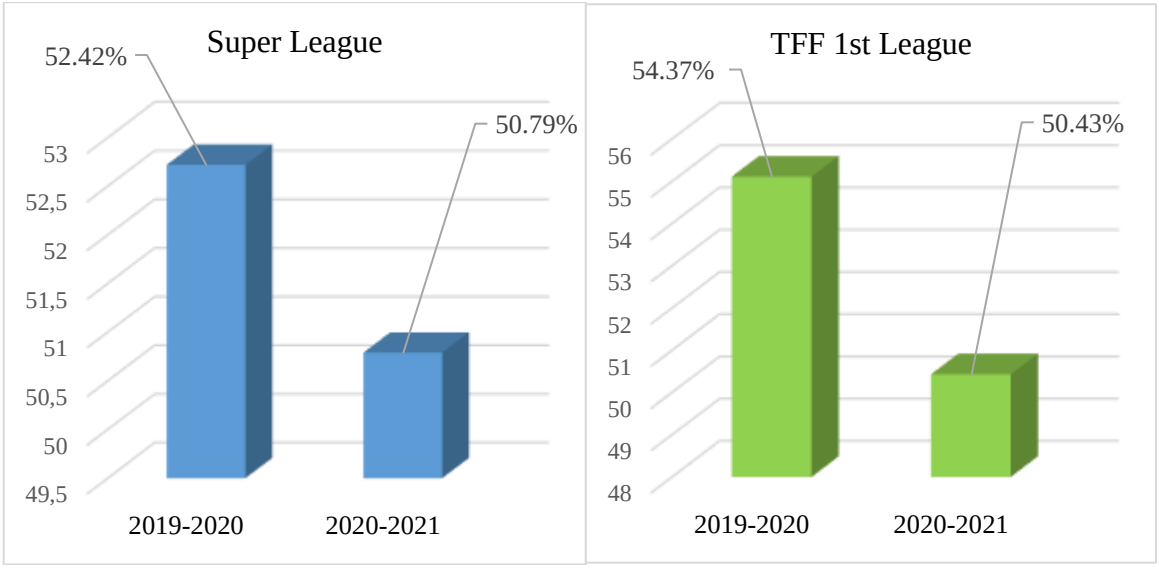

Figure 1. Home advantage pre-pandemic period (2019-2020 Season) and during the pandemic period (2020-2021 Season)

DISCUSSION

The present study was conducted to analyze the home advantage in the Turkish Football Super League and TFF 1st League matches before and pandemic period. In the study, in which the results of the competitions played in the last two seasons (2019-2020 and 2020-2021 seasons) were evaluated, technical parameters (e.g. the number of wins of the teams as the home and away teams, and the effect of the first goal on the score of the match, and the home advantage) were examined and analyzed.

Both the Super League (72.97%) and the TFF 1st League (61.11%) home teams had mostly a win after their first goal in the 2019-2020 season. Similarly, the home team's win rate after the first goal scored in both the Super League (74.52%) and the TFF 1st League (77.85%) was quite high in the 2020-2021 season of the pandemic period. Away teams won 57.14% of the matches after their first goal in the

Super League in the 2019-2020 season, which was 54.26% in the TFF 1st League. The win rate after the first goal scored by the home teams in the Super League was determined as 62.43% in the Super League in the 2020-2021 season of the pandemic period, which was 69.23% in the TFF 1st League.

As another variable that was examined in the study, when the advantages of being the home team were examined, it was found that there was a decrease in the home advantage values in both the Super League and the TFF 1st League when compared to the pre-pandemic period. In the last season played before the pandemic, the audience factor can be considered among the important factors that affect the home advantage, considering that the home advantage values decreased in the competitions played without spectators in both leagues during the pandemic period.

In a previous study that was conducted by Inan (9) regarding crowd support and being the home team advantage in football, it was found that the support of the supporters and audience density were found to be important variables contributing to home advantage in football. In the study that was conducted by Subak & Kaya (24) in which the home advantage and the spectator effect was analyzed in the Turkish Super League in the Covid-19 season, it was found that the Covid-19 pandemic affected football players; and when all the results were examined, a decrease was found in the infield performance and an increase in the away performance. On the other hand, it was also reported that playing a match without spectators seemed to be an important factor for success in football.

Pratas et al. (22) conducted a study in the Portuguese Premier League, and reported that, when the home teams scored the first goal, the rate of leaving the pitch with a win was found to be 74.59%, and the rate of leaving the matches with a win when the away teams scored the first goal was found to be 62.22%. In their study, Inan et al. (10) reported the rate of the home teams scoring the first goal in the match was 56% in the German Bundes Liga, 52% in the Italian Serie A, 52% in the English Premier League, and 53% in the Spanish La Liga. After the first goal is scored, the rates of winning the match were found to be 70% in Bundes Liga, 75% in Serie A, 75% in Premier League, and 78% in La Liga.

In a study that was conducted by Armatas & Yiannakos (3) in which the 2006 World Cup was analyzed, it was found that the team that scored the first goal won the matches (73.21%). The rate of winning after the first goal scored in tournament matches was examined in a study conducted by Leite (12), and the average of this rate was found to be 71.06% in the examined FIFA World Cup matches, 70.04% in matches in UEFA European Championships, 70.21% in the CONMEBOL Cup of America; and 68.73% in the AFC Asian Cup.

In a study that was conducted by Armatas et al., (2) on the Greek Super League, it was reported that 71.43% of the teams that scored the first goal in the matches left the matches after winning, and 16.19% of the matches ended in a draw. In another study that was conducted by Molinuevo & Bermejo (14) on Spanish La Liga, it was found that the first goal scored in 56.96% of the matches played in the league were the home team's, and the home advantage was found to be 60.21%. In the study that was conducted by Sampedro & Pietro (23), the effects of scoring the first goal on the results of the matches were examined, and it was found that the teams that scored the first goal won the game with a high rate (79.32%). In Leite's study (11) in which the goals scored in Euro 2012 were analyzed, when the effects of the first goal scored in the matches were examined, it was found that the teams scoring the first goal won the games in 70.97% of the matches, 16.13% ended with draw, and only 6.45% ended with defeat.

In some previous studies conducted on the home advantage in football, advantage of being the home team values were reported as follows; Allen & Jones (1) 60.78% in the English Premier League; Göral (6) 60.07% in the Turkish Super League; Leite (13) 57% in France, 57.5% in the Netherlands, 60.7% in Belgium, 61.2% in Spain; Pollard & Gomez (21) 62.25% in Italy, 60.82% in Mexico, 64.89% in Brazil; Talab & Mehrsafar (25) 52.5% in the Iranian Super League.

In his study, Öndes (16) evaluated the performance indicators affecting the home advantage in the framework of a long-term analysis which covered the last 22 years of the Turkish Super League, 6732 matches in total, and found that the probability of winning the matches played at home was greater than the probability of winning the matches played away. In a study that was conducted by Tütüncü & Yolgörmez (26), the performance of the home teams was compared in the matches played in the Bundes Liga, Premier

League, Seria A, La Liga, and Turkish Super League in the 2019-2020 Season before (with spectators) and after the pandemic (without spectators), and although no percentage differences were detected in the parameters of the home teams, increased percentages were detected in the outfield teams. In this case, it was argued that although the matches played with or without spectators had no effects on the performances of the home teams, the absence of spectators might have increased the performances of the teams in outfield matches. Wolfson et al. (27) emphasized that fans can develop mechanisms to help their teams cope with disappointing results to maintain the positive results of commitment to their team and reduce the potential discomfort of losing in football.

According to the indices of average points per game and average team performance scores in football leagues in Turkey, the score range of "2.294-3.000" in the Super League and "1.983-3.000" in the TFF 1st League are included in the "very good" class. Also, "1.591±0.137" points in the Super League and "1.680±0.115" points in the TFF 1st League can be sufficient as an average of points per game to finish the league in the top five ranks (7). According to the results of the study, when the average points per game collected both in the home field (2.42 points) and away field (2.12 points) in the pre-pandemic season and in the home field (2.43 points) and away field (2.15 points) during the pandemic period were considered, it can be argued that scoring the first goal in competitions is a very important factor in reaching the targeted levels in football.

CONCLUSION

In conclusion, it can be argued based on the findings of the present study that the first goal scored in football is an important factor that affects the result directly. On the other hand, based on the decreased home advantage values of the football teams in the season played with spectators when compared to the values in the games played in the season without spectators, it is considered that the spectator factor plays an important role in the home advantage in football.

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Does ankle plantar and dorsiflexion affect fifty-meter swimming time in swimmers?

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Abstract

The purpose of this study was to determine the relationships between ankle plantar and dorsiflexion and the four swimming styles in girl and boy swimmers. The study consisted of 20 girls (Mage= 16.50 ± 0.51 years) and 20 boys (Mage= 16.50±0.51 years), for a total of 40 swimmers volunteer individuals. Anthropometric and body composition measures were obtained including body height, body mass, fat %, fat free mass (FFM). Besides, ankle flexibility was assessed by measuring ankle plantar flexion and ankle dorsiflexion and four style swimming performance was obtained in official competition. All values are presented as mean ±SD and median (min – max). Student t-test was performed on each independent variable to compare differences between the genders for the parametric test, for the nonparametric tests, it was used Mann Whitney U test. For the correlation analysis between two variables, Pearson correlation coefficients were used to describe correlations for the parametric variables, spearman's correlation coefficients were used for the non-parametric variables. Significant high and moderate level of correlations was found between ankle plantar flexion, dorsiflexion (right and left), and average flexion and four style swim time in girl swimmers ($p<0.001$). In boy swimmers, there was found a moderate level of correlation between left, and average ankle dorsiflexion except right ankle dorsiflexion and swimming time for all styles ($p<0.05$). In conclusion, the study findings especially point towards the potential importance of ankle plantar and dorsiflexion in 50 m swimming time for all styles in girl swimmers.

Keywords: Dorsiflexion; Gender; Plantar Flexion; Swimming.

Yüzücülerde Ayak Bileği Plantar ve Dorsifleksiyon Elli Metre Yüzme Süresini Etkiler Mi?

Özet

Bu çalışmanın amacı kız ve erkek yüzücülerde ayak bileği plantar ve dorsifleksiyon ile dört yüzme stili arasındaki ilişkiyi belirlemektir. Bu araştırmaya 20 kız (Ortyaş= 16.50 ± 0.51 yıl) ve 20 erkek (Ortyaş= 16.50±0.51 yıl) olmak üzere toplam 40 yüzücü gönüllü olarak katılmıştır. Antropometrik ve vücut kompozisyonu olarak boy uzunluğu, vücut ağırlığı, vücut yağ yüzdesi ve yağ dışı kütle (FFM) ölçümleri yapılmıştır. Ayrıca, ayak bileği esnekliği, ayak bileği plantar ve dorsifleksiyon ölçümleri yapılmış ve resmi yarışmada dört farklı stil yüzme performansı elde edilmiştir. Tüm değerler ortalama ±SS ve medyan (min – maks) olarak sunulmuştur. Parametrik test için cinsiyetler arası farklılıkları karşılaştırmada student t-testi, parametrik olmayan testler için Mann Whitney U testi kullanılmıştır. İki değişken arasındaki korelasyon analizinde parametrik değişkenler için Pearson korelasyon katsayısı, parametrik olmayan değişkenler için spearman korelasyon katsayısı kullanılmıştır. Kız yüzücülerde ayak bileği plantar fleksiyon, dorsifleksiyon (sağ ve sol) ve ortalama fleksiyon ile dört yüzme stili süreleri arasında anlamlı düzeyde yüksek ve orta düzeyde korelasyon bulunmuştur ($p<0.001$). Erkek yüzücülerde ise, tüm stillerde sağ ayak bileği dorsifleksiyon dışında sol ve ortalama ayak bileği dorsifleksiyonda orta düzeyde korelasyon bulunmuştur ($p<0.05$). Sonuç olarak, araştırma bulguları, özellikle kız yüzücülerde tüm stiller için 50 m yüzme süresi ayak bileği plantar ve dorsifleksiyonunun önemini göstermektedir.

Anahtar Kelimeler: Cinsiyet, Dorsifleksiyon, Plantar Fleksiyon, Yüzme

INTRODUCTION

Flexibility is a measure of the range of motion (ROM) that is one of the most important components of both health and performance related to physical fitness, known to affect performance and health (17). The ROM of a particular joint is affected by a number of factors that consist of connective tissue structure, activity level, age, and sex Baechle and Earle (2). Flexibility is a critical part of the training that may provide benefits in some cases, including maintaining appropriate muscle lengths, improving muscle balance and muscular weaknesses, and reduce the risk of injury, and also can improve posture and the ability to move to athletic training (17). Each sport and activities have specific requirements for ROM that related to the movements based on sport-specific requirements Baechle and Earle (2). Sport of swimming requires the utilization of plantar and dorsal flexion, which is the essential components to maintain foot strokes and a balanced position. The plantar flexion and dorsiflexion range of motion is necessary to use in the feet in order to move forward to travel a certain distance in the water (1).

Many coaches and swimmers are seeking ways to improve performance to be successful, and especially in sports that based on time, to be a winner is determined by merely fractions of a second. In competitive swimming, performance is identified by the time utilized to finish the race distance. Therefore, all factors that may contribute to athletic performance and success, should be examined. One area interested by coaches and swimmers to improve is ankle flexibility, particularly plantar flexion (15). More flexible ankles are believed by coaches, to contribute to faster kicking ability McCullough et al., (10). A good range of motion, flexibility, and above-average musculoskeletal forces produce powerful whip kick propulsion during the movement (23). Previous studies conducted in swimmers examining the effect of ankle joint flexibility consisted the areas including dolphin kick performance (24), kick performance on the breaststroke (8), (23), flutter kick performance (15), kinetic characteristics of the ankle joint and the performance of freestyle kick (21), kicking efficiency and kinematics analysis (22), dynamic balance ability to angle range of motion (1). The current investigation focused on ankle joint flexibility for both girl and boy swimmers, and it aimed to determine the relationship of plantar flexion and dorsiflexion range of motion on swimming time based on genders in four swimming styles, and to compare to the angle range of motion between the genders. It was hypothesized based on the above-mentioned cases that the angle flexibility may influence the swimming time.

MATERIALS AND METHODS

Participants

A total of forty college swimmers (girl: N=20 and boy: N=20) participated in the study. Subject characteristics are described in Table 1. Before the participating to the study, the written informed consent form was obtained from their parents. The detailed explanation of the risks and benefits of the study for each participant before the investigation. The study was approved by the Ethics Committee of Hitit university (2018-11).

Anthropometric And Body Composition

The body height and mass of the subjects were measured to the nearest 0.5 cm and 0.1 kg respectively. Body mass index was calculated based on body mass (kg) / body height (m2). Body compositional assessment was performed by an expert person. Skinfold thickness (mm) was measured for girls and boys at three identified anatomical landmark sites. The anatomical sites included triceps, suprailium, and thigh for girls; chest, abdomen, thigh for boys, it performed using a Holtain caliper. Body fat (BF) percent for boys and girls was calculated by using Jackson- Pollock equation (11).

Ankle Flexibility Measurements

Ankle flexibility was measured using goniometric measurements by the same experienced person. Subjects sat on a flat bench with legs extended. To measure ankle plantar flexion and dorsiflexion range of motion were measured using the method described by Ekstrand et. al. (5).

Swimming Performance

The swimming performance was obtained in official competition that was held during the 50-meter season in 2018. It was recorded with one-hundredth of a second accuracy for each freestyle, backstroke, breaststroke, and butterfly swimming styles.

Statistical Analysis

Statistical analysis of the data was performed using SPSS 20.0 (Statistical Package for the Social Sciences, Version 22.0, SPSS Inc., Chicago, IL, USA).

Some of the variables presented in the tables were normally distributed, some also were not. Before using parametric and nonparametric tests, the assumption of normality, distribution was verified using the Shapiro-Wilk test. All values are presented as mean ±SD and median (min – max). Student t-Test was performed on each independent variable to compare differences between the genders for the parametric test, for the nonparametric tests, it was used Man Whitney U test. For the correlation analysis between two variables, Pearson correlation coefficients were used to describe correlations for the parametric variables, spearman's correlation coefficients were used for the non-parametric variables. To interpret the correlation coefficients for the reference values was regarded respectively $0.00 < r < 0.25$ as very weak, $0.26 < r < 0.49$ as weak, $0.50 < r < 0.69$ as moderate, $0.70 < r < 0.89$ as strong and $0.90 < r < 1.00$ as very strong and the level of significance was set at $p < 0.05$ for all tests.

RESULTS

Mean and standard deviation and median scores on characteristics of the participants for girl and boy swimmers are presented in Table 1. The data indicated statistical differences in BH, BM, fat %, FFM between the genders. No significant difference was found between genders according to biological age ($p>0.05$). The boys were taller ($p<0.05$), heavier ($p<0.05$) and had low body fat %, and more FFM ($p<0.05$) than the girls. In addition, the boy swimmers had more training experience than the girl swimmers ($p<0.05$) (Table 1). Mean and standard deviation and median scores on ankle dorsi and plantar flexion (right and left) the participants for girl and boy swimmers are presented in Table 2. The statistical differences were found in right, left, and average ankle plantar flexion between the genders ($p<0.05$) (Table 2).

According to the obtained competition results for both genders, the scores and percentage of difference are given in Table 3. The statistical differences were found in freestyle, breaststroke, and butterfly swimming competition scores between the genders ($p<0.05$) (Table 3).

Table 4 presents the correlational relationships among the variables. In girl swimmers: a significantly high level of correlations was found between left and average ankle dorsiflexion and swimming time for all styles, but right ankle dorsiflexion negatively correlated as moderate level. There was a moderate negatively correlation between right, left and average ankle plantar flexion and swimming time for all swimming styles ($p<0.05$). In boy swimmers: there was found a moderate level of correlation between left, and average ankle dorsiflexion except right ankle dorsiflexion and swimming time for all styles ($p<0.05$). Right, left and average ankle plantar flexion was not significantly correlated with swimming time for all styles ($p>0.05$) (Table 4).

Table 1. Characteristic of the participants, according to the genders.

Variables	Girls	Boys	D (%)	p
Age (year)	16.50 (16-17) (16.50±0.51)	16.50 (16-17) (16.50±0.51)	0	1.000b
BH (cm)	164.9±7.4	174.4±5.81	5.76	<0.001a
BM (kg)	59.1 (43-68) (57.81±7.23)	66 (53-95) (67.00±10.56)	15.89	0.002b
Fat (%)	10.55 (8.81-17.77) (11.58±2.47)	6.33 (4.26-21.31) (7.58±4.79)	-34.54	<0.001b
FFM (kg)	53.18 (37.65-60.64) (51.06±6.15)	61.97 (48.42-75.30) (61.52±6.54)	20.48	<0.001b
TE (year)	6.5 (5-9) (6.30±1.59)	7 (5-9) (7.40±1.63)	15.00	0.023b

Statistical significance $p<0.05$; BH: body height; BM: body mass; D: difference; FFM: fat free mass (kg); TE: training experience; a:student's t test with mean ± standard deviation; b:Mann Whitney U test with median (min-max) (mean ± standard deviation).

Table 2. The data of the ankle dorsiflexion and plantar flexion, according to the genders.

Variables - ankle	Girls	Boys	D (%)	p
Dorsi flexion, right (°)	22.95±4.24	21.95±2.32	-4.35	0.211a
Plantar flexion, right (°)	102.0±12.51	88.75±15.80	-12.99	0.005a
Dorsi flexion, left (°)	24 (12-27) (21.75±5.05)	22.25 (14-33) (21.19±5.16)	-2.57	0.862b
Plantar flexion, left (°)	104 (74-123) (101.60±14.65)	80 (69-118) 84.85±16.68	-16.48	0.002b
Dorsi flexion average (°)	23.5 (12.50-27.50) (22.35±4.48)	22.12 (17.50-27.00) (22.07±3.26)	-1.04	0.823b
Planter flexion average (°)	103.25 (77.50-121.50) (101.80±13.43)	83.75 (69.50-119) 86.80±16.09	-18.11	0.003b

Statistical significance $p<0.005$; D: difference; a:student's t test with mean ± standard deviation; b:Mann Whitney U test with median (min-max) (mean ± standard deviation).

Table 3. The fifty-meter swimming competition times for four-swimming styles, according to the genders

Style	Girls	Boys	D (%)	p
Freestyle (s)	29.48±2.35	27.05±2.32	-8.24	0.009a
Backstroke (s)	32.18±2.79	30.96±2.33	-15.94	0.231a
Breaststroke (s)	36.19±2.92	32.92±2.19	-9.03	<0.001a
Butterfly (s)	32.44±3.49	29.79±2.53	-8.16	0.014a

Statistical significance p<0.05; D: difference; s: second; a:student's t test with mean±standard deviation.

Table 4. The correlation between right, and left ankle flexion and fifty-meter swimming times, according to the genders.

Gender	Variables - ankle		Freestyle	Backstroke	Breaststroke	Butterfly
G	**Dorsiflexion, right (°)**	**r**	**-0.610****	**-0.609****	**-0.623****	**-0.577****
		p	**0.004a**	**0.004a**	**0.003a**	**0.008a**
G	**Planter flexion, right (°)**	**r**	**-0.621****	**-0.548***	**-0.582****	**-0.561***
		p	**0.003a**	**0.012a**	**0.007a**	**0.010a**
G	**Dorsiflexion, left (°)**	**r**	**-0.820****	**-0.849****	**-0.746****	**-0.842****
		p	**<0.001b**	**<0.001b**	**<0.001b**	**<0.001b**
G	**Planter flexion, left (°)**	**r**	**-0.716****	**-0.628****	**-0.631****	**-0.655****
		p	**<0.001a**	**0.003a**	**0.003a**	**0.002a**
G	**Dorsiflexion average (°)**	**r**	**-0.737****	**-0.783****	**-0.720****	**-0.745****
		p	**<0.001b**	**<0.001b**	**<0.001b**	**<0.001b**
G	**Planter flexion average (°)**	**r**	**-0.665****	**-0.590****	**-0.607****	**-0.593****
		p	**0.001a**	**0.006a**	**0.005a**	**0.006a**
B	**Dorsiflexion right (°)**	**r**	-0.347	-0.113	-0.163	-0.152
		p	0.134a	0.635a	0.493a	0.523a
B	**Planter flexion, right(°)**	**r**	-0.418	-0.085	-0.201	-0.288
		p	0.058a	0.721a	0.396a	0.218a
B	**Dorsiflexion, left (°)**	**r**	**-0.560***	**-0.460***	**-0.505***	**-0.582****
		p	**0.010a**	**0.041a**	**0.023a**	**0.007a**
B	**Planter flexion left (°)**	**r**	-0.381	-0.126	-0.243	-0.239
		p	0.097b	0.597b	0.303b	0.310b
B	**Dorsi flexion average (°)**	**r**	**-0.540***	**-0.468***	**-0.495***	**-0.526***
		p	**0.014a**	**0.048a**	**0.026a**	**0.017a**
B	**Planter flexion average (°)**	**r**	-0.387	-0.035	-0.159	-0.221
		p	0.092b	0.885b	0.504b	0.348b

Statistical significance p<0.001**; G: Girls; B: Boys; a: Pearson correlation coefficient b:Spearman correlation coefficient.

DISCUSSION

To the best of our knowledge, the researches related to ankle joint flexibility about swimmers has been evaluated on a specific swimming style or technic. Therefore, this is the first study to investigate the relationship related to ankle joint flexibility and 50 m swimming performance based on four swimming styles for both genders. The study aimed to determine the relationship of plantar flexion and dorsiflexion range of motion on swimming performance based on genders in four swimming styles. This study primary findings respectively: (a) girl swimmers had the significantly greater right, left, and average ankle plantarflexion angles than boy swimmers (Table 2); (b) left and average ankle dorsiflexion negatively as high level correlated with swimming time on four swimming styles, but right ankle dorsiflexion negatively correlated as moderate level in girl swimmers; (c) right, left and average ankle plantar flexion negatively as moderate level correlated with swimming time on four swimming styles in girl swimmers; however, in boy swimmers, (d) left, and average ankle dorsiflexion negatively as moderate level correlated with swimming time for all styles; (e) right, left and average ankle plantar flexion, and right ankle dorsiflexion was not significantly correlated with swimming time for all styles.

When boys access the biological maturation of the girls in puberty become taller, heavier, with more muscle strength, as well as presenting better motor control and coordination (3). In our study, the similar results were seen between the genders, as

based on these findings, the reason for the differences between the swimming time for both genders may be explained because of the fact that the differences, including tall, body mass, Fat %, and FFM (Table 1). Besides, the differences to the right-left, and average ankle plantarflexion angles between the genders (Table 2), may be explained by girls had more flexible joint structure or a higher range of motion dependent on the higher body fat percent generally in girls than boys (Table 1) Baechle and Earle (2).

The present study findings indicated that a significant relationship in high and moderate level between ankle plantar and dorsiflexion (right and left) and swimming time for all styles in girls (Table 4). However, in boy swimmers only left, and average ankle dorsiflexion correlated moderately with swimming time for all styles. Our study findings may also indicate that the reason for the differences that occurred in correlation analysis for the right and left ankle joint angles (plantar and dorsiflexion), could be caused because of the fact that using a dominant body limb or the gender differences which girl swimmers had greater ankle flexibility. The literature studies mostly investigated to the specific style or technical perspective, but the findings that partly agreement with our results showed that McCullough et al. (10) reported being a significant relationship between ankle plantar flexion and 50 m swimming times in the competitive swimmers. They stated that the greater flexibility in the ankle was able to flutter kick with greater velocity for the swimmers. Jagomägi and Jürimäe (8) stated that flexibility measurements that consist of knee external rotation, ankle supination, and hip external rotation, explained swimming results 28.2 %. In addition, they stated that good flexibility was more important than a single anthropometrical parameter to explain breaststroke swimming results. Shimojo et al. (22) reported that foot rotational flexibility, rather than ankle plantar flexibility, is associated with an increase in butterfly kick velocity. Sugimoto et al. (20) found that swimmers with low flexibility of plantar flexion tended to achieve a faster swimming velocity after increasing the plantar flexion angle. Willems et al. (24) reported that between ankle muscle strength and dolphin kick performance was significantly correlated. They also stated that a flexibility restriction in plantar flexion and internal rotation in the ankles showed a significant decrease in dolphin kick performance in competitive swimmers. They also recommended that enhancing dolphin kick velocity might be provided by ankle muscle strength exercises and restricted ankle flexibility might improve by a flexibility program. The findings of our research support these statements. In contrast to these studies, Mookerjee et al. (13) found that there was no significant relationship between ankle plantar and dorsiflexion and swimming performance. Reichmuth et al. (18) stated that the flexibility measurements that included shoulder inside rotation, shoulder outside rotation, hip extension, sit-and-reach, plantar flexion, supination showed no significant correlation with race time of any of the lifesaving disciplines. Geladas et. al. (6) reported that the girl swimmers significantly had a larger ankle flexibility angle than the boys, but for both genders, ankle flexibility was not correlated with 100 m freestyle swimming. However, they demonstrated that for both genders respectively, body height, upper extremity and hand length, shoulder flexibility, and horizontal jump were related significantly with swimming performance in girls; body height and mass, arm, hand, and foot length, chest circumference, biacromial and biiliac breadths significantly correlated with swimming performance in boys. Some of literature findings and our study findings partly may suggest that ankle joint flexibility may be a potential contributor to the swimming time for both genders, especially girl swimmers.

The literature studies suggest that improve performance in swimming for both the styles and gender may have been related to increased aerobic, anaerobic (4, 12, 26), muscle strength and endurance (6, 9, 14), flexibility (19), speed (7, 26, 25), agility (27), and balance (16) components. Success in sports is a multifaceted phenomenon including many interrelated conditions. Therefore, swimming performance not only a single variable requires but also needs performance components which aforementioned, however, more specific components such as ankle flexibility, may be willing to importance to reach a high level of performance. McCullough et al. (10) asserted that on the biomechanical side, the foot is positioned to remove water in a backward direction provided that the ankle has the larger angles to plantar flex. This condition may be supporting to push the water backward, at the same time, it would provide propulsion to move the body forward in swimming.

CONCLUSIONS

It is evident that minor details in sports are decisive in achieving success in many events. Therefore, these findings highlight the potential importance of ankle plantar and dorsiflexion on swimming 50 m time particularly in girl swimmers. If the specific training practices may be used to improve ankle joint flexibility in water or dry-land training, it could contribute to swimming performance for both genders.

Disclosure Statement

The authors report no declarations of interest.

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Examination of Teaching Styles Used by Physical Education Teachers and Trainers and their Perceptions of These Styles: An Example From Edirne

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Abstract

With the increasing recognition of the constructivist nature of learning as well as the diversity of student learning styles, the need for teachers to use different teaching styles is emphasized, while little is known about teachers' use and perception of various teaching styles. In parallel with this, it is seen that there are much less studies about the use and perception of teaching styles by trainers. Therefore, In this study, the extent to which trainers and physical education teachers used teaching styles and their value perceptions related to these styles were examined by comparison according to gender, education level, age and group variables. Moreover, the effect of the teachers' and trainers' use of these styles on their value perceptions was investigated. A total of 129 participants, of whom 90 were teachers employed by the Ministry of National Education and 39 were trainers employed by the Provincial Directorate of Youth and Sports in the centre of Edirne, took part in the study based on the principle of voluntariness. Of the participants, 72 were male, and 57 were female. According to the findings, the most valued styles were command and practice, while the least valued styles were self-teaching and student initiation It was seen that the most used styles were command and practice, while the least used styles were self-teaching and student initiation. In the dimensions of providing "Enjoyment", "Learning" and "Motivation" for students, it was seen that the most valued styles in terms of motivation were command, practice and reciprocal styles; the most valued styles in terms of learning were command, practice and participation styles; and the most valued styles in terms of enjoyment were command, practice and participation styles. The findings revealed that significant differences were seen as a result of comparison of the mean scores for value perceptions of the styles and for use of the styles according to the group (physical education teachers and trainers), gender and age variables, whereas no significant differences were seen following comparison according to the education level variable. In conclusion, the reason for the choice of the command and practice styles as the most used and valued styles can be regarded as the fact that teachers' and trainers' desire to increase their authority over students directed them towards these styles. Therefore, it is recommended that preservice teachers and trainers attending physical education teaching and coaching education programmes gain experience by giving them the opportunity for practice in the different courses that they take throughout their periods of study, and by enabling them to discover the areas of strategic use of the other teaching styles, and that professional development programmes are prepared in accordance with this.

Keywords: Trainer, Physical Education, Teacher, Style, Perception.

Beden Eğitimi Öğretmenleri ve Antrenörlerin Kullandıkları Öğretim Stilleri ve Stillere İlişkin Algılarının İncelenmesi (Edirne Örneği)

Özet

Öğrenci öğrenme stillerinin çeşitliliğinin yanısıra öğrenmenin yapılandırmacı doğasının artan tanınırlığı ile birlikte öğretmenlerin farklı öğretim stilleri kullanma ihtiyacı vurgulanır iken öğretmenlerin çeşitli öğretim stillerini ve algılaması hakkında çok az şey bilinmektedir. Buna paralel olarak antrenörlerin öğretim stilleri kullanması ve algılaması hakkında çok daha az çalışmanın olduğu görülmektedir. Bu nedenle, bu çalışmada antrenörlerin ve beden eğitimi öğretmenlerinin öğretim stillerini kullanma düzeyleri ve stillere ilişkin değer algılarının, grup, cinsiyet, yaş, eğitim durumları değişkenlerine göre karşılaştırarak incelenmiştir. Edirne merkezde MEM'de çalışan 90 öğretmen ile GSİM'de çalışan 39 antrenör olmak üzere toplam 129 katılımcı, kolayda örneklem yöntemi ile seçilmiş ve gönüllük ilkesine göre katılmışlardır. Bulgulara göre en çok değer verilen stiller, komut ve alıştırma, en az değer verilen stiller ise kendi kendine öğretme ve öğrencinin başlatması olarak sıralanmıştır. En çok kullanılan stiller komut ve alıştırma, en az kullanılan stiller ise kendi kendine öğretme ve öğrencinin başlatması olarak sıralandığı görülmektedir. Stillerin öğrencilere "Eğlenme", "Öğrenme" ve "Motivasyon" sağlama boyutlarında; motivasyon açısından komut, alıştırma ve eşli çalışma, öğrenme açısından komut, alıştırma ve katılım, eğlence açısından komut, alıştırma ve katılım stillerine en fazla değer verildiği görülmektedir. Bulgular grup, cinsiyet ve yaş değişkenlerine göre stillere ilişkin değer algıları ve kullandıkları öğretim stilleri ortalama puanlarının karşılaştırılması sonuçlarında anlamlı değişikler olduğu görülmüştür. Sonuç olarak, en çok kullanılan ve değer verilen stiller olarak komut ve alıştırma stillerinin seçilmesi, öğretmen ve antrenörün öğrenciler üzerinde kontrolün daha fazla arttırma istekleri, bu stillere yönelten temel sebep olarak görülebilir. Bu nedenle beden eğitimi öğretmenliği ve antrenörlük programında öğrenimlerini sürdüren öğretmen ve antrenör adaylarının öğrenim süreleri boyunca aldıkları farklı derslerde uygulama imkanı bulmaları için fırsatlar verilerek, diğer öğretim stillerinin stratejik kullanım alanlarının keşfetmeleri sağlanarak, deneyim kazanmaları ve mesleki gelişim programlarının bu doğrultuda hazırlanması önerilir.

Anahtar Sözcükler: Antrenör, Beden eğitimi, Öğretim, Stil, Algı,

INTRODUCTION

When our country's Olympic medal performance results are compared with other countries in the world, there is a big difference. When we think about the factors affecting these differences, many reasons may come to our mind. However, in Arnold Gesell Maturation Theory, the importance of the appropriate environment for successful development and the role of the educational processes that complement it is emphasized (Orhan and Sinan, 2018). f the development processes of all children in the world are in the same direction at similar ages, why are some countries more successful in terms of sports? At this point, when the countries that are successful in the Olympics or other sports competitions are examined, it is seen that there are suitable sports fields, sports culture has developed since childhood, and appropriate education-teaching environments and appropriate programs are designed (Orhan and Sinan, 2018; Onur, 1995). While designing appropriate educational environments and programs, increasing the recognition of the constructivist nature of learning and emphasizing the need for teachers to use different teaching styles, it has not been sufficiently studied about teachers' use and perception of various teaching styles, and accordingly, much less work has been done on coaches' use and perception of teaching styles. It can be seen when the literature is reviewed (Onur, 1995). In this study, the teaching styles used by physical education teachers and coaches were examined. The similar and different aspects of the teaching styles used by physical education teachers and coaches working in appropriate education-teaching fields were examined. Mosston and Ashworth (2008), in their work named "Physical Education Teaching-Teaching Physical Education", which is used in the field of education and sports, which are available and frequently used, and the teaching styles used by teacher training institutions and physical education teachers until today were examined. In the related literature, physical education is a part of general education and there is a similarity between the objectives and it is seen that they complement each other. It can contribute to contemporary education with its general and specific goals by contributing to the development of all characteristics of students in a democratic environment.Psychologists, educators, and researchers have debated for many years about the definition of learning and teaching and how it happens. In the developing, growing and changing world, different definitions and arguments are presented for the concept of learning and teaching, as in many other subjects. Different teaching methods based on these different approaches have been developed (Temizöz and Özgü, 2009).

Educational approaches, educational methods and teaching models developed in the field of education in general have been reorganized due to its structure based on kinetic (motor) development and teaching through physical activities, as well as being used in the field of physical education. When the literature on physical education in education is scanned, in the organization of learning and teaching activities; It is seen that concepts such as strategy, approach, model, method, technique, style and tactics come to the fore and are used (Cengiz & Serbes, 2014). The concept of "style" nowadays; In the education system where individual differences are gaining importance, in general terms, it is seen that the preference of the individual in using his talents is expressed as the way he prefers to use when applying his knowledge and skills (Fer, 2005). teaching style; It is expressed as the behaviors that teachers display continuously and consistently in their communication and interactions with their students during the learning and teaching process (Grasha, 2002). teaching style; It is an indicator of how the teacher presents information and the quality of communication and interaction with students (Felder, 2002). Teaching style and teaching method are two different but complementary terms. As a sports trainer, the physical education teacher is an expression of the trainer's style, personal philosophy and goals, and individuality. In some cases, teaching style and teaching method are confused. Teaching method is related to the techniques and ways the teacher uses, such as books, auditory and visual aids, to reveal a certain subject or skill (Demirhan, 2006). Style, in other words, style is the personal characteristic of the individual. Therefore, it generally contains an invariable feature (Dunn et al., 1989). In order to understand the structure of teaching styles, it is necessary to know each of its sub-stages. This structure, which is built on effectiveness, also shows an attitude that values attitude, reveals the level of awareness and prioritizes being vigilant while doing all these. In this case, the teacher should consider this situation first for himself, then for his class, then for others and his environment (Butler, 1987).

The main goal of trainers and physical education teachers is to help students reach the desired goals in terms of psychomotor, cognitive and affective aspects. To maximize learning efficiency, coaches and physical education teachers must determine which type of goal will yield results for a larger number of students. Choosing the appropriate goals is one of the most important decisions teachers have to make, but it is also one of the most overlooked. It is stated in the literature that the practical practices of trainers are based on a theoretical framework and this theoretical framework provides a general design and logical approach to teaching and learning (Lyle, 2002; Mosston & Ashworth, 2002). It also provides clarity on the purpose and organization of activities that increase student interest, collaboration, and managerial effectiveness and encourage more legitimate assessments of learning (Metzler, 2000; Mosston & Ashworth, 2002). Teaching strategies can be named as any method and technique used by teachers and coaches to achieve the goals of the lesson or training (Guven, 2008). As it is seen that teaching strategies vary from teacher to teacher, from coach to coach, the way they are used can also change from environment to environment (Şahin, 2007).

Table 1. Relation of Basic Teaching Approaches-Method/Technique-Outcome

Approaches	Method/Techniques	Gains		
		Cognitive	Affective	Psychomotor
Presentation	Lectures, Demonstration, Question and answer, Interview, Case study, Symposium, Discourse	Knowledge	Taking	arousal
Finding	Discussion, Case study, Scenario, Question and answer, Interview, Debate, Opposition panel	Comprehension, Analysis, Synthesis	Do not react Valuation	All steps
Research review	Problem Solving, Project, Travel Observation, Demonstration, Case Study,Experiment, Brainstorming, Interview	Application, Analysis, Synthesis, Evaluation	Organizing Personalizing	All steps

Expository Teaching Approach; It is a teaching method in which the student is secondary. In this method, their roles are clearly defined, the teacher or coach makes decisions and the students follow these rules, the teacher and the coach are the leaders (Demirhan, 2006). It can be said that the teaching approach by presentation is an effective teaching

method as it facilitates the establishment of learning on solid foundations and increases permanence (Bilen, 1999). Students are given information that is very carefully arranged in a specific sequence, in a specific order, and using a regular hierarchy. It refers to the process of giving in a ready-to-receive condition by students. The information is explained by the teacher and it expresses the process interpreted by the students (Fidan, 1998; Kaya, Erdik, 2014). It is known that in the presentation strategy, it is directed by asking questions to attract the attention of the student. It is stated in the studies that the student learns when he pays attention and attention is directed, even if he does not have sufficient motivation. In order to organize meaningful learning in the presentational teaching process; The information to be taught must have integrity and meaning in itself, and there must be a positive preparation from the students for meaningful learning (Özakpınar, 1987; Kaya, Erdik, 2014). The approach to teaching by presentation; It is seen as an important feature as it can provide students with a large amount of information in a short time and ensure that students learn by making sense of the information. However, if student and teacher interaction is not sufficient, it is an important point to consider that it turns into a completely teacher-centered teaching process (Aydın, 2001; Erden and Akman, 1997; Ausubel and Robinson, 1969).

Invention Teaching Strategy; The main goal in this learning is that the individual is active in the learning process. In this process, the importance of turning the desire to learn into an internal motivation by the individual becomes evident. Invention method; It refers to the teaching process, which includes the process in which the teaching environment is organized in a way to choose the subject and give the students the opportunity to make inventions. In learning by discovery, it is argued that the desire to learn is an internal motif and that the individual can find the source and reward of this motif in his own work. It is mentioned that internal reinforcements are more important than external reinforcements in learning. It is emphasized that the pleasure of success as a result of solving a question on the subject on one's own without direct help from any individual, realizing a new knowledge by oneself, and discovering knowledge is an internal reinforcement that increases motivation for that individual (Bruner, 1968). The discovery teaching strategy is inductive and requires more attention when applying than the presentation approach. It is seen that the correct use of the given directives, the teachers and trainers having sufficient knowledge and skills about this strategy constitute important technical issues for successful results in this method (Bilen, 1993).

As a result; In the literature, "Physical Education Teaching-Teaching Physical Education", in their work Mosston and Ashworth (2008), it has been used by teacher training institutions and physical education teachers, where the styles for physical education teaching are explained.

This book describes 11 teaching styles used in physical education teaching. These styles are styles A through K; A; command style, B; practice style, C; working style, D; self-monitoring style, E; participation style, F; directed invention style, G; problem solving (one right style), H; problem solving (different paths generation style), I; student's design style, J; student initiation style, K; self-teaching style. The previously acquired knowledge from A to E is re-disclosed; These are the styles in which basic skills are acquired, traditional culture is continued, previous achievements are put forward by the student, definitions and classifications are made, and mostly past and present information are dealt with. From F-to-K are seen as teaching styles in which new information is produced. Styles F and G involve the discovery of single-correct concepts, while styles H to K involve students' exploration, alternative constructs and interacting with new concepts. In short, styles from F to K include experiences of discovering information (Mosston & Ashworth, 2008; Saraç & Mustu, 2013). It is seen in the literature that physical education teachers and coaches mainly use teaching methods based on behavioral approaches in skill teaching (Cassidy et al., 2009; Cothran, Kulinna and Ward, 2005; Demirhan et al., 2008). Mosston's teaching styles provide a conceptual perspective of the teaching methods used by coaches and physical education teachers. Although it is primarily designed for physical education teachers, it is stated that it is also suitable for use in other fields of sports education (Mosston & Ashworth, 2008; 2002). If the development processes of all children in the world are in the same direction at similar ages, why are some countries more successful in terms of sports? At this point, when the countries that are successful in the Olympics or other sports competitions are examined, it is seen that there are suitable sports

fields, sports culture has developed since childhood, and appropriate educational environments and programs have been designed. For this reason, in this study, it is aimed to examine the subject on the education and training department. It has been tried to find answers to some questions about education programs by researching the teaching styles of physical education teachers and coaches working in appropriate education-training areas. Mosston and Ashworth (2008) in their work named "Physical Education Teaching-Teaching Physical Education" used in the field of physical education and sports, in which the styles of physical education teaching are explained and the teaching styles used by teacher training institutions and physical education teachers until today, physical education teachers in this study. analyzed comparatively for teachers and coaches.

Reported knowledge of coaches varies considerably according to sport types. In general, it is seen that the strategy method in which the trainer is in the center, that is, behaviorist and learning is centered, and it is based on social, cognitive and constructivist (humanistic) learning theories (Kılıç and İnce, 2019). In order to better understand what kind of learning the teaching strategies developed by the trainers in the field of training serve, it is necessary to understand the basic approaches on which these learnings are based. For this reason, are there any similarities or differences between physical education teachers and coaches' perceptions of the teaching styles and styles they use in developing educational approaches? When the literature is scanned to reach the answers to these questions, it is seen that many studies focus on teachers' teaching styles and studies covering coaches' teaching styles are not sufficient.

As a result of scanning and examining the literature, the aim of this study is to examine the level of use of teaching styles by physical education teachers and coaches and their value perceptions regarding these styles, by comparing them according to group, gender and age variables. In addition, the second aim is to discuss how teachers' and coaches' use of styles and their value perceptions about styles can affect 'Physical Education Teacher and Trainer Education Programs'. The research questions that guide this research are: 1) What are the similarities and differences in the teachers' and coaches' level of use of teaching styles and their perceptions of value? 2) Does the group, gender (male, female), age, educational background (language, postgraduate) of teachers and coaches make a difference in their level of use of teaching styles and in the effect of teaching styles on value perceptions? 3) Is there a difference between teachers' and coaches' perceptions of the styles according to their use of teaching styles (using or not using them)?

In this study, it is aimed to create new resources for the field by examining the teaching styles of physical education teachers and coaches, to make necessary suggestions for trainers and physical education teachers training programs based on the findings, and to be a reference resource for trainers and physical education teachers and candidates.

METHOD

Sample

In this study, a total of 129 participants, 90 teachers working in the Directorate of National Education in the center of Edirne and 39 trainers working in the Provincial Directorate of Youth and Sports, were selected by convenience sampling method and participated on a voluntary basis. The teachers and coaches in the sample group have undergraduate and graduate education, minimum 5 years of professional experience and their own life stories. In addition, as Mosston and Ashworth (2008) stated in their book "Physical Education Teaching-Teaching Physical Education", it was assumed that they understood the teaching styles and formed a philosophy accordingly. The sample of the study consisted of 129 physical education teachers (90) from Edirne Provincial Directorate of National Education (centre) and trainers (39) working in Edirne Provincial Directorate of Youth Services and Sports in 2019, who agreed to participate in the study voluntarily. Of the participants, 72 (55.8%) were male and 57 (44.20%) were female. 3.9% of the participants are in the 20-25 age range, 11.6% are in the 26-30 age range, 24.0% are in the 31-35 age range, 19.4% are in the 36-40 age range, and 41% ,1 of them are over 41 years old. 93.8% of the participants have undergraduate and 6.2% graduate education.

Data collection tool

As a data collection tool, the “Physical Education Teachers’ Use of Teaching Styles and Perceptions of Styles Questionnaire” (Kulinna and Cothran, 2003) adapted into Turkish by İnce and Hünük (2010) and the "Teaching Methods Scale of Trainers Used by Trainers" developed by Kılıç and İnce (2019) “Coaches’ Use of Teaching Methods

Scale – Athlete Perception Version (CUTEMS – ATHLETE)" is used. It is limited to features measured on this scale. While the 11 teaching styles in the data collection form specific to teachers are divided into 11 factors (İnce & Hünük, 2010), the scale form adapted for coaches collects 11 styles into 3 factors (Kılıç & İnce, 2019). A questionnaire form containing a total of 11 scenarios belonging to each teaching style and 4 questions answered on a 5-point Likert scale (never, rarely, sometimes, often, always) was used. Survey questions; In order to evaluate the level of using the teaching style of physical education teachers and coaches, the question "I am teaching physical education lesson with this method" is the first question, and the second, third and fourth questions; There are questions that enable physical education teachers and coaches to determine the "value perceptions" of the style, related to the fact that the relevant style makes the lesson fun for students (entertainment), helps to learn skills and concepts (learning), and motivates students to learn (motivation). The item assessing the level of using the teaching style of physical education teachers and coaches is analyzed in two ways. While the first is examined by taking the average value on a 5-point Likert scale, the second is those who give the answer "never" and do not use, and those who answer as "rarely", "sometimes", "often" and "always" are coded as users, and those who give the answer "never" are used and those who do not use it. This is done by creating "groups". Value perception levels are examined by taking the average of the value obtained from the sum of the three related items (minimum 3, maximum 15) and the value (minimum 1, maximum 5) obtained from each item (entertainment, learning, motivation) (İnce and Hünük, 2010).

Data collecting

T.U. After obtaining approval from the Social Sciences Ethics Committee, necessary official permissions were obtained from the Edirne Directorate of National Education and the Edirne Provincial Directorate of Youth and Sports. While evaluating the findings of this study, it is necessary to pay attention to some limitations regarding the sample selection and data collection tool in the study. The study sample includes Edirne NED physical education teachers and YSPD trainers, and the findings can be generalized to this sample only. Since the data collection tool is a questionnaire, the limitations of the studies conducted by means of questionnaire data collection are also valid for the findings of this study. The limitations of the studies on the teaching styles used by the trainers and the value perceptions of the styles should also be taken into consideration. The questionnaires were applied to physical education teachers by visiting schools in Edirne Center and by going to the training work areas of Edirne YSPD trainers. After explaining the content of the study to physical education teachers and trainers, it was stated that participation in the study was on a voluntary basis. The questionnaires were filled in by the teachers and coaches who volunteered to participate in the study and delivered to the researcher. The time it takes physical education teachers and coaches to fill out the questionnaires is approximately 15 minutes.

Data analysis

First of all, using descriptive statistical methods, "the level of use of physical education teachers and coaches' teaching styles, their value perceptions about styles" was analyzed. Before the analysis of the data set, it was tested whether the relevant variables fit the normal distribution in order to determine the statistical method to be used. At this stage, Kolmogorov-Smirnov and Shapiro-Wilk tests were used. The critical value was p=0.05. As a result of the test, it was accepted that if the p values obtained for the relevant variables were greater than 0.05, the data conformed to the normal distribution, and if it was small, it did not conform to the normal distribution. Since the data set did not conform to the normal distribution, non-parametric methods "Kruskal-Wallis" and "Mann-Whitney U" tests were used for comparisons between groups. The first research question was analyzed using descriptive statistics (mean and standard deviation) methods, first of all, the differences in "the level of teachers' and coaches' use of teaching styles and their perceptions of value regarding styles". Depending on this question, the differences and similarities between the use of different teaching styles and between value perceptions (comparing) were examined using the MANN-WHITNEY test. The second research question was analyzed with the KRUSKAL-WALLIS and MANN-WHITNEY tests, in terms of the different and similar aspects (comparing) of the teachers and coaches on the level of using teaching styles according to group, gender, age, educational status and the effect of teaching styles on value perceptions. The third research question was to examine the "different and similar aspects (comparing) between the value perceptions of the styles according to the teachers' and coaches'

use of teaching styles", and for teachers and coaches those who do not use each teaching style (Never) and "Users" (Rarely, Occasionally). sequence, Frequently, and Always). Then, the value perceptions of those who do not use each style and those who use it were compared using the MANN-WHITNEY test (p<.05). İnce and Hünük (2010) found the internal consistency (Cronbach Alpha) of the questionnaire in the dimension of value perception of each style between .86 and .95. In this study, the Cronbach's alpha reliability coefficient value = 0.820.

RESULTS

Use of Instructional Styles and Value Perceptions of Styles

* The lowest value that the use of teaching styles can be taken is 1 and the highest value is 5.

** The lowest value from which the perception of values for styles can be obtained is 3, and the highest value is 15.

Table 2. Descriptive Statistics Table for "Use" and "Value Perceptions" Scores

	Use			Value Perceptions		
Use	n	Mean	sd.	n	Mean.	sd
Command	**129**	**4,02**	**1,02**	**129**	**12,43**	**2,24**
Exercise	**129**	**3,58**	**1,23**	**129**	**11,82**	**3,01**
Co-Working	129	2,84	1,01	129	10,18	2,55
Self-Control	129	2,75	1,16	129	9,37	3,31
Participation	129	3,14	1,23	129	10,43	3,19
Directed Invention	129	2,81	1,27	129	9,69	3,29
Problem Solving: One Straight	129	2,69	1,21	129	9,65	3,14
Problem Solving: Different Paths Generation	129	2,86	1,20	129	9,73	3,01
Student's Design	129	2,68	1,22	129	9,52	3,27
Student Initiation	**129**	**2,47**	**1,37**	**129**	**8,66**	**3,74**
Self-Teaching	**129**	**1,81**	**1,18**	**129**	**6,67**	**3,70**

As can be seen in Table 2, the most used styles are command (avg:4.02; sd.1.029 and practice (avg: 3.58; sd: 1.23), the least used styles are self-teaching (avg: 1. 81; sd: 1.18) and student's initiation (average: 2.47; ss: 1.37). Also the most valued styles are command (avg:12.43;nd:2.24) and practice (avg:11.82;nd:3.01), while the least valued styles are self-teaching (avg:6.67;nd:3, 70) and student's initiation (average:8.66;sd:3.74).

Table 3. Ranking the Average Value Perceptions of the Styles for Students in the Dimensions of Providing "Entertainment", "Learning" and "Motivation" from High to Low

Entertainment			Learning			Motivation		
Learning Styles	Ort.	ss.	Learning Styles	Ort.	ss.	Learning Styles	Ort.	ss.
Command	3,93	1,01	Command	4,14	,87	Command	4,36	,69
Exercise	3,80	1,20	Exercise	3,92	1,01	Exercise	4,10	1,08
Participation	3,44	1,17	Participation	3,47	1,12	Participation	3,62	,99
Co-Working	3,24	,91	Co-Working	3,32	,91	Participation	3,53	1,19
Problem Solving: Generating Different Paths	3,17	1,05	Student's Design	3,25	1,13	Directed Invention	3,46	1,20
Directed Invention	3,05	1,16	Problem Solving: Generating Different Paths	3,22	1,02	Problem Solving: One Straight	3,39	1,17
Problem Solving: One Straight	3,05	1,13	Problem Solving: One Straight	3,22	1,11	Problem Solving: Generating Different Paths	3,34	1,11
Student's Design	3,02	1,15	Directed Invention	3,18	1,14	Self-Control	3,28	1,23
Self-Control	2,99	1,12	Self-Control	3,10	1,16	Student's Design	3,25	1,24
Student Initiation	2,71	1,26	Student Initiation	2,96	1,31	Student Initiation	2,99	1,38
Self-Teaching	2,21	1,29	Self-Teaching	2,20	1,24	Self-Teaching	2,26	1,34

As seen in Table 3, in the dimensions of providing students "Entertainment", "Learning" and "Motivation"; command in terms of motivation (avg: 4.36; sd: .69), practice (avg: 4.10; ss: 1.08) and paired work (avg: 3.62; sd: .99), command in terms of learning (mean:4.14; nd: .87), practice (avg: 3.92; nd: 1.01) and participation (avg: 3.47; sd: 1.12), command in terms of entertainment (avg: 3. 93; nd: 1.01), exercise (mean: 3.80; nd: 1.20) and participation (mean: 3.44; nd: 1.17) styles were given the highest value.

Table 4. The Mann-Whitney Test Results Regarding the Comparison of the Value Perceptions of Styles and the Average Scores of the Teaching Styles Used by the Group (Teacher and Ant: Trainer) Variable

	Value Perceptions Regarding Styles						Use of Instructional Styles				
	Group	n	Mean	sd.	Z	p	n	Mean	sd.	Z	p
Command	Teacher	90	12,88	2,15	**-3,573**	**0,001***	90	4,30	,77	**-4,432**	**0,001***
	Coach	39	11,38	2,10			39	3,36	1,20		
Exercise	Teacher	90	11,86	3,34	-1,31	0,191	90	3,73	1,23	**-2,438**	**0,015***
	Coach	39	11,74	2,09			39	3,23	1,16		
Co-Working	Teacher	90	9,90	2,87	-1,852	0,064	90	2,81	1,08	-0,505	0,613
	Coach	39	10,82	1,41			39	2,92	,84		
Self-Control	Teacher	90	9,08	3,75	-1,054	0,292	90	2,62	1,25	-1,761	0,078
	Coach	39	10,05	1,85			39	3,05	,86		
Participation	Teacher	90	10,19	3,58	-0,919	0,358	90	3,07	1,33	-0,789	0,43
	Coach	39	11,00	1,97			39	3,31	,95		
Directed Invention	Teacher	90	9,46	3,46	-1,354	0,176	90	2,67	1,27	**-1,984**	**0,047***
	Coach	39	10,23	2,84			39	3,15	1,23		
Problem Solving: One Straight	Teacher	90	9,24	3,38	**-2,302**	**0,021***	90	2,66	1,30	-0,628	0,53
	Coach	39	10,59	2,28			39	2,77	,99		
Problem Solving: Generating Different Paths	Teacher	90	9,13	3,16	**-3,242**	**0,001***	90	2,69	1,21	**-2,26**	**0,024***
	Coach	39	11,10	2,06			39	3,26	1,12		
Student's Design	Teacher	90	9,42	3,67	-0,582	0,561	90	2,67	1,31	-0,462	0,644
	Coach	39	9,74	2,07			39	2,72	1,02		
Student Initiation	Teacher	90	8,29	4,01	**-1,956**	**0,050***	90	2,42	1,45	-0,851	0,395
	Coach	39	9,51	2,87			39	2,56	1,19		
Self-Teaching	Teacher	90	5,50	3,30	**-5,619**	**0,001***	90	1,53	,96	**-3,954**	**0,001***
	Coach	39	9,38	3,15			39	2,46	1,37		

* Use; The lowest value that can be taken is 1 and the highest value is 5.
** Value Perceptions; The lowest value that can be taken is 3 and the highest value is 15.

When the comparison of value perceptions regarding styles according to the group variable in Table 4 is examined, the "Command ($p<0.01$)" style average scores differ from the average score of the teachers (average:12.88;sd:2.15), and the mean score of the coaches (mean:11,38; nd:2,10) is seen to be significantly high. "Problem solving: One Right ($p<0.05$)" style mean score is significantly higher than the mean score of teachers (mean:9.24; sd:3.38), and the mean score of coaches (mean:10.59;sd:2.28). low, "Problem Solving: Different Ways Production ($p<0.01$)" style mean score of teachers (average: 9.13; sd:3.16) is higher than the mean score of coaches (mean:11.10; sd:2.06). In terms of "Student Initiation ($p<0.05$)" style mean score, which is significantly lower, the mean score of teachers (mean: 8.29; sd: 4.01) is higher than the mean score of coaches (mean 9.51; sd :2.87), the average score of the teachers (mean:5.50;sd:3.30) in terms of the "Self-Teaching ($p<0.01$)" style average score, which was significantly lower than the mean score of the coaches (average: 2.87) :9.38; ss:3.15) is seen to be significantly lower.

In addition, when the average scores of the teaching styles they use according to the "Group" variable are compared, the average score of the teachers in terms of the "Command ($p<0.01$)" style average score is compared to the average score of the coaches (average: 4.30; sd: .77). mean: 3.36; sd: 1.20), the mean score of teachers (mean: 3.73; sd: 1.23) in terms of "Exercise ($p<0.05$)" style mean scores, which was significantly higher, compared to coaches. significantly higher than the mean score (mean: 3.23; SD: 1.16), In terms of "Guided Invention ($p<0.05$)" style average scores, the average score of the teachers (mean: 2.67; sd: 1.27) is higher than the mean score of the coaches (mean: 3.15; sd: 1.23). In terms of "Problem Solving: Generating Different

Ways (p<0.05)" style mean score, the mean score of the teachers (mean: 2.69; sd: 1.21) is significantly lower than the mean score of the coaches (mean: 3 ,26; sd: 1.12), the mean score of teachers (mean: 1.53; sd: .96), the mean score of coaches in terms of "Self-Teaching (p<0.01)" style mean scores score (mean: 2.46; sd: 1.37) is seen to be significantly lower.

Table 5. Mann-Whitney Test Results Regarding the Comparison of the Average Scores of Teaching Styles, Value Perceptions and Use of Teaching Styles by Gender

	Value Perceptions Regarding Styles						Use of Instructional Styles				
Gender (value perceptions).	Gender	n	Mean	sd.	Z	p	n	Mean	sd.	Z	p
Command	Male	72	12,43	2,32	-0,104	0,917	72	4,13	,89	-0,995	0,32
	Female	57	12,42	2,15			57	3,88	1,15		
Exercise	Male	72	11,86	3,20	-0,555	0,579	72	3,64	1,26	-0,798	0,425
	Female	57	11,77	2,78			57	3,51	1,20		
Co-Working	Male	72	9,89	2,55	-1,806	0,071	72	2,81	,99	-0,544	0,586
	Female	57	10,54	2,52			57	2,89	1,05		
Self-Control	Male	72	9,17	3,34	-0,726	0,468	72	2,67	1,10	-0,839	0,402
	Female	57	9,63	3,29			57	2,86	1,23		
Participation	Male	72	10,28	3,32	-0,668	0,504	72	3,06	1,23	-0,903	0,367
	Female	57	10,63	3,05			57	3,25	1,23		
Directed Invention	Male	72	9,35	3,26	-1,269	0,204	72	2,65	1,29	-1,613	0,107
	Female	57	10,12	3,32			57	3,02	1,23		
Problem Solving: One Straight	Male	72	9,65	3,17	-0,266	0,79	72	2,71	1,20	-0,31	0,757
	Female	57	9,65	3,13			57	2,67	1,23		
Problem Solving: Generating Different Paths	Male	72	9,60	2,87	-0,538	0,591	72	2,79	1,17	-0,659	0,51
	Female	57	9,89	3,19			57	2,95	1,25		
Student's Design	Male	72	9,75	3,28	-1,073	0,283	72	2,78	1,15	-1,188	0,235
	Female	57	9,23	3,25			57	2,56	1,31		
Student Initiation	Male	72	8,61	3,74	-0,091	0,928	72	2,53	1,40	-0,534	0,593
	Female	57	8,72	3,76			57	2,39	1,33		
Self-Teaching	Male	**72**	**6,04**	**3,42**	**-2,159**	**0,031***	**72**	**1,63**	**1,00**	**-1,956**	**0,05***
	Female	**57**	**7,47**	**3,92**			**57**	**2,05**	**1,34**		

As can be seen in Table 5, the average score of the "Self-Teaching (p<0.05)" style of teaching style value perceptions according to the variable of "Gender" for men (mean: 6.04; sd: 3.42) was compared to women. It is seen that it is significantly lower than the mean score (mean: 7.47; sd: 3.92) of In addition, according to the "Gender" variable, the use of teaching styles in terms of the "Self-Teaching (p<0.05)" style mean score for men (mean: 1.63; sd: 1.00), compared to the mean score for women (mean: 2.05; ss: 1.34) is seen to be significantly lower.

Table 6. Kruskal-Wallis Test Results on the Comparison of Value Perceptions of Styles According to the Variable of "Age Group" and the Average Scores of the Teaching Styles They Use

	Value Perceptions Regarding Styles							Use of Instructional Styles					
	Age group	n	Mean	Sd.	Chi Square	p	Difference	n	Mean	sd.	Chi Square	P	Difference
Commond	20-25	5	12,20	1,10	2,908	0,573	-	5	4,20	,45	2,579	0,631	-
	26-30	15	12,60	2,50				15	4,00	1,13			
	31-35	31	12,10	1,92				31	3,81	1,11			
	36-40	25	13,00	1,87				25	4,28	,79			
	41 ve üzeri	53	12,32	2,56				53	4,00	1,06			
Exercise	20-25	5	9,60	3,29	4,039	0,401	-	5	2,60	,89	5,091	0,278	-
	26-30	15	12,00	2,56				15	3,40	1,30			
	31-35	31	11,71	2,81				31	3,52	1,34			
	36-40	25	11,32	3,97				25	3,56	1,36			
	41-	53	12,28	2,66				53	3,77	1,09			
Co-Working	20-25	5	10,20	4,09	2,516	0,642	-	5	3,00	1,22	0,664	0,956	-
	26-30	15	10,53	2,20				15	2,80	1,08			
	31-35	31	10,10	2,29				31	2,84	,82			
	36-40	25	9,64	2,43				25	2,92	1,04			
	41 -	53	10,38	2,73				53	2,81	1,09			
Self-Control	20-25	5	6,20	3,27	5,48	0,241	-	5	2,00	1,00	3,072	0,546	-
	26-30	15	10,00	2,80				15	3,00	1,25			
	31-35	31	9,16	3,11				31	2,71	1,04			
	36-40	25	9,12	3,32				25	2,72	1,31			
	41 -	53	9,74	3,48				53	2,79	1,15			
Participation	20-25	5	8,80	3,27	7,406	0,116	-	5	2,80	1,30	6,933	0,139	-
	26-30	15	11,53	2,70				15	3,73	1,16			
	31-35	31	9,32	3,53				31	2,77	1,20			
	36-40	25	10,48	2,71				25	3,20	1,29			
	41 -	53	10,91	3,19				53	3,19	1,19			
Directed Invention	20-25	5	8,60	4,62	6,183	0,186	-	5	2,80	1,64	2,979	0,561	-
	26-30	15	11,07	3,17				15	3,00	1,46			
	31-35	31	9,55	3,03				31	2,87	1,15			
	36-40	25	8,80	3,48				25	2,44	1,26			
	41 -	53	9,91	3,22				53	2,91	1,27			
Problem Solving: One Straight	20-25	5	9,60	2,51	2,026	0,731	-	5	2,40	1,52	2,183	0,702	-
	26-30	15	10,27	3,97				15	2,87	1,51			
	31-35	31	9,84	3,24				31	2,52	1,00			
	36-40	25	8,88	3,55				25	2,56	1,33			
	41 -	53	9,74	2,69				53	2,83	1,17			
Problem Solving: Generating Different Paths	20-25	5	8,80	4,02	4,193	0,381	-	5	2,60	1,52	5,416	0,247	-
	26-30	15	10,40	3,14				15	3,27	1,22			
	31-35	31	9,84	2,96				31	3,03	1,08			
	36-40	25	8,64	3,51				25	2,48	1,36			
	41 -	53	10,08	2,59				53	2,85	1,15			
Student's Design	20-25	5	7,40	3,21	**11,044**	**0,026***	**2-1 2-3**	5	2,00	1,22	**14,43**	**0,006***	**2-1 2-3 2-4**
	26-30	15	11,20	3,41				15	3,47	1,13			
	31-35	31	8,35	3,27				31	2,23	1,06			
	36-40	25	9,08	3,15				25	2,44	1,08			
	41 -	53	10,13	3,01				53	2,91	1,27			
Student Initiation	20-25	5	8,20	4,09	4,42	0,352	-	5	2,20	1,64	5,509	0,239	-
	26-30	15	10,13	4,56				15	3,20	1,74			
	31-35	31	8,06	3,22				31	2,10	1,11			
	36-40	25	7,84	4,00				25	2,36	1,38			
	41 -	53	9,02	3,58				53	2,55	1,32			
Self-Teaching	20-25	5	6,00	3,32	3,919	0,417	-	5	1,60	,89	4,363	0,359	-
	26-30	15	6,47	4,31				15	1,60	1,24			
	31-35	31	6,48	3,45				31	1,71	1,04			
	36-40	25	5,96	4,19				25	1,68	1,25			
	41 -	53	7,25	3,51				53	2,02	1,23			

As seen in Table 6, the average value of the participants in the 26-30 age group (mean: 11.20; sd: 3.41) in terms of the average scores of the "Student's Design ($p<0.05$)" style according to the "Age Group" variable).

It is seen that the average values of the participants in the 20-25 (mean:7.40; SD: 3.21) and 31-35 (mean:8.35; SD: 3.27) age groups are significantly higher than the average values.

Table 7. Kruskal-Wallis Test Results on the Comparison of Value Perceptions of Styles and Average Scores of Teaching Styles According to the Variable of "Educational Status"

		Value Perceptions Regarding Styles					Use of Instructional Styles				
	Educational Status	n	Mean	sd.	Z	p	n	Mean	sd.	Z	P
Commond	Degree	121	12,44	2,20	-0,125	0,901	121	4,03	,98	-0,256	0,798
	Graduate	8	12,25	2,92			8	3,75	1,49		
Exercise	Degree	121	11,81	2,95	-0,576	0,564	121	3,56	1,22	-0,877	0,38
	Graduate	8	12,00	4,11			8	3,88	1,46		
Co-Working	Degree	121	10,17	2,57	-0,243	0,808	121	2,85	1,03	-0,358	0,72
	Graduate	8	10,38	2,39			8	2,75	,71		
Self-Control	Degree	121	9,30	3,36	-0,656	0,512	121	2,75	1,18	-0,015	0,988
	Graduate	8	10,50	2,27			8	2,75	,89		
Participation	Degree	121	10,49	3,16	-0,681	0,496	121	3,18	1,24	-1,744	0,081
	Graduate	8	9,63	3,78			8	2,50	,76		
Directed Invention	Degree	121	9,79	3,32	-1,363	0,173	121	2,83	1,29	-0,651	0,515
	Graduate	8	8,13	2,53			8	2,50	,93		
Problem Solving: One Straight	Degree	121	9,65	3,16	-0,212	0,832	121	2,68	1,23	-0,583	0,561
	Graduate	8	9,63	2,92			8	2,88	,99		
Problem Solving: Generating	Degree	121	9,69	3,01	-0,534	0,593	121	2,85	1,22	-0,382	0,702
	Graduate	8	10,25	3,20			8	3,00	1,07		
Student's Design	Degree	121	9,43	3,31	-1,211	0,226	121	2,65	1,24	-1,266	0,206
	Graduate	8	10,88	2,30			8	3,13	,83		
Student Initiation	Degree	121	8,70	3,71	-0,428	0,669	121	2,48	1,39	-0,348	0,728
	Graduate	8	8,00	4,34			8	2,25	1,16		
Self-Teaching	Degree	121	6,69	3,71	-0,222	0,824	121	1,80	1,17	-0,137	0,891
	Graduate	8	6,50	3,85			8	2,00	1,41		

When looking at the comparison of the value perceptions of the styles and the average scores of the teaching styles they use according to the variable of "Educational Status" in Table 7, Command", "Exercise", "Paired Work", "Self-Control", "Participation", "Guided Invention", " Problem Solving: One Right", It is seen that there is no statistically significant difference ($p>0.05$) in terms of the mean scores of value perceptions related to "Problem Solving: Generation of Different Ways", "Student Design", "Student Initiation", "Self-Teaching" styles.

DISCUSSION

The findings of the study revealed the teaching styles used by coaches and physical education teachers in Edirne in 2019 and their value perceptions regarding these styles. According to the findings, the most valued styles were command and exercise, and the least valued styles were self-teaching and student initiation. It is seen that the most used styles are command and exercise, and the least used styles are self-teaching and student initiation. In the dimensions of providing students "Entertainment", "Learning" and "Motivation"; In terms of motivation, command, exercise and co-working, command, practice and participation in terms of learning, command, exercise and participation styles in terms of entertainment are seen the most valued. As a result, the choice of command and exercise styles as the most used and valued styles, and the desire of teachers and coaches to increase control over students can be seen as the main reason for these styles. For this reason, it is

important that teachers and coach candidates who continue their education in the physical education teaching and coaching program are given the opportunity to find application in different courses they take during their education period, and that other teaching styles are explored and experienced strategically. When the literature is examined, it is seen that they prefer to use presentational styles more in their teaching style preferences (Cothran et al., 2005; Hein et al., 2012), whereas in the study conducted in Finland, teachers' "Command", "Exercise", "Problem Solving: different roads production" styles (Kullina and Cothran, 2003; Jaakkola, 2011). In our study, it is seen that the most used styles and their value perceptions are similar. In the study conducted on Turkish and American teachers, it is stated that teachers in Turkey prefer experts, authoritarians and guides at a high level, personal models and representatives at a moderate level, while teachers in the USA prefer them low in authority and high in other dimensions (Güncel, 2013). In general, student-centered teaching styles are preferred more than teacher-centered teaching styles, the most preferred teaching style is guidance teaching style, and the least preferred teaching style is personal teaching style (Süral, 2013). In another study, it is stated that guiding, expert and representative teaching styles are preferred at a high level (86.2%), while personal and authoritative teaching styles are preferred at a moderate level (Altay, 2009). In the study of Bilgin and Bahar (2008), expert, guiding and representative stated that they were high, personal model and authoritarian teaching styles were moderate. Many international studies have been conducted on the teaching styles put forward by Mosston and Ashworth (2008), and these studies have compared the styles with each other. The findings of these studies, for example; Problem Solving: Different Ways Generating Style revealed that it had a positive effect on students' producing different solutions to the problem (Papaioannou, Theodosiou, Pashali, & Digelidis, 2012; Kolovelonis, Goudas and Gerodimos, 2011). Studies conducted in our country in the field of physical education have also revealed that teachers prefer teacher-centered styles (Demirhan et al., 2008; Yoncalık, 2009). In addition, in Mendoza's (2004) study, it was stated that the majority of teachers preferred teacher-centered teaching styles. It differs with the work done. Because the most used styles in the study are command and exercise, and the least used styles are self-teaching and student initiation. It is also seen that the least valued styles are student initiation and self-teaching (Table 2). In the study in which "teaching styles used by pre-service teachers studying in physical education teaching and certificate programs" were examined, there was no difference in terms of styles used and value perception according to the gender variable (Yıldızer et al. 2017), it is seen that they are not similar to our study. Because, when the values given to the teaching styles in our study were analyzed according to the gender variable, it was seen that the average score of the self-teaching style was significantly lower than the mean score of the women in terms of the mean score of the self-teaching style, and the mean score of the men was higher than the mean score of the women in terms of the mean scores of the use of teaching styles. appears to be significantly low. Continuing to examine according to the gender variable, Saraç and Mustu (2013) stated in their study that female participation style, student design and self-teaching styles were preferred more by male candidates. In addition, in the value perceptions of male and female physical education teacher candidates towards teaching styles, there is a difference in the male candidates' more positive value perception in participation, Student Design and Self-Teaching styles compared to female candidates. At this point, it appears to be similar to our study (Table 5).

In the study on the relationship between teachers' teaching styles and job satisfaction; While it was stated that all teaching styles were mostly preferred at a high level, only the authoritative teaching style was preferred among female and male teachers in favor of female teachers (Dinçer et al., 2017), while the perception of value and the styles used in the study were dominated by command and exercise styles (Dinçer et al., 2017). Table 2). In studies examining the relationships between teaching style variables and different demographic variables, it was observed that there was no significant difference between age and teaching style preference (Maden, 2012; McCaskey, 2009; Üredi, 2006; Watkins, 2006), while the mean score for men and the mean score for women in the study. It is seen that the score is significantly lower than the score (Table 5). In addition, it is seen that the most preferred teaching style in the game and physical activities lesson is the command and practice style (Dedeşah, 2020) and it is similar to the study.

As a result, the choice of command and exercise styles as the most used and valued styles, and the

desire of teachers and coaches to increase control over students can be seen as the main reason for these styles. For this reason, it is important that teachers and coach candidates who continue their education in the physical education teaching and coaching program are given the opportunity to find application in different courses they take during their education period, and that other teaching styles are explored and experienced strategically.

CONCLUSION

In this study, it is seen that the most used styles by coaches and physical education teachers and the values, command and exercise styles related to these styles. In ordering the average value perceptions of the styles in the dimensions of providing students with "Entertainment", "Learning" and "Motivation" from high to low, the most common styles are command, practice and co-work in terms of motivation, command, practice and participation in terms of learning, command, exercise and participation styles in terms of entertainment. appears to be valued. The fact that command and exercise styles increase the teacher's and coach's dominance over the student may be the main reason for these styles. In addition, the fact that teacher and coach candidates who continue their education in physical education teaching and coaching program have the opportunity to practice in different lessons they take during their education can be shown as the main reason that leads them to these styles such as "Problem solving: production of different ways". In addition, Grasha (1996) revealed in his studies that there is a relationship between teachers' teaching styles and their learning styles. For this reason, it would be beneficial to examine the relationship between physical education teachers and coaches' teaching styles and their learning styles as a new research topic and to share the findings as a literature. The teaching methods used by trainers are very important in the development of athletes in competitive sports environments. For this reason, it is necessary to examine the teaching methods used by coaches in different sports environments. Therefore, it will be useful in determining the professional needs of coaches.

This study should enable the development of a questionnaire that allows the use of teaching styles and value perceptions of trainers and physical education teachers in Turkey to be evaluated reliably and validly, and to compare them with the relevant characteristics of trainers and teachers in other countries. In addition, the education program of trainers and physical education teachers should support this in order to bring the multi-faceted development of individuals to the forefront in the curriculum, so that the student's learning by doing, experiencing and practicing can be highlighted in the restructured programs. It is recommended that the application dimension of learner-centered methods be transferred through in-service trainings before trainers and teachers start their profession. The reasons for the experienced teachers in the literature and the teacher candidates in this study to prefer teacher-centered styles should be examined in depth. In the training program, attention should be drawn to the use of styles in the method of invention of trainers. It should be noted that since the trainers are given training on developing the special skills of the students specific to the sports branch, they should be used to increase the performance in technical and tactical studies. As a result, it is thought that the results of this research will contribute to the making of new researches, and that the qualitative and quantitative studies to be conducted on this subject will contribute to the literature with comparisons.

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The Effect Of Plyometric And Tabata Training On Jump Performance, Respiratory Function Parameters On Aerobic Gymnasts

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Abstract

In this study, the effect of pliometric and tabata training applied to aerobic gymnasts between the ages of 12-14 on jump performance and respiratory function parameters was investigated. Actively competing in the study, mean age 12.8 ± 0.19 (year), average body weight 34.28 ± 1.46 (kg), average height 145.19 ± 2.29 (cm), average age for sports 7.14 ± 0.24 female gymnasts participated voluntarily. The subjects were randomly divided into 3 groups according to age groups. First group (A group), Technical + Pliometric training program, second group (B group), Technique + Tabata training program, third group (C group) control group applied only Technical training program. A total of 12 exercises were applied to the subjects for 6 weeks, 2 exercises per week. The subjects were tested for jump performance, 30 sec Bosco Test, respiratory function test and C group basic difficulty elements test, pre-test and post-test. In the evaluation of the data, analysis of variance was used in 3 x 2 repeated measures. The difference between the groups was determined by the Bonferroni test. As a result of the 6-week training, there was no significant difference in the control group according to the pre-test and post-test results, while in the pliometric training group and tabata training groups, active jump, 30 sec Bosco, tuck jump, cossack jump, pike jump and straddle jump group C There was a significant difference in performance, respiratory functions at FEV1 and FVC ($p<0.05$) levels, but no significance was found at other levels ($p>0.05$). As a result, it is recommended to trainers to use pliometric training for jumping strength and performance increase, tabata training method to increase the continuity of the series, reduce energy expenditure and increase anaerobic capacity.

Keywords: Aerobic Gymnastics, Plyometrics, Tabata, Respiratory Parameters

Aerobik Cimnastikçilere Uygulanan Pliometrik Ve Tabata Antrenmanlarının Sıçrama Performansı Ve Solunum Fonksiyon Parametreleri Üzerine Etkisi

Özet

Bu çalışmada 12-14 yaş arasındaki, aerobik cimnastikçilere uygulanan pliometrik ve tabata antrenmanlarının sıçrama performansı ve solunum fonksiyon parametreleri üzerine etkisi araştırılmıştır. Çalışmaya aktif olarak yarışan, yaş ortalaması 12,8±0.19 (yıl), vücut ağırlığı ortalaması 34,28±1,46 (kg), boy ortalaması 145,19±2,29 (cm), spor yaşı ortalaması 7,14±0,24 yıl olan 21 kadın cimnastikçi gönüllü olarak katılmıştır. Denekler rastgele yöntemle yaş gruplarına göre 3 gruba ayrılmıştır. Birinci grup

(A grubu), Teknik + Pliometrik antrenman programı, ikinci grup (B grubu), Teknik + Tabata antrenman programı, üçüncü grup (C grubu) kontrol gurubu sadece Teknik antrenman programı uygulamıştır. Deneklere 6 hafta boyunca, haftada 2 antrenman olmak üzere toplam 12 antrenman uygulanmıştır. Deneklere sıçrama performansı ölçümü, 30 sn Bosco Sıçrama Testi, solunum fonksiyon testi ve C grubu temel zorluk elementleri havada kalış süreleri testi, ön test ve son test olmak üzere yaptırılmıştır. Verilerin değerlendirilmesinde, 3 x 2 Tekrarlı ölçümlerde Varyans analizi kullanılmıştır. Gruplar arasındaki farklılık Bonferroni testi ile tespit edilmiştir. Yapılan 6 haftalık antrenmanların sonucunda, ön test ve son test sonuçlarına göre kontrol grubunda anlamlı farklılık bulunmazken, pliometrik antrenman gurubu ve tabata antrenman guruplarında, aktif sıçrama, 30 sn Bosco, tuck jump, cossack jump, pike jump ve straddle jump c grubu temel elementlerin sıçrama performanslarında, solunum fonksiyonlarında FEV1 ve FVC'de ($p<0.05$) düzeyinde anlamlı farklılık bulunmuş, diğer düzeylerde herhangi bir anlamlılık bulunmamıştır ($p>0.05$). Sonuç olarak antrenörlere, sıçramaya yönelik gücün ve performans artışının sağlanması için pliometrik antrenmanların, serinin devamlılığı, enerji harcamını azaltmak için ve anaerobik kapasiteyi arttırmak için tabata antrenman yönteminin kullanılması önerilmektedir.

Anahtar Kelimeler: Aerobik Cimnastik, Pliometrik, Tabata, Solunum Parametreleri

INTRODUCTION

Gymnastics sport is a branch of sport that depends on the ability to apply methodical, measured and regular exercises with intelligence and courage in its own competition equipment within the framework of certain rules. Although the training is divided into artistic, rhythmic and general branches; it consists of many movements and movement groups such as jumping, turning, handstand, leg and arm swings, flight, static stance (1). The advancement and development of technology provides an increase in scientific publications. The development of sports branches is in direct proportion to the increase in these characteristics. Gymnastics, which is one of these sports branches, is one of the sports branches that increase the number of success and medals with the development of technology. Gymnastics is a very difficult sport that requires the neuromuscular system to work optimally and efficiently. It includes exercises that require physical strength, flexibility, agility, coordination, balance, and grace (5). Many sports branches, in which perfectly developed biomechanical properties, neuromuscular properties and coordination features are used, ensure that athletes develop according to the development of their body structures and the desired characteristics in their branches, thus increasing the number of success of the athletes. Gymnastics has many sub-disciplines with these characteristics. One of these sub-disciplines is aerobic gymnastics. Aerobic gymnastics is the regular blending of the elements of difficulty, which are composed of aerobic step patterns spliced together, and required to be done according to the baton rule, accompanied by music prepared for the planned competition choreography and presented in accordance with the competition criteria (6). Aerobic gymnastics is a high-intensity branch that is perfectly integrated with music and can take place in anaerobic alatacid conditions. Due to the high speed of the choreography or series times (1.20 ± 5 seconds) and the tempo of the music (150-160 Bpm) of the competitors, the energy expenditure of the athletes in an anaerobic environment is high. Complex movements are expected to be applied, as the youngest and ever-expanding gymnastics branch is defined as an aesthetic technical discipline (7). High intensity interval training (HIIT) is one of the methods used to improve aerobic and anaerobic capacity. Although this method is used in endurance development, it quickly and effectively meets the need for adaptation and shortens the duration of exercise. HIIT, a training method that improves the cardiovascular system and metabolic functions, has recently made new and positive contributions for both sedentary and athletes in the perspective of positive adaptation, health and performance. Tabata, created as a result of a study conducted by Prof. Izumi Tabata et al at Tokyo National Institute of Fitness and Sports school, Tabata is a HIIT workout (2). The ability of the athlete to exhibit the movements in the choreography perfectly depends on his physical capacity. Determining the level of physiological characteristics and trying to increase them is extremely important in terms of performance as well as physical properties. The results of this study will give the trainers the opportunity to compare the effects of plyometric and tabata training on jump performance and respiratory function parameters in aerobic gymnasts performed at different times of the day, and will help in planning the training. It can be recommended to use the obtained test results well because it will provide significant positive effects on long-term health and performance levels of athletes.

METHOD

Subjects and Research Model

Actively in aerobic gymnastics competitions in Manisa Magnet Sports Club and Izmir Gencay Cüce Gymnastics and Dance Sports Club participated voluntarily. The subjects were informed about the possible risks and advantages of the study and gave their informed permission to participate in this study, which was approved by the Clinical Research Ethical Committee of Pamukkale University (60116787-020/4295). This study was supported by Pamukkale University Scientific Research Projects Coordination Unit (project number is 2018SABE011).

Data Collection

Anthropometric Measurements

The height of the subjects was measured by a stadiometer (Seca, Germany) with an accuracy degree of 1 mm and body weight measurements of 0.1 kg. After the anatomical position was taken, the measurement results were recorded in cm and kg.

Jump Performance Measurements

The subjects were measured with the Smart Speed mat and the best grades of the subjects were recorded. In active jumping, the subjects were initiated in an upright position with their arms free and carried out by lowering the arms and applying a rapid squatting motion and a rapid rising motion by pulling the arms up. In squat jump, subjects were applied with the knees bent approximately 90 degrees, with the subject's hands fixed on the hip and initially without a bowing motion. Measurements are recorded in cm. Subjects participating in the study were given two repetition rights. 15 seconds of rest is given between both jumps. One minute rest is given between the squat jump and the active jump.

30 sec Bosco Jump Test

The subjects were measured with the Smart Speed mat. The subject jumped on the mat and meanwhile time (0.001) started to work, time stopped when the athlete landed on the ground. Thus, the duration of the subject's stay in the air was calculated. In the test result of the subjects, the power was recorded in Watts.

Respiratory Function Test

Respiratory parameters (VC-vital capacity, FVC-forced vital capacity, MVV-maximum voluntary ventilation, FEV1-First second forced expiration volume) of the subjects were measured with a BTL-08 PC SPIRO brand portable spirometer. All measurements were taken while the subject was sitting. In spirometer measurements; The noses of the subjects were closed with a clip, and several breaths were made in tidal volume with the help of a mouthpiece connected to a spirometer. After getting accustomed to this type of breathing, the measurement was carried out. Each measurement was repeated 2 times and the best value was recorded (3).

Basic Difficulty Elements "Group C" Measurements

The C group main difficulty of the subjects, which are included in the jump and leap family, whose series are also used, is to determine the measurements of the elements (Tuck Jump, Cossack Jump, Pike Jump, Straddle Jump) before the test to determine the measurements of the elements (Tuck Jump, Cossack Jump, Pike Jump, Straddle Jump) they were informed. The subjects were measured with the Smart Speed mat and the best scores of the subjects were recorded. In the measurements, the air time of the subjects was recorded as milliseconds. After each measurement, the device was reset and the stability of the device was paid attention to. Subjects participating in the study were given two repetition. Both elements are given 15 seconds rest between jump. One minute rest was given between each element and the best result was recorded.

Elements

Tuck Jump

One or two feet are lifted from the ground. A vertical jump is made by moving the legs with the knees bent close to the chest, and the element is shown in the air and the feet are next to the ground.

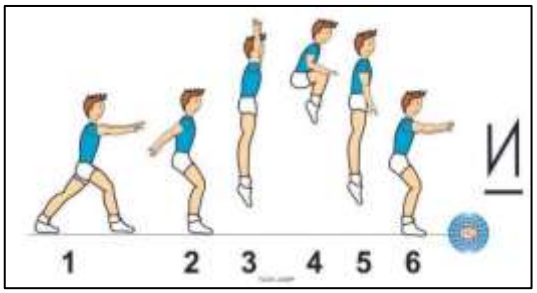

Figure 1. Tuck jump element

Cossack Jump

One leg is bent at the knee (cossack) and both legs are raised parallel to the ground or higher and vertical jump is made. The thighs of both legs are adjacent and the element is shown parallel to the ground and the feet are adjacent to the ground.

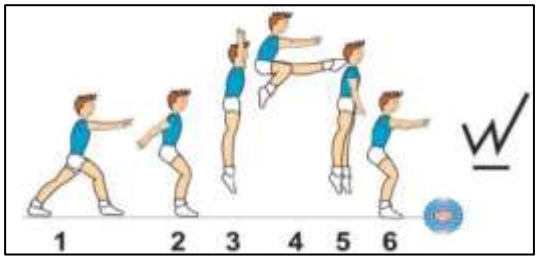

Figure 2. Cossack jump element

Pike Jump

It is done by doubling the body in the air by jumping vertically. Both legs are lifted from the ground and taken to a position parallel to the floor. Legs are parallel to the ground or higher than the ground, indicating an angle of no more than 60 ° between the trunk and legs. Arms and hands reach to the tip of the toes, showing the element and landing with the feet next to the ground.

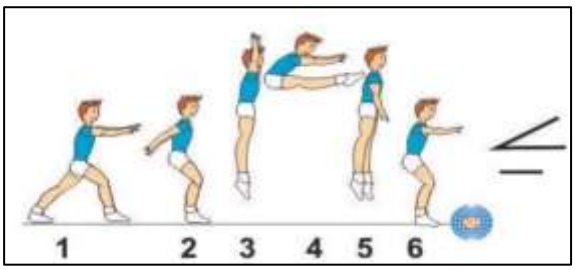

Figure 3. Pike jump element

Straddle Jump

Vertical jump is applied and the legs are lifted while in the air and the Straddle (legs in the air are opened with at least 90 ° width) position is taken with the arms. The angle between the body and legs is not more than 60 °, the legs are raised parallel to the ground or higher than the ground, the element is shown and the feet are adjacent to the ground.

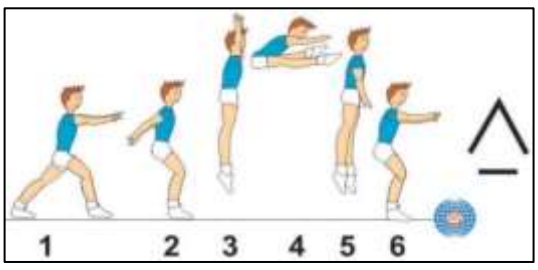

Figure 4. Straddle jump element

Test Protocol

Following the application of pre-test protocols applied after 48 hours of rest in 1 week, the subjects were divided into 3 groups in a way to ensure equality according to pre-test, age, height and performance status. Training programs were applied to the athletes for 6 weeks, 2 days a week, Monday and Thursday. While the Pliometric + Technique and Tabata + Technique trainings were applied right after the warm-up, the 3rd Group determined as the control group continued their normal technical trainings. The final test measurement protocol was applied after a full rest was provided at 48 hours intervals within 1 week after the training programs.

Tabata and Pliometric Training

In the training program, the subjects were divided into 3 groups. A training program was applied to each group 2 days a week for 6 weeks. Technique + Pliometric training for group A (first group); Training for group B (second group), Technique +Tabata; the technical training program was applied to the C group (third group). Tuck jump, Cossack jump, Pike jump and Straddle jump movements are used. Plyometric training was applied for 6 weeks. 5 movements were applied in the training. 1st and 2nd movement 4 sets; 3rd and 4th moves 6 sets; The 5th and 6th movements were performed in 8 sets. Each move is 10 seconds. Rest between movements is 1 minute. Rest between sets is 2-3 minutes. Tabata training was applied for 6 weeks. 5 movements were applied in the training. 1st and 2nd moves 2 sets; 3rd and 4th moves 3 sets; 5th and 6th movements were applied in 4 sets. Each move is 20 seconds. Rest between movements is 10 seconds. Rest between sets is 2 minutes.

Movements in Plyometric and Tabata Training

1. Jump Burpee Push Up
2. Half Squat Jump
3. Springboard Jump
4. Split Lunge Jump
5. Tuck Jump

Table 1. 6-Week Plyometric Training Program

Week	Movements	Movement time	Sets	Rest between movements	Rest between sets
1	1, 2, 3, 4, 5	10 s	4	1 min	2-3 min
2	1, 2, 3, 4, 5	10 s	4	1 min	2-3 min
3	1, 2, 3, 4, 5	10 s	6	1 min	2-3 min
4	1, 2, 3, 4, 5	10 s	6	1 min	2-3 min
5	1, 2, 3, 4, 5	10 s	8	1 min	2-3 min
6	1, 2, 3, 4, 5	10 s	8	1 min	2-3 min

Table 2. 6-Week Tabata Training Program

Week	Movements	Movement time	Sets	Rest between movements	Rest between sets
1	1, 2, 3, 4, 5	20 s	2	10 s	2 min
2	1, 2, 3, 4, 5	20 s	2	10 s	2 min
3	1, 2, 3, 4, 5	20 s	3	10 s	2 min
4	1, 2, 3, 4, 5	20 s	3	10 s	2 min
5	1, 2, 3, 4, 5	20 s	4	10 s	2 min
6	1, 2, 3, 4, 5	20 s	4	10 s	2 min

Statistical Analysis

SPSS 22 program was used. Shapiro Wilk Test was used for the distribution of normality in the evaluation of the data. In the analysis of normally distributed data, 2-way Analysis of Variance was used in 3 x 2 repeated measurements. Benforroni test was used to determine the source of the difference between groups. The confidence interval was chosen as 95% ($p < 0.005$) and values below were considered significant.

RESULTS

Table 1. Descriptive parameters of the subjects

Group (n=21)	**Pliometric**	**Tabata**	**Control**		
	Mean	Mean	Mean	Min-Max	Mean
Age (year)	12,93	12,85	12,89	12,00-14,00	12,85±0,18
Height (cm)	146	147	144	132,00-165,00	145,19±2,29
Weight (kg)	34	36	31	25,00-47,00	34,28±1,46
Sport Age (year)	7,14	7,42	6,85	5,00-9,00	7,14±0,241

Table 2. Comparison of pre-test and post-test parameters of the groups

	Pre-Test (X±ss)			Post-Test (X±ss)		
Parameters	Pliometric	Tabata	Control	Pliometric	Tabata	Control
CMJ (cm)	34,54±5,72	34,91±3,83	33,71±4,83	37,01±4,40	36,27±3,62	34,25±4,83
Skuat Jump (cm)	28,54±4,09	29,15±3,02	28,16±3,74	31,27±4,03	28,97±4,09	28,09±3,15
Bosco Number of Repetitions	68,85±3,57	72,00±3,21	65,14±7,28	59,57±3,57	60,14±3,21	63,14±7,28
Bosco Jump Heights (cm)	11,75±1,43	10,08±1,24	13,84±5,05	16,30±3,09	14,21±1,66	15,07±4,72
FEV1 (ml)	2,12±,51	1,47±,28	1,44±,50	2,23±,48	1,89±,33	1,65±,48
FVC (ml)	2,35±,40	2,06±,27	1,63±,50	2,33±,52	2,46±,30	1,98±,42
MVV (ml)	61,82±25,33	60,68±9,16	50,52±10,08	61,32±21,99	66,50±4,65	52,38±10,15
Tuck Jump (ms)	498,57±50,43	491,57±39,85	474,42±28,94	516,42±36,51	506,28±32,40	480,00±26,48
Cossack Jump (ms)	514,85±33,81	499,28±38,45	487,71±29,82	529,00±37,02	515,42±33,81	490,00±28,35
Pike Jump (ms)	510,57±32,17	502,57±38,10	500,14±34,66	534,28±29,04	511,71±36,01	502,71±35,78
Straddle Jump (ms)	543,00±36,16	541,28±25,66	533,00±30,40	565,14±30,98	550,71±26,62	533,00±35,31

The arithmatic average of the pre-test and post-test measurement values of each group of CMJ, Skuat Jump, Bosco Number of Repetitions, Bosco Jump Heights, FEV1, FVC, MVV, Tuck Jump, Cossack Jump, Pike Jump, and Straddle Jump measurements were given in the table 2.

Table 3. Comparison of groups in pre-test – post-test within groups, between groups and post-hoc

Within Group

	Time (Pre-Test- Post Test)					Time x Group				
Parameters	Sum of squares	sd	Mean of squares	F	p	Sum of squares	sd	Mean of squares	F	p
CMJ (cm)	22,262	1	22,262	10,01	<,005	6,46	2	3,23	1,452	<,26
Skuat Jump (cm)	7,091	1	7,091	1,593	<,223	19,127	2	9,563	2,148	<,146
Bosco Number of Repetitions	624,857	1	624,857	21,256	<,001	183	2	91,5	3,111	<,069
Bosco Jump Heights (cm)	114,626	1	114,626	9,581	<,006	22,9756	2	11,488	0,96	<,402
FEV1 (ml)	0,646	1	0,646	13,005	<,002	0,173	2	0,086	1,738	<,204
FVC (ml)	0,616	1	0,616	16,921	<,001	0,359	2	0,179	4,93	<,020
MVV (ml)	60,173	1	60,173	0,779	<,389	71,374	2	35,687	0,462	<,637
Tuck Jump (ms)	1697,357	1	1697,357	17,519	<,001	285,143	2	142,571	1,471	<,256
Cossack Jump (ms)	1237,714	1	1237,714	18,298	<,001	392,714	2	196,357	5,806	<,081
Pike Jump (ms)	1464,381	1	1464,381	18,641	<,001	819,619	2	409,81	5,217	<,016
Straddle Jump (ms)	1162,881	1	1162,881	10,827	<,004	864,333	2	432,167	4,024	<,036
p<0.05										

Between Groups

	Group					Error		
Parameters	Sum of squares	sd	Mean of squares	F	p	Sum of squares	sd	Mean of squares
CMJ (cm)	27,254	2	13,627	0,353	0,708	599,972	18	33,332
Skuat Jump (cm)	22,196	2	11,098	0,478	0,116	481,054	18	26,725
Bosco Number of Repetitions	33,476	2	16,738	0,694	0,512	434	18	24,111
Bosco Jump Heights (cm)	42,296	2	21,148	2,264	0,133	168,117	18	9,34
FEV1 (ml)	3,066	2	136,541	392,263	0,001	6,266	18	0,348
FVC (ml)	2,324	2	1,162	3,604	0,048	6,266	18	0,348
MVV (ml)	1185,176	2	592,588	1,476	0,255	7226,689	18	401,483
Tuck Jump (ms)	6823,619	2	3411,81	1,318	0,292	46588,286	18	2588,238
Cossack Jump (ms)	7692,048	2	3846,024	1,741	0,204	39763,857	18	2209,103
Pike Jump (ms)	3300,762	2	1650,381	4607,772	0,512	42730,571	18	2373,921
Straddle Jump (ms)	3164,714	2	1582,357	0,866	1,732	39763,857	18	1827,69
p<0.05								

Post-Hoc Comparisons

	Group 1 vs 2		Group 1 vs 3		Group 2 vs 3	
Parameters	Mean difference	p	Mean difference	p	Mean difference	p
CMJ (cm)	0,185	1,000	1,793	1,000	1,608	1,000
Skuat Jump (cm)	0,8447	1,000	1,7799	1,000	0,9352	1,000
Bosco Number of Repetitions	0,071	1,000	1,857	0,991	1,928	0,937
Bosco Jump Heights (cm)	1,8841	0,361	0,4252	1,000	2,3093	0,183
FEV1 (ml)	0,497	0,116	,627*	0,035	0,13	1,000
FVC (ml)	0,0832	1,000	0,5354	0,068	0,4521	0,148
MVV (ml)	10,119	0,594	2,024	1,000	12,143	0,379
Tuck Jump (ms)	8,571	1,000	30,285	0,398	21,714	0,821
Cossack Jump (ms)	14,5714	1,000	33,0714	0,237	18,5	0,934
Pike Jump (ms)	15,286	1,000	21	0,800	5,714	1,000
Straddle Jump (ms)	8,071	1,000	21,071	0,626	13	1,000
p<0.05						

In table 3, there is a statistically significant difference between the height averages of the pre-test and post-test active jump timing ($p<0.05$) regarding the active jumps, there is no statistically significant difference between the height averages of the pre-test and post-test jump timing for squat jumps. ($p>0.05$). There is a statistically significant difference between the pre-test and post-test regarding the number of repeats of the 30 sec Bosco test and the mean jump height ($p<0.05$). There is a statistically significant difference between the pre-test and post-test averages of FEV1 and FVC performances ($p<0.05$). When the MVV performances are examined, there is no statistically significant difference between the pre-test and post-test averages ($p>0.05$). There is a statistically significant difference between the pre-test and post-test averages of Tuck Jump, Cossack Jump, Pike Jump and Straddle Jump elements ($p<0.05$). In the Table 3, statistically significant difference in active jump timing height, squat jump timing height, Bosco repetition numbers, 30 sec Bosco average jump heights, MVV performances, flight times of Tuck Jump, Cossack, Pike Jump and Straddle Jump elements compared to exercise groups is absent ($p>0.05$). There is a statistically significant difference in FEV1 and FVC performances compared to the exercise groups ($p<0.05$). In addition, there is no statistically significant difference in the interaction between exercise groups and measurement times in active jump timing height, squat jump timing height, Bosco repetition numbers, 30 sec Bosco average jump heights, MVV performances, flight times of Tuck Jump and Cossack elements ($p>0.05$). There is a statistically significant difference in the interaction between FVC, Pike Jump and Straddle Jump ($p<0.05$).

DISCUSSION

The fact that there are few studies on aerobic gymnastics in the literature has led us to do this study. We compared the effects of plyometric and tabata methods on some performance and physiological values of aerobic gymnasts. At the literature, we see that there are many studies parallel to our study. Akyüz (3) compared the difference between different jumping methods and the duration of stay in the air in aerobic gymnastics athletes in his study. When looking at the comparison between jump methods in gymnasts, the average hovering flight values in active jump (525.86 ± 42.21 ms) and the hovering flight average values in squat jump (502.46 ± 32.98 ms) were found. He reported that there was no significant difference between the duration of the athletes staying in the air with different methods. Aleksandreviciene et al. (5) investigated aerobic fitness and physiological and energetic responses in aerobic gymnasts during the competition. The gymnasts demonstrated a progressive treadmill test and competition performances. Energetic response was calculated from oxygen uptake and blood lactate changes. They reported that the peak oxygen intake was higher in international competitors than in national competitors. During the competition, they concluded that the total energy and fractions of aerobic, anaerobic, lactic and anaerobic lactic energy, the contribution of anaerobic energy was higher ($p = 0.03$) in the international group. He reported that the aerobic condition of the athletes and the absolute energetic and physiological responses of the athletes during the competition were not different between groups of aerobic gymnasts with different performance levels, but the higher level of anaerobic energy was found in the group with higher performance levels. The high anaerobic energy capacity of aerobic gymnasts ensures that their competition performance is excellent. Church (9), the effect of warm-up and flexibility exercises on vertical jump performance was examined. They found that PNF flexibility studies had a negative effect on jumping. Harry (13) looked at the evaluation of the performance in vertical jump descent with maximum jump and found that the athletes who made fast landing after the jump showed higher vertical jump results than the athletes who made the slow descent. In the study, they reported that exercises with jumping over the body and fast descent support rapid ascent. Nagano (17) stated that in gymnastics, jumping characteristics of athletes are an important motor skill and jumping height is a determining factor in performance. It is stated that the vertical jumping ability of athletes, which is quite effective on performance, and lower extremity muscles are dependent on explosive power. Özmen (18) stated that non-professional gymnasts are partly organized with the stability of the trunk, dynamic balance and vertical jump height. Although there are various training methods including heavy resistance exercises, explosive strength exercises, electrostimulation exercise and vibration, they are used effectively for vertical jump performance. In the study, it was stated that most trainers and researchers agreed that plyometric training was a method of choice, while aiming to improve vertical

jumping ability and leg muscle strength. In our study, it was found that the highest increase was in the plyometric group with 9.56%, and it is similar to Özmen (18) study. In addition to the elements in aerobic gymnastics, which is one of the sub-disciplines of gymnastics, the use of the jumps in the transition and connections used during the competition, the grips on the landing and accordingly, the flexibility-containing transitions are made possible by the perfect use of the whole body. Athletes who lack biomotor skills suffer from serious loss of points by not being able to do some basic elements during the competition. It is seen that the technical tactics of the athletes who can reach the desired criteria in the branch are also strong. In a study by Kaldırımcı (15), it was stated that there was a significant improvement in the vertical jump performances of handball players as a result of the pliometric jump training with resistance training. In a study similar to this study, it was stated that handball athletes participating in the study also showed a significant improvement in one-foot vertical jump performance. In addition to these, it was determined that the noticeable increase in the levels of the handball players in the long jump with stopping was statistically significant. These findings obtained in our study support the study in which plymetric training in addition to resistance training in 15-17 age group handball players improved their jumping performance. Demirci et al. (10), in their study, divided male tennis players aged 16-18 into two groups of 10, and investigated the vertical jump effect by applying the tabata method 3 days a week for 6 weeks. As a result of the study, while there was no significant difference between the first group and the second group in the pre-test results, they found that there was a significant difference in the post-test results in the second group in which the tabata protocol was applied in addition to the studies. Bozdoğan et al. (8), in their study, regularly applied coordination and plyometric training to badminton athletes with an average age of 21.00 ± 1.00 years for 8 weeks. As a result of the study, they stated that plyometric and coordination studies had a significant increase on jumping ability and biomotor abilities. Anıl et al. (11) divided a total of 24 athletes consisting of 14-16 age group female basketball players into 2 groups of 12 people. They applied only technical training to the first group, and plyometric and technical training to the second group for 8 weeks, 3 training sessions a week. As a result of the study, it was stated that a significant increase was found in the pre-test and post-test in the plymetric + technical training group, while the athletes' body fat percentage decreased, performance was increased, and a significant increase was found in vertical and horizontal jump levels. Aykora (7) applied a pliometric training with the tabata program for 8 weeks to two groups of 64 female volleyball players between the ages of 16-18. While the normal training was applied to the first group, the second group was applied pliometric + normal training with the wearer method. As a result of the study, it was reported that while there was a significant difference between the pre-test and post-test in the study group, there was a significant improvement in vertical jump, long jump and dunk jump performances. İmamoğlu (14), as a result of the study of the effect of eight-week preparatory work on some biomotor and physiological characteristics of female football players, the body weight taken before and after the preparatory training, flexibility, 30 m, horizontal jump, vertical jump, anaerobic power, reaction time, the values of leg strength, thigh circumference and calf circumference were found to be statistically significant. Eight-week preparatory studies showed a decrease in body weight, reaction times, 30 m and circumference measurements, decrease in fat percentage and increase in jump values, leg strength and anaerobic power of football players. In the study, an eight-week training program was recommended for female soccer players in the developmental stage to be suitable for a high-level performance. In the study, while plyometric and tabata training provided significant improvements on the jumping performance of the athletes, it was determined that their averages did not differ statistically from exercise groups ($p > 0.05$). In the study, it was found that FEV1 and FVC showed statistically significant difference on respiratory function parameters ($p < 0.05$), while MVV did not differ statistically ($p > 0.05$). An effective jump in aerobic gymnastics is based on the athlete's motor characteristics (balance, power output, agility, jumping performance) and respiratory control. During training, the upper and lower extremity muscles and trunk of the gymnast directly or indirectly step in to stabilize the core muscles together with the diaphragm, resulting in an increase in respiration (4). During the use of the core, especially the abdominal respiratory muscles work actively. Aerobic gymnastics is an anaerobic branch. High-intensity repetitive activities during training or competition cause an increase in the ventilation of athletes. The increase in challenging vital capacity is affected by aerobic exercises, and

the increase in air flow velocity is affected by anaerobic-based activities (16). The reason for the changes in the forced vital capacity after the tabata protocol in the athletes participating in the study; It is thought to be a result of the intense use of repetitive movements of high intensity. On the C group basic elements (Tuck Jump, Cossack Jump, Pike Jump and Straddle Jump) used in aerobic gymnastics competitions, it was determined that their averages differed statistically according to the flight times ($p<0.05$). While the pliometric training group found more significant results on jumping performance compared to the other groups, the respiratory function parameters of the participants in the tabata group were found to be more significant. In aerobic gymnastics, group C jumping and jumping elements from the desired families are used more than other jumping and jumping elements. Therefore, in the aerobic gymnastics branch, the required technical or optional elements to be selected in the C group in the competition series will be at a technically perfect level, relaxing the athlete in terms of energy expenditure, and will increase the quality of the selected element. The ability of aerobic gymnasts to achieve this situation and to choose the alternatives of the elements in the elemental pool can be possible by improving and strengthening their jumping performance and increasing the time of stay in the air (flight time). Due to the high speed of the choreography or series times (1.20 ± 5 seconds) and the tempo of the music (150-160 Bpm) of the competitors, the energy expenditure of the athletes in an anaerobic environment is high. As a result, it is recommended to trainers to use pliometric training for jumping strength and performance increase, tabata training method to increase the continuity of the series, reduce energy expenditure and increase anaerobic capacity.

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Moral Disengagement in Sports: A Study on Young Turkish Athletes

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Abstract

Ethics in sports are the rules that comply with the spirit of sports and should not be forgotten and very important by all stakeholders. Athletes, coaches, managers, spectators, referees, sports media and many people are the subject of ethical rules in sports. The aim of this study was to investigate moral disengagement attitudes of participants studying at School of Physical Education and Sports and practising active sports. Totally, 310 active athletes (235 male, 75 female) were taken part in this research. Data was gathered through Moral Disengagement in Sport Scale-Short version which was developed by Boardley and Kavussanu (5) and translated to Turkish Language by Gurpinar (19). In evaluation part for questionnaires answered by participants, Kolmogorov Smirnov normality test, T-Test and One Way ANOVA tests were used. According to the results, it was statistically determined that there were not significant differences on age, branches and training years ($p>0,05$); but there were significant differences on analyses done for gender and participants' mothers' education level ($p<0,05$). In the light of the obtained results, the importance of increasing sports ethics education and fair-play awards at an early age was emphasized. Fair-play samples should be increased and good behaviours in sports should be seen more.

Key words: ethics, ethics in sports, disengagement in sports, athletes

Sporda Ahlaktan Uzaklaşma: Genç Türk Sporcular Üzerine Bir Araştırma

Özet

Sporda etik, sporun ruhuna uygun, unutulmaması gereken ve tüm paydaşlar tarafından çok önemli kurallardır. Sporcular, antrenörler, yöneticiler, seyirciler, hakemler, spor medyası ve birçok kişi sporda etik kurallara tabidir. Bu araştırmanın amacı, Beden Eğitimi ve Spor Yüksekokulunda öğrenim gören ve aktif spor yapan katılımcıların ahlaki uzaklaşma tutumlarını incelemektir. Bu araştırmaya toplam 310 aktif sporcu (235 erkek, 75 kadın) katılmıştır. Veriler, Boardley ve Kavussanu (5) tarafından geliştirilen ve Gürpınar (19) tarafından Türkçe'ye çevrilen Sporda Ahlaki Ayrılma Ölçeği-Kısa versiyonu aracılığıyla toplanmıştır. Katılımcılar tarafından yanıtlanan anketlerin değerlendirme kısmında Kolmogorov Smirnov normallik testi, T-Testi ve Tek Yönlü ANOVA testleri kullanılmıştır. Sonuçlara göre yaş, branş ve eğitim yılları arasında istatistiksel olarak anlamlı bir farklılık olmadığı tespit edildi ($p>0,05$); ancak cinsiyete ve katılımcıların annelerinin eğitim düzeyine göre yapılan analizlerde anlamlı farklılıklar bulunmuştur ($p<0,05$). Elde edilen sonuçlar ışığında spor etiği eğitiminin ve fair-play ruhuna uygun davranmışların erken yaşta artırılmasının önemi vurgulanmıştır. Fair-play örneklerinin artırılması ve sporda iyi davranışların bu örnekler ile birlikte arttırılması önerilmektedir.

Anahtar Kelimeler: etik, sporda etik, sporda etikten uzaklaşma, sporcular

INTRODUCTION

Many of the ethical rules about life in a rapidly developing and changing world are also invisible and indifferent. This is in parallel with many values that change in schools, universities, and in many areas of sports as well as in many branches.

The concept of ethics comes from the Greek word "ethos", expresses the meaning of character and behaviour (22). The word ethics originated from the word 'Ethice', which means the science of truth and wrong, which means behaviour, attitude and attitude appropriate to custom, ceremony (28).

Ethics can be defined as a whole of principles used by individuals during their behaviour or can be defined as personal criteria that an individual uses when distinguishing between right and wrong (25, 7).

Ethics is, first of all, the research and understanding of a life to be desired. With a broader perspective, what to do or not to put in place all the activities and objectives; knowing what to want or not to know what to own or not to have (3).

The task and function of ethics is to give people a systematic approach to raise awareness about ethical depth in their actions, to seek for a good life in general and to make decisions about ethical situations, or to support them with ethical grounding and ways of thinking in doing what is right and fair (13).

Undoubtedly, it is a fact that ethics appears in every field. It can come up with various names in various fields. This means that there are kinds of ethics as meta ethics, normative ethics and applied ethics (2, 9).

Meta Ethics; the main purpose of this type of ethics is not to set precise rules about ethics, but to examine and analyse the current situation. Evaluating these results by thinking about the concluded events constitutes the main subject of meta ethics (14). The ethical judgements and value judgements in our lives are based on whether they are verifiable and on what basis they are verified (15).

Normatic Ethics; it plays the role of a guide. It shapes individual how to behave, how to live, how to participate in actions. This type of ethics is also provides information about what is beneficial what is not, what is useful, what is not, what to do and not do, what goals to progress and how to progress it (8).

Applied Ethics; It is about creating criteria for discussion of ethical problems occurring in specific areas and applying these criteria in human behaviour (1). One form of applied ethics is the application of normative theories of ethics to certain controversial issues. In these cases, the ethical adopts a defensible theoretical structure and then applies the theory and derives normative recommendations (10).

There is no single ethics in human life because it is versatile and it is common for every area of our lives to have a unique ethics. For example, business ethics, scientific ethics, daily ethics, marriage ethics, etc. As an ethics, sports are in parallel and indirectly to all of these, just like every day, ordinary life. Its important distinction is that its structure that intrinsically ethical. Principles and characteristics that determine sports also determine this ethic or way of living (12).

Although sports and ethics are considered as separate fields, it can be mentioned that there is a very meaningful relationship between these two fields that has been ignored so far. Because the common starting point of both fields is the existence of rules system that regulates the relations between individuals. These two fields organize human relations and activities within the system of rules. Both concepts emerged as a result of interactions and interactions between individuals (24).

Sport and ethics can both be considered as a system of rules. It is not possible to evaluate the actions of players in competitions without sports rules. No rule-free sports competition can be considered, and the act of abiding by the rule is fed by the ethical judgements of the athletes apart from the sports rules. The meaning of written sports rules is thanks to the ethical behaviours that the athletes will demonstrate (17).

In the concept of ethics, there is sensitivity to individual needs and differences, responsibility for personal behaviour, interest in other people, honesty and commitment to Fair Play. When we look at the ethical values in sports, Fair-Play concept covers the high and universal values of individuals. Human reaching high values is the last step of being human (21).

Fair-Play is a philosophical thought, in the efforts of the athletes to remain patient, conscious

and consistent in the difficult situations during the competitions, not to accept the disadvantages in the equality of opportunity, not to take advantage of the disadvantages of the opponent, to see the opponent as an individual who has equal rights with him for the realization of the game and not the enemy (30).

The basis of sports is competition. The aim of sports is to win. But the Fair-Play spirit is required to win in an ethical framework (11). The idea of winning at any cost is incompatible with the spirit of Fair-Play. It is natural to aim to win, to want to be the best. However, all these must be in a noble competitive framework (16).

Recently, ethical discussions have started to be discussed more than sports. Undoubtedly, it is the sports branches that are based on superior individual success (31). In this direction; there is thinking of "I have to win at all costs" and "Losing is the end of everything". Such an approach considers any bad attempts (game fixing, doping, violence, etc.) to success as usual (26).

Whichever level and form we participate in sports (athletes, coaches, managers, referees, spectators, etc.) in a discipline, everyone should pay attention to be honest, virtuous, respectful and tolerant and the requirements of the concepts of honour must be fulfilled. In this context, to adopt the fair-play concept expressed in formal and informal style and to act accordingly will protect athletes from possible dangers and adopt the concept of honour for humanity in addition to community education (6).

MATHERIAL AND METHOD

The research population is 310 students (235 male; 75 female), the sample is students studying at Physical Education and Sports Teaching, Sports Management, Coaching Education, Recreation Departments at School of Physical Education and Sports, Dumlupinar University and practising any sports as active athletes.

In the research, personal information form and the Moral Disengagement in Sport Scale-Short developed by Boardley and Kavussanu (5), and translated Turkish language by Gurpinar (19) was used. The scale consisting of 8 items and 7 Likert-type (1= totally disagree, 7= totally agree). The scale was explained before applying to the sample group and the participants were provided to fill the scale in line with the voluntary participation principle. The scale was explained before applying to the sample group and the participants were provided to fill the scale with the voluntary participation principle.

Statistical Analysis

The data obtained from the participants in the study were evaluated in the SPSS 22.0 statistics package program. Kolmogorov Smirnov normality test was applied to the data to decide which statistical analysis method to use and it was observed that the variables showed normal distribution ($p<0.05$). Therefore, it was decided to use the parametric tests as T-Test and One Way ANOVA. The margin of error in the study was accepted as .05.

RESULTS

Table-1. Distribution of Demographic Information of the Sample Group

FACTOR	VARIABLE	f	%
Gender	Female	75	24,2
	Male	235	75,8
	Total	310	100
Age	20 years old or younger	171	55,2
	21 years old or older	139	44,8
	Total	310	100
Branch	Team Sports	229	73,9
	Individual Sports	81	26,1
	Total	310	100
Training Year	1-3 years	69	22,3
	4-6 years	68	21,9
	7-9 years	85	27,4
	10 years or more	88	28,4
	Total	310	100
Education Level of Mother	Primary School	218	70,3
	High School or higher	92	29,7
	Total	310	100

Table 1 gives the distribution of the personal information of the individuals participating in the research. According to the data, it is seen that 75.8% of the participants in the sample group are "male" (N= 235) and 24.2% are "female" (N=75). When the age groups of the sample group are evaluated, it is seen that the participants who are in the age range of "20 years and under" with a rate of 55.2% and those who are in the age group of "21 years and over" with a rate of 44.8% are included in the study. 22.3% of the participants have "1-3 years" 21.9% have "4-6 years" 27.9% have "7-9 years" 28.4% "10 years and more" training experience. In addition, 70.3% of mothers of the participants are primary school graduates, while 29.7% of the mothers of the participants are at the level of high school or higher.

Table-2. T-Test Analysis for Scores of Participants' Moral Disengagement in Sport According to Gender

	Gender	N	X	Ss	t	p
Moral Disengagement in Sport	Female	75	22,94	8,952	2,904	0,004*
	Male	235	26,08	7,873		
p<0,05						

When the data in Table 2 are examined, it was found that the participants' tendency to moral disengagement in sport showed statistically significant difference according to gender [t(308)= 2,904; p<.05].

Table-3. T-Test Analysis for Scores of Participants' Moral Disengagement in Sport According to Age

	Age	N	X	Ss	t	p
Moral Disengagement in Sport	20 years old or younger	171	24,50	8,076	-1,803	0,073
	21 years old or older	139	26,33	9,539		
p<0,05						

In Table 3, when the tendency of the participants to moral disengagement in sport by age, no significant differences were found between moral disengagement in sport and age [t(308)= -1,803; p>.05].

Table-4. T-Test Analysis for Scores of Participants' Moral Disengagement in Sport According to Branch

	Branch	N	X	Ss	t	p
Moral Disengagement in Sport	Team Sports	229	25,76	9,207	1,637	0,103
	Individual Sports	81	24,08	7,419		
p<0,05						

In Table 4 as a result of the T-Test in order to determine the difference between moral disengagement in sport and branches of participants, no significant difference was found [t(308)= 1,637; p>.05].

Table-5. ANOVA Analysis for Scores of Participants' Moral Disengagement in Sport According to Training Years

	Training Years	N	X	SS	F	p
Moral Disengagement in Sport	1-3 years	69	23,73	7,661	1,278	0,282
	4-6 years	68	26,05	9,022		
	7-9 years	85	25,04	8,531		
	10 years or more	88	26,27	8,795		
p<0,05						

In Table 5, when the tendency of the participants to moral disengagement in sports according to their training year was compared, no statistically significant differences were found [F(3–306)= 1,278; p>0,05].

Table-6. T-Test Analysis for Scores of Participants' Moral Disengagement in Sport According to Education Level of Participants' Mothers

	Education Level of Mother	N	X	Ss	t	p
Moral Disengagement in Sport	Primary School	229	24,54	8,698	-2,411	0,017
	High School or Higher	81	27,17	8,793		
p<0,05						

Statistically significant difference was found in Table 6 when the participants' tendency of moral disengagement in sports was compared according to the mother's education levels [t(308)= -2,411; p<.05].

DISCUSSION AND CONCLUSION

In this study, which is thought to be an example for research on moral disengagement in sports, the level of tendency to moral disengagement in sports was studied at School of Physical Education and Sports of Dumlupinar University.

When Table-2 is examined, statistically significant difference was found between genders of the participants and tendency of moral disengagement in sports in favour of male participants. (p<0,05). It is thought that the reason of male participants who are actively engaged in sports have a tendency moral disengagement in sports more than female athletes who are actively doing sports may be due to the fact that male athletes do not have a problem in stretching the rules by showing some unethical behaviours in order to win. Ozturk (23) determined that male participants tend to have moral disengagement in sports more than female participants as similar to this result of the research.

According to the results obtained in the analysis made according to the age variable, although the participants in the active sport, who are in the older age, have higher tendency to moral disengagement in sports, this result was not found statistically significant. It can be thought that the reason why older participants have higher tendency to moral

disengagement in sports is related to the trying of some illegal behaviours when there is a decrease in sports performance compared to the participants in the lower age group. In their study, Tsai, Wang and Lo (29) observed that as the age of the participants increased, there was a difference in the tendency to moral disengagement in sports.

Comparing the tendency to moral disengagement in sports according to the branches of the participants, there was no statistically significant difference between the branch variable and the tendency to moral disengagement in sports, although the participants who were actively involved in team sports had higher scores than those who were competing in individual sports. It is thought that this result may be due to the fact that the behaviours performed by the athletes in a larger crowd in team sports and that some immoral behaviours cannot be observed. Boardley and Kavussanu (4) found that football and rugby athletes' tendency to moral disengagement in sports is higher than that of other branch athletes in support of this result of our study.

According to the training age of the participants, when the tendency to moral disengagement in sports is examined, although the scores of the participants who are between 1-3 years of training in their branch are lower than the others, there is no statistically significant difference. It is thought that this situation may be related to the fact that the athletes with a training year of 1-3 years attach great importance to some ethical principles and that they have not suffered some value losses yet.

Comparing the levels of moral disengagement in sports according to the mother's education levels of the participants, statistically significant difference was found in favour of the candidates with higher mother education levels. In support of this result, Gurpinar (18) determined that as the level of education increases, the sub-dimension of protecting to win fairly increases.

In the light of all these results, examples of ethical behaviour in sports should be increased, and ethical behaviours should be gained through training at very young ages by giving the necessary importance in sports as in all life. The necessity of rejection of the idea that everything is permissible in the path of victory should be emphasized and the need to respect the opponent and congratulate the opponent when it is lost. Instead of the examples of aggression and violence in sports in education curricula, fair-play samples should be increased and good behaviours should be seen and increased in sports.

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Relationship Between Intellectual Capital and Altruism (A Research of Mediterranean Region and Public Sports Organisations)

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Abstract

The present study aims to examine the relationship between intellectual capital and altruism. The research universe consists of personnel working within the public sports organizations located in the Mediterranean Region of Turkey. However, the sample group consists of a total of 363 personnel, 138 women and 225 men, who voluntarily accepted to participate in the research by being selected by convenience sampling method among this personnel. The research data were collected using the "intellectual capital" and "altruism" scales, and confirmatory factor analysis (CFA) was carried out for the related scales. In addition to descriptive statistics, correlation and regression methods were applied within the scope of the relational model in the research. According to the result of the correlation analysis, a significant, positive, but low-level correlation was found between human capital, social capital, and structural capital, which are among the sub-dimensions of intellectual capital, and altruism. According to the result of multiple regression analysis, it can be noted that structural capital, which is the sub-dimension of intellectual capital, has a significant positive contribution to explaining the impact of intellectual capital on altruism. As the level of intellectual capital (structural capital) of those who work in public sports organizations increases, their altruism will also increase.

Keywords: Altruism, intellectual capital, public sports organization.

Entelektüel Sermaye ve Diğerkamlık İlişkisi (Akdeniz Bölgesi Kamu Spor Örgütleri Araştırması)

Özet

Bu araştırmanın amacı, entelektüel sermaye ve diğerkâmlık ilişkisinin incelenmesidir. Araştırmanın evrenini Türkiye'nin Akdeniz Bölgesinde bulunan kamu spor örgütleri bünyesinde görev yapan iş görenler oluşturmaktadır. Örneklem grubunu ise bu iş görenler arasından kolayda örnekleme yöntemiyle seçilerek, araştırmaya katılmayı gönüllü olarak kabul eden 138 kadın, 225 erkek olmak üzere toplamda 363 iş gören oluşturmaktadır. Araştırma verileri "entelektüel sermaye" ve "diğerkâmlık" ölçekleri ile toplanmış ve ilgili ölçeklere ilişkin doğrulayıcı faktör analizi (DFA) yapılmıştır. Araştırmada betimsel istatistiğin yanı sıra, ilişkisel model kapsamında korelasyon ve regresyon yöntemlerine başvurulmuştur. Korelâsyon analizi sonucuna göre entelektüel sermayenin alt boyutlarından olan insan sermayesi, sosyal sermaye ve yapısal sermaye ile diğerkâmlık arasında anlamlı, pozitif yönlü, ancak zayıf düzeyli bir ilgileşim tespit edilmiştir. Çoklu regresyon analizi sonucuna göre entelektüel sermayenin, diğerkâmlık üzerindeki etkisini açıklamada entelektüel sermayenin alt boyutu olan yapısal sermayenin anlamlı bir şekilde pozitif yönde katkısı olduğu, kamu spor örgütleri iş görenlerinin entelektüel sermaye (yapısal sermaye) düzeyleri arttıkça diğerkamlılıklarının da artacağı söylenebilir.

Anahtar kelimeler: Diğerkamlık, entelektüel sermaye, kamu spor örgütü.

INTRODUCTION

Globalization has brought new structures and constitutions with it, and now more effective and efficient works are expected from public organizations. The maintenance of an institution's effective and efficient existence depends on its capacity to develop its practices (2). Intellectual capital is an intangible asset that contains the knowledge required to overcome the challenges faced by the public sector. In terms of public management, the practical and timely use of knowledge helps public sector organizations cope more effectively in the increasingly competitive public sector. The higher the public sector intellectual capital values, the greater the awareness people will have of the quality of knowledge use and management (6).

The concept of intellectual capital

Intellectual capital is one of the intangible assets owned by organizations (3). According to Stewart (29), intellectual capital is intellectual material that can create wealth. Therefore, intellectual property is information, knowledge, and experience. According to Hoche (15), intellectual capital refers to the intangible values of an organization. It can also be said that the concept of intellectual capital is a concept that refers to a collection of knowledge and experience accumulated and ready for use at any time, as well as focused on continuous development and change (27).

It would be a mistake to evaluate organizations today only with the tangible assets they own and consider their tangible assets as a measure of success. The current structure of organizations, corporate memory, knowledge, experience, and all the innovative thought structures that organizations have through both internal and external stakeholders are facts that add value to organizations. At the very center of all these facts that we have listed is knowledge. Organizations obtain this knowledge through intellectual capital (26).

Intellectual capital in public sports organizations

Public sports organizations are characteristically non-profit organizations. They take several measures to protect and improve Turkish citizens' physical and mental health by carrying out youth and sports activities by the provisions of Articles 58 and 59 of the current constitution of the Republic of Turkey. Public sports organizations have also been made responsible and authorized to organize national and international sports organizations by directing individuals to sports, social and cultural activities. While public sports organizations fulfill their duties within the powers and responsibilities of their personnel, it is an undeniable fact that their intellectual capital accumulation reflects on their working skills. Following this, it is considered that the accumulation of intellectual capital in public institutions that direct sports and similar activities in our country is the most vital aspect of organizations as well as individuals. It can also be stated that intellectual capital in public sports organizations can meticulously preserve corporate memory and corporate culture within the framework of innovations, in which innovation is combined with tradition. For this, it is thought that it is an essential situation for sports organizations of which input and output in a particular process are human, to create, protect, strengthen and make them their property, to adapt to changes, and to continue their consisted existence (28).

Components of intellectual capital

The concept of intellectual capital is widely researched and discussed. Therefore many components are available in the relevant literature to evaluate this concept (11). According to Subramaniam and Youndt (31), these components are grouped into three dimensions: human capital, social capital, and structural capital.

Human capital

Human capital represents the human factor in an organization. It can be defined as a component of different characters within the organization, such as intelligence, skills, and expertise (7). The education level and quality of the personnel, who are the main source of intellectual capital and are the producers of services in sports organizations, their professional background in sports and their physical and mental literacy, organizational and communication skills, solution-oriented information sharing, analytical and conceptual thinking skills can be considered to be constituting the human capital dimension of intellectual capital. It can also be noted that the fact that the current human capital profile is high quality and is combined with sports culture will increase the likelihood that public sports organizations will succeed in achieving their objectives (28).

Social capital

Social capital is a set of embodied values and norms that promote cooperation between two or more people or groups (12). We can consider the network of relations established by public sports organizations with other institutions-organizations and their personnel while fulfilling the duties assigned to them as a part of social capital. The protocols that public organizations have signed with private organizations and their affiliated units and non-governmental organizations and units can be considered clear examples. In this way, both personnel of public sports organizations and employees of organizations who interact with each other internalize the concepts of "social solidarity," "trust," and "cooperation" within the definitions of social capital under the structure of their institutions (27).

Structural capital

Structural capital consists of organizational structure, equipment, databases, software, and organizational capacities that support employee productivity. It refers to all kinds of capacities left behind in the organization when the personnel return home (4). To the extent that all technological tools, especially infrastructure, process, software, and hardware that carry out the functioning of public sports organizations, have a holistic aesthetic functioning mechanism, service provision, and limits will be able to expand. In the end, infrastructural values, systems, and mechanisms are related to organizational accumulation and processes or the organizations. The better these processes are followed and used by organizations and structural innovations, the more benefits can be provided to society and the organization in the long term (27).

The Concept of Altruism

There are various explanations about the perspectives on altruism and its conceptualization. Therefore, there is no single accepted definition of altruism (1). Undoubtfully, human beings are at the highest level of the realm of beings. The humanistic features stem from the principle of "creating to exist." The essence of this principle is to love, respect, not to alienate, share, realize their responsibility in this regard, and fulfill what is necessary based on tolerance. When all this is taken into consideration, the subject's essence is to give willingly, that is, altruism (10). Altruism can also be defined as the behavior of helping someone else to improve their well-being (30). Although it is referred to differently in field researches, it would be most appropriate to define the phenomenon of altruism as a form of behavior that is carried out only voluntarily, without expecting any response from the counter-side that they are sacrificing for (37).

This research, conducted with personnel working within the public sports organizations located in the Mediterranean Region of Turkey, aims to examine the relationship between intellectual capital and altruism. When the relevant literature is examined, no research has been found in which these two concepts are evaluated together within the framework of public sports organizations. It is thought that the research findings will contribute to all public sports organization employees, especially sports managers.

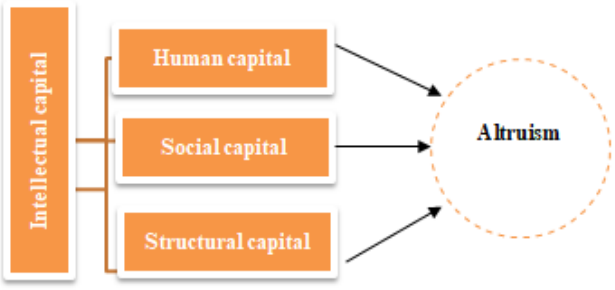
METHOD

The Research Model

Relational or singular researches can be performed as well as the general survey models (17). In the present study, a relational survey model was performed. The research was evaluated by the scientific research and publication ethics committee of the relevant institution within the relevant (b) circular framework, and it was deemed appropriate to conduct the research (E-36592570-730.08.03-89436).

The Model of the Research

The model of the research is shown as follows.



Research Group

While the study group consists of personnel working in public sports organizations in the Mediterranean Region of Turkey, the sample group consists of 363 personnel, 138 women and 225 men, who were selected by convenience sampling method among these individuals and accepted to participate in the research voluntarily.

Data Collection Tools

The intellectual capital scale: It was developed by Subramaniam and Youndt (31) and translated into Turkish by Özdemir and Taşçı (25), and its validity and reliability were ensured. The scale consists of 3 sub-dimensions and 14 proposals: human capital, social capital, and structural capital. As a result of the confirmatory factor analysis of the "intellectual capital scale" used within the scope of this research, the model fit criteria were examined and found to be CMIN/DF(x2/df): 2,768, GFI: 0.928, AGFI: 0.893, CFI:0.961, IFI:0.961, RMSEA:0.07. Cronbach Alpha values of the scale for this research have been determined as human capital: .896; social capital: .860; structural capital: .890.

Altruism Scale: Developed by Ersanlı and Doğru-Çabuker (10). The scale consists of 2 sub-dimensions and 20 proposals, including the "Dedication" dimension of 15 items and the "Selfism" dimension of 5 items. It is a 5-point Likert-type scale ranging from the least (1) to the most (5). Model compliance criteria were examined as the result of confirmatory factor analysis related to the "altruism scale" used within the scope of this research and was found to be CMIN/DF(x2/df): 2.132, GFI: 0.917, AGFI: 0.888, CFI:0.912, IFI:0.914, RMSEA:0.056. In addition, the Cronbach Alpha values of the scale are determined as dedication: .840; selfism: .788. That X2 /DF is below 3, RMSEA value is below 0.08, and GFI, AGFI, CFI, IFI values are within the value ranges stated in the literature indicate that both scales have been verified by the data collected (9,14,18).

Analysis of the Data

The data collection tools' validity and factor structure appropriateness were tested through confirmatory factor analysis with the statistics program. Descriptive statistics were applied. Pearson correlation and regression methods have been used to test the relationships between scales within the scope of the relational model.

FINDINGS

Table 1: Demographic features of the participants of the study

		n	%
Gender	Female	138	38.0
	Male	225	62.0
Age	18-25	12	3.3
	26-35	172	47.4
	36-45	130	35.8
	46 and above	49	13.5
Level of Education	Primary School	16	4.4
	Secondary School	30	8.3
	High school	72	19.8
	Associate degree	32	8.8
	Undergraduate	193	53.2
	Graduate	20	5.5
Type of Position	Worker	114	31.4
	Officer	104	28.7
	Coach	73	20.1
	Specialist	33	9.1
	Manager	18	5.0
	Other	21	5.8
Duration of Employment	1-3 years	99	27.3
	4-6 years	104	28.7
	7-9 years	70	19.3
	10-12 years	45	12.4
	13 years and above	45	12.4
Total		363	100%

When the participants' demographic features were examined, it was seen that 62% of the 363 participants (225 people) were male, and 38% (138 people) were female. 47.4% of the participants (172 people) are in the age range of 26-35 years, 35.8% (130 people) are in the age group of 36-45 years, and 13.5% (49 people) are in the age group of 46 years and over. The smallest share is 3.3% (12 people), consisting of those aged 18-25 years. This includes 19,8% (72 people) high school graduates, 8,8% (32 people) associate degree graduates, 8,3% (30 people) secondary school graduates, 5,5% (20 people)

graduate degree holders and 4,4% (16 people) primary school graduates as the smallest ratio. According to the type of position, participants are consisted of 31,4% (114 people) workers, 28,7% (104 people) officers, 20,1% (73 people) coaches, 9,1% (33 people) specialists, 5,8% (21 people) other and 5,0% (18 people) manager groups. According to the duration of employment, participants consist of 28,7% (104 people) those working for 4-6 years, 27,3% (99 people) those working for 1-3 years, 19,3% (70 people) those working for 7-9 years, 12,4% (45 people) those working for 10-12 years and 12,4% (45 people) those working for 13 years and above.

Table 2. Correlation analysis of intellectual capital and altruism

N =363		M	SD	1	2	3	4	5
Intellectual Capital	1. Human capital	4.68	1.235	-				
	2. Social capital	4.67	1.160	,632**	-			
	3. Structural capital	5.18	1.230	,578**	,594**	-		
	4. Dedication	4.13	,515	,214**	,168**	,262**	-	
	5. Selfism	2.18	,954	,016	,047	-.074	-,290**	-

**p<.01

According to the results of the correlation analysis between human capital, social capital, and structural capital, which are the sub-dimensions of intellectual capital, and altruism (dedication, selfism), there is a positive and moderately significant (r= ,632; p<0.01) relationship, a moderately significant positive correlation between human capital and structural capital (r=.578; p<0.01), and a significant, positive and moderate relationship between social capital and structural capital (r=.594; p<0.01) found between human capital and social capital. No correlation has been found between the three sub-dimensions of intellectual capital and the selfism dimension of the altruism scale. A significant, positive but low-level correlation was found between human capital, one of the sub-dimension of the intellectual capital, and dedication (r=,214; p<0,01), between social capital and dedication (r=,168; p<0,01), between structural capital and dedication (r=,262; p<0,01).

Table 3 . Regression analysis of intellectual capital and altruism

Independent Variables	Dependent Variable	β	P	F	R	R^2	Corrected R^2
Human capital	Altruism (Dedication)	,105	,129	9.692	,274	,075	,067
Social capital		-.028	,691				
Structural capital		,218*	,001				

Table 3 shows the multiple regression analysis conducted between the dependent variable and altruism compared to the three sub-dimensions of the intellectual capital scale, an independent variable. As a result of the correlation analysis was not included in the regression model because there was no correlation between the dimensions of selfism and intellectual capital, which is the negative dimension of altruism (Table 2). With the regression model created, the explanatory power, influence, and direction of the intellectual capital that constitutes the independent variable on altruism that constitutes the dependent variable were revealed. The results of the multiple regression model are statistically significant (F(df=3,359) =9,692, p< 0.001). R2 value of the study is 075. The corrected R2 value is 067. This finding shows that the independent variable intellectual capital explains about 07 % of the changes in the dimension of the dependent variable altruism. It can be considered that the sample group has an effect on the fact that the R2 values are quite low.

Considering the significance of the independent variables in this relationship, affecting the dependent variable, based on beta indicators, it was determined that the human capital dimension (β=.105; p>.05), and the social capital dimension (β=-.028; p>.05) did not show any effect because they were statistically insignificant. The significant and positive effect is on the structural capital (β=,218; p<,01), which is the sub-dimension of intellectual capital. It can be noted that structural capital has a significant positive contribution in explaining the effect of intellectual capital on altruism, and a one-unit increase in the structural capital level of the personnel of public sports organizations increases their altruism by 21%.

DISCUSSION AND CONCLUSION

Employees of public sports organizations located in the Mediterranean Region of Turkey participated in this study, which examined the relationship between intellectual capital and altruism.

According to the correlation analysis findings of the study, a moderately significant relationship was found between human capital, social capital, and structural capital, which are the sub-dimensions of intellectual capital. No correlation has been found between the three sub-dimensions of intellectual capital and the selfism dimension of the altruism scale. A significant, positive, but low-level correlation was found between human capital, one of the sub-dimensions of intellectual capital, and dedication, which is the sub-dimension of altruism, between social capital and dedication, and between structural capital and dedication. To sum up, a medium-level correlation has been found between the dimensions of intellectual capital itself. A significant, positive, but low-level correlation was found between intellectual capital (human capital, social capital, structural capital) and altruism (Table 2).

The regression model created within the scope of the study is statistically significant. When the beta indicators were examined, it was determined that they did not show an effect because the human capital dimension and the social capital dimension were not statistically significant. The significant and positive effect is on the structural capital, which is the sub-dimension of intellectual capital. It can be said that structural capital has a significantly positive contribution to explaining the impact of intellectual capital on altruism. A one-unit increase in the level of structural capital of the personnel of public sports organizations increases their altruism by 21% (Table 3). It can also be thought that technological applications that make things easier in the dimension of structural capital have positive effects on the dedicated work of the personnel.

In the literature review of the related literature, subjects such as intellectual capital as a generator of innovation in companies (23), intellectual capital, information management practices, and firm performance (16), the regulatory role of information sharing in the effect of intellectual capital on organizational performance (3), the role of organizational climate supporting innovation in the relationship between intellectual capital and corporate performance (34), the relationship between organizational learning ability, intellectual capital and job satisfaction in sports organizations (5), intellectual capital, information sharing and innovation performance (20), the effect of intellectual capital on innovative working behavior (33), the role of intellectual capital in organizational innovation (22), effect of the intellectual capital on innovative talent types (31), intellectual capital and futurism (32), intellectual capital and organizational performance (36,38), the relationship between physical education teachers' helpfulness and altruism levels (35), civic engagement and altruism (13), performance from mutual altruism (24), altruism in sports aid campaign (21), the relationship between altruism and employee performance (19), examination of social innovation tendency in the axis of altruist behavior (37) have been found to have been studied. No studies found that directly examine the relationship between intellectual capital and altruism levels of employees of public sports organizations. Therefore, it is thought that this study will make significant contributions to the related literature.

According to Stewart (29), intellectual capital is a source of wealth for individuals and organizations and is the common property of both parties. Hoche (15), however, stated that intellectual capital could be used in the context of assessing the wealth of an organization. Altruism acts as a source of positive results such as cooperation among employees, synergy, the emergence of team spirit, a sense of unity, and organizational commitment (1). Therefore, it can be stated that it is essential to carry out studies aimed at improving the intellectual capital and altruism of both public sector and private sector personnel.

As a result of this research carried out with the participation of the personnel of public sports organizations, a significant, positive. However, a low-level correlation was found between intellectual capital (human capital, social capital, and structural capital) and altruism. It can be noted that structural capital, which is the sub-dimension of intellectual capital, has a significant positive contribution to explaining the impact of intellectual capital on altruism. As the level of intellectual capital (structural capital) of those who work in public sports organizations increases, their altruism will also increase.

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