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The Relationship between Sports Federations and Fair Play

Ömür Fatih Karakullukçu[1], Eda Semikan Öğün[2] and ilal Okudan[3]
[1]*Ankara Hacı Bayram Veli University, Ankara, Turkey.*
[2]*Afyon Kocatepe University, Afyonkarahisar, Turkey.*
[3]*Adnan Menderes University, Aydın, Turkey.*

Abstract

Sport concept makes it possible for people who are all around the world, from all cultures and from all ethnic origins come together, and rejoice, stand shoulder to shoulder, crow screams of joy. Recently, it is observed that there is an increase in the cases overshadowing fair play concept which we do dislike and have to witness not only in green fields but also in parquet flooring. This increase has prompted non-governmental organizations, several society foundations and sports federations in this respect, and various projects have been started. In this study, the endeavors of sports federations aiming to make fair play culture become popular are scrutinized and investigated in their current situation. Literature is scanned during the preparation of this study which has the characteristics of compilation, and theoretical knowledge is collected in an organized way. Electronic magazines are scanned, written-published resources are analyzed in the preparation of the topic 'the relationships between Sports Federations and Fair play', and the knowledge which is collected is interpreted by creating the framework of the study in this way.

Keywords: Fair play, Sports federations, Sportsmanship

1. Introduction

Sport concept has taken a significant place in billions of people's lives all over the world. It would not be wrong to mention that either active sportsmen or passionate supporters and passive audience have touched sports in some part of their lives in a way. The main reason of sports touching a massive public is surely its capacity of reintegrating and wide-ranging in composing all the people who are from different cultures and ethnic origins even having different worldviews and speaking different languages. Uniting the differences, the sports concept not only make people enjoy from all over the world but also make them cry while hugging each other. People who feel that kind of emotional process in an intense way have led to standing out of concepts fanatic and fanaticism (Gumus, 2019). Fanaticism is being used as a term of antonymous of fair play, and as to "sports", it has brought with the arguments of fair play and fanaticism in all platforms.

Nowadays, sports has gained new dimensions depending on social changes such as high industrial production, over urbanization, increased free time (Gumus et. al., 2016; Isik et. al., 2015). Sports is based on two main features which are motion and agitation. Sports has a lot of things to do with education. The best education is the one which starts at the early ages. Regarding that, it could be said that sports and youth are interdependent. In our daily time, sports is a science which makes people physically, psychologically and mentally improved and coordinated. However, this improvement and coordination is likely to happen by using scientific methods. Unless it is conducted in this way, sports cannot go further than being a hobby that is taken up in order to gap the free time.

Sports is divided into two sections in scientific field.

1) Peak sports or competitive sports
2) Public sports

To catch the era in sports is not only a duty but also an aim of our time which is being a term of competition in cultural, scientific and economic fields as well.

We may be able to create more healthy generations if we make children and teenagers more into sports in Turkey which has the youngest population of Europe (Sunay, 2003).

Sports is above the parties, and there is only one policy toward it which is to serve the public. In our country, the rate of population who are between 12 and 24 ages has reached %30 in total population. While

all the countries are trying to increase their youth rate in their total population, Turkey has to provide young people with the best circumstances in order to benefit from them (DPT, 2000).

Youth and Sports Management, which is also responsible for the sports of administration in Turkey, attains the article 59 of constitution "The government takes precautions that improve physical and mental health of people from all ages, encourages people to do the sports, and protects the successful athletes" and gives certain responsibilities to sports federations which serve as main service institutions. Therefore, either Sports and Youth Ministry or sports federations had better exist in a hierarchy which is being in a harmony of daily life circumstances, and update themselves fulfilling the realities of daytime (Colakoglu and Erturtan, 2009).

Sports, which is conducted by volunteer foundations in developed countries, is still depended on the institutions administered by the government and face certain difficulties occasionally. Sports almost every country in Europe is in a constructing generalized by sports clubs whose numbers are more than 100000 and are conducted by independent organizations. For example, CCPR (Central Council of Physical Recreation and Sport) is an institution out of government which is responsible for making physical recreation and sports popular, developed, scientifically searched out and conducted in England, and it includes at least 250 management institutions which are not based on the government administrative system and has more than 150000 sports clubs. The same duty is carried out by DOSB – (Deutcher Olimpische Sport Bund) in Germany with the help of DSJ, DSB, 75 sports management institutions and nearly 90.000 sports clubs (www.ccpr.org.uk; www.dosb.de).

Sports Federations are in a position of construction which takes over significant and dimensional missions on behalf of sports under the control of Sports General Management, currently being federations in Turkish Sports Organizations whose hierarchy was set up in the early years of Turkish Republic and which changed and developed itself in terms of quality and functions from the establishment of Turkey Gymnast Communities Confederation (14.06.1922) until the establishment of Youth and Sports Ministry (06.04.2011).

The responsibilities of Sports Federations are pointed out in detail, in article 9 of applicable legislation, number 3289, about the organization, duties and Youth and Sports General Management. These are the following ones (http://mevzuat.basbakanlik.gov.tr/).

1.Making the sports in homeland common and developed equally.

2.Monitoring sports activities and developments in homeland and abroad, organizing and controlling competitions and other activities.

3.Providing coaches and monitors with seminars and courses to make them professionally developed, registering officially who are successful, and observing their studies continuously.

4.Organizing competitions in homeland and maintaining continuity of these competitions, assigning referees, delegates and observers.

5.Observing the sportive performance regarding the developments and novelty, and by doing that, making it possible to benefit from this knowledge in homeland.

6.Detecting the standards of sports equipment and trying to have them made in homeland or abroad.

7.Solving the possible technical incompatibility between clubs and cities.

8.Organizing international courses, seminars and sports organizations by getting the permission of International Federations.

9.Picking up the teams that go for international competitions and prepare them for the competitions

10. Presenting the precautions to be taken while planning the development of sports branches.

11. Preparing the Referee, Coach, Monitor Regulations Drafts and present them to Center Consultation Council which are needed to organize the competitions.

12. Taking the necessary precautions to raise certain and promising athletes by keeping their files.

13. Opening training and preparation camps for all the athletes from every level.

14. Studying on archive and statistics related to sports branches, preparing educational video, slay and brochure, and cooperating with press and TV foundations and sports training center.

15. Identifying the procedures to be performed in order to follow a certain system in sports.

16. Making sure that the budget given to the federation is spent well.

17. Dispatching athletes, referees, coaches and managers, and sports institutions who perform unsporting behavior to Penal Councils.

18. Providing insurance procedures of National Team Athletes and Directors

19. Making city sports delegates and federations coordinate with each other.

In this context, sports federations have taken significant roles and responsibilities to popularize fair play culture.

Fair play, emphasizing the fair and honest playing with its simplest meaning, is expected from healthy and moral individuals composing the ideal society. Increasing commercial and political expectations have led to losing the value of the professional spirit against the amateur spirit by putting the ethics in the backseat. The rise of ungentlemanly behaviors in sports has shown that a systematic and longtime education process is vital to absorb fair play concept (Yıldıran, 2005).

The aim of every individual is surely to get the upper hand. However, the success in sports, medals or championship must be a means to an end not the end. As to the end, it must be implementing fair play namely sportive virtue. In this sense, sports means trying to beat the opponent in the best way of struggling under the certain rules and sportive issues. Otherwise, assuming everyway fair in order to win is not complying with sportive concept. However, the value of sportive activities is indexed to success and end. That has transformed sport "a struggle which is aimed to win at all costs." In other words, sports has become an issue done for medals, prizes and championship rather than done for sportive virtues, therefore, sportive virtues have become a topic that does not have a lot of significance compared to success. Sports straying from its real aim and being indexed to success has brought about moral corruption in sportive competitions. Additionally, sportive struggle has given its way to winning ambition (Tanrıverdi, 2012).

Sports activities, which are carried out by sports federations in homeland, have a significant role in internalizing humanitarian values such as cooperation and solidarity, creating awareness of rule, sharing, justice, indulgence and charitableness.

In line with these aims, the main objective of this study is to underline the relationship between fair play and sports federations.

2. Method

The endeavors of the sports federations and the available conditions regarding the popularity of fair play culture have been examined in this study. During the preparation of this study, which is also being a compilation, literature has been investigated, and theoretical knowledge has been gathered systematically. During the preparation of the topic "the relationship between sports federations and fair play culture", electronic magazines were scanned, printed- hard copy resources were investigated, and acquired knowledge has been interpreted by creating the conceptual framework in this way.

3. Discussion and Results

Sports straying from its real aim and being indexed to success has brought about moral corruption in sportive competitions. With the effect of psychologic pressure felt by athletes, coaches and directors to win medals or prizes or to be successful, the tendency towards amoral behaviors in sport organizations has increased. Hence, fair play has given the its place to winning ambition (Kocak et. al, 2017; Gumus et al., 2016; Eruzun et. al., 2017; Gencer et. al., 2019; Gumus and Karakullukcu, 2015).

The endeavors about fair play in Turkey seem to have started in 1981 with International Olympiad Committee (IOC) suggestion to gather Turkey National Olympiad Committee (TNOC) under the chairmanship Turgut Atakol. In the meeting, Fair Play Council was formed (officially registered July 20 th 1993). Since 1995, Turkey has been home to Europe Fair Play Movement (EFPM) for several times. Fair Play Committee has awarded people in three different sections (behavior, career, communication) in sports since 1982, but after the year of 1999, it has divided its prizes in two groups as sportive and social groups. By doing that, it has started to award the prize to people who behave accordingly in Turkey. The chairman of media organ - which is called Play Fair Magazine, and website of this magazine is being

www.FairPleyeur.com-of EFPM is Erdoğan Arıpınar who is co-director of TNOC (Turkey National Olympiad Committee) also working as a chairman of the Fair Play Council, and both of these media organs are made in Turkey. There are still three members from Turkey in World Fair Play Council. Togay Bayatlı, ex-chairman of TNOC, Erdoğan Arıpınar and Şenes Erzik are serving currently. The logo of Fair Play Council is a hand showing a card including the star and crescent (meaning not showing a red card but giving the heart). The winners are given a brazen statue on which people are hugging the earth, a certificate for Social Fair Play Prize, and a statue and certificate for Sportive Fair Play Prize with name tags. Turkey National Olympiad Committee Fair Play Council consists of 20 members being respectful sportsmen who are selected every four years in Turkey. This council conducts fair play duties and determines the people who will take Fair Play Prize (www.olimpiyatkomitesi.org.tr).

Such kind of activities in order to generalize fair play philosophy are needed as examples. It is seen that federations which perform similar activities are pretty rare and projects are not sustainable. Additionally, it observed that although there are regulations about fair play issued by Turkey Football Federations (TFF), the level of performance is not satisfying. "The Fair Play Regulations", which was issued in September, 1999, aim to organize fair play, to identify the precautions needed to encourage sportive honesty and gentlemenship and to establish the criteria how to award (www.tff.org). That command of federation includes football clubs, athletes, referees, technical directors, trainers and audience.

The struggle of many federations about fair play has not gone further than asking for fair play before matches/competitions that are considered to pass tense and giving prizes regarding sportive behaviors.

When the endeavors of Turkey Tennis Federations are examined, it has been declared that Fair Play Awards would be given every single year since 2011. Every kind of study, occupation, organization regarding that are being conducted by Turkey Tennis Federations Movement Council. For Fair Play Awards Gentlemenship, events including devotion are in the forefront. Prizes are being handed out in 3 branches as "Sportive Behavior", Career" and Introduction". Athletes, foundations and teams who are considered to deserve Fair Play are awarded with 5000 TL during the ceremonies which are held at the end of year. As to "Sportive Behavior", it has to be presented to Turkey Tennis Federations with files proving the events and behaviors. For "Career", athletes and clubs need to have an identity acting in harmony with fair play, profiting national sports and society, being successful in any sports branch and serving as a model. As to "Introduction" presenting fair play, gentlemenship, devotion and generalizing these values are taken into consideration (www.ttf.org.tr).

The command of federation includes football clubs, athletes, referees, technical directors, trainers and audience.

The struggle of many federations about fair play has not gone further than asking for fair play before matches/competitions that are considered to pass tense and awarding the people regarding sportive behaviors.

When the endeavors of Turkey Tennis Federations are examined, it has been declared that Fair Play Awards would be given every year since 2011. Regarding that, every kind of study, work, organization are being conducted by Turkey Tennis Federations Management Council. Gentlemanship events including devotion take the front place for Fair Play Awards. Prizes are being awarded in three branches as 'Sportive Behavior', 'Career' and 'Introduction'. Athletes, foundations, and teams who are considered to deserve Fair Play are awarded 5000 TL during the ceremonies which are held at the end of year. As to 'Sportive Behavior', it has to be presented to Turkey Tennis Federations with formal files proving the events and behaviors. For 'Career', athletes and clubs need to have an identity acting in harmony with fair play, contributing national sports and society, being successful in any sports branch and setting as a model. As to 'Introduction', presenting fair play, gentlemanship and devotion to society and making these virtues common are taken into consideration (www.ttf.org.tr). In addition to this, TTF claimed that " Every athlete has to behave well and respectfully toward his opponent, referees and audience, and behaviors such as slowing the game, making his opponent angry, not obeying game rules when there is referee and taking advantage of non-referee playing rules constantly, resting in inappropriate time or taking restroom and

injury break wrongly, making the referee and chief referee's job hard and trying to cheat them, disobeying constantly are evaluated by referees and chief referee carefully, if needed, according to the type of event, ' warning', 'fine' and 'disqualify' may be punished directly while taking the importance of the flaw into consideration.

Turkey School Sports Federation has a significant mission in fair play issue. Fair play could be taught via educative resource, programs related to recreational events, organizations in schools as well as sports foundations. The general ethical and humanitarian aims of school sports could be explained as awakening the physical, mental and social health consciousness of children and teenagers, and making them skillful in these aspects. Sports activities via physical education classes play important roles in internalizing humanitarian values such as cooperation, rule awareness, sharing, justice, tolerance and helpfulness. Therefore, in order to raise a generation which has ethical values, with the help of the project called 'I am the joy of school and delegate of fair play', which TSSF has created, it is aimed to present and emphasize that the object is to participate, compete and be a part of the event rather than to win, additionally the opponent is not the enemy but a component who is vital to existence of the competition itself. As a pilot study, more than 5000 students are trained with fair play by 18 fair play delegates in Afyonkarahisar. Fair play ideology has been explained to 5336 students in 22 different schools governed by National Education Ministry in Afyonkarahisar by 18 physical education and sports school students who have taken 12-week-training with the project 'I am the joy of school and delegate of fair play'. Believing that the only way to prevent sports violence in Turkey is education, The School Sports Federations have mentioned the importance, the nature and the ideology of it while talking about the damage of sports violence and aggressiveness to person, team and national sports.

As a result, the increase of unmoral behaviors in sports has shown that a systematic and long education process is vital to acquire fair concept/culture. Practices must be done for the sake of imposing fair play concept into athletes, coaches, referees and other stuff who perform in federations. Fair play training must be given in some organizations such as coaching courses, refereeing, in service trainings which are held in the direction of federations. Project sections in federations are suggested to focus on sportsmanship projects.

It should not be forgotten that the most advantageous institutions are the federations in terms of infusing fair play into next generation athletes, and thanks to this, it is contributing the national sports..

References

1. Çetin, E. Çocuk ve gençlerin televizyonda maç izleme alışkanlıklarının spordaki şiddet eylemlerine etkileri. *International Journal of Science Culture and Sport.* 2015; 3(Special Issue 3), 828-844.
2. Chung, E., Farrelly, F., Beverland, M. B. & Karpen, I. O. Loyalty or liability: Resolving the consumer fanaticism paradox. *Marketing Theory*. 2018; 18(1), 3-30.
3. Çolakoğlu, T., & Erturan, E. E. Spor federasyonlarının özerkleşmeleri ve hukuksal boyutunda spor hukuku gereksinimleri. Elektronik Sosyal Bilimler Dergisi. 2009; 8(27), 323-335.
4. DPT Sekizinci Beş Yıllık Kalkınma Planı. Beden eğitimi, spor ve Istanbul olimpiyatları özel ihtisas komisyonu raporu. Ankara: DPT Yayını No: 2513. 2000.
5. Eruzun, C., Kinali, Y., & Ogut, E. E. E. A Qualitative View into the Employment Problems of Sports Management Graduates in Turkey. *International Journal of Recreation and Sports Science*. 2017; 1(1), 13-21.
6. Gencer, Y. G., Eroğlu, O., & Yıldırım, Y. Investigation of Sportsmanship Behaviors of Athletes Participating in Intercollegiate Basketball Competitions. *International Journal of Recreation and Sports Science.* 2019; 3(1), 39-45.
7. Gumus, H. X kuşağında sportmenlik yönelimi. OPUS–Uluslararası Toplum Araştırmaları Dergisi. 2019; 10(17), 738-755. DOI: 10.26466/ opus.524867.
8. Gumus, H., & Karakullukcu, O. F. Leisure satisfaction in football and basketball fans: a sample of Afyonkarahisar. *International Journal of Sport Culture and Science*, 2015; 3(Special Issue 3), 401-409.
9. Gumus, H., Saraclı, S., Karakullukcu, O. F., Doganay, G., & Kurtipek, S. Ortaöğretim öğrencilerinde fair

play kavramı. *International Journal of Science Culture and Sport*, 2016; 4(2), 430-438.
10. http://www.ccpr.org.uk (Accessed on 12.05.2019).
11. http://www.dosb.de (Accessed on 12.05.2019).
12. http://www.mevzuat.gov.tr/ (Accessed on 05.04.2019).
13. Isik, O., Gumus, H., Okudan, B., & Yilmaz, M. Evaluation of the effects of the quality of life levels of university students upon their depression levels. *International Journal of Science Culture and Sport (IntJSCS)*, 2014; 2(5), 836-843.
14. Karadag F. T. Türkiye'deki spor federasyonları çalışanlarının örgütsel öğrenme ve bireysel yenilikçilik profillerinin incelenmesi. Yayınlanmamış Doktora Tezi, Gazi Üniversitesi Sağlık Bilimleri Enstitüsü, Ankara.2018
15. Kocak, Y., Tukul, U., Tolan, B., Gumus, H., & Tolukan, E. Spor ve Sağlıklı Yaşam Merkezlerinde Hizmet Kalitesine Yönelik Müşteri Beklentilerinin ve Algılarının Analizi (Afyonkarahisar İli Örneği). *International Journal of Recreation and Sports Science*, 2017; 1(1), 38-46.
16. Sunay, H. Türk spor politikasına analitik bir bakış. Spormetre Beden Eğitimi ve Spor Bilimleri Dergisi, 2003; 1(1), 39-42.
17. Tanrıverdi, H. Spor ahlakı ve şiddet. The Journal of Academic Social Science Studies, 2012; 5(8), 1071-1093.
18. Taşmektepligil, M. Y., Cankaya, S., ve Taner, T. Futbol taraftarı fanatiklik ölçeği. Spor ve Performans Araştırmaları Dergisi, 2015; 6(1), 41-49.
19. Taşmektepligil, M. Y., Küçük, V., Karakuş, S. ve Kalkavan, A. Bireysel şiddet açısından spor medyasının etkileri. *Marmara University Journal of Sport Science*, 2017; 2(2), 30-42, https://doi.org/10.22396/sbd.2017.29
20. Türkiye Futbol Federasyonu. Retrieved from: http://www.tff.org/Resources/TFF/Documents/TALIMATLAR/Fair-Play-Talimati.pdf. 2019.
21. Türkiye Milli Olimpiyat Komitesi. 2019; Retrieved from: http://www.olimpiyatkomitesi.org.tr/Detay/Faaliyetlerimiz/Fair-Play/28/1.
22. Türkiye Okul Sporları Federasyonu. 2019; Retrieved from: http://tosf.gov.tr/fair-play-uzerine.
23. Türkiye Tenis Federasyonu. 2019; Retrieved from: https://www.ttf.org.tr/seniors-duyurulari/fair-play-odulleri.
24. Yıldıran, I. Fair play eğitiminde beden eğitiminin rolü. *Gazi Beden Eğitimi ve Spor Bilimleri Dergisi*, 2005; 10(1), 3-16.
25. Yücel, A. S., Atalay, A. & Gürkan, A. Sporda şiddet ve saldırganlığı etkileyen unsurlar. *Uluslararası Hakemli Psikiyatri ve Psikoloji Araştırmaları Dergisi.* 2015; 2(2), 68-90. https://doi.org/10.17360/UHPPD.201529603.

The Body Mass Index as an Indicator of the Physical Development of the Male Students Studying at Various Universities of Tyumen Region

E.A. Semizorov[1], N.Ya. Prokopiev[2], A.M. Durov[3], B.N. Beketov[4], S.I. Khromina[5], V.I. Nazmutdinova[6], D.S. Rechapov[7] and L.N. Albert[8]

[1]Candidate of Sciences in Pedagogy, associate Professor, Northern Trans-Ural State Agricultural University, Russia.
[2,3]Doctor of Sciences in Medicine, Professor, University of Tyumen, Russia.
[4]Doctor of Sciences in Pharmaceutical, Professor, Tyumen State Medical University of the Ministry of Health of the Russia Federation, Tyumen, Russia.
[5]Candidate of Biological sciences, Tyumen State Industrial University, Russia.
[6]Candidate of Sciences in Biology, associate Professor, University of Tyumen, Russia.
[7]Candidate of Sciences in Pedagogy, associate Professor, University of Tyumen, Russia.
[8]Senior tutor ,Tyumen State Medical University of the Ministry of Health of the Russia Federation, Tyumen, Russia.

Abstract

The study is aimed at assessing a body mass index which is one of the indices of the physical development of adolescent students studying at various universities of Tyumen region. 273 male students aged 18.7±1.4 years old were examined. "The method of the physical development assessment of population" (The certificate about the state computer program registration № 2008615639) including the body height (sm), body mass (kg) and Quetelet index (g/sm) determination was devised. The significant differences in the body height and mass as well as the body mass index were not revealed (p>0,05) in all adolescent students at the beginning of the training period studying at various universities of Tyumen region and it demonstrates the harmonious physical development at the previous stages of ontogenesis. The received data show that students' morphological state allows them not only to attend physical cultureclasses but go in for the chosen kind of sport. At the same time according to the primary investigation carried out at the beginning of the training period, it is difficult to judge about the students' physical development as a whole, so the complex assessment of their physical development will be carried out during their future training period.

Keywords: adolescent students, physical development, body mass index

Introduction

The physical culture [2, 10, 22] supporting the high level of the motion activity [23], the optimal morphological and functional state and health [9, 12, 31, 33, 34, 35] has been playing a great role in the individual development of children, adolescents and students living in different regions of our country for many decades.

In the modern conditions when cruelty and violence prevail in mass media the role of the physical culture and sport in the healthy life style and spiritual and moral personal development forming is increasing [30, 39]. It is proved that the people going in for sport regularly , taking an active part in sport events are more successful in studying, less susceptible to catching a cold and more communicative in the society [18, 29, 40].

It should be admitted that the health of modern students is a guarantee of preserving working potential of the country [13, 32, 37]. In this connection, research work related to working out the regional standards of the physical development of population is relevant [1, 5, 38].

Every physical culture teacher training students has to know their life style [24] as well as morphological and functional peculiarities [6, 11, 14, 15, 17, 19, 20, 25, 27, 28, 41, 43].

The body mass index is one of the important indicators of the physical development [3, 4, 7, 8, 16, 42, 44] which has not been studied enough in adolescent students studying at various universities of Tyumen

region. The aim of the study is to assess the body mass index as one of the indices of the physical development in adolescent male students of various universities of Tyumen region.

Methods of research

273 adolescent male students at the age of 18.7±1.4 years old studying at 6 various universities of Tyumen region were examined. 44 students were studied in Northern Trans-Ural State Agricultural University, 47 male students – in Tyumen state university, 31 students - in Tyumen state medical university of the Ministry of Health of the Russian Federation; 49 students -in Tyumen industrial university; 52 students - in Tobolsk pedagogical institute named after D.I.Mendeleev of the federal state autonomous educational institution of higher education Tyumen State university; 50 students - in Ishim pedagogical institute named after P.P. Ershov of the federal state autonomous educational institution of higher education Tyumen State university.

When allocating age groups, the "Scheme of age periodization of human ontogenesis" was used , adopted at VII All-Union conference on the problem of age morphology, physiology and biochemistry of Academy of Pedagogical Sciences of the USSR (Moscow, 1965).

The collection and analysis of the material were carried out according to "The method of the human physical development assessment" offered by us [26] (Certificate about the state computer programs registration № 2008615639). The body height was calculated within 0.5 centimeter with the help of height meter offered by us (Patent of RF for useful model № 153076).

Quetelet index is widely used by clinicians and morphologists, otherwise, it is called mass height index. Firstly, we have to note that in literature this index is called Quetelet index that is not correct at all. The point is that this index must be called Quetelet index from the point of spelling. Secondly, according to historical information Quetelet is considered to be an anthropologist but it does not correspond to the truth. As a matter of fact, Belgian Lambert- Adolph – Jacques Quetelet (February 22, 1796 – February 17, 1874) was a sociologist and mathematician, a specialist in statistics.

In 1869 Quetelet, professor of mathematics offered a method of calculating the body mass index which was widely used in the clinical and age anthropology, subsequently called by his name. According to his contribution to statistics, mathematics and astronomy Quetelet *was depicted on the Belgian stamp in 1974.*

At present there is a wide scientific and practical experience reflecting different aspects of using index method [21, 49].

The determination of mass height index (BMI, g/sm) is carried out according to the formula:

$$BMI = \frac{\text{Body mass (g)}}{\text{Height in a standing up position (sm)}}$$

Norm standard for men is 350–410 g/sm.

The results of the study were processed on a personal computer using t – criterion of Student. The differences were considered to be significant in $p < 0.05$ accepted in the medical and biological studies. The study was conducted in compliance with the principles of voluntariness, individual rights, and freedoms guaranteed by Articles 21 and 22 of the Constitution of the Russian Federation, as well as the Order of the Ministry of Health and Social development of Russia N 774n of August 31, 2010 "On the Ethics Council". The study was carried out in compliance with the ethical

standards set up in the Helsinki Declaration and the European Community (8/609EC) and informed students consent.

Results and discussion

Basic indices of the physical development as the body height and mass of adolescent students of various universities of Tyumen region (table 1) demonstrated that any significant differences in their means were not found ($p>0.05$). At present in scientific research related to the assessment of the physical development index Quetelet is considered to be normal in the value of 0.420 g/ sm, that is why the indices higher than 0.400 g/ sm in students of TPI and IPI indicate that they do not go beyond the normal values.

***Table 1**. Physical development of adolescent students of various universities of Tyumen region (M**±m**)*

Indices of the physical development	**Universities**					
	NTUSAU **n = 44**	TSU **n = 47**	TyumSMU **n = 31**	**TIU n = 49**	**TPI n = 52**	**IPI n = 50**
Body height	177.42±2.04	176.62±1.81	178.34±2.13	177.11±1.93	178.56±2.24	178.27±2.19
Body mass	69.86±1.82	68.24±1.67	70.73±1.43	69.47±1.66	71.82±1.58	71.63±1.47
Quetelet index	393	386	396	**389**	**402**	**401**

It is noted that such an important index of the physical development as the body height in adolescent students of various universities of Tyumen region is not significantly different from data received by other researchers (Table 2).

***Table 2.** Indices of the physical development in male adolescents*

Author	ear	ody height	ody mass	Quetelet index
Gorst N.A., Gorst Z.R.	005	79.4	3.5	
Negasheva M.A.	007	77.99	7.24	
Pulikov A.S.	011	72.3	3.96	
Zaitdinov A.I.,Mingazov E.N.	013	73.82	5.2	
Nazmutdinova V.I. et al.	015	78.0	5.5	
Yasin K.B.	015	78.0	3.86	
Bondareva E.A. et al.	016	78.3	5.0	
Kharisova E.Z.	016	75.6	6.7	
Bazarbaeva S.M. et al.	017	77.5	9.7	2.1±0.2
Belkina A.A.	017	77.04	3.47	
Krasilnikova V.A., Ayzman R.I.	017	74.0	5.1	1.7±0.6
Sidorenko A.V.	018	78.3	2.32	
Averyanova I.V.	018	78.8	3.5	
Zamkova E.V.	018	77.8	2.6	

According to the table 2, it is noted that the body height in young men ranges between 172.3 to 179.4 sm. It can be concluded that the body mass of adolescent students of various universities of Tyumen region corresponds to the data of other researchers given in literature.

Proceeding from the data regarding the adolescent student body mass presented in table 2 they range between 63.96 to 83.86 kg and our values about the body mass of students of Tyumen do not go beyond these indices.

The comparison of the body height of men living in European countries with the body height of adolescent students of various institutions of Tyumen region was made and given in table 3.

Table 3. *Body height of men living in European countries*

№	Country	Body height
1	Netherlands	182.5
2	Belgium	181.7
3	Estonia	181.6
4	Denmark	181.4
5	Latvia	181.4
6	Bosnia and Herzegovina	180.9
7	Croatia	180.8
8	Serbia	180.6
9	Czech Republic	180.1
10	Germany	179.9

Taking into account the body mass one can be noted that there is a tendency to its increase which takes a global problem [45, 46, 47, 48]. There is also a tendency in literature which is connected with opposite processes when in the longitudinal height stabilization the decrease in body mass is marked and it results in the changes of body shape toward to asthenization and leptosomization of body[50] and this fact influences on the health level. It is indicated that the body mass of first year adolescent students studying at Siberian universities is located on the normal lower border [36].

The results of our research showed that the obesity was not revealed using the body mass index in adolescent students of various universities of Tyumen region.

As for the comparison the data of Global Burden of Disease is given in table 4 in which 10 countries having the highest level of obesity in adult population are shown.

Table 4. *Countries having the high level of obesity in adult population*

Rating	Country	Number of people	% adult population
1	USA	78 m	33%
2	China	46 m	4.4%
3	India	30 m	3.8%
4	Russia	28m	24.1%
5	Brazil	22 m	16.2%
6	Mexico	20 m	26.9%
7	Egypt	18 m	35.9%
8	Germany	16 m	24.3%
9	Pakistan	14 m	13.6%
10	Indonesia	11 m	6.8%

Thus, on the basis of the completed study, it can be concluded that the calculated indices of the physical development of adolescent students studying at different universities of Tyumen region, firstly, do not go beyond normal values of age stage of ontogenesis. Secondly, the body mass index of adolescent students as the index of the physical development corresponds to data of other researchers. We suppose that according to one research work conducted at the beginning of studies it is difficult to speak about the physical development of adolescent students, so we will conduct a study and assess the physical development during their further training.

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References

1. Averyanova I.V., Maksimiv I.V. Age dynamics of main somatometric indices in adolescents students living in Magadan // Morphology. – 2016. – N2. – C.62-67.
2. Bakhmudov B.M.,Magomedov G.M. Physical culture and sport in the development of the student personality and forming healthy life style // Problems of the theory and practice of the development of the physical culture and sport at the modern stage: Materials of VII All Union scientific and practical conference. Editor Sh.O.Ismailova. – Makhachkala, November 16, 2018. P. 12-14.
3. Belik S.N., Zhukova T.V., Svintukhovsky O.A., Kharagurgieva I.M., Avetisyan Z.E. Dependence of the adaptation potential on body mass index in students.// Collection of conferences SRC Sociosphera. – 2016. – N 23. – P.58-60.

Belousova K.V., Shuklina N.A. The Influence of the physical activity and proper diet on the body mass index in men // Problems and perspectives of modern science. – 2016.- N11. P.73-79.

4. Bondareva E.A., Negasheva M.A., Grudieva A.V., Tarasova T.V. Association t/a –polymorphism of FTO gene with the character of fat deposition in boys and girls// Vestnik of Moscow university. Series 23: Anthropology. – 2016. – N 4. – P.69-77.
5. Demin I.V., Stepanov M.Yu., Salamatov M.B. The management of the training process in single combats using systemic and constitution approach. // Physical culture: brining up, education, training. – 2019. – N 1. – P. 45-46.
6. Dorofeeva S.G., Shelukhina A.N., Goretaya M.O., Lesnaya N.P. Analysis of obesity incidence in students. // Models of integration decisions of increasing competition of the domestic science: collection of articles of All-Union scientific and practical conference. – Ufa, 2019. - P. 268-269.
7. Evsevyeva M.E., Rusidi A.V., Fursova E.N., Borlakova E.N., Podushinsky A.Yu. Body mass index and screening of metabolic profile indices in young persons. // Russian cardiological journal. – 2016. – V. 21. – N S4-1. – P.28b-29.
8. Eremenko I.A. Student's health passport as a method of the assessment of physical and functional body state. // Scientific fundamentals of the strategy of APK and rural territories development in VTO conditions: materials of international scientific and practical conference devoted to 70 anniversary of VolSAU foundation. – 2014. P.28 – 29.
9. Ivanova E.N., Lipatova I.F. The role of physical training in the development of the student's personality. // Actual problems of the physical culture and sport in the modern social and economic conditions: Materials of International scientific and practical conference. – Cheboksary, January 22-23, 2019. – P.200-203.
10. Kasakova G.N., Pankova E.S., Zamkova E.V., Zyuzyukina A.V., Sindeeva L.V. The constitution characteristics and functional status of first year students as a criterion of the adaptation to studies at University. // Modern problems of science and education. – 2018. - N6. – P.61.
11. Kozhevnikova O.A., Trifonov D.P. The estimation of the students physical development of Nizhnetagil state social - pedagogic institute/ Eurasian Scientific Union. – 2019. – V.2. – N 2(48). – P. 106-109.
12. Kozyreva O.A., Dyakova N.I., Nikulenkov V.V., Drozova I.A. Pecularities of communicaive tolerance of students of university with PPD and students without having health disturbances: results of comparative analysis.// Innovative projects and programs of education. – 2018 –N 5. – P. 75-80.
13. Kolokoltsev M.M., Ermakov S.S., Tretyakova N.V. To the question of the organization of the physical training at University taking into consideration the constitution typology and groups of health of students. // Education and science. -2019. – V. 21.- N 5. – P. 201-206.

14. Krasilnikova V.A., Ayzman R.I. Comparative characteristics of morphofuncional indices of first year students o Tuva state university from uban and rural areas. // Vestnik of Novosibirsk state pedagogic university. – 2017. –V. 7. – N 5. – P. 178-192.
15. Kryuchkova A.V., Semynina N.M. Kondusov Yu.V., Poletaeva I.A., Knyazeva A.M. The assessment of indices of body mass index and arterial pressure in adult population of Voronezh // Clinical medicine. – 2017. – V. 95. – N 2. – P. 148 -153.
16. Kurnikova A.A. The proportion of the frontal norm of students of NizhSA. // Innovation in medicine and pharmacology: Collection of scientific work according to the results of international scientific and practical conference. N 2. – Ryazan, 2017. – 83 p. P 33-35.
17. Lipatova I.F. The influence of the physical training and sport on the ability to work of students of University. // Actual problems of the physical culture, sport and health. // the ways of their realization: materials of sci.- pract. conf. Cheboksary: Publ. Chuvash. University, 2017. – P.110 – 116.
18. Lopsan A.D.O., Budukool L.K.S. The comparative analysis of morphofunctional and psychophysiologial state of Tuva young male students having different moving activity. //Man. Sport. Medicine. – 2017. – V. 17. N 2.- P.20-29.
19. Medvedeva O.A, Aleksanyants G.D. Morphological peculiarities of physical development in young male students specializing in handball. // Materials of scientific and scientific and methodical conference of professors and teachers of Kuban university of physical culture, sport and turism. – 2015. – N 1. – P. 114 – 115.
20. Mikhaylova S.V, Kalyuzhny E.., Kuzmichev Yu. G., Troitskaya I. Yu., Maslova V. Yu. The study of morphofunctional state of students going in for sport in various sport group using the index method.// E-scientific journal "Medical university" / [E resource]. – 2013. – Issue. 4(15) October–December.–P. 3–9.
21. Mozgovykh A.L. The use of influences of physical culture in creating students personality, developing hidden potential.//Modern educational technologies in the world educational area. – 2016. – N 6 – P. 53-56.
22. Nazmutdinova V.I., Durov A.M., Shatiovich L.N. Dynamics weight and weight indices in students of Tyumen having different level of motive activity.// Medical science and education of Ural. – 2015. – V. 1. – N 4 (84). – P 90-93.
23. Pichugina N.N., Titova D.A., Saleeva V.V. The role of life style in forming a body mass index. //Bulletin of medical internet conferences.– 2016. –V. 6. – N 5. –P. 701–702.
24. Prokopyev N.Ya., Ananyev V.N., Seizoov E.A., Shatilovich .N., Ananyeva O.V. The physical capacity to work of young male students of Siberia depending on vital capacity of lungs. // Natural and technical sciences. - 2019- N 9 (135). - P. 90–94.
25. Prokopyev N.Ya., Maryinskikh S.G., Maltsev V.L., Prokopyev A.N. The method of the assessment of the physical development of people. // A certificate about the state of registration of computer programs N 2008615639.
26. Pulikov A.S., Zaytseva O.I., Petrov I.A., Markovich E.B., Blasova E.N., Basisty A.A. The body mass and adaptation abilities of young male students of republic Khakasiya. // Vestnik of Khakasiya state university named after N.F. Katanov. – 2018. – N 24. – P. 134 – 136.
27. Pulikov A.S., Kochan N.S., Markovich E.B., Petrov I.A. Constitution characteristics of the physical development and sexual dimorphism of young male persons of aboriginals of republic of Khakasiya. // Modern problems of science and education. – 2016. – 2016. – N 6. – P.254.
28. Semizorov E.A. The importance and development of optional disciplines in the physical culture and sport in Northern Trans-Ural state agricultural university. // The world of science, culture, education. 2018. – N 6 (73). – P. 189 – 191.
29. Sidorenko A.V., Pulikov A.S., Markovich E.B., Petrov I.A. Age peculiarities of the physical development of young male persons of European population of republic Khakasiya. // Vestnik of Khkasiya state university named after N.F.Katanov. – 2018. – N 24. –P. 136–138.

30. Sidorova K.A., Sidorova T.A., Dragich O.A., Churilova I.S. The analysis of morphofunctional body variability of young male students in the conditions UrFO. // Fundamental studies. – 2011. N 12-4. – P. 712-715.
31. Sipatorova A.M., Melikhov Ya.P. Informing the students about hypodynamia and its influence on the students health state. // Science and education today. – 2018. – N 4(27). – P. 78-79.
32. Slabodchik P.P. The assessment of the level of the physical development of first year students of SEMSMU. // Actual problems of medicine: collection of scientific articles of Republic scientific and practical conference and 26 th final scientific session of Gomel state medical university. – Gomel, November 3-4, 2016. – P. 710-712.
33. Studenkov M.O., Ukhanov I.A., Frolov V.K. Some indices of physical development of medical students of Tula state university// Modern tendencies of the development of education, science and technologies: Collection of scientific wirk according to materials of VII international scientific and practical conference. Editor A.V. Tugolukova. – Moscow, December 28, 2018. – P.158-162.
34. Sukhanova I.V., Maksimov A.L. Modern tendencies of the physical development and the state of cardio-vascular system in adolescent students of Magadan // Hygiene and sanitaria. – 2015. – V. 94. – N 3. – P. 83-86.
35. Sukhinina K.V., Lobkova D.K., Plotnikova I.I., Dorzhieva O.S. The physical development and physical training of first year students of the Siberian university. // Physical culture: education, training. – 2019. – N 3. – P. 56-58.
36. Syupova M.S., Khalikova S.S. Students health as a factor of containing of working force of the region. // Scientific notes of TESU. – 2013. V. 4. – N 4. – P. 204-209.
37. Timoshenko K.T., Nikolenko V.N., Minnibaev T.Sh., Nikityuk D.B., Klochkova S.V. Anthropometric indices of adolescent students at the initial period of training at University. // Population health and environment. – 2016. – N 6(279). – P. 29 – 32.
38. Tkachenko Yu.A., Yumanets D. The physical culture as the most important component in education of the many-sided student personality. // Forming of a future personality on the base of psychological and pedagogical analysis: Collection of articles of International scientific and practical conference. 2017. – P. 111-114.
39. Filchakov S.A., Chernyshova I.V., Shlemova M.V. Actual problems of student health. // Success of modern natural science. – 2013. – N 10. – P. 192 -192.
40. Kharisova E.Z. The comparative analysis of morphological peculiarities in adolescent students aged 17 - 20 having different sport qualifification . // Actual problems of sport biochemistry and bioenegetics in XXI century: materials of All-Union scientific and practical internet- conference with the international participation. – Moscow, April 10-26, 2017. – P. 310 -314..
41. Chichina S.V. Body mass index as the important index of the physical development of first-year students. // Ecology of South Siberia and nearest areas. 2 volumes. Editor V.V. Anyushin. – Abakan, November 23-25, 2016. = P. 128 – 129.
42. Shevyakova A.A. Peculiarities of morphofunctional indices of adolescentmale persons of different ethnic groups: doctoral dissertation of cand. of biological scences: 03.03.01 / A.A. Shevyakova. – astrakhani state university. – 2017. – 136 p.
43. Yasko L.V. The assessment of body mass index in students of special medical group during physical education. // Clobozhansk scientific sport vestnil. – 2014. – N 2 (40). – P. 135 – 138.
44. Johnston F.E. The Obesity Culture: Strategies for Change //Public Health and University Community Partnerships. – Smith–Gordon, 2009. – 164 p.
45. Michael K., Leigh A. Survey Socio–economic correlates of body size among Australian adults //Families, Incomes and Jobs. A Statistical Report on Waves 1 to 6 of the HILDA Survey. Socio–economic correlates of body size among Australian adults. – 2009. – Vol. 4. – P. 180–188.

46. Moore L.L., Singer M.R., Qureshi M.M., Bradlee M.L. Dairy Intake and Anthropometric Measures of Body Fat among Children and Adolescents in NHANES //J. Am. Coll. Nutr. – 2008. – Vol. 27. – No. 6. – P. 702–710.
47. Nikolova M., Tineshev S.l. Comparison of the body mass index to other methods of body fat assessment in Bulgarian children and adolescent. //Biotechnol. & Biotechnol. – 2010. Special edition 24. – P.329–337.
48. Semizorov E.A., Prokopiev N.Ya., Gubin D.G., Solovieva S.V., Rechapov D.S. The Hildebrant Index in Adolescent Students While Studying at Various Universities.
49. Wang Y., Monteiro C., Popkin B.M. Trends of obesity and underweight in older children and adolescents in the United States, Brazil, China, and Russia //Am. J. Clin. Nutr. – 2002. – Vol. 75, № 6. – P. 971–977.

Effect of Social Problem Solving Skill and Time Management on Physical Activity Level

Himmet Kağan Tekin[1] and Mustafa Akil[2]
[1]*Uşak University, Graduate School of Health Sciences, Uşak, Türkiye.*
[2]*Uşak University, Faculty of Sport Sciences, Uşak, Türkiye.*

Abstract

The aim of this study is to analyse the effect of social problem solving skills and time management on the level of physical activity.1535 people participated in the research. 709 (46.2%) of the subjects were males and 826 (53.8%) were females. Subject Information Form, Physical Activity Questionnaire, Time Management Questionnaire and Social Problem Solving Inventory were used to collect data. When the findings were examined, 29.6% of the participants were inactive, 51.9% were minimum active and 18.4% were very active.Subjects' Positive problem orientation and rational problem orientation factors among their social problem solving skills are at high level, but negative problem orientation, impulsive/careless problem style and avoidant style are at low level. Subjects' time management is at moderate level. There is positive correlation between subjects' physical activity levels and social problem solving total score ($p<0.05$). There is a positive correlation between subjects' physical activity levels and their total time management scores ($p<0.05$). When subdimensions are analysed, it is seen that there is positive correlation between vigorous physical activity level and their time planning, time attitudes and time wasters, but the correlation is negative between time wasters. Also, the correlation between their physical activity at moderate level and their time planning skills, time attitude skills and total time management scores. There is positive correlation between their level of walking and time attitudes and their time management total score.As a result, social problem solving skills and proper management of time can directly affect physical activity.

Keywords: Physical Activity, Social Skill, Time Management

1. Introduction

Regular participation in physical activity (PA) is closely related with health (34). Participation in PA has many effects on the organism [1,3,4,29]. These effects are various, whether physical [7, 31, 33] or psychological [32]. Being physically inactive increases the risk of cardio metabolic diseases such as diabetes, coronary heart health and stroke, and it has effect on some health problems such as cancer [16, 21]. For this reason, increasing the PA is vital for individual and social health [17]. The World Health Organization (WHO) reports in its 2018-2030 Global Action Plan that people need to be physically active in order to remain healthy [36]. However, only a small number of people act in accordance with the international recommendations of The Who [18]. That is why the barriers to the PA should be well investigated and the problems should be eliminated.

Time management is one of the absolute necessary factors for success. Performance and ability can be improved with time management [5]. However, time is seen as a commodity that can be consumed easily today. When time is effectively used and managed, success will follow [22]. The lack of rational and accurate planning of time leads to the inability of the person to devote time to various activities [15]. It is, therefore, important to know whether the time is being properly managed, which could prevent participation in the PA.

Cognitive and behavioral activities in which an individual tries to understand problems and find effective solutions are characterized as problem solving skills [14]. Problem solving skills contribute positively to social activity and the general psychological situation [27]. PA is also directly related to various cognitive activities such as attention and memory [19, 30]. Therefore, a relationship can also be found between social problem-solving skill and regular PA.

PA can be influenced by individual considerations and social factors. Thus, it is firstly necessary to

understand the factors affecting the PA or the factors PA affects. The aim of our research is to determine the PA levels of individuals between the ages of 18 and 22, to determine whether there is a relationship between PA and time management and PA and social problem solving skills that contribute to their social and physical development.

2. Method

2.1. Sample Group

1535 people participated in the research. 709 (46.2%) of the subjects were males and 826 (53.8%) were females. 109 (7.1%) of the them are in the age group of 18, 268 (17.5%)aged 19, 491 (32.0%) aged 20, and 384 (25.0%) aged 21 and 283 (18.4%) aged 22. 66 (8.0%) of the females are aged 18, 154 (18.6%) aged 19, 275 (33.3%) aged 20, 191 (23.1%) aged 21 and 140 (16.9%) aged 22. 43 (%6.1) of the males aged 18, 114 (%16.1) aged 19, 216 (%30.5) aged 20, 193 (%27.2) aged 21 and 143 (%20.2) aged 22. Subject Information Form, Physical Activity Questionnaire, Time Management Questionnaire and Social Problem Solving Inventory were used to collect data. Data were collected by five interviewers included in the research by face-to-face interview technique in classroom setting. Subjects were informed about the study. Their oral consent was taken. The study was approved by Uşak University Social and Human Sciences, Scientific Research and Publication Ethics Committee (Decision No. 2018-65 dated 07.11.2018).

2.2. Scales

Social Problem Solving Inventory Short Form (SPSI-SF)

Social Problem Solving Inventory was developed by D'Zurilla & Goldfried (1971) and it was reviewed by themselves in 1990 [12, 13]. In our study, Social Problem Solving Inventory Short Form (SPSI-SF) adapted by Çekici (2009) into Turkish was used. It consists of two dimensions as Problem Solving Style and Problem Orientation. Problem Orientation has two subscales: Positive Problem Orientation and Negative Problem Orientation. Problem Solving Style has three subscales: Rational Problem Solving, Impulsive/Careless Problem Style and Avoidant Style. There are 5 subscales. Totally there are 25 items. High score means that social problem solving skill is at good level, low score means social problem solving skill is at low level [8].

2.2.1. Time Management Questionnaire (TMQ)

Time Management Questionnaire was developed in 1991 by Britton and Tesser [6]. It was adapted into Turkish by Alay and Koçak (2002), its validity and reliability was tested [2]. It is 27 item Time Management Questionnaire.It has three components: 1: Time Planning, (Short and Long Range Planning) Component 2: Time Attitudes, Component 3: Time Wasters. Total score on TMQ ranged from 47 to 123. Questions are prepared according to 5-point Likert scale. Always means (5point), never means (1 point) at positive items according to normal scoring system; always (1 point), never (5 point) at negative items in reverse scoring system.High scoring suggests that time is managed well 24, 25, 26 and 27. Items in subdimension of Time Wasters are negative. The scoring is reversed while entering data.

2.2.2. International Physical Activity Questionnaire (IPAQ)

International Physical Activity Questionnaire (IPAQ) was developed by Craig et. al in 2003. It is a scale applicable to anyone in the 15-65 age range in order to determine PA levels [11]. It was adapted into Turkish by Öztürk in 2005 [28]. The evaluation of activities is based on the fact that each activity is performed for at least 10 minutes.MET score is multiplied after the day and minute curves are determined and the score is obtained.PA levels are classified as very active (beneficial for health) (>3000 METmin/week), Minimal active (600-3000 METmin/week) and inactive (<600 METmin/week) [11].

2.3. Cronbach Alpha Coefficient for the Study

Cronbach α internal consistency for TMQ which consists of 27 items is 0,830. Cronbach α internal consistency forIPAQ is 0,687, it is 0,701 for (SPSI-SF). They show that validity of the scales is adequate.

2.4. Statistical Analysis

In order to analyse data SPSS 21.0 program was used. Significance level is accepted as $p<0.05$.For deciding to perform parametric analyses, it was searched whether data showed normal distribution. Spearman Correlation Test was applied to determine relations between factors in scales for PA which shows non-normal distribution and Pearson Correlation Coefficient Test was implemented for the other scales showing normal distribution.

3. Results

Table 1. *Average MET Scores for PA Levels*

	N	Average±SD
Vigorous PA	1535	709.63±1542.55
Moderate PA	1535	333.06±854.73
Walking PA	1535	1078.41±1218.23
PATotal	1535	2121.01±3615.51

Subjects' level of vigorous is x=709.63±1542.55,moderate PAlevel is x=333.06±854.73, walking PAlevel is x=1078.41±1218.23.

Table 2. *Subjects' PA Levels*

	N	%
Inactive	455	29.6
Minimal Active	797	51.9
Very Active	283	18.4
Total	1535	100.0

According to scores to determine the subjects' level of PA 29.6% of them are inactive, 51.9 % minimal active, 18.4 % of them are very active.

Table 3.*Social Problem Solving Skills Total and Average Scores*

	N	Number of Questions	Total Scores			Average Scores
			Min. Score	Max. Score	Score±SD	Average±SD
SPST	1535	25	25.00	125.00	73.79±13.66	2.95±0.55
Factor 1	1535	5	5.00	25.00	17.25±3.89	3.45±0.78
Factor 2	1535	5	5.00	25.00	12.95±4.20	2.59±0.84
Factor 3	1535	5	5.00	25.00	17.74±4.32	3.55±0.86
Factor 4	1535	5	5.00	25.00	12.21±3.67	2.44±0.73
Factor 5	1535	5	5.00	25.00	11.03±4.44	2.21±0.89

SPST: Social Problem Solving Total; Factor 1: Positive Problem Orientation; Factor 2: Positive Problem Orientation; Factor 3: Rational Problem Orientation; Factor 4:Careless/Impulsive Problem Solving Style;Factor 5: Avoidant Problem Solving Style.

Subjects' total score from Social Problem Solving is x=73.79±13.66, positive problem orientation score is x=17.25±3.89,negative problem orientation score is x=12.95±4.20, their score for rational problem solving is x=17.74±4.32, careless/impulsive problem solving score is x=12.21±3.67 and finally their avoidant problem solving score is x=11.03±4.44.

Table 4. *Total and Average Scores for Time Management*

	N	Number of	Total Score	Average Score

		Questions	Min. Score	Max. Score	Score±SD	Average±SD
Time Management Total Score	1535	27	40.00	125.00	86.85±3.88	3.26±0.41
Time Planning Dimension	1535	16	16.00	80.00	49.73±11.90	3.11±0.74
Time Attitudes Dimension	1535	7	7.00	35.00	24.44±4.21	3.49±0.60
Time Wasters Dimension	1535	4	4.00	20.00	12.68±3.34	3.17±0.84

Subjects' total score for time management is x=86.85±13.88. Time Planning score is x=49.73±11.90, time attitudes score is x=24.44±4.21, and time wasters score is calculated as x=12.68±3.34.

Table 5.*PA and Social Problem Solving Scale Correlation Table*

		Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	SBÇT
VPA	r	.127**	-.129**	.118**	-.035	-.047	.141**
	p	.000	.000	.000	.165	.065	.000
	n	1535	1535	1535	1535	1535	1535
MPA	r	.121**	-.073**	.115**	-.049	-.075**	.139**
	p	.000	.004	.000	.056	.003	.000
	n	1535	1535	1535	1535	1535	1535
W	r	.166**	-.076**	.159**	-.060*	-.118**	.182**
	p	.000	.003	.000	.018	.000	.000
	n	1535	1535	1535	1535	1535	1535
PAT	r	.192**	-.115**	.178**	-.060*	-.106**	.206**
	p	.000	.000	.000	.019	.000	.000
	n	1535	1535	1535	1535	1535	1535

** Correlation is two sided, significant level is 0.01. * Correlation is two sided, significant level is 0.05. SPST: Social Problem Solving Total; Factor 1: Positive Problem Orientation; Factor 2: Negative Problem Orientation; Factor 3: Rational Problem Orientation; Factor4:Careless/Impulsive Problem Solving; Factor 5:Avoidant Problem Solving; VPA: Vigorous Physical Activity; MPA: Moderate Physical Activity; W: Walking; PAT: Physical Activity Total.

It is determined that there is positive correlation between PA total score and MET score (r=0.206;p=0.000).When correlations between subdimensions are analysed it is observed that positive correlation exists between vigorous PA and positive problem orientation (r=0.127;p=0.000),negative correlation exists between negative problem orientation (r= -0.129;p= 0.000),there is positive problem orientation between rational problem solving (r=0.118;p=0.000) and the correlation between social problem solving total score is positive (r=0.141;p=0.000). There is also positive correlation between subjects' moderate level of PA and positive problem orientation skills (r=0.121;p=0.000),negative correlation between negative problem orientation (r=-0.073;p=0.004), positive correlation between rational problem solving (r=0.115;p=0.000), but there is negative correlation between avoidant style problem solving skills (r=-0.075;p=0.000), and the correlation between social problem solving total score is (r=0.139;p=0.000). The correlation between subjects' walking levels and positive problem orientation (r=0.166;p=0.000), rational problem solving skills (r=0.159;p=0.000) and social problem solving total score (r=0.182;p=0.000) is positive, but the correlation between negative problem orientation (r = -0.076 p = 0.003), careless/impulsive problem solving skills (r=-0.060;p=0.018) and avoidant problem solving style (r=-0.118;p=0.000) is negative.

Table 6. *PA Level and Time Management Scale Correlation Table*

		TP	TA	TW	TMT
VPA	r	.105**	.117**	-.064*	.107**
	p	.000	.000	.012	.000
	n	1535	1535	1535	1535
MPA	r	.106**	.106**	-.007	.126**
	p	.000	.000	.772	.000
	n	1535	1535	1535	1535
W	r	.036	.110**	-.029	.059*
	p	.159	.000	.254	.022
	n	1535	1535	1535	1535
S	r	-.055	-.075*	.064*	-.055
	p	.090	.021	.050	.090
	n	939	939	939	939
PAT	r	.070**	.138**	-.044	.092**
	p	.006	.000	.085	.000
	n	1535	1535	1535	1535

** Correlation is two sided, significant level is 0.01. * Correlation is two sided, significant level is 0.05. VPA: Vigorous Physical Activity;MPA: Moderate Physical Activity; W: Walking; S: Sitting; PAT: Physical Activity Total.TP: Time Planning; TA: Time Attitudes; TW; Time Wasters; TMT: Time Management Total.

The correlation between subjects' PA total MET score and time management total score is positive (r=0.092;p=0.000). There is positive correlation between VPA and Time Planning (r=0.105;p=0.000), time attitudes (r=0.117;p=0.000) and time management (r =0.107;p=0.000), but there is negative correlation between time wasters dimension (r=-0.064;p=0.000). Also the correlation between subjects' MPA and time planning (r=0.106;p=0.000), time attitudes (r=0.106;p=0.000) and time management total score (r=0.126;p=0.000) is positive. Finally, the correlation between walking levels and time attitudes (r=0.110;p=0.000)and time management total score (r=0.059;p=0.022) is positive.

4. Discussion and Conclusion

It was determined by the scoring made for identifying subjects' PA levels that that 18.4% of them were very active, 51.9% were minimal active, and 29.6% of them were inactive. According to these results most of the subjects' physical level focus on walking (Table 1, 2). While it is important to promote healthy lifestyles and increase physical development in this age group [26], it is suggestive that there are still quite a lot of sedentary individuals [9, 10]. Research shows that about 50% of its students are considered physically inactive [20]. In our study, the number of people (51.9%) who do their daily work by walking was more than the number of people in this age group is equivalent to the university level. The fact that similar results were obtained in a study on university students is important to support our study [25].

Among their social problem solving skills positive problem orientation and rational problem orientation level is at recommended level, but careless/impulsive problem orientation, negative problem orientation and avoidant problem orientation level is low (Table 3). The correlation between social problem solving total score and PA total score is positive. Vigorous and Moderate level of PA has positive impact on positive problem orientation, rational problem orientation and general problem solving skills. On the other hand, it has negative impact on negative problem orientation, careless/impulsive problem solving and avoidant problem orientation (Table 5). It is significant that one of the studies carried out in Japan has positive correlation between PA and social problem solvig skill since it is parallel to our study [30]. Findings indicate that regular PA develops social problem solving skill and it can help to improve individuals' level of mental health [11].

Subjects' time management skills are at moderate level. In addition, there is a positive correlation

between PA levels and total time management score. Considering other dimensions, the correlation between vigorous PA level and time planning, time attitudes is positive; however, the correlation between time wasters is negative. Also positive correlation is determined between other subdimensions. That is, PA level increases and time management is influenced positively, but time wasters decreases. Because PA is necessary for success and it requires spending time. It is compulsory for most of the athletes to increase time use [24]. Time management is key factor for athletes' good performance [23]. Similarly, to spare time in order to carry out a behaviour, to know how to manage time is very vital for "time management". Besides, correct use of time management is related closely with high PA [35].

As a result, 29.6% of the subjects are inactive, 51.9 % minimal active, 18.4% are very active.The correlation between PA levels and social problem solving skills is positive. Furthermore, there is a positive correlation between PA levels and total time management. When all the findings are analysed together it can be inferred that social problem solving increases regular PA, increased PA level affects time management positively but time wasters decrease.

References

1. Akil, M. (2012). Effect of acute exercises applied to sedentaries on various enzyme levels related to muscle damages. African Journal of Microbiology Research, 6(2): 284-287.
2. Alay, S., Koçak, S. (2002). Zaman yönetimi anketi: geçerlilik ve güvenilirlik. Hacettepe Üniversitesi Eğitim Fakültesi Dergisi, 22: 9-13.
3. Bicer, M., Akil, M., Baltaci, A.K., Mogulkoc, R., Sivrikaya, A., Akkus, H. (2015). Effect of melatonin on element distribution in the liver tissue of diabetic rats subjected to forced exercise. Bratislava Medical Journal-Bratislavske Lekarske Listy, 116(2): 119-123.
4. Bicer, M., Akil, M., Baltaci, A.K., Mogulkoc, R., Sivrikaya, A., Akkus, H. (2012). Protective effect of melatonin on lipid peroxidation in various tissues of diabetic rats subjected to an acute swimming exercise. Bratislava Medical Journal-Bratislavske Lekarske Listy, 113(12): 698-701.
5. Brigitte, J.C., Claessens, Eerde, W. V., Rutte, C. G, Roe, R. A. (2005). A review of the time management literature. Emerald Group Publishing Limited, 36 (2): 2007.
6. Britton, B. K. and Tesser, A. (1991). Effects of Time Management Practices on College Grades". Journal of Educational Psychology, 83: 405-410.
7. Çagri, Ç., Marangoz, I., Aktug, Z.B., Top, E., Akil, M. (2015). The effect of quadriceps femoris and hamstring muscular force on static and dynamic balance performance. International Journal of Physical Education, Sports and Health, 2(2): 323-325.
8. Çekici, F. (2009). Problem çözme terapisine dayalı beceri geliştirme grubunun üniversite öğrencilerinin sosyal problem çözme becerileri, öfkeyle ilişkili davranış ve düşünceler ile sürekli kaygı düzeylerine etkisi. Yayınlanmamış Doktora Tezi, Çukurova Üniversitesi Sosyal Bilimler Enstitüsü, Adana.
9. Clemente, F.M., Nikolaidis, P.T., Martins, F.M.L., Mendes, R.S. (2016). Physical activity patterns in university students: Do they follow the public health guidelines? PLoS ONE, 11:e0152516.
10. Cocca, A., Liukkonen, J., Mayorga-Vega, D.(2014). Health-related physical activity levels in Spanish youth and young adults. Percept. Mot. Ski, 118: 247-260.
11. Craig, C. L., Marshall, A.L., Sjostrom, M., Bauman, A. E., Booth, M. L. Ainsworth BE, Pratt M, Ekelund U, Yngve A, Sallis JF, Oja P. (2003). International physical activity questionnaire: 12-country reliability and validity. Medicine and Science in Sports and Exercise, 35(8): 1381-1395.
12. D'Zurilla, T.J., and Goldfried, M.R. (1971). Problem solving and behavior modifica- tion. Journal of Abnormal Psychology, 78: 107-126.
13. D'Zurilla, T.J., and Nezu, A.M. (1990). Development and preliminary evaluation of the Social ProblemSolving Inventory (SPSI). Psychological Assessment: A Journal of Consulting and Clinical Psychology, 2: 156-163.
14. D'Zurilla, T.J., Maydeu-Olivares, A. & Gallardo-Pujol, D. (2011). Predicting Social Problem Solving Using Personality Traits. Personality and individual differences, 50: 142-147.

15. Ebrahim,i H., Hosseinzadeh, R., Tefreshi, M.Z., Hosseinzadeh, S. (2014) Time Management Behaviors of Head Nurses and Staff Nurses Employed in Tehran Social Security Hospitals, Iran in 2011. Iran J Nurs Midwifery Res, 19(2):193-198.
16. Gakidou, E. (2017). 'GBD 2016 Risk Factors Collaborators'. Global, regional, and national comparative risk assessment of 84 behavioural, environmental and occupational, and metabolic risks or clusters of risks, 1990–2016: a systematic analysis for the Global Burden of Disease Study 2016. Lancet, 390: 1345–422.
17. Golden, S.D., Earp, J.A. (2012). Social ecological approaches to individuals and their contexts: twenty years of health education & behavior health promotion interventions. Health Educ Behav, 39(3): 364-72.
18. Hallal, P.C., Andersen, L.B., Bull, F.C., Guthold, R., Haskell, W., Ekelund, U. (2012). Global physical activity levels: Surveillance progress, pitfalls, and prospects. Lancet, 380: 247-257.
19. Kamijo, K., Pontifex, M.B., O'Leary, K.C., Scudder, M.R., Wu, C.T., Castelli, D.M., Hillman, C.H. (2011). The effects of an afterschool physical activity program on working memory in preadolescent children. Dev Sci. 14: 1046–58.
20. Keating, X.D., Guan, J., Piñero, J.C., Bridges, D.M. (2005). A meta-analysis of college students' physical activity behaviours. J. Am. Coll. Health, 54:116-126.
21. Lee, I.M., Shiroma, E.J., Lobelo, F., Puska, P., Blair, S.N., Katzmarzyk, P.T., Lancet Physical Activity Series Working Group. (2012). Effect of physical inactivity on major non- communicable diseases worldwide: an analysis of burden of disease and life expectancy. Lancet, 380: 219–29.
22. Macan, T.H., Shahani, C., Dipboye, R.L., Phillips, A. P. (2000). College student's time management: Correlations with academic performance and stress. Journal of Educational Psychology, 82 (4): 760-768.
23. Macquet, A.C. (2010). Time Management in the Context of Elite Sport Training. Sport Psychologist, Human Kinetics, 24 (2): 194-210.
24. Macquet, A.C., Skalej, V. (2015). Time management in elite sports: How do elite athletes manage time under fatigue and stress conditions? Journal of Occupational and Organizational Psychology, 88(2): 341-363.
25. Molina-García, J., Menescardi, C., Estevan, I., Martínez-Bello, V., Queralt, A. (2019). Neighborhood Built Environment and Socioeconomic Status are Associated with Active Commuting and Sedentary Behavior, but not with Leisure-Time Physical Activity, in University Students. Int J Environ Res Public Health, 16(17): 3176.
26. Murphy, J.J., MacDonncha, C., Murphy, M.H., Murphy, N., Nevill, A.M., Woods, C.B. (2019). What Psychosocial Factors Determine the Physical Activity Patterns of University Students? J. Phys. Act. Health. 16: 325-332.
27. Nezu, A.M. (2004). Problem Solving and Behavior Therapy Revisited. Behavıor Therapy. 35; 1-33.
28. Öztürk, M. Üniversitelerde Eğitim Öğretim Gören Öğrencilerde Uluslar arası Fiziksel Aktivite Anketinin (IPAQ) Geçerliliği ve Güvenirliği ve Fiziksel Aktivite Düzeyinin Belirlenmesi. Sağlık Bilimleri Enstitüsü, Yüksek Lisans Tezi, Ankara: Hacettepe Üniversitesi, 2005.
29. Sivrikaya, A., Akil, M., Bicer, M., Kiliç, M., Baltaci, A.K., Mogulkoc, R. (2013). The effect of selenium supplementation on elements distribution in liver of rats subject to strenuous swimming. Bratislava Medical JournalBratislavske Lekarske Listy, 114(1): 12-14.
30. Sone, T., Kawachi, Y., Abe, C., Otomo, Y., Sung, Y.W., Ogawa, S. (2017). Attitude and practice of physical activity and social problem solving ability among university students. Environ Health Prev Med, 22(1): 18.
31. Top, E., Akıl, M. (2018a). Effects of a 3-month recreative exercise applied to individuals with intellectual disability on their electromyogram (EMG) variations and balance performance. International Journal of Developmental Disabilities, 64(4-5): 282-287ç
32. Top, E., Akıl, M. (2018b). Effects of the Sports on the Personality Traits and the Domains of Creativity. World Journal of Education, 8(3): 56-64.
33. Top, E., Kıbrıs, A., Kargı, M. (2020). Effects of Turkey's folk dance on the manual and body coordination among children of 6–7 years of age. Research in Dance Education, DOI: 10.1080/14647893.2019.1708888

34. Warburton, D.E.R,, Bredin, S.S.D. (2017). Health benefits of physical activity: a systematic review of current systematic reviews. Curr Opin Cardiol. 32(5): 541-56.
35. Williams, S.L., French,. D.P. (2011). What are the most effective intervention techniques for changing physical activity self-efficacy and physical activity behaviour and are they the same?Health Educ Res, 26(2):308-22.
36. World Health Organization (WHO). Global action plan on physical activity 2018–2030: more active people for a healthier world. Geneva: World Health Organization. Licence: CC BY-NC-SA 3.0 IGO. ISBN 978-92-4-151418-7. 2018.

Investigation of The Effects of Eating Attitudes on Success in Special Talent Exam of Physical Education and Sports College

Ozan Esmer[1]
[1]*Asist. Prof., School of Physical Education and Sports, Mardin Artuklu University, Mardin, Turkey.*

Abstract

The aim of this study is to reveal the effects of eating habits of students who take physical education and sports school exam on exam success. 503 candidates from 632 candidates who applied to Mardin Artuklu University School of Physical Education and Sports Special Talent Exam in the 2019- 2020 academic year participated in the study voluntarily and the questionnaires of 395 candidates were evaluated. "Eating Attitude Test 40" (EAT-40) scale was applied to the participants. The results were analyzed with SPSS 20.0 package program. A statistically significant difference was found between the EAT score and the height of the participants. There was no statistical difference between EAT score and talent exam success, age, weight, gender and university exam BAT (Basic Ability Test) scores. Although no meaningful result was found between the EAT scores and the success of the talent exam, it can be considered that 164 of 220 students who won the exam and enrolled in the school were survey participants and 145 of them had low EAT scores, their eating attitudes were effective on physical performance and exam success.

Keywords: Eating attitudes, Special talent exam, Eating attitude test

1. Introduction

Nutrition; In order to perform physiological and metabolic activities, micro and macronutrients are being absorbed through the intestines and used for vital activities through circulation after being subjected to some chemical processes after being taken by the organism [1].

Balanced nutrition is; It is expressed as the intake of fat, protein, carbohydrate, vitamins and minerals that are needed for the organism to work regularly and for the body to grow properly and to be used systematically in living things [2].

One of the most important components of the sportive performance is the nutrition of the sportsman. The healthy recovery of the organism after training or competitions is possible with a balanced, conscious and appropriate nutrition characteristic of the sports branch [3]. In addition to gender, genetics, age, physical fitness, and physiological parameters, among the determinants of performance during sports activity, there is also purposeful nutrition [4]. Although a healthy, regular and balanced diet does not have an impact on physical performance alone, it has significant effects on general success [5].

The obesity, overweight or zero body obsession, which is among the biggest problems of our time, are due to the changes in eating attitudes and eating disorders. Eating disorder is defined as eating excessive eating that triggers the occurrence of obesity, refusing to eat, restricting eating due to vegetarianism or psychological reasons, eating out of control overnight, throwing the food immediately after a rapid digestion or eating non-food items [6].

Age and gender are among the factors affecting eating attitudes in the literature. According to the American Psychiatric Association data, it has been reported that anorexia nervosa disease has increased significantly between the ages of 15-19 and 40% of the cases across the country are in this age range [7].

Neurochemical, individual, familial, developmental, environmental, cultural and psychological factors are among the factors that predispose to eating disorders [8].

In this study, which was designed based on the idea that eating attitudes affect sports success, the effect of eating attitudes on the achievement of special talent exam applied to physical education and sports college was investigated.

2. Method

2.1. Participants

This study included 503 candidates who volunteered to participate from 632 candidates who applied to the School of Physical Education and Sports special talent exam at Mardin Artuklu University in the 2019-2020 academic year.

2.2. Materials

Eating Attitude Test (EAT-40) scale was used as data collection tool. Missing information, document deformation, and questionnaires that were observed to be filled inelaborately were not evaluated, and as a result, 395 questionnaires of 503 participant candidate surveys were included into the study.

2.2.1. Eating Attitude Test (EAT-40)

This scale, which is used worldwide to describe problematic eating behaviors, was developed by Garner and Garfinkel in 1979 [9]. In 1989, Savaşır and Erol conducted a reliability and validity study in our country [10]. In the test consisting of 40 questions, the answers are evaluated as six-point Likert as "always-never". The cutoff score for the test is indicated as 30. Scores of 30 and above indicate eating disorders [9].

2.3. Data Analysis

EAT questionnaire scores applied to the participants were compared with age, height, weight, gender, BAT score and aptitude test success parameters. SPSS 20.0 package program was used to analyze the data. One sample "Kolmogorov-Smirnov" test was used to find out whether the data had a normal distribution or "Anova-Homogenety of variance" test to evaluate whether the data was homogeneous. As a result of these tests, it was understood that the data did not have a homogeneous and normal distribution. Non- parametric test method was used in the analysis of the data.

3. Results

503 of the 632 candidates who applied for the exam voluntarily participated in the survey study conducted to examine the effect of eating habits on the success of the aptitude test. 395 questionnaires were taken into consideration after excluding missing information, document deformation, and questionnaires that were observed to be filled inelaborately.

***Table 1**. Group statistics and T- Test*

Eating Attitude by Success Group Statistics and T Test

SUCCESS STATUS	N	Aver. (X)	S. S	s.d.(N-1)	t	p
YES	164	18,7012	10,33914	393	-0,134	0,894
NO	231	18,8355	9,45280			

$p < .05$

Of the 395 participants who filled out a questionnaire before the talent test, 164 were successful and enrolled in the school, while 231 failed. The average EAT of successful candidates is 18,7012, standard deviation is 10,33914; the average of unsuccessful candidates is 18,8355 and the standard deviation is 9,45280. As a result of the T test, the degree of freedom was calculated as 393, t = -0.134 and p = 0.894. At the 0.05 significance level, p = 0.894> 0.05 and there is no statistically significant difference between the groups.

As p = 0.000 <0.05 as a result of the normality test, the data are not suitable for normal distribution. For this reason, Mann-Whitney U test, one of the non-parametric tests, was applied.

***Table 2**. The effect of eating attitude to success*

Ranking					Mann-Whitney U Test Statistic	
SUCCESS STATUS		N	Ranking Average	Total Ranking		Eating Attitude
Eating Attitude	YES	164	193,97	31811,00	Mann-Whitney U	18281,000
	NO	231	200,86	46399,00	Wilcoxon W	31811,000
	Total	395			p	0,554

p < .05

When we look at the ranking average column in the table above, it is seen that there is no significant difference in the scores of successful and unsuccessful candidates. As a result of the test statistics, there is no statistically significant difference between eating attitude and achievement exam success since p = 0.554> 0.05 at the level of significance of 0.05.

***Table 3**. Success on EAT score ≥30*

Eating Attitude ≥ 30 * Success Status Cross Chart			
	SUCCESS STATUS		
	YES	NO	Total
Eating Attitude ≥ 30	19	24	43

Of the 43 candidates whose EAT scores were found to be 30 or above, that is, eating disorder, eating attitude score of more than 30, 19 were successful and 24 failed.

***Table 4.** T- Test according to gender*

Eating Attitude Group Statistics and T Test by Gender						
GENDER	N	Aver (X)	S.S	s.d.(N-1)	t	p
FEMALE	106	19,3962	8,47931	393	0,75538	0,45047
MALE	289	18,5536	10,26953			

p < .05

106 of the 395 participants are female and 289 are male candidates. The average of female candidates is 19,3962, the standard deviation is 8,47931, the average of male candidates is 18,5536, and the standard deviation is 10,26953. After the t test, the degree of freedom was calculated as 393, t = 0.75388 and p = 0.45047. At the 0.05 significance level, p = 0.45047> 0.05 and there is no statistically significant difference by gender.

Table 5. *Correlation analyzes*

Correlation

			Eating Attitude	Age	Height	Weight	BAT Score
Spearman's rho	Eating Attitude	Correlation Coefficient	1,000				
		Sig. (2-tailed)					
	Age	Correlation Coefficient	0,036	1,000			
		Sig. (2-tailed)	0,476				
	Height	Correlation Coefficient	**,103***	**,252****	1,000		
		Sig. (2-tailed)	0,041	0,000			
	Weight	Correlation Coefficient	-0,062	-0,022	**-,266****	1,000	
		Sig. (2-tailed)	0,220	0,657	0,000		
	BAT Score	Correlation Coefficient	0,093	**,321****	**,544****	**-,463****	1,000
		Sig. (2-tailed)	0,064	0,000	0,000	0,000	
		N	395	395	395	395	395

p < .05

* Correlation is significant at the 0,01 level (2- tailed)

** Correlation is significant at the 0,05 level (2- tailed)

P = 0.041 <0.05 and the correlation coefficient is r = 0.103. There is a strong positive relationship between eating attitude and height.

4. Discussion and Conclusion

Eating Attitude Test is a scale used to determine the eating attitudes of the participants and the disorders in eating behaviour. This scale was developed for the clinical evaluation of symptoms of anorexia nervosa [9].

In this study, EAT (Eating Attitude Test) scores, age, height, weight, gender, university exam BAT (Basic Ability Test) scores and aptitude test success were compared.

When eating attitudes were analyzed by gender, there was no statistically significant difference between men and women.

There was no significant difference between the participants' age, weight and BAT scores and eating attitudes. In some studies, significant differences were found between eating attitudes and age, and the risk of eating disorders increased as the age progressed. In a study on university students' eating attitudes, the concept of self-efficacy, and the factors affecting them, the proportion of students with an EAT score of more than 30 was lower in the age group of 18-19, whereas this rate increased in the age group of 20-21 and 22-24 [11]. In this study, no significant correlation was found between age and eating attitudes.

In a study conducted by Tazegul, she determined the eating attitude score of individuals who exercise regularly as 16,5185 [12]. In a study they conducted in 2019, Sarıbas et al. investigated the eating attitudes and self-esteem and personality traits of 102 football players at elite and amateur levels [13]. In their research, they found a significant relationship between eating attitude and height and weight. Similarly, a strong and positive relationship was found between eating attitude and height in this study (P = 0.041). As the height of the participants increased, their eating attitude scores increased.

The EAT score of 43 of 395 participants was determined above 30. Of the 43 participants with an eating disorder, 19 succeeded in the aptitude test. In other words, 19 of 164 participants who passed the exam showed signs of eating disorder. This is not statistically significant.

There was also no statistically significant difference between the success of the aptitude test and the eating attitude scores. Although the results are not significant, it is an important determination that among the 220 students who have been entitled to take part in Mardin Artuklu University School of Physical

Education and Sports in the 2019-2020 academic year, 164 of the survey participants have passed the exam, which is considered to be a crucial determination. This situation can be interpreted as eating attitudes have an effect on physical performance and exam success.

References

1. Baysal A, 2015. Beslenme. Hatipoglu Publisher, Ankara.
2. Ersoy G, 1998. Sağlıklı yaşam, spor ve beslenme. Damla Printing, Ankara.
3. Vahapoğlu E, 2012. 60 günde ideal vücut. Artemis Publications, Istanbul.
4. Bora Z, 2014. Determination of the nutrition context and nutrition supplements used by the bodybuilding coaches at sports club. Master Thesis, University of Başkent, Institute of Health Sciences, Ankara.
5. Akıl M, 2004. To evaluate and to designate of level of nutrition knowledge of sportsmen dealth with markmanship branches of tracking. Master thesis, University of Selçuk, Institute of Health Sciences, Konya.
6. Tam C, Cherry FN, Chak MY, 2007. Disordered eating attitudes and behaviours among adolescent in Hong Kong: prevalence and correlates. Journal of Pediatrics Child Health. 47: 811-817. DOI: 10.1111/j.1440-1754.2007.01195.x
7. Vançelik S, Önal S, Gürаksın A, Beyhu E, 2007. Related Factors with Nutritional Habits and Nutrition Knowledge of University Students. TAF Preventive Medicine Bulletin. 6(4): 242-248.
8. Jones JM, Bennett S, Olmsted MP, Lawson ML, Rodin G, 2001. Disordered eating attitudes and behaviours in teenaged girls: a school-based study. CMAJ. 165(5): 547-552.
9. Garner DM, Garfinkel PE, 1979. The eating attitudes test: an index of the symptoms of anorexia nervosa. Psychol Med. 9: 273-279.
10. Savaşır I, Erol N, 1989. Yeme tutum testi: anoreksiya nervoza belirtileri indeksi. Journal of Psychology. 7: 19-25.
11. Kadıoğlu M, Ergün A, 2015. The eating attitudes of the university students, self-efficacy and affecting factors. Journal of Marmara University Institute of Health Sciences, Volume:5, Number:2, 96- 104. DOI: 10.5455/musbed.20150309011008
12. Tazegül Ü, 2018. Investigation of The Relationship Between Body Image and Eating Attitudes Individuals Who Regular Exercise. Journal of Social and Humanities Sciences Research (JSHSR) Vol:5 Issue:16, p: 73-77.
13. Sarıbaş ÇÇ, Başgül ŞS, Cömert IT, Tutlu MG, 2019. Examining of 15-17 Age Elite and Amateur Footballers Eating Attitude, Self Respect and Personality Features. Journal of Turkish Social Sciences Research, April, Volume:4 Number: 1, 34- 46.

Investigation the Correlation of Leg Volume with Anaerobic Power and Dynamic Balance

Kenan Işildak[1]
[1] *Dr., Süleyman Demirel University, Turkey.*

Abstract

The aim of this study is to determine the correlation between the anaerobic power and dynamic balance characteristics of the leg volume of women who do step-aerobic and zumba. A total of 15 female athletes who were in the step-aerobic and zumba team of Süleyman Demirel University participated in the study. After determining the athlete's leg volume by implementing Frustum method, the linear regression formula was applied. The complement coefficient of this formula is R2 = .95 and the prediction standard error is 056. In order to determine anaerobic performances, Wingate anaerobic power test and dynamic balance were measured with a stabiliometer balance system. The evaluation of the data was carried out online with the help of a statistical program. "Shapiro-Wilk Test" was performed for normal distribution of data. In statistical analysis, minimum and maximum values, arithmetic mean and standard deviation values were calculated. "Pearson" correlation analysis was implemented for the data showing normal distribution related to total leg volume and anaerobic power and dynamic balance. The data was evaluated according to the "0.05" significance level. A positive correlation was found between TLV values and PP values of athletes (r =, 539 *; p <, 038), TLV values and AP values (r =, 563 *; p <, 029), TLV values and MinP values (r =, 570 *; p <, 027). No significant difference was found between TLV values and FI values (r = -, 387; p>, 155) and TLV values and DB values (r = -, 036; p> 898). In conclusion, it is possible to claim that the leg volume of women doing step aerobics and zumba has positive effects on anaerobic power characteristics. Since the high number of muscle fibers and the large cross-sectional area of the muscle will reveal muscle strength, we predict that the anaerobic power feature may be high accordingly. We think that the reason for the negative correlation between leg volume and balance features is that it arises from the characteristics of female athletes such as focusing abilities. In addition, we believe that the data in our study will be a reference for future studies.

Keywords: Step Aerobic and Zumba, Leg volume, Anaerobic power, Dinamic balance

1. Introduction

Today, sports have an important place for public health. It is thought by all humanity that sports have positive effects on life and health. However, while exercises with appropriate training and appropriate techniques can have a positive effect on our physical appearance, sportive movements with unsuitable training and incorrect techniques bring most injuries (28).

Step- Aerobic is an exercise that consists of rhythmic streching movements with music. It is known as an aerobic exercise where motion combinations are adapted to music with the use of the step platform (17). It is also a combination of steps on the platform designed for step aerobics, aerobic dances (with an adjustable height with the ability to absorb ankle and knee load). Different movement structures are combined with different choreographies. Choreography is often repeated with music to maximize aerobic capacity (22). The Zumba branch emerged in 2001. The growing interest in this branch is an increasingly widespread exercise that also involves a dance with Latin culture. It is thought that it has an important role in increasing health quality, reducing diabetes, high blood pressure and obesity thanks to zumba exercises performed by everyone (13).

Anaerobic power corresponds to the high anaerobic threshold of an athlete, lower oxygen consumption of athletes who train, and high intensity applied without accumulating lactic acid during athletic exercise (8). Anaerobic power is also an important term for short-term or explosive sports. The performance of the athlete may vary depending on both individual and environmental factors. Regular and

systematic training programs play a major role in the athlete's maximum power (PP), avarage power (AP), minimum power (MinP) and fatigue indexes (FI). This increase in anaerobic power is an increase in the adenosine triphosphate (ATP-PC) tanks and the efficiency of lactic acid system. Therefore, an athlete's energy resources and ability to use these resources are important in terms of increasing their physical performance (23). There are also many factors that affect anaerobic power. Among these factors, the length of muscle fibril, total leg volume (TLV) and muscle mass (MM) are the defining features on the strength of the muscle in situations requiring anaerobic power (3,6,7). According to many scientific studies, athletes who has a higher level of fast-contracting muscle fiber ratio, muscle mass, muscle cross-sectional area, leg volume and leg mass ratios have better anaerobic power (25).

It is a complex motor capability that includes balance control, integration of sensory inputs as well as the planning and implementation of flexible motion patterns (9). Balance, as a definition of concept, is an object or a person standing still. As a definition of physics, it is the state of stopping, which is the result of forces that eliminate each other. This ability is used to eliminate motoric problems that may occur in conditions when there are narrow areas of resistance and balance can be easily disturbed, especially as the balance of the body changes due to the change of the center of gravity. Balance can be investigated by dividing it into two as static and dynamic balance (21). Static balance (SB) is; while the body's ability to maintain balance at a certain point or position, dynamic balance (DB) is; the ability of the body to maintain balance while on the move (11).

The aim of this study is to investigate the correlation between anaerobic power and dynamic balance characteristics of the leg volume of women who do step-aerobic and zumba.

2. Materials and Methods

2.1. Participants

A total of 15 female athletes engaged in step aerobics and zumba participated in this study. The women participating in the study were composed of those who are in the step aerobics and zumba team of Isparta Suleyman Demirel University Faculty of Sport Sciences, studied and interested in different sport branches. The women who participated in the study were informed about the content of the research and the most accurate measurements were taken and the voluntary consent form was filled. Anaerobic power, leg volume and dynamic balance measurements of all women participating in the study were performed at Isparta Süleyman Demirel University Faculty of Sport Sciences Atatürk Sports Hall performance test laboratory. Measurements of all athletes were taken between 10.00 am and 12.00 am. We applied the principles outlined in the Declaration of Helsinki.

2.2. Measurements

Measurement of Height

It was measured on the bare foot by using a SECA (Germany) brand size scale with a sensitivity of 0.1 m.

Measurement of Weight

It was taken by weighing on the bare foot via SECA (Germany) electronic scale, which has a sensitivity of 0.5 kg, only with shorts and a T-shirt on athletes.

Fatigue Index Test

It is the percentage of power reduction that occurs during the test. It is found by dividing the difference between the highest power value and the lowest value obtained in any five-second time period created during the test (FI = Fatigue Index).

$$FI\ (\%) = PP(W) - MinP(W) \ / \ PP(W) \times 100$$

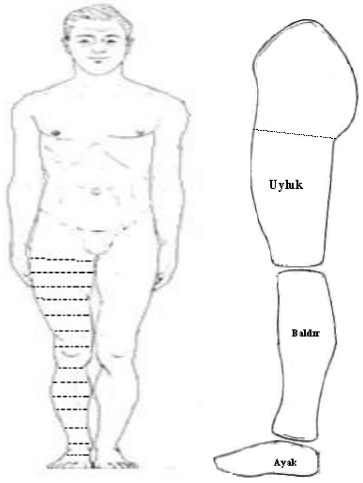
Wingate Anaerobic Test (WAnT)

After the research group was given detailed information about the test before it started, 4-5 minutes warm-up protocol consisting of 60-70 W work load in bicycle ergometer 60-70 rev / min. at pedal speed, 4-8 sec. including 2 or 3 sprints was implemented. Passive rest is provided for 3-5 minutes after warm-up. Saddle and handlebar adjustments were formed for each research group member after warm-up and rest. While the seating level member of the research group was sitting on the saddle, the pedal was at the lowest point, the knee was adjusted to reach full extension and the feet were fixed to the pedal with the help of clips. The test, which corresponds to 7.5% of the body weight of each member of the research group, was placed on the pan of the bicycle as resistance during the test. Then the test started. Participants were asked to maintain the highest possible maximal pedal speed by reaching a specified pedal speed (130-150 rpm) without load at the beginning for 3-4 seconds, then loaded for 30 seconds (12).

Women who participated in the study were verbally encouraged during the test period.

Total Leg Volume Test (TLV)

Since the total leg volume is classified with the volume between the gluteal fold and the sole of the foot, gluteal folds were standartized before starting volume measurements.



Classification of Gluteal Layer Test

The gluteal fold area of the measuring leg was classified after the athlete, whose leg volume was to be measured, wore a slip swimsuit. When the athlete is in the upright position, she placed the opposite leg of the measuring leg on a stand, at 90 knee flexion and the thigh at 90 angles with the trunk. The gluteal fold occurring in the measuring leg is marked with a pencil that is not affected by water. Then the athlete lowered her leg. While she was standing still in an upright position, with her legs widely open, a 50 cm ruler with a spirit level was placed on the mark, the scale is balanced and gluteal fold line was drawn. In bilateral measurements, the gluteal fold region of the previous leg was taken as reference to determine the gluteal fold region of the other leg with minimum error. After the gluteal fold region of a leg was marked by the method described above, the athlete whose legs were still standing with the shoulder width wide was in an upright position, gluteal fold lines were drawn by placing the 50 cm ruler on the leg. After one end of the 50 cm ruler was placed on the specified gluteal fold point, the other end was placed on the other leg with the spirit level in balance.

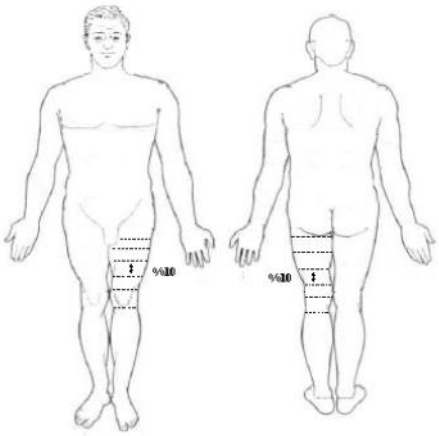
Calculation of Total Leg Volume

After classifying the total leg volume (TLV) as the volume between the gluteal fold and the sole of the foot, the total volume of the leg was calculated by collecting the right and left thigh and right and left calf volumes.

TLV= Vt + Vc

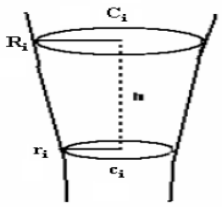
Thigh Volume

With the athlete standing and legs wide at the shoulders, the measurements were measured with an accuracy of ± 1 mm at 10% intervals between the tibial point and the inguinal fold.



Calculation of Thigh Volume

After the distance between the thigh volume tibial point and the inguinal fold was measured at 10% intervals, as described by the Frustum sign model method (27,18,16), the volumes of the pieces taken at 10% intervals were calculated. Then the volumes of all the parts between the tibial point and the inguinal fold were summed and the total volume of the thigh was calculated.

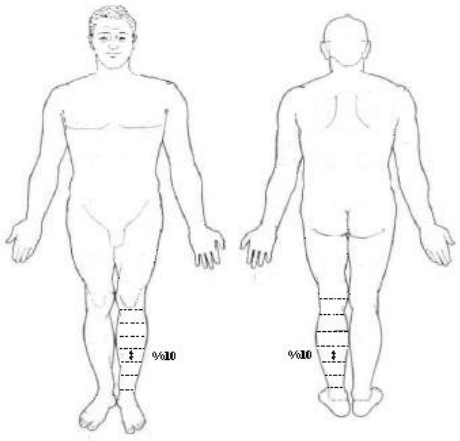


$$R_i = \frac{C_i}{2\pi},$$

$$V_u = \sum_{i=1}^{10} \frac{\pi}{3} h\left(R_i^2 + R_i r_i + r_i^2\right)$$

Calf Volume

With the athlete standing and legs wide at the shoulders, the measurements were measured with an accuracy of ± 1 mm at 10% intervals between the tibial point and the medial malleolus point.



Calf Volume Calculation

After the distance between the calf volume tibial point and the medial malleolus point was measured at 10% intervals, as described by the Frustum sign model method (16,18,27), the volumes of the pieces taken at 10% intervals were first calculated. Later, the volumes of all the parts between the tibial point and the medial malleolus point were added and calculated as the total volume of the thigh.

Dinamic Balance Test (DB)

Balance measurements were taken by the Stabiliometer balance system device. The athletes participated in the test with a suitable sports suit and on the bare feet. Attention had been paid to ensure that the environment to be measured was at a suitable temperature and at a sufficient level. Athletes were stepped on the balance system on the bare foot and practice tests were performed. Later, for measuring the dynamic postural control scores, the platform level was set to 10 and the tests were started. Athletes were given the right to try 3 times. Athletes were asked to balance on the device for 30 seconds. A 30 sec rest period was provided between each test. The best scores of athletes were accepted at the end of the test.

2.3. Statistical Analysis

The evaluation of the data was carried out via a computer-based statistical program. "Shapiro-Wilk Test" was performed for the normal distribution of data. In statistical analysis, minimum and maximum values, arithmetic mean and standard deviation values were calculated. "Pearson" correlation analysis was implemented for the data showing normal distribution in total leg volume, anaerobic power and dynamic balance. The data was evaluated according to the "0.05" significance level.

3. Results

Table 1*. Physical Properties of Athletes*

	N	Minimum	Maximum	Mean	SD
Age (years)	15	19,00	24,00	20,93	1,27
Height (cm)		160,00	178,00	166,73	4,99
Body Weight (kg)		43,00	74,00	56,86	8,37

According to Table 1, the mean age of the athletes was 20.93 ±, 1.27 years, the mean height was 166.73 ± 4.99 cm and the mean body weight was 56.86 ± 8.37 kg.

Table 2. *Descriptive Statistics*

	N	Mean	SD
TLV (Lt)	**15**	19845,5334	14661,28259
PP (W)		407,3580	81,07115
AP (W)		315,5127	60,08874
MINP (W)		209,1247	39,90502
FI (%)		46,0033	7,04899
DB (Min)		12,0800	13,67700

Table 3. *The correlation of Athletes' Total Leg Volume with Anaerobic Power and Dynamic Balance*

		TLV (lt)	PP(w)	AP(w)	MinP(w)	FI (%)	DB(min)
TLV (lt)	r	1	,539*	,563*	,570*	-,387	-,036
	p		**,038**	**,029**	**,027**	,155	,898
PP(w)	r	,539*	1	,800**	,701**	-,376	,072
	p	**,038**		**,000**	**,004**	,167	,799
AP(w)	r	,563*	,800**	1	,950**	-,685**	-,150
	p	**,029**	**,000**		**,000**	**,005**	,594
MinP(w)	r	,570*	,701**	,950**	1	-,773**	-,292
	p	**,027**	**,004**	**,000**		**,001**	,291
FI (%)	r	-,387	-,376	-,685**	-,773**	1	,488
	p	,155	,167	**,005**	**,001**		,065
DB(min)	r	-,036	,072	-,150	-,292	,488	1
	p	,898	,799	,594	,291	,065	

**p<0.01
* p<0.05

According to Table 3, while there is a positive meaningful correlation between TLV values and PP values of athletes (r =, 539 *; p <, 038), TLV values and AP values (r =, 563 *; p <, 029), TLV values and MinP values (r =, 570 *; p <, 027), no significant difference was found between TLV values and FI values (r = -, 387; p>, 155) and TLV values and DB values (r = -, 036; p> 898).

4. Discussion and Conclusion

In the study, it was aimed to investigate the correlation of leg volume between anaerobic power values and dynamic balance features of women doing step aerobics and zumba in university category. The mean age of the athletes participating in the research was calculated as 20.93 ±, 1.27 years, mean height 166.73 ± 4.99 cm, and body weight mean 56.86 ± 8.37 kg.

In our study, there has been a positive significant correlation between TLV values and PP values of athletes (r =, 539 *; p <, 038), TLV values and AP values (r =, 563 *; p <, 029), TLV values and MinP values (r =, 570 *; p <, 027).

Işıldak (2018), examined the effect of anaerobic power and leg volume on muscle damage, PP (r = .713;

p <0.05) Watt / kg, AP (r = .682; p <0.05) in his study. He found a positive correlation between the total leg volumes and the Peak and Average Power values per kg. in total leg volume and anaerobic power relation values.

Zorba et al. (2010), showed that wrestlers' leg volume and leg mass played a decisive role in their anaerobic performance in their study consisting of 31 students who were university students engaged in wrestling sports.

In the study conducted by Özkan et al. (2008), there was a significant correlation between total leg volume and mass and anaerobic performance values, while they stated that this correlation had a determining role in anaerobic performance.

In a study by De SteCroix et al. (2000), while it was stated that there was a significant correlation between leg muscle volume and maximum and average strength values, in another study, it was stated that there was an increase in the maximum and average power values with the increase of body weight, skin fold thickness and leg volume and mass occur even when age is kept under control (Armstrong et al., 2001). These studies are similar to our research.

On the other hand, no significant difference was found between TLV values and FI values (r = -, 387; p>, 155) and TLV values and DB values (r = -, 036; p> 898).

In the study of comparison of supramaximal leg exercise responses in young footballers struggling in the infrastructure of teams playing in different level leagues, which was examined by Alemdaroğlu et al. (2008), they did not find a significant difference (p> 0.05).

In their study investigating the correlation between aerobic and anaerobic performance characteristics and repetitive sprint ability found a statistically negative correlation between 0-10m best sprint time and 0-20m performance drop percentage and fatigue index (Yılmaz et al., 2012).

In the study conducted by Bulgay and Polat (2017), they examined the correlation between leg strength and balance performances of elite wrestlers and as a result, they found a statistically significant correlation between leg hamstring and quadriceps force and left leg posterolateral and posteromedial balance performances.

In Kurt (2010), study of 30 male wrestlers in the senior free wrestling national team, while finding a statistically significant difference between the leg strengths of free wrestling classics, the balance characteristics of the athletes were not found to be significant.

In the study conducted by İbiş et al. (2015), the effect of the volleyball players' leg volume and mass on balance and reaction time was examined. As a result of the study, it was stated that the increase of the leg volume and mass of athletes positively affect the strength values, the force plays an important role in achieving the high level balance. In the light of this information, the increase in the leg volume and leg mass may cause an improvement in balance.

Mohammadi et al. (2012), In their study on young male athletes found that as a result of the strength training performed for the leg muscles for 6 weeks, dynamic and static balance improvements occurred with the increase of leg strength.

Aktuğ (2017), investigation the correlation between isokinetic leg force and static, dynamic balance performance, leg volume and leg mass, it was revealed that isokinetic leg strength, balance performance, leg volume and leg mass had a positive correlation with each other.

While some studies with fatigue index and balance are similar to our study, some studies do not. It is thought that this may be due to features such as leg volume levels, sports ages, differences in lower limb leg strength and gender differences in different types of sports branches.

As a result, we can say that the leg volume of women doing step aerobics and zumba has positive effects considering anaerobic power characteristics. Since the high number of muscle fibers and the large cross-sectional area of the muscle will reveal muscle strength, we predict that the anaerobic power feature may be high accordingly. We think that the reason for the negative correlation between leg volume and balance features is that it arises from the characteristics of female athletes such as focusing abilities. In addition, we believe that the data in our study will be a reference for future studies.

References

1. Alemdaroğlu, U., Arslan, E., Karakoç, B., & Köklü, Y. Farklı seviyedeki liglerde oynayan takımların altyapısında mücadele eden genç futbolcularda supramaksimal bacak egzersizi yanıtlarının karşılaştırılması. Spormetre Beden Eğitimi ve Spor Bilimleri Dergisi 2008;6(1), 21-25.
2. Aktuğ, Z. B. Profesyonel futbolcularda izokinetik bacak kuvveti ile denge performansı bacak hacmi ve bacak kütlesi arasındaki ilişkinin incelenmesi. Erciyes Üniversitesi, Sağlık Bilimleri Enstitüsü, Beden Eğitimi ve Spor Anabilim Dalı, Doktora tezi, 2017.
3. Armstrong, N., Welsman, J. R., Chia, M. Y. H. Short term power output in relation to growth and maturation, British Journal of Sports Medicine 2001; 35, 118-124.
4. Bar-Or, O. Wingate anaerobik testi metofoloji, güvenilirlik ve geçerlilik üzerinde bir güncelleme. Spor hekimliği 1987; 4(6), 381-394.
5. Bulgay, C., Polat, S. Ç. Elit seviyedeki güreşçilerin bacak kuvvetleri ve denge performansları arasındaki ilişkinin incelenmesi. İnönü Üniversitesi, Beden Eğitimi ve Spor Bilimleri Dergisi 2017; 4(3), 59-67.
6. De Ste Croix, M.B.A., Armstrong, N., Chıa, M.Y.H., Welsman, J.R., Parsons, G., Sharpe, P. Changes in short-term power output in 10 to 12– year-olds. Journal of Sports of Sciences 2000; 19: 141-148.
7. Dore, E., Bedu, M., França, N. M., Praagh, E. V. Anaerobic cycling performance characteristics in prepubescent, adolescent and young adults females, European Journal of Applied Physiology 2001; 84, 476-481.
8. Edwards, AM, Clark, N., Macfadyen, AM. Laktat ve ventilatör eşikleri, maksimum aerobik gücün değişmediği profesyonel futbolcuların antrenman durumunu yansıtır. Spor bilimi ve tıp dergisi 2003; 2 (1), 23.
9. Ferdjallah, M., Harris, G.F., Smith, P., Wertsch, J.J. Analysis of Postural Control Synergies During Quiet Standing in Healthy Children and Children with Cerebral Palsy, Clinical Biomechanics 2002; 17, 203-210.
10. Harmancı, H., Özkan, A., Hazır, T., Aşçı, A., Açıkada, C. Vücut kompozisyonu, bacak hacmi, bacak kütlesi ve anaerobik performans arasındaki ilişki. 4. Uluslararası Akdeniz Spor Bilimleri Kongresi Bildiri Özetleri Kitabı, Akdeniz Üniversitesi, Antalya, 2007; sf, 252.
11. Hazar, F., Taşmektepligil, Y. Puberte öncesi dönemde denge ve esnekliğin çeviklik üzerine etkilerinin incelenmesi. Spormetre Beden Eğitimi ve Spor Bilimleri Dergisi 2008; 6(1), 9-12.
12. Inbar O, Bar-Or O. Anaerobic characteristics in male children and adolescents. Medicine and Science in Sport Exercise 1986;18(3): 264-269.
13. Inouye, J., Nichols, A., Maskarinec, G., Tseng, C. W. A survey of musculoskeletal injuries associated with Zumba. Hawai'i Journal of Medicine & Public Health 2013; 72(12), 433.
14. Işıldak, K. Anaerobik güç ve bacak hacminin kas hasarına etkisi (Türkçe Özel Seri). Lambert Academic Publishing; 2018. P. 92.
15. İbiş, S., İri, R., Aktuğ, Z. B. The effect of female volleyball players' leg volume and mass on balance and reaction time. Journal of Human Sciences 2015; 12(2), 1296-1308.
16. Karges J.R, Mark B.E, Stikeleather S.J, Worrell T.W. Concurrent validity of upper-extremity volume estimates: Comparison of calculated volume derived from girth measurements and water displacement volume. Physical Therapy. 2003;83 (2):134-145.
17. Kurt, S., Hazar, S., İbiş, S., Albay, B., Kurt, Y. Orta yaş sedanter kadınlarda sekiz haftalık step-aerobik egzersizinin bazı fiziksel uygunluk parametrelerine etkilerinin değerlendirilmesi. Uluslararası İnsan Bilimleri Dergisi 2010; 7(1), 665-674.
18. Lund H, Chrıtensen L, Savnık A, Boesen J, Samsoe B.D, Blıddal H. Volume estimation of extensor muscles of the lower leg based on MR imaging. European Radiology. 2002;12: 2982-2987.
19. Mohammadi, V., Alizadeh, M., Gaieni, A. The Effects of Six Weeks Strenght Exercises on Static and Dynamic Balance of Young Male Athletes. Social Behavioral Sci 2012; 31,247-250.
20. Moraru, C., Neculaeş, M., Hodorcă, R.M. Comparative study on the balance ability insporty and unsporty children. Social Behavioral Sci 2014;116, 19–22.
21. Muratlı, S. Çocuk ve Spor – Antrenman Bilimi Işığı Altında, Bağırgan Yayımevi;1997, Ankara.

22. Özdöl, P., Çetin, E., Aktop, A. Farklı yaş kadınlarda step-aerobik egzersizlerinin aerobik kapasite ve beden kompozisyonu üzerine etkisi. Spormetre Beden Eğitimi ve Spor Bilimleri Dergisi 2018; 16 (1), 49-54.
23. Özkan, A., Sarol, H. Dağcılarda vücut kompozisyonu, bacak hacmi, bacak kütlesi, anaerobik performans ve bacak kuvveti arasındaki ilişki. Spormetre Beden Eğitimi ve Spor Bilimleri Dergisi 2008; 6(4), 175-181.
24. Paillard, T., Noe, F. Effect of expertise and visual contribution on postural control in soccer. J Sci Med Sports 2006;16,345-348.
25. Shephard, R. J., Bouchlel, E., Vandewalle, H., Monod, H. Muscle mass as a factor limiting physical work, Journal of Applied Physiology 1988; 64(4), 1472-1479.
26. Siriphorn, A., Chamonchant, D. Wii balance board exercise improves balance and lower limb muscle strength of overweight young adults.J Phys Ther Sci 2015; 27, 41–46, 2015.
27. Sukul K, Hoed P.T, Johannes E.J, Dolder R, Benda E. Direct and indirect methods for the quantification of leg volume: Comparison between water displacement volumetry, disk model method and frustum sign model method, using the correlation coefficent and the limits of agrement. Journal of Biomedicine England 1993;15: 477-480.
28. Smith, L. L., Miles, M. P. Exercise-ınduced muscle ınjury. Exercise and Sport Science 2000; 401.
29. Walaszek, R., Sterkowicz, S., Chwala, W., Sterkowicz-Przybycien, K., Walaszek, K., Burdacki, M., Klys, A. Assesment of the impact of regular judo practice on body posture, balance, and lower limbs mechanical output in six-year-old boys. The Journal of Sports Medicine and Physical Fitness 2016; 57(12):1579-1589.
30. Yılmaz, A., Müniroğlu, S., Kin, İ. A., Akalan, C. Aerobik ve anaerobik performans özelliklerinin tekrarlı sprint yeteneği ile ilişkisi. Spormetre Beden Eğitimi ve Spor Bilimleri Dergisi 2012; 10(3), 95-100.
31. Zorba, E., Özkan, A., Akyüz, M., Harmancı, H., Taş, M., Şenel, Ö. Güreşçilerde bacak hacmi, bacak kütlesi, anaerobik performans ve bacak kuvveti arasındaki ilişki. Uluslararası İnsan Bilimleri Dergisi 2010; 7(1), 83-96.

The Effect of Upper Extremity TRX Training on The Number of Strokes and Swimming Degrees in 10-12 Year Swimmers

Canan Gülbin Eskiyecek[1], Mine Gül[2]*, Berkay Meşeci[3] and Gazanfer Kemal Gül[4]
[1]*Asist. Prof., School of Physical Education and Sports, Mardin Artuklu University, Mardin, Turkey.*
[2]*Asist. Prof., Faculty of Sports Sciences, Kocaeli University, Kocaeli, Turkey.*
[3]*Graduate Student, Faculty of Sports Sciences, Kocaeli University, Kocaeli, Turkey.*
[4]*Asist. Prof., Faculty of Sports Sciences, Kocaeli University, Kocaeli, Turkey.*
**Correspondence*

Abstract

This study was conducted to determine the effects of 8-weeks TRX exercises toward upper extremity area of male swimmers in 10-12 age group on 25 meter and 50 meter freestyle swimming degrees and the number of 50 m strokes. 14 licensed and 7 amateur male athletes who are from Kocaeli Province Gölcük Municipality Swimming Club voluntarily participated in this study. Participators were divided into three groups as Subject1 (n=7, age average= 11.14±0.69 years, height average= 1.53±0.06 m, bodyweight average= 39.16±6.11 kg stroke length average= 1.54±0.07 m), Subject2 (n=7, age average= 11±0.82 years, height average = 1.52±0.05 m, bodyweight average = 40.26±5.09 kg stroke length average= 1.53±0.05 m) and Control (n=7, age average = 11.14±0.9 years, height average= 1.52±0.05 m, bodyweight average = 43.31±7.35 kg and stroke length average= 1.50±0.05 m) groups. Athletes of Subject1 group performed 60° TRX exercises such as Push Up, Chest Press, Chest Fly, Low Row, Biceps Curl, Triceps Extension, Reaching Row toward upper extremity area in addition to 8-weeks swimming practices. TRX practices were performed for 3 days a week before swimming exercises. Subject2 group performed routine club swimming exercises only; the control group has not applied any exercises. Obtained data were analyzed by Paired-Samples t-test and One-Way ANOVA test in SPSS 24.0 packaged software. Results were evaluated at $p < .05$ significance level. It is determined in in-group comparisons that there are significant differences between 25 m and 50 m freestyle pretest and posttest swimming degrees ($p < .05$). Concerning between-groups comparisons, there are significant differences between posttest values of control and subject2 group in terms of both the number of 50 m stroke and 25 m and 50 m swimming degrees ($p < .05$). Regarding posttest values of control and subject1 group, there also are significant differences in both the number of 50 m strokes and 25 m freestyle swimming degrees ($p < .05$). We can say as the result of this study that TRX exercises toward upper extremity area of swimmers in 10-12 age group have a positive effect on the number of 50 m strokes and 25 m and 50 m freestyle degrees.

Keywords: Swimming, Force, TRX, Performance, Number of strokes

1. Introduction

Swimming is a sport in which arms and feet are continuously on the move to cover a specific distance in water [1]. Swimming provides body muscles to symmetrically and balancedly improve. For another definition, swimming is a sports branch in which all the body muscles are used at the same time [2]. Moreover, this related sports branch maximizes heart and lung capacity; develops endurance and flexibility [3]. Since swimming is a sport that is played against water resistance, it significantly contributes to force and coordination properties [2]. This is because the force is crucial in swimming. Force is one of the main motor abilities and a must for each of the sports branches [3]. Moreover, force is the ability of muscles that peculiar to specific moves of athletes to run [4]. Accordingly, since the arm grip and foot-tapping movements are important in swimming, improving force that towards arm muscles in the upper extremity is critical. The muscular force increases by age; the highest muscular force is reached in childhood when the increase in muscle mass is at the top [5]. For this reason, force exercise that is performed in conscious way has an important role in increasing performance. Starting from this, force exercises are vital for athletes to make

progress in addition to swimming performance [6]. Some important points are remarkable to develop force skill in preadolescence by no matter which training method is chosen. For the sake of example for these points; coaches need to be experts in this issue and check whether children apply the correct technique in training. Another important issue is the well-designed training program to follow from first to last; loads that children can apply should be selected after a well-organized adaptation program [7]. There are a set of methods to develop force. These methods are provided some pieces of equipment and machines besides own body weight. One of these instruments that are used to develop force is the elastic resistance bands. The spectacular feature of elastic bands is that their resistance increases as they get longer. These bands that can be used for many different purposes are preferred by coaches due to being carriable and budget-friendly. Furthermore, related bands are commonly used also in rehabilitation training after getting injured [2].

TRX is training equipment that is developed for the needs of Navy SEALs that is a private unit of the force of the U.S navy. Randy Hetrick who is the creator and founder of TRX passed his 14 years as Navy SEALs commando after university. He developed Total Resistance Exercise (TRX) towards the needs of a private unit of force in the meantime. TRX is fitness equipment that provides to work out as multi-planar (at 3 different planes) and enables us to perform all the functional fitness exercises in which resistance intensity can be reduced and increased by changing body position and joint angles. This exercise method helps exercises to be performed to keep stomach muscles active and enable the lower and upper body to work. TRX (suspension) system is a tool that is used for rehabilitation and before general fitness exercise [8]; this ensures to burn more calories during exercises. TRX provides a cardiovascular workout while the muscle strength increases. One of its most important characteristics is that being performable out of doors. Accordingly, the efficiency of workout can be maximized in the green area with plenty of oxygen [9].

It is expressed that suspension training is a simple and effective method to burn calories while there is need for more studies to determine the effects of long-term suspension workout programs on cardiovascular fitness, muscle strength, weight loss and sports performance [10]. It is offered to coach and athletes to perform ground exercises in addition to TRX practices because of the positive effect of TRX resistance exercises on swimming and physical performance development [11]. Within this scope, the goal of this study was to specify the effects of TRX force exercises with 8-weeks swimming training toward upper extremity region in male swimmers in 10-12 age range on number of strokes for 50 meters of freestyle and swimming degrees at 25 m ve 50 m freestyle swimming.

2. Method

2.1. Research Design

This research utilized original experimental design with a control group as pretest and posttest in conformity with the experimental method.

2.2. Research Group

The research group consisted of 21 volunteer male athletes whose 14 are licensed and 7 are amateur in 10-12 age group from Kocaeli Province Gölcük Municipality Swimming Club. Table 4 shows descriptive statistics related to ages, height, body weight, and stroke length of athletes. A signed 'Informed Volunteer Consent Form' was received from all the participant athletes and their parents. Moreover, the required official permissions were received from Kocaeli Province Gölcük Municipality Swimming Club for training and tests.

2.3. Research Method

Swimming+TRX practices toward upper extremity areas were performed to athletes in the Subject1 group for 8 weeks [12]; Related TRX exercises were performed before swimming work. The Control group did not apply for any exercise program while Subject2 group performed routine club swimming work. The training was carried out in covered swimming pool of Gölcük Municipality; height, arm length, body

weight, and measurements swimming degrees at 25 m and 50m freestyle were taken before 8-weeks training. Movements in the TRX program for Subject1 group are tabulated below (Table 1).

Table 1. *8-Weeks TRX Training Movement Table*

Movements
1. Push Up
2. Upper Body Push (Chest Press)
3. Upper Body Push (Chest Fly)
4. Low Row
5. Biceps Curl
6. Triceps Extension
7. Reaching Row

Determining Angle of Motion and Strength of TRX Exercises

Proper principles for TRX exercises that are performed for the upper extremity area in the Subject1 group are seen below.

1. **In Push up and Low Row exercises;** the pendulum principle is utilized for efficiency. Locating the center of gravity by horizontal angle based on point of support is accepted as an easier level according to age and training age level of children. The strength of exercises was specified based on the maximum number of repetitions within a minute at the proper angle of movement.
2. **In Biceps Curl and Reaching Row exercises;** the vector resistance principle is utilized for efficiency. The angle of a body in proportion to the ground is accepted as an easier level for age and training age level. The strength of exercises was specified based on a maximum number of repetitions within a minute at the proper angle of movement.
3. **Triceps Extension, Chest Fly, and Chest Press exercises;** stability principle is utilized for efficiency. Size and position, namely the angle of support center in proportion to the center of gravity are specified as the medium level for the age and training age of the children. The strength of exercises was specified based on a maximum number of repetitions within a minute at the proper angle of movement.

Table 2. *8-Weeks TRX Training Program of Research Group*

	1st TRAINING: Triceps Extension, Chest Fly, Chest Press, Biceps Curl, Reaching Row, Push up and Low Row	**STRENGTH**	**2nd TRAINING:** Triceps Extension, Chest Fly, Chest Press, Biceps Curl, Reaching Row, Push up and Low Row	**STRENGTH**	**3rd TRAINING:** Triceps Extension, Chest Fly, Chest Press, Biceps Curl, Reaching Row, Push up and Low Row	**STRENGTH**
1st Week	8x3*	Low	8x3*	Low	8x3*	Low
2nd Week	10x4*	Low	10x4*	Low	10x4*	Low

3rd Week	12x5*	Medium	12x5*	Medium	12x5*	Medium
4th Week	14x5*	Medium	14x5*	Medium	14x5*	Medium
5th Week	16x5*	Medium	16x5*	Medium	16x5*	Medium
6th Week	18x5*	Medium	18x5*	Medium	18x5*	Medium
7th Week	20x5*	High	20x5*	High	20x5*	High
8th Week	22x5*	High	22x5*	High	22x5*	High

* Number of repetitions for each of movements

Subject1 group performed exercises above for 1 hour on Wednesday, Friday, and Saturday before swimming exercises; TRX practices were performed on the same days for 1 hour before swimming exercises (Table 2). Rest periods between sets that were 12 repetitions and 3 times were 1 hour. The program was applied for 8 weeks as 1 set and 2 repetition increases each week; there was only repetition increase after 3rd week and swimming exercises continued. Subject2 group was applied only swimming exercises for 90 minutes (Table 3).

Table 3. *Swimming Exercises Program for Subject1 and Subject2 Group*

	1st Training (Wednesday)	**2nd Training (Friday)**	**3rd Training (Saturday)**		**1st Training (Wednesday)**	**2nd Training (Friday)**	**3rd Training (Saturday)**
1st Week	Warm-up Foot-kick for 100 m with the board, Arm grip to 50 m left and right, 50 m dolphin hit, 100 m Freestyle, 100 m Backstroke technical swimming Cool-down	Warm-up Foot-kick for 100 m with the board, Arm grip to 50 m left and right, 50 m dolphin hit, 100 m Freestyle, 100 m Backstroke technical swimming Cool-down	Warm-up Foot-kick for 100 m with the board, Arm grip to 50 m left and right, 50 m dolphin hit, 100 m Freestyle, 100 m Backstroke technical swimming Cool-down	**5th Week**	Warm-up Foot-kick for 100 m with the board, Arm grip to 50 m left and right, 50 m dolphin hit, 400 m Butterfly stroke, 400 m Backstroke technical swimming Cool-down	Warm-up Foot-kick for 100 m with the board, Arm grip to 50 m left and right, 50 m dolphin hit, 400 m Butterfly stroke, 400 m Backstroke technical swimming Cool-down	Warm-up Foot-kick for 100 m with the board, Arm grip to 50 m left and right, 50 m dolphin hit, 400 m Butterfly stroke, 400 m Backstroke technical swimming Cool-down
	Warm-up	Warm-up	Warm-up		Warm-up	Warm-up	Warm-up

2nd Week	Foot-kick for 100 m with the board, Arm grip to 50 m left and right, 50 m dolphin hit, 150 m Freestyle, 150 m Breaststroke technical swimming	Foot-kick for 50 m with the board, Arm grip to 50 m left and right, 50 m dolphin hit, 150 m Freestyle, 150 m Breaststroke technical swimming	Foot-kick for 50 m with the board, Arm grip to 100 m left and right, 50 m dolphin hit, 150 m Freestyle, 150 m Breaststroke technical swimming	**6thWeek**	Foot-kick for 100 m with the board, Arm grip to 50 m left and right, 50 m dolphin hit, 450 m Freestyle, 450 m Butterfly technical swimming	Foot-kick for 100 m with the board, Arm grip to 50 m left and right,100m dolphin hit, 450 m Freestyle, 450 m. Butterfly technical swimming	Foot-kick for 100 m with the board, Arm grip to 50 m left and right,100m dolphin hit, 450 m Freestyle, 450 m. Butterfly technical swimming
	Cool-down	Cool-down	Cool-down		Cool-down	Cool-down	Cool-down
3rd Week	Warm-up Foot-kick for 100 m with the board, Arm grip to 50 m left and right, 50 m dolphin hit, 200 m Freestyle, 200 m Butterfly technical swimming	Warm-up Foot-kick for 100 m with the board, Arm grip to 50 m left and right, 100 m dolphin hit, 200 m Freestyle, 200 m Butterfly technical swimming	Warm-up Foot-kick for 100 m with the board, Arm grip to 50 m left and right, 100 m dolphin hit, 200 m Freestyle, 200 m Butterfly technical swimming	**7th Week**	Warm-up Foot-kick for 100 m with the board, Arm grip to 50 m left and right, 100 m dolphin hit, 500 m Butterfly, 500 m Breaststroke technical swimming	Warm-up Foot-kick for 100 m with the board, Arm grip to 50 m left and right, 100 m dolphin hit, 500 m Butterfly, 500 m Breaststroke technical swimming	Warm-up Foot-kick for 100 m with the board, Arm grip to 50 m left and right, 100 m dolphin hit, 500 m Butterfly, 500 m Breaststroke technical swimming
	Cool-down	Cool-down	Cool-down		Cool-down	Cool-down	Cool-down
4th Week	Warm-up - Foot-kick for 100 m with the board, Arm grip to 50 m left and right, 50 m dolphin hit, 25 m Freestyle, 250 m Freestyle technical swimming	Warm-up - Foot-kick for 100 m with the board, Arm grip to 50 m left and right, 50 m dolphin hit, 25 m Freestyle, 250 Freestyle technical swimming	Warm-up - Foot-kick for 100 m with the board, Arm grip to 50 m left and right, 50 m dolphin hit, 25 m Freestyle, 250 m Freestyle technical swimming	**8th Week**	Warm-up - Foot-kick for 100 m with the board, Arm grip to 50 m left and right, 50 m dolphin hit, 500 m Freestyle, 500 m Backstroke technical swimming+Turns	Warm-up - Foot-kick for 100 m with the board, Arm grip to 50 m left and right, 50 m dolphin hit, 500 m Freestyle, 500 m Backstroke technical swimming+Turns	Warm-up - Foot-kick for 100 m with the board, Arm grip to 50 m left and right, 50 m dolphin hit, 500 m Freestyle, 500 m Backstroke technical swimming+Turns
	Cool-down	Cool-down	Cool-down		Cool-down	Cool-down	Cool-down

Measurement Methods

Height measurements of participants were calculated in cm by "Five Star/JC-585E" branded tape with 0.1 cm degree of accuracy when athletes at anatomical posture position at the inspiration stage; the head is at the frontal plane and overhead platform touches to vertex point. *Body weight* of participants was computed in cm with pool suit when he was at anatomical posture position on a weighbridge. *Stroke length measurements* of participants were computed by "Five Star/JC-585E" branded steel tape with a 0.1 cm degree of accuracy at the wall scale. Athletes were asked for spreading their arms wide so as their heels to touch to the wall by specifying a plain wall as the starting point. There was ticked to the extreme where athletes could reach; measurements were computed in cm. *Number of strokes and 50 m freestyle degrees* were computed by the "Catiga/CG-501" branded timekeeper.

2.4. Statistical Analysis

SPSS 24.0 statistical packaged software was used for statistical analysis of data of research; for findings, the measurement value of athletes conforms to the normal distribution (Normality With Plots Test). Paired-Samples T-test determined in-group differences for the analysis of pretest and posttest measurements after deciding on the analysis of parametric tests. One-Way ANOVA test specified the difference between the groups. The significance level was accepted as $p<0.05$ to evaluate the results.

3. Results

T-test and ANOVA test analysis values toward pretest and posttest measurements of variables with statistical data related to findings are respectively tabulated as follows;

Table 4. *In-group Paired-Samples T-Test Analysis Results with Descriptive Statistics of Athletes*

	CONTROL			**SUBJECT1 (n=7)**			**SUBJECT2 (n=7)**		
Variables	**Mean (X)**	**Standard Deviation (SD)**	**p**	**Mean (X)**	**Standard Deviation (SD)**	**p**	**Mean (X)**	**Standard Deviation (SD)**	**p**
Age (years)	11.143	0.900		11.143	0.690		11.000	0.816	
Weight (kg)	43.313	7.345		39.157	6.109		40.257	5.089	
Height (m)	1.517	0.045		1.530	0.062		1.520	0.045	
Stroke Length (m)	1.504	0.045		1.544	0.069		1.533	0.048	
50 m Number of Strokes-First	48.714	1.113	1.00	47.429	1.902	0.172	48.143	1.676	0.172
50 m Number of Strokes-Last	49.714	1.113		47.143	2.193		47.857	1.864	
25 m Swimming-First (sec)	18.174	1.119	0.325	16.651	0.834	**.037***	16.896	0.822	0.083
25 m Swimming-Last (sec)	18.487	0.865		16.417	0.932		16.669	0.791	
50 m Swimming-First (sec)	34.967	1.235	0.420	36.571	1.509	**.037***	37.259	1.479	0.083
50 m Swimming-Last (sec)	34.834	1.305		36.337	1.568		37.031	1.470	

*p< .05

Table 4 shows that the analyses related to pretest and posttest values of measurement parameters; the number of 50 m strokes of the control group is (48.71±1.11–49.71±1.11) p=1.00; 25 m swimming value is

(18.17±1.12–18.48±0.86) p=0.325; 50 m swimming value is (34.97±1.24–34.83±1.31) p=0.42. There is a statistically significant difference between the measurement values of the control group (p> .05).

The number of 50 m strokes of the Subject1 group was found as (47.43±1.90–47.14±2.19) p=0.172; 25 m swimming value was (16.65±0.83–16.42±0.93) p=0.037; 50 m swimming value was (36.57±1.51–36.34±1.57) p=0.037. For findings, there is a statistically significant difference between 25 m and 50 m pretest and posttest swimming values of the Subject1 group (p< .05). The number of strokes of Subject2 group was found as (48.14±1.14–47.86±1.86) p=0.172; 25 m swimming value is (16.90±0.82–16.67±0.79) p=0.083; 50 m swimming value is (37.26±1.48–37.03±1.47) p=0.083. There is no statistically significant difference in measurement parameters of Subject2 group (p> .05) (Table 4).

Table 5. *One-Way ANOVA Test Analysis Results of Between-Group Posttest Measurements*

Variables	Groups	Mean. (X)	Standard Deviation (SD)	Mean Dif.	Mean Dif. (%)	F	t	p
Number of 50 m strokes-Last	**Control**	49.71	1.11	2.57	5.17%	6.76	2.77	**0.02***
	Subject1	47.14	2.19					
	Control	49.71	1.11	1.86	3.74%	0.85	2.26	**0.04***
	Subject2	47.86	1.86					
	Subject1	47.14	2.19	-0.71	-1.52%	0.96	-0.66	0.52
	Subject2	47.86	1.86					
25 m Swimming-Last (sec)	**Control**	18.49	0.87	2.07	11.20%	0.06	4.31	**0.00***
	Subject1	16.42	0.93					
	Control	18.49	0.87	1.82	9.84%	0.09	4.10	**0.00***
	Subject2	16.67	0.79					
	Subject1	16.42	0.93	-0.25	-1.53%	0.00	-0.54	0.60
	Subject2	16.67	0.79					
50 m Freestyle Swimming-Last (sec)	Control	34.83	1.30	-1.50	-4.31%	0.38	-1.95	0.08
	Subject1	36.34	1.57					
	Control	34.83	1.30	-2.20	-6.31%	0.27	-2.96	**0.01***
	Subject2	37.03	1.47					
	Subject1	36.34	1.57	-0.69	-1.91%	0.01	-0.85	0.41
	Subject2	37.03	1.47					

*p<0.05

It is seen in Table 5 in which One-Way ANOVA tests related to analyses of the difference of between-group posttests were analyzed that there is a statistically significant difference between control and subject1

group related to the number of 50 m strokes (Mean Dif.=2.57; 5.17%; p=0.02); there also is a statistically significant difference between control and subject2 group (Mean Dif.=1.86; 3.74%; p=0.04) (p< .05). We found statistically significant difference between posttests of control and subject1 group (Mean Dif.=2.07; 11.20%; p=0.00); again, a difference at statistically significant level is observed between control and subject2 group (Mean Dif.=1.82, 9.84%; p=0.00) (p< .05) in terms of 25 m swimming degree (p< .05). Regarding 50 m swimming degree, there can be seen a statistically significant difference between posttest values of control and subject2 group (p< .05).

4. Discussion

In this study, results that related to the effect of TRX force exercises with 8-weeks swimming practices on performance of male athletes in the 10-12 age group were compared with other studies in literature by discussing within the frame of the content of the research.

For findings of this research, regarding in-group comparisons, there are significant developments between both 25 m and 50 m pretest and posttest results of the subject1 group (p< .05). We found developments at a significant level between the number of 50 m strokes of control and subject2 group; between posttest values of 25 m freestyle swimming degrees of control and subject1 with control and subject2 groups; between posttest values of 50 m freestyle swimming degrees of the control and subject2 group (p< .05).

Taşkın tested the relationship between stroke length and 25 m short distance swimming speed of 11 age group male swimmers; for findings, stroke length positively affects swimming performance [13].

Şenol and Gülmez researched the effect of resistance exercises with functional exercise band (TRX) and body weight for 8 weeks on 200 m freestyle swimming transition degrees of male swimmers whose age average was 13 years. They observed that swimming performance and development of physical properties of swimmers who perform resistance exercises by utilizing TRX are statistically more significant compared to the control group and ones who perform resistance exercises by body weight (p< .05) [11]. This research jibes with our study in terms of both methods and developments in swimming degrees.

Yapıcı et al., analyzed the effect of 6-weeks ground and resistance exercises on lower extremity isokinetic force performance and swimming degrees of swimmers in 13-16 age group and found that there are statistically significant differences in 25 m underwater, 25 m, 50 m, 75 m ve 100 m freestyle swimming values between pretest and posttest (p< .05) [14].

Özeker scrutinized the effect of ground exercises in addition to swimming practices for 8 weeks for swimmers in the 10-12 age group on force and swimming performance. He observed at the end of the research that ground exercises create a positive effect on functional force and swimming performance (p< .05) [15].

McGellan conducted a study for competitor male swimmers and emphasized that TRX exercises caused positive developments in their force and increases in their swimming performances at the same time (p< .05) [16]. This research does not jibe literature. The reason may be that related research reviewed exercises toward upper extremity; literature has studied on exercises toward force.

Korkmaz found statistically significant differences between swimming performances of subject and control group in his study towards upper extremity areas of swimmers in the same age group (p< .05) [17]. This study does not go parallel with literature. The reason may be that the age group or the content of exercises are different.

Eskiyecek et al. reported that core force exercises toward the upper body of male swimmers in the 10-12 age group for 8 weeks have positive effects on 50 m swimming performances (p< .05) [18]. For findings, in analogy to literature, force exercises for upper extremity provide improvements in swimming degrees of swimmers in 10-12 age group.

For Willardson, child athletes in the 10-12 age group who regularly perform swimming practices have better values compared to athletes in the control group in terms of basic motor skills (p< .05) [19].

Another research was conducted by Erdoğan; there were performed entirely 40 units of exercises (4 swimming+1 ground exercises) in a week for 12 weeks for students in the 10-12 age group. For findings, there were positive improvements in 25 m swimming performances of students who performed 1600 m swimming, 20-minutes jogging and ground exercises toward general condition. There was no statistically significant difference in swimming performances of swimmers in the 10-12 age group at the end of 12-weeks swimming and TRX exercises ($p < .05$) [20].

Doğan surveyed swimmers in the 12-14 age group; he reviewed the effect of force exercises with TRX and dynamic works for upper extremity area on 50 m freestyle and backstroke swimming performance. For findings, there is no statistically significant difference [21]. This related study jibes with studies in the literature.

Another study belongs to Akgün and tested young athletes. For the research report, TRX exercises do not create a significant difference in selected biomotor skills and 50 m freestyle swimming performance [22]. This research revealed that there is an improvement in the group who performed swimming practices only; however, there is no significant difference between themselves and a group who performed TRX exercises. This result supports the findings of the literature.

Balcıoğlu carried out a study on child athletes in the 10-12 age group; he also found that 8-weeks TRX exercises have no positive impact on basic motor skills and swimming performances [23]. Since our study revealed a result that 8-weeks TRX practices have a significant effect on swimming performances of male swimmers in the 10-12 age group, this study does not jibe with literature.

Fan expressed that TRX suspension exercises in addition to fitness practices can increase body balance by a strong core muscle; keep the posture; increase the exercise, dynamic and static balance ability; decrease musculoskeletal disorders of students of police college [24].

Sadek reviewed average and statistical values of tests of static force, passive shoulder flexibility, shoulder mobility and throwing a med ball by sitting in TRX suspension exercises for 3 days a week for 8 weeks. For findings, there are significant differences between analyses of pretest and posttest measurements ($p < .05$) [25].

Smith et al., analyzed the effect of TRX suspension exercises (3days/week-60min/day) on some physiological, motoric, and fitness values in healthy individuals. With reference to their findings, TRX exercise is an alternative way for traditional exercise techniques. Moreover, there were observed significant differences in leg-press, bench-press, curl-up, and push up exercises as a result of related practices ($p < .05$). It can be said in the light of data that there can be provided significant improvement in flexibility and force parameters at the end of the practices [26]. This result in literature can be accepted as compatible with our study in terms of the exercises program of our study.

5. Conclusion

This paper reveals that there are significant differences in 25 m and 50 m freestyle swimming degrees and the number of 50 m strokes and performances of swimmers in the 10-12 age group during 8-weeks swimming exercises ($p < .05$). In conclusion, we can say that TRX practices toward the upper extremity area provide positive improvements in the number of strokes and freestyle swimming degrees; in addition to all these, TRX is an applicable method for the development of swimming performance degrees of groundwork athletes.

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References

1. Hanula, D. & Thornton, N. The Swim Coaching Bible, 1.St Edition, America, Human Kinetics, USA, 2001, 21-133.

2. Bozdoğan, A. Yüzme: Fizyoloji - Mekanik - Metot. 2.Edition, İstanbul İlpress Basım & Yayın, 2003.
3. Akgün, N. Egzersiz Fizyolojisi. İkinci Baskı. İzmir, Ege Üniversitesi Basımevi, 1986
4. Zambak, Ö. Sağlık Ve Spor Bilimleri / 1, Geleceğin Dünyasında Bilimsel Ve Mesleki Çalışmalar. Spor Alanında Kuvvetin Tanımlaması, Ekim Basım Yayın Dağıtım 1. Baskı, Mart, 2020, Bursa. Sayfa; 184.
5. Güler, D., Balcı, S. S., Çolakoğlu, F. & Karacan, S. 8–10 Yaş Grubu Türk Kız Çocukların Sağlıkla İlişkili Fiziksel Uygunluklarının Değerlendirilmesi Ve Normları. Mehmet Akif Ersoy Üniversitesi Eğitim Fakültesi Dergisi, 2004; 5(2): 157-164.
6. Tokman, S. Yüzme Sporu El Kitabı. İstanbul: Ofset Yapımevi. 2010.
7. Selçuk, H.11-13 Yaş Grubu Erkek Yüzücülerde 12 Haftalık Terabant Antrenmanının Bazı Motorik Özellikler İle Yüzme Performansına Etkileri. Selçuk University, Sağlık Bilimleri Enstitüsü, Beden Eğitimi Ve Spor Anabilim Dalı, Unpublished Master Thesis, 2013, Konya.
8. Melrose, D. & Dawes, J. Resistance Characteristics Of The TRX™ Suspension Training System At Different Angles And Distances From The Hanging Point. Journal Of Athletic Enhancement, 2015; 4: 1. Doi.Org/10.4172/2324-9080.1000184.
9. Tarakçıoğlu, B. (2014). 'TRX Antrenmanı' Nedir Ve Kimler Tarafından Uygulanır? Https://Www.Uplifers.Com/Trx-Antrenmani-Nedir-Ve-Kimler-Tarafindan-Uygulanabilir-Fit-Beril/? Erişim Tarihi: 03.12.2019
10. Dudgeon, W.D., Herron, J.M., Aartun, J.A., Thomas, D.D., Kelley, E.P. & Scheett, T.P. Physiologic And Metabolic Effects Of A Suspension Training Workout. International Journal Of Sports Science, 2015; 5(2): 65-72.
11. Şenol, M. & Gülmez, İ. Fonksiyonel Egzersiz Bandı (TRX) Ve Vücut Ağırlığı Kullanılarak Uygulanan Direnç Antrenmanlarının Yüzme Performansına Etkisi. İstanbul Üniversitesi Spor Bilimleri Dergisi, 2017; 7(1): 62-75.
12. Calatayud, J., Borreani, S., Colado, J.C., Matin, F., Rogers, E.M., Behm, D. & Andersen, L.L. Muscle Activation During Push-Ups With Different Suspension Training Systems. Journal Of Sports Science And Medicine, 2014; 13: 502-510.
13. Taşkın, M. The Effect Of Body Mass Index And Stroke Length On Short Freestyle Swimming Distance
14. Yapıcı, A., Maden, B. & Fındıkoğlu, G.13-16 Yaş Grubu Yüzücülerde 6 Haftalık Kara Ve Direnç Antrenmanlarının Alt Ekstremite İzokinetik Kuvvet Performansına Ve Yüzme Derecelerine Etkisi. Journal Of Human Sciences, 2016; 13(3): 5269-5281.
15. Özeker, K.M. 10-12 Yaş Yüzücülerde Kara Antrenmanlarının Fonksiyonel Kuvvet Ve Yüzme Performansına Etkisi. Kırıkkale University, Sağlık Bilimleri Enstitüsü, Master Thesis, 2018, Kırıkkale.
16. Mcgellan, J.C. Strength Training For Swimmers: Training The Upbody. Strength And Conditioning Journal, 2006; 11(2): 40-42.
17. Korkmaz, E. Düzenli Yapılan Yüzme Antrenmanlarının Çocukların Bazı Fiziksel Ve Fizyolojik Parametreleri Üzerine Etkisi. Master Thesis, Gazi University, Sağlık Bilimleri Enstitüsü, 2008, Ankara.
18. Eskiyecek, C.G., Gül, M., Uludağ, B. & Gül, G.K. The Effect Of 8-Week Core Exercises Applied To 10-12 Age Male Swimmers On Swimming Performance.
19. Willardson, J.M. TRX Stability Training: Applications To Sports Conditioning Programs. Journal Of Strength And Conditioning Research, 2007; 21(3): 979-985. Https://Doi.Org/10.1519/R-20255.1
20. Erdoğan, Ş. Yüzme Antrenmanı Yaptırılan 10–12 Yaş Gurubu İlköğretim Öğrencilerinde Vücut Yapısal Ve Fonksiyonel Özelliklerinin İncelenmesi. Master Thesis, Erciyes University, Sağlık Bilimleri Enstitüsü, 2008, Kayseri.
21. Doğan, S. 12-14 Yaş Grubu Bayan Sporcularda Klasik Ve TRX İle Yapılan 8 Haftalık Kuvvet Antrenmanlarının 200m. Serbest Yüzmedeki Geçiş Derecelerine Etkisi. Master Thesis, Ege University, Sağlık Bilimleri Fakültesi, İzmir, 2005.
22. Akgün, N. Egzersiz Ve Spor Fizyolojisi. İzmir Ege Üniversitesi Basımevi, 2015; 8(1): 22– 36.
23. Balcıoğlu, A. 10-12 Yaş Gurubu Çocuklarda Merkez Üst Ekstremite Bölgesi (TRX) Kuvvet Antrenmanlarının Bazı Motorik Parametreler Üzerine Etkisi. Unpublished Master Thesis, 2014, Muğla.

24. Fan, Z. Research On The Education Reform Of TRX Suspension Training Method Applied In Physical Fitness Course In Police Colleges. Advances In Social Science, Education And Humanities Research, 2017; 119: 1723-1726.
25. Sadek, M.T. Effect Of Trx Suspension Training As A Prevention Program To Avoid The Shoulder Pain For Swimmers. Science, Movement And Health, 2016; 16(2): 222-227.
26. Smith, L.E., Snow, J., Fargo, S.J., Buchanan, C.A. & Dalleck, L. The Acute And Chronic Health Benefits Of TRX Suspension Training® In Healthy Adults. International Journal Of Res. Ex. Phys, 2016; 11(2): 1-15.

Investigation of Leisure Management Skills and Leisure Boredom in University Students in Terms of Different Variables

Yusuf Er[1], Mehmet Demirel[2] and Abdullah Çuhadar[3]

[1].*Assistant Professor, School of Applied Sciences, Department of Recreation Management, Karamanoğlu Mehmetbey University, Turkey.*

[2] *Associate Professor, Tourism Faculty, Department of Recreation Management, Necmettin Erbakan University, Turkey.*

[3] *Research Assistant, School of Applied Sciences, Department of Recreation Management, Karamanoğlu Mehmetbey University, Turkey.*

Abstract

The aim of the study is to examine leisure time skills and leisure problems of university students in terms of different variables. The sample group of the study consists of a total of 545 university students, 335 women (61.5%) and 210 men (38.5%), via the convenience sampling method and on a voluntary basis. The "Free Time Management Scale (BZYÖ)" developed by Wang, Kao, Huan and Wu (2011) and adapted into Turkish by Akgül and Karaküçük (2015) and "The Leisure Boredom Scale" developed by Iso-Ahola and Weissinger (1990) to determine the recreational activities of the participants and their boredom levels and translated into Turkish by Soylu and Siyez (2014) were used in the study. In the analysis of the data, descriptive statistical methods such as percentage and frequency were applied to determine the distribution of the personal information of the participants, and the skewness and kurtosis values of the data were checked to determine whether the data showed a normal distribution and the data were found to comply with the parametric test conditions. Accordingly, besides descriptive statistical models, t-test, Anova, Tukey HSD multiple comparison test, which is applied to determine from which groups the significant difference arises, and correlation test analysis methods were used to test the relationship between leisure time management and boredom ($\alpha = 0.05$). As a result, it was determined that there was a significant difference in the scheduling sub-dimension according to gender in the leisure time management, while there was a significant difference between leisure time boredom and leisure boredom in terms of age.

Keywords: recreation, leisure management, leisure boredom

1. Introduction

An effective time management provides opportunities for a better individual career planning, preparation for the future, reading and learning more, following new developments and technology, allocating more time to family and other people, resting, having fun, thinking, creating new ideas, and launching new projects [1]. The concept of time has an increasing importance in the constantly and rapidly developing world, namely called as the information age [2]. Today, the understanding of the development of leisure, in advanced and industrialized countries, and leisure is a growing topic of interest in developing economies such as Turkey, is seen as a blessing of civilization and sophistication [3]. As a matter of fact, the importance of leisure time in social life continues to become more prominent due to the decrease in daily and weekly working hours, the increase of holiday days, and the change in social norms. Leisure time and activities affect other dimensions and values of individuals' lives directly or indirectly [4]. Leisure time activities must be completely out of time for working and necessary needs [5]. Active leisure time management will also have a positive impact on one's working life and increase the individual success and desire.

Technological developments and mechanization have provided people with more free time [6]. İt is possible to have a bright future and a healthy life thanks to many important and valuable activities that can be done in leisure time; however, most people do not use their leisure time well enough in the hustle of making money and maintaining their lives [7]. Of course, effective leisure evaluation and management

affects the individual positively (rest, fun, renewal, socialization, etc.), while bad leisure evaluation and management affects the individual negatively (stagnation, laziness, carelessness, selfishness, etc.). This reveals the importance and necessity of effective leisure management. At this point, individuals who manage and evaluate their leisure time during the university period in the best way are expected to lay the foundations of being a successful, characterful and dignified person that is likely to continue for years [8,9].

When people experience boredom, they resort to various activities to get rid of this feeling [10]. İt is an indicative of boredom to recognize an undesirable situation, get out of this situation, set a new goal and maintain the significance of the task performed. This task is a self-destroying function of boredom. When one realizes that s/he is bored, s/he takes action to eliminate this feeling [11]. Individuals turn to various leisure activities to end their boredom feelings in their daily lives. They should plan their leisure activities well so that individuals can spend their leisure activities effectively. The problem faced by university youth about leisure management and boredom is increasing day by day. This research has been a significant factor in the conduct of this study, as the domestic and international scientific research conducted on the relationship between university students' leisure management skills and boredom is insufficient.

2. Method

The sample group of the study consists of a total of 545 university students, 335 women (61.5%) and 210 men (38.5%), who were determined using the convenience sampling method. In the study, "Free Time Management Scale (BZYÖ)" developed by Wang, Kao, Huan and Wu and adapted into Turkish by Akgül and Karaküçük was used to determine the participants' leisure time management skills [12,13]. The scale consists of four sub-dimensions (goal setting and evaluating, technique, free time attitude and scheduling) and 15 items, and is a 5-point Likert type. The internal consistency coefficients calculated for the sub-dimensions of the scale based on the data collected in this study are ,502 for the "Goal setting and evaluating", ,514 for the "Technique" "and ,561 for the "Free Time Attitude" and ,610 for the "Scheduling" sub-dimensions. The Leisure Boredom Scale, developed by Iso-Ahola and Weissinger and translated into Turkish by Soylu and Siyez [14,15]. Was used to determine the levels of boredom by participating in recreational activities. The scale consists of two sub-dimensions, namely Competence and Motivation, and 12 items and is a 5-point Likert-type measurement tool. The internal consistency coefficients calculated for the sub-dimensions of the scale based on the data collected in this research are ,587 for the "Competence", and ,574 for the "Motivation" sub-dimensions.

In the analysis of the data obtained in the study, the percentage and frequency were applied to determine the distribution of the personal information of the participants, and the skewness and kurtosis values of the data were checked to determine whether the data showed a normal distribution. As a result of the analysis, it was determined that the data has a normal distribution. According to Jondeau and Rockinger, when the skewness and kurtosis coefficients of sub-dimensions range between +3 and -3, these sub-dimensions have conditions suitable for non-parametric distribution parameters [16]. In addition to descriptive statistical models, t-test, Anova, Tukey HSD Multiple Comparison test, and correlation test analysis methods were used to test the relationship between happiness level and perceived health outcomes in order to determine which groups the meaningful difference originated from ($\alpha = 0.05$).

3. Results

Table 1. *Distribution of Free Time Management Scale (FTMS) and Leisure Boredom Scale (LBS) Scores*

Scales and Sub-dimensions	Number of Items	N	Mean	Ss	Skewness	Kurtosis
FTMS (Goal setting and evaluating)	6	545	3,24	,905	-,321	-,122
FTMS (Technique)	3	545	3.35	,961	-,515	,038
FTMS (Free time attitudes)	3	545	3,50	1,02	-,361	-,401
FTMS (Scheduling)	3	545	3,04	,986	-,044	-,472
LBS (Competence)	6	545	3,08	,834	-,160	-,241
LBS (Motivation)	6	545	3,01	,700	,050	,984

Table 1 includes the average scores of the participants in the study within the scope of free time management and leisure boredom scales. Accordingly, the highest average free time management scale was determined as 3.50 in the free time attitude sub-dimension, while in the leisure boredom scale, it was determined in the competence sub-dimension with an average of 3.08.

Table 2. *Demographic Information of Participants*

Variables		f	%
Gender	Male	210	38,5
	Female	335	61,5
	Total	**545**	**100,0**
Age	18-21	222	40,7
	22-25	176	32,3
	26-29	147	27,0
	Total	**545**	**100,0**

As can be seen in Table 2, it was determined that 61.5% of the participants in the study were women and 40.7% were in the 18-21 years age group.

Table 3. *Distribution of Scale Scores According to the Gender Variable*

Scale (Sub-dimensions)	Variable	mean	Ss	t	p
FTMS (Goal setting and evaluating)	Male	3,3460	,88888	2,133	,033
	Female	3,1766	,91081		
FTMS (Technique)	Male	3,3317	1,05434	-,465	,642
	Female	3,3711	,89978		
FTMS (Free time attitudes)	Male	3,4492	1,00652	-,955	,340
	Female	3,5353	1,03530		
FTMS (Scheduling)	Male	3,1698	1,02972	2,309	,021
	Female	2,9701	,95182		
LBS (Competence)	Male	3,1595	,91262	1,633	,103
	Female	3,0398	,77933		
LBS (Motivation)	Male	3,0294	,77392	,404	,687
	Female	3,0045	,65081		

According to the T-Test results made based on the genders of the participants of the free time management scale and leisure boredom scales, a significant difference was found in the "Goal Setting and Evaluation" and "Scheduling" sub-dimensions, while the other sub-dimensions had no significant difference between boredom and the gender variable (p> 0.05).

Table 4. *ANOVA Test Results According to the Ages of Participants*

Scale (Sub-dimensions)	**Variable**	**Mean**	**Ss**	**F**	**p**	**Difference Tukey**
FTMS (Goal setting and evaluating))	18-21	3,1892	,91300	1,918	,148	
	22-25	3,2045	,96781			
	26-29	3,3662	,80515			
FTMS (Technique)	18-21	3,3423	,98655	,130	,878	
	22-25	3,3864	,94400			
	26-29	3,3401	,94962			
FTMS (Free time attitudes)	18-21	3,5300	1,08690	,376	,686	
	22-25	3,5189	,97961			
	26-29	3,4399	,98233			
FTMS (Scheduling)	18-21	2,9595	,99160	2,673	,070	
	22-25	3,0303	1,01935			
	26-29	3,1995	,92542			
LBS (Competence)	18-21	2,9902	,87248	4,786	**,009**	**1-3***
	22-25	3,0616	,88237			
	26-29	3,2596	,68110			
LBS (Motivation)	18-21	2,9910	,66187	,730	,483	
	22-25	2,9934	,79629			
	26-29	3,0737	,63153			

According to the results of the ANOVA Test of the Free Time Management Scale and Leisure Boredom Scales based on the age variable, there was no significant difference in the free time management scale sub-dimensions while there was a significant difference in the "Competence" sub-dimension of the leisure boredom scale (p>0.05). According to the results of the Tukey HSD multiple comparison test conducted to determine which groups the significant difference originated from, it was determined that the significant difference was in favor of the participants in the age group 18-21 years and 26-29 years age group and 26-29 age group.

Table 5. *Correlation Test Results for the Analysis of the Relationship between Free Time Management Scale and Leisure Boredom Scale Sub-dimensions*

		FTMS1	FTMS2	FTMS3	FTMS4	FTMS1	FTMS2
FTMS1	R	1					
	p						
	N	545					
FTMS2	R	,496**	1				
	p	,000					
	N	545	545				
FTMS3	R	,299**	,386**	1			

	p	,000	,000				
	N	545	545	545			
FTMS4	R	,180**	,098*	,127**	1		
	p	,000	,023	,003			
	N	545	545	545	545		
FTMS1	R	,195**	,144**	,041	,155**	1	
	p	,000	,001	,344	,000		
	N	545	545	545	545	545	
FTMS2	R	,173**	,130**	,147**	,157**	,353**	1
	p	,000	,002	,001	,000	,000	
	N	545	545	545	545	545	545

**p<0.01 ** p<0.05

The correlation coefficient between the scores obtained by the participants from "Free Time Management (FTMS)" and the sub-dimensions of "Leisure Boredom (LBS)" showed a positive significant relationship (p (0.01) (p<0.05).

4. Discussion and Conclusion

This study has been designed to determine whether the relationship between leisure time skills and boredom among university students varies in terms of gender and age. In the study, data were collected from 545 students studying at the university via questionnaire. It was determined that 61.5% of the participants in the study were female, 38.5% were male, 40.7% were 18-21 years old, 32.3% were 22-25 years old, and 27.0% were 26-29 years old.

According to the test results based on the gender of the participants of the free time management and leisure boredom scales, a significant difference was found in the "Goal Setting and Evaluation" and "Scheduling" sub-dimensions, while other sub-dimensions had no significant difference between the leisure boredom and gender variable. Macan et al. revealed the meaningful relationship between gender and time management skills by concluding that women exhibit their mechanical time management skills behavior more effectively, and that men feel more responsible in time management skills [17]. According to the findings of Misra and McKean, women had higher levels in all dimensions of time management skill behaviors (time control, setting goals and ranking the priority ones, having plans for work and duty and having organized approaches) than men [18]. Sugötüren et al. in their study with university students, reported that time management varies in favor of female students according to the gender variable [19]. Contrary to the results obtained in the study, Yaşartürk et al. concluded that free time management does not differ by gender in their study with university students [4]. In their study with high school students, Çuhadar et al. concluded that free time management does not differ significantly by gender [6].

According to the results of the ANOVA Test of Free Time Management Scale and Leisure Boredom Scales based on the age variable, there was no significant difference in the sub-dimensions of the Free Time Management Scales while there was a significant difference in the sub-dimension of "Competence" of the leisure boredom scale. According to the results of Tukey HSD multiple comparison test conducted to determine which groups the significant difference originated from, it was determined that the significant difference was in favor of the participants in the age group of 18-21 years old and 26-29 years old and 26-29 years old. Yaşartürk et al. concluded that free time management does not differ according to age variable in their study [4].

The correlation coefficient between the scores obtained by the participants from "Free Time Management (FTMS)" and "Leisure Boredom (LBS)" sub-dimensions showed a positive significant relationship. It can be said that as the free time management levels of university students increase, the levels of leisure boredom also increase.

As a result, it was concluded that the participants' free time management and leisure boredom levels differ in some sub-dimensions in gender and age variables and that there is a positive relationship between free time management and leisure boredom. Therefore, it can be stated that the participants' positive and correct evaluation of their free time management will also affect their leisure boredom levels positively.

Conflict of interests

The authors declare that there is no conflict of interest

References

1. Sayan İ. (2005). Yönetici hemşirelerde zaman yönetimi. Yüksek Lisans Tezi, Marmara Üniversitesi, İstanbul.
2. Çuhadar, A., Yusuf, ER., Demirel, M., & Demirel, D. H. (2019). Bireyleri Rekreasyonel Amaçli Egzersize Motive Eden Faktörlerin İncelenmesi. Spormetre Beden Eğitimi Ve Spor Bilimleri Dergisi, 17(3), 153-161.
3. Gürbüz, B., & Henderson, K. A. (2014). Leisure activity preferences and constraints: Perspectives from Turkey. World Leisure Journal, 56(4), 300-316.
4. Yaşartürk, F., Akyüz, H., & Karataş, İ. (2018). Rekreasyon Bölümü Öğrencilerinin Boş Zaman Yönetimi İle Akademik Başarılarını Etkileyen Örgütsel Faktörler Arasındaki İlişkinin İncelenmesi. Spor Bilimleri Araştırmaları Dergisi, 3(2), 233-243.
5. Demirel, M., & Harmandar, D. (2009). Üniversite öğrencilerinin rekreasyonel etkinliklere katılımlarında engel oluşturabilecek faktörlerin belirlenmesi. Uluslararası İnsan Bilimleri Dergisi, 6(1), 838-846.
6. Çuhadar, A., Demirel, M., Er, Y., & Serdar, E. (2019). Lise Öğrencilerinde Boş Zaman Yönetimi Ve Gelecek Beklentisi İlişkisi. Journal Of International Social Research, 12(66).
7. Aydoğan, İ., Gündoğdu, B. F. (2006). Kadın öğretim elemanlarının boş zamanlarını değerlendirme etkinlikleri, Erciyes Üniversitesi Sosyal Bilimler Enstitüsü Dergisi, 21(2), 217-232.
8. Lapa, T. Y., & Ardahan, F. (2009). Akdeniz Üniversitesi Öğrencilerinin Serbest Zaman Etkinliklerine Katılım Nedenleri Ve Değerlendirme Biçimleri. *Spor Bilimleri Dergisi*, *20*(4), 132-144.
9. Yıldız, S., & Dinçer, M. Z. (2017). Turizm Fakültesi Öğrencilerinin Bazı Demografik Özelliklerine Göre Serbest Zaman Motivasyonlarının İncelenmesi: Akdeniz Üniversitesi Örneği.
10. Harrison, S. (2005) Y@Our library: What do millennials want? Access, 11 (2), pp. 21-23.
11. Elpidorou, A. (2018). The bored mind is a guiding mind: Toward a regulatory theory of boredom. Phenomenology and the Cognitive Sciences, 17(3), 455-484.
12. Wang, W.C., Kao C.H., Huan, T. C & Wu, C.C (2011). Free Time Management Contributes to Better Quality of Life: A Study of Undergraduate Students in Taiwan. Journal of Happiness Studies, 12(4):561-573.
13. Akgül B. M., Karaküçük, S. (2015) Boş Zaman Yönetimi Ölçeği (GeçerliGüvenirlik Çalışması) International Journal Of Human Science, 12, (2), 1867-1880.
14. Iso-Ahola, S. E. ve Weissinger, E. (1990). Perceptions of boredom in leisure: Conceptualization, reliability and validity of the leisure boredom scale. Journal of Leisure Research, 22(1), 1-17.
15. Soylu, Y. ve Siyez, D. M. (2014). Boş Zaman Can Sıkıntısı Ölçeği'nin Türkçe'ye Uyarlanması. Ege Eğitim Dergisi. 1(15), 80-95.
16. Jondeau, E., Rockinger, M. (2003). Conditional validity, skewness, and kurtosis: existence, persistence, and comovements. Journal of Economic Dynamics & Control, 27, 1699 – 1737).
17. Macan, T. H., Shahani, C., Dipboye, R. L., & Phillips, A. P. (1990). College students' time management: Correlations with academic performance and stress. *Journal of educational psychology*, *82*(4), 760.

18. Misra, R., & McKean, M. (2000). College students' academic stress and its relation to their anxiety, time management, and leisure satisfaction. American Journal of Health Studies, 16(1), 41-51.
19. Sugötüren, M., Ballı, Ö. M., & Gökçe, H. (2011). Spor Bilimleri ve Teknolojisi Yüksekokulunda Öğrenim Gören Öğrencilerin Zaman Yönetimi Davranışları. Spormetre Beden Eğitimi ve Spor Bilimleri Dergisi, 9(3), 91-96.

Investigation of Antropometric and Performance Responses of Core Exercises in Volleyball Players

Hilal Kilinç Boz[1]
[1]*School of Physical Education and Sports, Van Yüzüncü Yıl University, Van, Turkey.*

Abstract

The aim of the study is to investigate the effect of core exercise on performance in volleyball players. In the study, the effect of core exercises performed as statically and dynamically on body composition, agility related to anaerobic strength tests and core stabilization tests in volleyball players was investigated. Thirty volleyball players participated in the study, 10 of them did volleyball exercises, the other group of 10 did volleyball and core exercises together for 2 days in a week about 30 minutes during 9 weeks. However, the remaining 10 subjects did not perform any activities as a control group. In the analysis of obtained values SPSS 25 program was used. Significant differences were found at the level of $p < 0.05$ in all comparisons in-group, pre, and post-tests of anthropometric measurements, body weight and body mass index. It was found that there were significant differences at the level of $p < 0.05$ in deadlift and doing sit-ups tests in the comparisons between the first and last measurements of all anthropometric measurements and in all measurements except in the control groups of the plank, shuttle and isometric tests. In all core tests, the measurements of the volleyball core group are statistically higher than the other two groups. In the first and last test comparisons within the group, there was a significant difference at $p < 0.05$ level in long jump, agility 550 and arrowhead agility tests. However, in all dynamic field tests, volleyball core increased the test time more than the volleyball and control group. On the other hand, an increase in the long jump test period of the control group is observed. While the test*group interaction is observed in the Arrowhead feature, this interaction results from the intra-group development of the volleyball core and volleyball test groups. As a result, based on the findings obtained, core exercise practices were found to improve core strength. Based on this development, it can be thought that core exercise programs will have a positive effect on the performance of volleyball athletes.

Keywords: volleyball, core, performance

Introduction

Taken anatomically, the core is defined as all the muscles that provide the body's skeletal system and soft tissues (cartilage and connective tissues) that stabilize the body or take part in active movements (Samsan, 2005). Although there is no consensus on exactly which muscles the core region consists of, there are different classifications. In general, the core region is used to name the area consisting of 29 different muscles, including the waist, pelvis, hips, abdomen, including the centre of gravity of the human body (Behm et al., 2010).

Some core muscles should be analysed in order to determine the workout practiced by athletes to increase their sports performance, increase their core strength and endurance levels, and determine the load severity and scope in the training programs (Ekstrom et al., 2007). The strengthening of the core muscles restricts the movements that may create a risk of disability, especially by providing the legs to press to the ground in a more stable and balanced way and this helps to protect the muscles of legs indirectly during the movement (Nesser et al., 2008).

The fitness of core muscles is very important for the athlete to achieve maximum strength and performance (Fredericson et al., 2005). A good core zone not only will allow the athlete to load more, but it also will enable more efficiently display of technical movements. Core region muscles constitute the strength dynamics of the body in a sense. These muscles may not produce as much force as some muscles in other parts of the body, but they have an important function in the correct transfer of force. Together with this task, it provides protection to other muscles in the body. It is easier for an athlete with well-developed core

muscles to adapt to overloads. Since the core area is strong, it prevents the other muscles from being damaged. Proportional development of the athlete's body will also facilitate learning and practicing a technical movement (Mcgill, 2010). Core training increases the strength of the big and small muscle groups and improves the balance of the body (Clayton et al., 2011). In fact, the development of balance is a natural result of increased strength in these muscles. The development of the core region improves the endurance feature of the athlete, supports the controlled application of the movement during the implementation of the sportive movements, and ensures the protection of the movement technique (Satiroglu et al., 2013). It contributes to the controlled behaviour of almost all parts of the body. By providing force increase and proportional transfer of force, it reduces the risk of injury and increases efficiency in movements or transitions between movements due to increased balance. Moreover, its development allows better demonstration of technical skills and the game quality of an athlete whose core region is well developed increases at the same time (Savas, 2013).

Volleyball is a game in which techniques determined within the framework of certain rules are used, and features such as strength, speed, endurance and intelligence come to the fore. Volleyball is one of the exciting and popular sports that have a high audience capacity and is enjoyed with pleasure. Since the volleyball game is played fast, the rallies demand a high level of skill and condition features, and there are many elements that interact with each other in this game. Displaying these elements in harmony makes the game perfect (Eralp, 2005). The most important motor skill affecting performance in volleyball is force. Volleyball is a sport that is applied with heavy loading and appropriate rest intervals. When core training is taken into account to increase the strength in large and small muscle groups, optimum core strength studies will lead to strengthening of the body and development of jumping ability in parallel. Activities such as block, slam-dunk and defence during volleyball require quick and explosive force (Ergun et al., 1994). It reveals the technical and intelligence needs of the players to make quick decisions and apply the movement suddenly and accurately. In-game movements are often repeated many times at high intensity. Therefore, most of the energy is obtained from the phosphagen (ATP-CP) system during the activities in the volleyball game (Conley, 1994).

Method

With the randomization method, 30 athletes participating in the study were divided into 3 groups as only playing volleyball (n = 10), volleyball and core applied (n = 10) and control (n = 10). Ten different core exercises with their own body weights were applied to the experimental group for 2 days a week during 10 weeks after their volleyball training. No additional training model was applied to the volleyball group, except for volleyball training. The control group is a sedentary group and is not included in any exercise program. Core exercises selected for the training program were planned from low-intensity exercise to high-intensity exercise. These core exercises are as following: Flat plank (Elbow plank), Side plank, Reverse plank, Flat plank-reverse hand reverse foot- (one arm / leg plank), Flat plank-one foot- (One leg plank), Right-left leg raise and lower in Plank stance (Single Leg Plank Raise), Leg raise-lower in side plank stance (Oblique Abductor Raise), Shuttle (Crunch), Jack-knife sit-ups (V-Ups), Reverse shuttle (Superman).

Stature and Body Weight

An electronic scale measured weight with an accuracy of 0.1 kg, and measurements of height were taken with a digital height-measuring instrument with a precision of 0.01 cm.

Waist-hip circumference and waist / hip ratio measurements

It is the number obtained by dividing the waist circumference into the hip circumference (all measurements are in centimetres), which gives information about the distribution of body weight.
It is considered as the prediction of obesity and health risk. If the ratio in young men is greater than 0.95, and 0.86 in women, it is considered as a high health risk (Zorba, 2006).

Leg Plank Raise Test

Participants were asked to raise their legs 5-10 cm upright with their backs lying on the mat and keep them still motionless. The hands were kept under the body between the back and hip during movement, thereby; while reducing the load on the back muscles, the load on the abdominal region muscles was increased. The test was terminated if the subjects significantly impaired their body positions and / or touched their legs to the ground. The measurement was made with a stopwatch and scores were recorded in seconds (Parkhouse, 2011).

Plank Test

It is one of the basic static tests used to measure body strength. The subjects were asked to lie face down, with their forearms and elbows bilateral shoulder width and on their toes, the pelvis lifted and the neck, shoulders, back, buttocks and legs were asked to form a straight line parallel to the ground and maintain the posture (Plank position). The time elapsed in seconds until the subject was tired and / or broke his position was recorded with the start of the period (Reiman, 2009).

Back Isometric Endurance Test

The 'Biering Sorenson Test', an isometric back muscle test, was used as an important static test to evaluate the durability of the back extensors. For this test, the athlete's prone body was laid with the spina iliaca hanging from the bed from the anterior superior. The athlete was asked to fix the body at the level of the gastrocnemius muscle from the legs and hold the trunk parallel to the ground against gravity with the hands clenched in the chest. Partial trunk extension was allowed. When the posture was impaired and / or the athlete left the experiment due to fatigue and pain, the time was stopped and the score was recorded in seconds (Moreou et al., 2001).

Push-up Test

Application of the Test: The athlete was asked to have arms wide shoulder, contact the chest area with the ground and elbow joints in full extension. The lifting of the chest from the ground and the contact with the ground again is recorded as 1. With the start command on the cushion, it was allowed to do push-ups at maximum speed for 30 seconds and the number reached by each athlete was recorded when the time expired (Kamar, 2008).

Standing Long Jump Test

Horizontal jump distance of the athletes participating in the study was measured in centimetres. Athletes were taken to this test after warming up. Behind the starting line, the feet were bilaterally arranged, the hands were moved as desired, and the athlete was asked to jump horizontally and fix it at the point where they fell without losing their balance and falling (Reiman & Manske 2009). The starting line and the distance the athlete jumped were measured. The athlete was given two attempts. The best jump distance was evaluated as the test score (Tamer, 2000).

Shuttle Test

In this test, which measures the strength and endurance of the abdominal muscles, athletes; performed flexion on the mat on the back while the knees were in a 90-degree flexion position (Ergun, 2011). With the mark, each body flexion was counted and the correct repeats within 30 seconds were recorded as the maximum number of shuttle (Henderson et al., 2007).

Dynamic Field Tests (Arrowhead and 505 Agility Tests)

Arrowhead Agility

Arrowhead test, which is accepted as another football-specific agility test, starts from one meter behind the starting point, passes through the photocell, the return to point D or C, located 5 meters from the right, and left side of point A, is 5 meters ahead of the point A. It includes the return of the B point and the

stop of the photocell by passing the starting point for the second time. Each athlete repeated the test three times, and the measurements were planned on the grass ground, allowing the athletes to recover (Harsley et al., 2014).

505 Agility Test

It is aimed to evaluate athletes' versatile speed, agility and body controls. As soon as the athlete exits one meter behind the starting point and passes through the starting point, the photocell time begins, after returning the distance of 10 m from the desired direction (on the right foot or on the left foot), it passes the second photocell at a distance of 5 meters and stops the time. The subject was given three attempts and the lowest time was recorded as the most successful score. The experiment was conducted on the grass ground with soccer shoes (Reiman, 2009).

Analysis of Data

Statistical analysis of the findings of the volleyball players was made in the IBM SPSS 25 package program. Descriptive information for all volleyball players and groups is tabulated. First-post-test distributions of variables according to groups were examined, normality of distributions and homogeneity of variances were determined by Mauchly'Sphericity Test and Levene test. Analyzes between the groups, within the group and the effect of training were made with multiple measures analysis of variance (MANOVA) in repeated measurements. Bonferroni Test was continued in Post Hoc comparisons in meaningful relationships and the degree of significance was accepted as 0.05.

Findings

Table 1. *Descriptive information about groups and comparison of height, weight, and body mass index between groups*

Group		Mean ± SD	Maximum	Minimum	Comparison between groups	
Control n=10	Height (m)	1,51±0,09	1,66	1,36		
	Weight (kg)	42,25±7,69	59,00	34,00		
	BMI (kg/m²)	18,32±1,83	21,67	15,57		
Volleyball n=10	Height (m)	1,55±0,09	1,67	1,41		
	Weight (kg)	44,14±6,01	51,00	33,00		
	BMI (kg/m²)	18,12±0,95	19,44	16,60		
Volleyball+Core n=10	Height (m)	1,58±0,07	1,69	1,48		
	Weight (kg)	47,30±4,27	53,00	38,00		
	BMI (kg/m²)	18,83±1,33	21,00	16,90	x-square	P
Total n=30	Height (m)	1,55±0,09	1,69	1,36	3,109	0,540
	Weight (kg)	44,56±6,30	59,00	33,00	3,208	0,376
	BMI (kg/m²)	18,42±1,40	21,67	15,57	0,653	0,474

Descriptive values of the subjects are indicated in the table. The average height, body weight and body mass index of 30 subjects (10 control, 10 volleyball, 10 volleyball and core exercise) belonging to 3 groups participating in the study were respectively 1.55±0.09; 44.56±6.30; 18.42±1,40. For all descriptive variables, there is no significant difference between the groups before the training period.

Table 2. *Comparison of the first and last anthropometric test changes of the groups*

	Group	N	Pre-test	Post-test	In-Group Change (%)	Test* Group F	P
Antropometric Measurements							
Weight (kg)	Control	10	42,25±7,69	43,02±7,50	0,77 (1,82)*		
	Volleyball	10	44,14±6,01	43,82±5,57	0,32 (0,72)*	**4,074***	0,028
	Volleyball+Core	10	47,30±4,27	47,61±4,51	0,31 (0,65)*		
BMI (kg/m^2)	Control	10	18,32±1,83	18,66±1,70	0,34 (1,85)*		
	Volleyball	10	18,12±0,95	18,01±0,90	0,11 (0,60)*	**4,394***	0,022
	Volleyball+Core	10	18,83±1,33	18,94±1,32	0,11 (0,58)*		
Waist (cm)	Control	10	68,50±5,25	69,30±5,03	0,80 (1,16)*		
	Volleyball	10	69,10±4,95	69,20±5,07	0,10 (0,14)*	2,116	0,140
	Volleyball+Core	10	71,70±3,40	72,70±3,43	1,00 (1,39)*		
Hip (cm)	Control	10	78,10±6,78	78,80±6,37	0,70 (0,89)*		
	Volleyball	10	80,80±6,05	82,10±6,15	1,30 (1,60)*	0,775	0,471
	Volleyball+Core	10	83,80±3,64	84,10±3,38	0,30 (0,35)*		
Waist/Hip Ratio	Control	10	0,879±0,05	0,881±0,03	0,002 (0,22)*		
	Volleyball	10	0,857±0,06	0,845±0,06	0,012 (1,40)*	2,306	0,119
	Volleyball+Core	10	0,856±0,03	0,864±0,02	0,008 (0,93)*		

BMI: Body Mass Index *$p<0,05$

In the table, pre-treatment and post-test measurements of anthropometric measurements such as body weight, body mass index, waist circumference and waist-hip ratio were compared in terms of inter-group, intra-group and group*test interaction. A significant difference was found in $p<0.05$ level in body weight and body mass index in the comparisons between the pre and post-tests of all anthropometric measurements. A significant difference was found at the level of $p<0.05$ in all of the intra-group comparisons of anthropometric measurements. While test*group interaction was observed in body weight and BMI tests, this interaction was due to the intra-group development of volleyball and volleyball core exercise groups. In other anthropometric variables, test*group interaction was not observed.

Table 3. *Comparison of the first and last core test changes of the groups*

	Group	N	Pre-test	Post-test	In-Group Change (%)	Test* Group F	P
Core Measurements							
Leg lifting (sec)	Control	10	25,50±9,07	26,80±8,99	1,30 (5,37)*		
	Volleyball	10	24,30±10,99	25,20±10,69	0,90 (3,70)*	**9,699***	0,001
	Volleyball+Core	10	39,10±8,14	42,80±8,16	3,70 (9,46)*		
Push-up	Control	10	10,70±2,90	14,10±2,92	3,40 (31,77)*		
	Volleyball	10	13,10±3,51	14,80±3,85	1,70 (12,97)*	2,120	0,140
	Volleyball+Core	10	15,10±3,03	19,00±5,51	3,90 (25,82)*		

Plank (sec)	Control	10	41,40±13,25	42,20±20,87	0,80 (1,93)		
	Volleyball	10	42,70±20,69	44,80±21,59	2,10 (4,91)*	0,101	0,904
	Volleyball+Core	10	46,70±20,67	49,70±21,39	3,00 (6,42)*		
Shuttle	Control	10	14,90±2,23	16,90±2,84	2,00 (15,50)		
	Volleyball	10	14,30±4,47	15,80±5,30	1,50 (10,48)*	3,314*	0,049
	Volleyball+Core	10	15,00±3,12	18,60±4,16	3,60 (24,00)*		
Back isometric (sec)	Control	10	38,10±9,65	39,20±14,09	1,10 (2,88)		
	Volleyball	10	43,30±19,33	43,80±19,87	0,50 (1,15)*	0,466	0,633
	Volleyball+Core	10	46,60±15,43	50,60±24,12	4,00 (8,58)*		

Intergroup comparisons: a>b **p<0,05*

In the table, the measurement results showing the core performance of the groups were compared in terms of intra-group, inter-group and group*test relationships. In the comparison of all anthropometric measurements between the first and last measurements, there was a significant difference at p<0.05 level in leg lift and shuttle tests and, in the group comparisons, at p<0.05 level in all measurements except the control groups of plank, shuttle and isometric tests. In all core tests, the measurements of the volleyball core group were statistically higher than the other two groups.

Table 4. *Comparison of the changes in the first and last performance measurements of the groups*

	Group	**N**	**Pre-test**	**Post-test**	**In-Group Change (%)**	**Test* Group F**	**P**
Dynamic Field Measurements							
Long Jump (cm)	Control	10	156,80±13,50	156,70±21,03	0,01 (0,06)*		
	Volleyball	10	157,10±32,78	159,70±33,33	2,60 (1,65)*	0,173	0,842
	Volleyball+Core	10	158,90±31,34	163,70±37,50	4,80 (3,02)*		
550 Agility (sec)	Control	10	3,78±0,09	3,77±0,09	0,01 (0,26)*		
	Volleyball	10	3,78±0,10	3,76±0,11	0,02 (0,52)*	0,582	0,565
	Volleyball+Core	10	3,73±0,13	3,69±0,11	0,04 (1,07)*		
Arrowhead Agility (sec)	Control	10	10,15±0,47	10,19±0,59	0,04 (0,39)*		
	Volleyball	10	10,50±0,36	10,46±0,37	0,04 (0,38)*	2,727	0,083
	Volleyball+Core	10	9,78±0,33	9,64±0,32	0,14 (1,43)*		

Intergroup comparisons: a>b **p<0,05*

In the table, the measurement results showing the dynamic area measurements of the groups were compared in terms of inter-group, intra-group and group*test relationship. In the first and last test comparisons within the group, there was a significant difference at p<0.05 level in long jump, agility 550 and arrowhead agility tests. In all Arrowhead tests, while the experimental groups significantly extended the test time, a significant decrease was observed in the test time in the control group. However, in all dynamic field tests, volleyball core increased the test time more than the volleyball and control group. An increase in the long jump test period of the control group was observed. The test*group interaction was observed in the Arrowhead feature, which is one of the dynamic field tests, and that interaction resulted from the intra-group development of the volleyball core and volleyball test groups.

Discussion and Result

Pre-treatment and post-test measurements of anthropometric measurements such as body weight, body mass index, waist circumference and waist-hip ratio were compared in terms of intergroup, intragroup and group * test interaction. A significant difference was found in $p<0.05$ level in body weight and body mass index in the comparisons between the pre-and post-tests of all anthropometric measurements. Bayrakdar and Kılınç Boz (2020) investigated the effect of 8-week core exercise on static and dynamic area measurement tests and stated that they found similar results in their studies. A significant difference was found at the level of $p<0.05$ in all of the intra-group comparisons of anthropometric measurements. The test*group interaction was observed in body weight and BMI tests, because that interaction was due to the intra-group development of volleyball and volleyball core exercise groups. In other anthropometric variables, test*group interaction was not observed. In the comparison of all anthropometric measurements between the first and last ones, there was a significant difference at $p<0.05$ level in leg lift and shuttle tests. In the group comparisons, there was a significant difference at $p<0.05$ level in all measurements except the control groups of plank, shuttle and isometric tests. In all core tests, the measurements of the volleyball core group were statistically higher than the other two groups and significant differences were found in long jump, 550 and arrowhead agility tests in the first and last test comparisons within the group at $p<0.05$ level. In all Arrowhead tests, while the experimental groups significantly extended the test time, a significant decrease was observed in the test time in the control group. However, in all dynamic field tests, volleyball core increased the test time more than the volleyball and control group. An increase in the long jump test period of the control group was also observed. The test*group interaction was observed in the Arrowhead feature, which is one of the dynamic field tests, and that interaction resulted from the intra-group development of the volleyball core and volleyball test groups.

In the study of Van Pletzen and Venter (2012), it is stated that the athletes with higher core muscle strength have better jump performance. Hoshikava et al. (2013) practiced football training only for the control group for 6 months in the study they performed on football players aged 12-13, and applied the core training to the experimental group by integrating the core training into the normal training program. A statistically significant difference was found between vertical jump distances between groups ($p<0.05$).

In another study conducted on the university volleyball team, the effect of the core training applied with the 9-week normal training process on the vertical jump was found significant ($p<0.05$). It can be said that core training improves lower limb muscle strength and thus vertical jump (Sharma et al., 2012). In their study, Afyon and Boyacı stated that the 8-week core-plyometric exercise increased the number of push-ups and horizontal bar, thereby improving the upper limb muscle strength (Afyon & Boyaci, 2013).

Sharrock et al. (2011) state that core exercise has a positive effect on sportive performance. Regular core training also improves core region muscles (Steven et al., 2011). Developing core region muscles allows the lower and upper limb muscles to work in harmony (Akuthota & Nadler, 2004). The optimum core strength maintains the body posture (Chun et al., 2015). In addition, the development of the core region reduces the risk of injury of the body (Sokunb & Kachall, 2015; Sever, 2018).

In a study conducted on sedentary individuals, 8-week core - plyometric exercise was reported to improve shuttle numbers and back force (Afyon & Boyaci, 2013). In their study, Nikolenka et al. (2011) stated that there was no relationship between core training and 40 m sprint time. Reed et al. (2012) stated that core training improves the 40 m sprint time. It is stated that 12-week core training, which was applied to 16-year-old players, improved 20 m sprint time (Afyon, 2014). In another study on young footballers, it is stated that the 9-week core training, which was applied in addition to the normal training program, positively contributed to the 10-20 meter sprint time (Prieska et al. 2015). In another study on 14-year-old footballers, it was stated that the core training integrated into the normal training program improves the 10 m and 30 m sprint time (Wong et al. 2010).

Fixed and non-fixed surface applications of Core Training cause muscle groups to participate in the movement at different rates. In core exercises performed on the moving surface, the tension time of the muscle is long but the speed of movement is low. When the literature is examined, it is seen that there are

limited number of studies that determine the statistical effect of core stabilization exercises on body composition and the existing studies have revealed different results from each other. While Some studies on sedentary women state that (Jago et al., 2006; Cruz-Ferreira et al., 2009; Rogers & Gibson, 2009; Noormohammadpour et al., 2012; Welling & Nitsure, 2015) core stabilization exercises are mostly positive on body composition, some other studies (Arslanoğlu and general, 2013) show that these exercises do not make any change on it. In a study conducted on female adolescent volleyball athletes (Yıldız, 2012), it was concluded that the 6-week trunk stabilization exercise program increased the strength of the abdominal muscles and back muscles. In consequence of the 8-week core stabilization program, applied to elite female gymnasts, the test results of the group who underwent core exercise increased compared to the control group (Bassett & Leach, 2011). In a study (Allen et al., 2014), after 6-week core exercise program applied to 164 students (86 females, 78 males) after physical education and sports classes, statistically significant findings were obtained in shuttle, side plank and back extension tests. In other study where 6-week core exercises were applied on the unstable surface (Parkhouse & Ball, 2011), it was determined that there was an increase in the core area strength of the athletes. In a study on active footballers (Sever, 2017), it was found that core strength training is beneficial in terms of condition.

As a result; based on the findings obtained, core exercise practices were found to improve core strength. Depending upon this development it can be thought that core exercise programs will have a positive effect on the performance of volleyball athletes.

References

Afyon Y A. Effect of Core training on 16 year-old Soccer Players. *Educational Research and Reviews* 2014; *9*:23, 1275.

Afyon Y A, Boyaci A. Investigation of The Effects By Compositely Edited Core-Plyometric Exercises In Sedentary Man On Some Physical And Motorc Parameters. *International Journal Of Academic Research* 2013; *5*(3).

Akuthota V, Nadler S F. Core strengthening. *Archives of physical medicine and rehabilitation* 2004; *85*, 86-92.

Arslanoğlu E, Şenel Ö. Effects of pilates training on some physiological parameters and cardiovascular risk factors of middle aged sedentary women. *Age (years)* 2013;*38*, 3-894.

Astorino T, Baker J, Brock S, Dalleck L, Goulet E, Gotshall R, Lim Y A. Relationships between isokinetic core strength and field based athletic performance tests in Male collegiate baseball players. *Journal of Exercise Physiologyonline* 2011; *14*:5.

Bassett S H, Leach L L. The effect of an eight-week training programme on core stability in junior female elite gymnasts, African Journal for Physical, Health Education, Recreation and Dance, 17: supp1 (Supplement) pp. 9-19: erratum. *African Journal for Physical Health Education, Recreation and Dance* 2011;*17*:3, 567.

Bayrakdar A, Kılınç Boz H, Işıldar Ö. The Investigation of the Effect of Static and Dynamic Core Training on Performance on Football Players, *Türk Spor ve Egzersiz Dergisi 2020; 22:1.*

Bayrakdar A, Kılınç Boz H. The effect of functional movement screen and lower extremity training on hamstring/quadriceps ratio in football players.

Behm D G, Drınkwater E J, Wıllardson J, Cowley P M. Theuse of instability to train the core musculature applied physiology, *Nutrition and Metabolism* 2010; 35:1,91-108.

Chun S P, Kim K Y, Kang T G, Kim G D. A study on core stability training for postural control ability and respiratory function in patients with chronic stroke. *International Journal of Bio-Science and Bio-Technology* 2015; *7*:3, 83-90

Conley M S. *Costill physiology of sport and exercise*. United states: Human Kinetics Champaign;1994.

Cruz-Ferreira A I C, Pereira C L N, Fernandes J A. Effects Of Three Months Of Pilates-based Exercise In Women On Body Composition: 1447Board# 49 May 27 9: 30 AM-11: 00 AM. *Medicine & Science in Sports & Exercise* 2009; *41*:5, 16-17.

Ekstrom Donatelli R, Carp K. Electromyographic analysis of core trunk, hip, and thigh muscles during 9 rehabilitation exercises. *J Orthop Sports Phys Ther* 2007; 37, 754-762.

Eralp E, Yoruç Ç M. *Voleybolda temel beceriler.* Istanbul: Yaylacık Matbaası;2005.
Ergun N, Baltacı G. Spor yaralanmalarında fizyoterapi ve rehabilitasyon prensipleri. *Ankara: Pelikan Yayınevi*;2014.
Ergun N, Baltacı, Yılmaz İ. Elit bir voleybol takımının fiziksel yapı, uygunluk ve performans düzeyinin analizi. *Hacettepe Üniversitesi Voleybol Bilim ve Teknoloji Dergisi* 1994; 2:2, 26-33.
Fredericson M, Moore T. Muscular balance, core stability, and injury prevention for middle-and long-distance runners. *Physical Medicine and Rehabilitation Clinics* 2005; *16*:3, 669-689.
Harsley P, Bishop D, Gee T. Reproducibility of speed, agility and power assessments in elite academy footballers;2014.
Henderson N D, Berry M W, Matic T. Field measures of strength and fitness predict firefighter performance on physically demanding tasks. *Personel psychology* 2007; *60*:2, 431-473.
Hoshikawa Y, Iida T, Muramatsu M, Ii N, Nakajima Y, Chumank K, Kanehisa H. Effects of stabilization training on trunk muscularity and physical performances in youth soccer players. *The Journal of Strength & Conditioning Research* 2013;*27*:11, 3142-3149.
Jago R, Jonker M L, Missaghian M, Baranowski T. Effect of 4 weeks of Pilates on the body composition of young girls. *Preventive medicine* 2006; *42*:3, 177-180.
Kamar A. Sporda Yetenek Beceri ve Performans Testleri. Nobel Yayınları, 2. *Basım. Ankara*;2008.
McGill S. Core training: Evidence translating to better performance and injury prevention. *Strength & Conditioning Journal* 2010; *32*:3, 33-46.
Moreau C E, Green B N., Johnson, C. D., & Moreau, S. R. Isometric back extension endurance tests: a review of the literature. *Journal of manipulative and physiological therapeutics* 2001; *24*:2, 110-122.
Nesser T W, Huxel K C, Tincher J L, Okada T. The relationship between core stability and performance in division I football players. *The Journal of Strength & Conditioning Research* 208; *22*:6, 1750-1754.
Nikolenko M, Brown L E, Coburn J W, Spiering B A, Tran T T. Relationship between core power and measures of sport performance. *Kinesiology: International journal of fundamental and applied kinesiology* 2011; *43*:2, 163-168.
Noormohammadpour P, Kordi R, Dehghani S, Rostami M. The effect of abdominal resistance training and energy restricted diet on lateral abdominal muscles thickness of overweight and obese women. *Journal of bodywork and movement therapies* 2012; *16*:3, 344-350.
Parkhouse K L, Ball N. Influence of dynamic versus static core exercises on performance in field based fitness tests. *Journal of bodywork and Movement Therapies* 2011; *15:4*, 517-524.
Prieske O, Muehlbauer T, Borde R A, Gube M, Bruhn S, Behm D G, Granacher U. Neuromuscular and athletic performance following core strength training in elite youth soccer: Role of instability. *Scandinavian journal of medicine & science in sports* 2016; *26*:1, 48-56.
Reed C A, Ford K R, Myer G D, Hewett T E. The effects of isolated and integrated 'core stability'training on athletic performance measures. *Sports medicine* 2012; *42*:8, 697-706.
Reiman M P, Manske R C. *Functional testing in human performance*. Human kinetics;2009.
Rogers K, Gibson A L. Eight-week traditional mat Pilates training-program effects on adult fitness characteristics. *Research quarterly for exercise and sport* 2009; *80*:3, 569-574.
Samson K M. *The effects of a five-week core stabilization-training program on dynamic balance in tennis athletes*. West Virginia University;2005.
Satiroglu S, Arslan E, Atak M. Core Training Application in Volleyball. *5. Training Science Congress*, 02-04 Temmuz 2013; Beytepe/Ankara, Türkiye.
Savas S. Basketball on Core Stabilization and the Impact on Performance of the Band Practice There. *5. Training Science Congress*, 02-04 Temmuz 2013; Beytepe/Ankara, Türkiye.
Sever O. Comparison of static and dynamic core exercises' effects on Stork balance test in soccer players. *Journal of Human Sciences* 2017; *14*:2, 1781-1791.
Sever O, Zorba E. Comparison of effect of static and dynamic core exercises on speed and agility performance in soccer players. *Isokinetics and Exercise Science* 2018; *26*:1, 29-36.

Sharma A, Geovinson, S. G., & Singh, J. S. Effects of a nine-week core strengthening exercise program on vertical jump performances and static balance in volleyball players with trunk instability. *The Journal of sports medicine and physical fitness* 2012; *52*:6, 606-615.

Sharrock C, Cropper J, Mostad J, Johnson M, Malone T. A pilot study of core stability and athletic performance: is there a relationship?. *International journal of sports physical therapy* 2011; *6*:2, 63.

Sokunbi O G, Kachalla F G. Effect of acupuncture, core-stability exercises, and treadmill walking exercises in treating a patient with postsurgical lumbar disc herniation: A clinical case report. *J Acupunct Meridian Stud* 2015; 8:1,48-52.

Steven ZG, John D C, Deydre, S.T., Samuel, S.W, Alison, C.W., Jessica, L.D., Michael, E.R. Brief psychosocial education, not core stabilization, reduced incidence of low back pain: Results from the prevention of low back pain in the military (POLM) cluster randomized trial. *BMC Medicine* 2011; 20: 119- 128.

Tamer K. *Sporda fiziksel-fizyolojik performansın ölçülmesi ve değerlendirilmesi*. Bağırgan Yayınevi;2000.

Van Pletzen D, Venter R E. The relationship between the bunkie-test and physical performance in rugby union players. *International Journal of Sports Science & Coaching* 2012; *7*:3, 543-553.

Welling A, Nitsure P. Comparative study between mat, swiss ball and theraband exercises on abdominal girth. *Int J Physiother Res* 2015; *3*:4, 1142-49.

Wong P L, Chamari K, Wisloff U. Effects of 12- week on-field combined strength and power training on physical performance among U-14 young soccer players. *J Strength Cond Res* 2010; 24:3,644-652.

Yıldız S. Adölesan kadın voleybol oyuncularında gövde stabilizasyon egzersiz eğitiminin kassal kuvvet, endurans ve denge üzerine etkisi. *Hacettepe Üniversitesi, Sağlık Bilimleri Enstitüsü, Spor Fizyoterapistliği Programı, Yayımlanmamış Yüksek Lisans Tezi. Ankara*;2012.

Zorba E. *Vücut yapısı: Ölçüm yöntemleri ve şişmanlıkla başa çıkma*. Morpa Kültür Yayınları;2006.

The Effects of Active Video Games on Strength, Vertical Jumping and Flexibility in Children Aged 12 to 15 Years Old

Çagrı Çifci[1] and Sebiha Gölünük Başpınar[2]*
[1]*Afyon Kocatepe University, Faculty of Sport Sciences, Turkey.*
[2]*Afyon Kocatepe University, Health Sciences Institute, Department of Physical Education and sports, Turkey.*
**Corresponded to Author*

Abstract

Active video games (AVGs) are recommended by most researchers to increase physical activity, to have fun, to create motivation. However, the effects of AVGs applications on children are limited. Therefore, this study investigated the effects of active video games in children aged 12 to 15 years children on strange, vertical jump, flexibility.

Total 100 children including 50 children in exercise group (25 boys, 25 girls) and 50 children in control group (25 boys, 25 girls) attend the research. Active video games, which are taken 40 minutes two days a week, are implemented in the exercise group during 8 weeks by using X box simulation protocol. In this research, physical properties, vertical jump, flexibility, double leg strength and hand grip strength are taken measurements providing that there are pretest and posttest. In the group of active video games, a significant increment has been realized on the value of the pretest and the posttest in terms of the value of flexibility, grip and leg strength, vertical jump ($p<0.05$). However, statistical different have not been seen between the exercise group and the control group in terms of the value of strength, vertical jump and flexibility ($p>0.05$).

As a result of the study, it is noticed that the active video games have an effect on the value of strength, vertical jump and flexibility in children between the ages of 12-15, but it is seen that any discrepancy has not been occurred with control group.

Keywords: Active video games, Strength, Vertical Jumping, Flexibility

1. Introduction

Together with the reduction of physical mobility, especially obesity causes many diseases seen at an early age. Inadequate physical activity in childhood can cause health problems in adolescence and adulthood. Determination of the physical characteristics of children has great importance at the subject of determining skills [1,2-3]. Inadequate physical activity in childhood can cause health problems in adolescence and adulthood [4]. Children is importance in determining skills. In order to achieve success in different sports branches, it is necessary to provide appropriate guidance to the sport at an early age [5]. The age at which children start playing digital games is reported as becoming 4.5 and the playing time per day is 179 minutes [6]. Recently, these games had been generally seen as solo and passive games. This causes physical inactivity and the lackness of motor development of children [7]. Children aged 1 to 4 years should engage in 180 minutes at the physical activity of different intensity during the day. For children aged 5 -11, moderate physical activities should be preferred for at least 60 minutes each day. For children aged between 12 and 18 years, on average 60 minutes per day, moderate and higher physical activities are recommened [8, 9]. Recent researches are also about AVGs rather than passive games. Nintendo and AHA are collaborating to investigate the effects of AV games to subsitute exercise by American Heart Association (AHA). The Researches in this area has brought AVGs to the agenda for increasing physical mobility [10, 11-3]. He explained that active video games supported in learning self-confidence and sharing self-confidence among young people, challenge games at various levels, and that active video usage has an impact on both emotional and cognitive levels [12]. In addition to the traditional games, the use of active video games as exercise can be suggested as an alternative to the development of motor skills. Motor tasks include with various sensory feedback among physical activities in active video games, levels of speed and sensitivity, and various visual, mental and attention tasks [13]. It is thought that during the implementation of the

games, the exercise motivation of the child will be able to increase. However, there is very limited empirical evidence that exercise games can facilitate the development of motor skills or will be able to be an alternative to motor-enhancing physical activity [14,15].

Based on this information, the aim of this study was to investigate the effects of active video games on strength, vertical jumping and flexibility in children aged 12 to 15 years old.

2. Method

2.1. Participants

Experimental method was used in this research. The study group consisted of 50 AVG exercise groups (25 boys, 25 girls) and 50 control groups (25 boys, 25 girls) in the 12-15 age group studying in Ortaköy Middle School in Çifteler district of Eskişehir.

2.2. Materials

In the research, AVG exercise were applied with the X box simulation device. Force, vertical jump and flexibility measurements were made before and after 8 week video games. Physical Measurements the height of the students who participated in the study was measured by means of a metal rod with a sensitivity of 0.1 cm, and their body weights were measured with tanita digital scale with a precision of 0.01 kilogram (kg). Body Mass Indexes (BMI) of the participants were calculated with VA / height2 (kg / m2) formula.

Motoric Test Measurements

Strength measurements: The measurements of gripping strength on the participants by being measured 3 times were carried out by adjusting according to the dominant hand preference of the athlete by digital hand dynamometer and the best score was obtained. In the leg strength, after placing the legs on the dynamometer stand, the arms were stretched, the body on tilted forward position slightly and the knees were measured at a 45 degree angle. This action was done 3 times and the best value was obtained.

Flexibility Test: Sit-in test was used for flexibility measurement. The participants were seated on the floor and barefoot soles were asked to lean horizontal on the test stand. The test was repeated 2 times the highest value was recorded in as cm.

Vertical jump: During the test participants were asked to squat from the knees quickly and bounce vertically while their hands on their waists and their knees were at the situation of extentation and in the upride position. According to the test protocol, They bounched without pulling the knees up, the legs are stretchly to the highest possible distance. It was repeated for each participant three times and the best value was recorded.

2.3. Procedure

Research volunteer participation of students studying in secondary school was realized. TV screen and X Box console connected system are installed. Video exercise application environment was created. AVGs exercise applications were carried out between 10.00-11.00 in the morning. No warming protocol was applied before the application. Ethics committee approval was received for the research (2011-KAEK-2).

Active Video Game Application

Video games were played for 8 weeks and 2 days and 40 minutes a week. X box Kinect training, volleyball, box and athletics games were applied to AVGs Exercise group for 2 weeks each. There is a rest time of 30 seconds and 2 times during the interval of the game.

Volleyball Game 1 set in the game lasts approximately 4-5 minutes. There is a 2 minute break between sets. During the game bounce, arm and shoulder movements are used effectively.

Boxing Game: İn the game; the round lasts about 2 minutes. 1 minute break is applied between rounds. During the game; arm and shoulder muscles are used effectively

Athletics Game: Athletics include sports such as long jumping, javelin throwing, hurdles running, disc throwing. Players receive different points for each sport branch

Statistical Analysis

All statistical analyzes at the meaningfulness p <0.05 level in SPSS 18 (SPSS Inc., Chicago, IL, USA). program were evaluated at. The homogeneity of the research data was tested by looking at the kurtosis and skewness values (between +1.5 and -1.5) and by the Kolmogorow Smirnov test since the number of participants was greater than 50. In-group and inter-group pre-test and post-test comparisons, dependent and independent samples "One-Sample T Test, Independent-Samples T Test, Paired-Samples T Test" test were applied.

3. Results

The purpose of the study, significant differences were observed in the pre- and post-test motoric characteristics of children exercising with AVGs. Acording to Table 1, there was no statistically significant difference in the physical measurements of the control and exercise groups (Age, body heighty, body weight, body mass index). These differences indicate that the post-test motoric performances of the group playing AVGs increased (Table 3). However, difference in motor test performance of children who did exercise application with AVGs compared to children who did not do exercise application wasn't observed (Table 2). In addition to this, children spend have funny time during practice and want to continue the game despite the end of their duration are among our observations.

Table 1. *Comparison of Physical Characteristics Between Exercised and Control Groups*

Değişkenler	Groups	N	x	Sd	t	p
Age (in year)	Exercised	50	12,52	1,05	-0,092	0,723
	Controls	50	12,54	1,12		
Body Heighty (cms)	Exercised	50	1,54	0,08	0,471	0,689
	Controls	50	1,53	0,08		
Body Weight (kgs)	Exercised	50	47,12	7,55	0,548	0,299
	Controls	50	46,33	6,84		
BodyMass Index (BMI)	Exercised	50	19,72	1,42	0,446	0,389
	Controls	50	19,60	1,21		

(p>0.05) There was no statistically significant difference in demographic information between exercise and control groups.

Table 2. *Comparison of Fitness Variables Between Exercised and Control Groups During Pre and Posttest*

Variables	Groups	PRETEST					POSTTEST			
		N	**Mean**	**ss.**	**t**	**P**	**Mean**	**ss.**	**T**	**p**
Right Handgrip Strength (kg)	Exercised	50	16.05	6.45	-0.357	0.722	16.61	6.37	-0.685	0.49
	Controls	50	15.64	5.04			15.83	5.05		
Left Handgrip Strength (kg)	Exercised	50	15.05	6.16	-0.403	0.688	15.72	6.06	-0.976	0.33
	Controls	50	14.60	4.83			14.65	4.80		

Double Leg Strength (kg)	Exercised	50	63.14	26.98	-0.255	0.799	63.64	26.75	-0.329	0.74
	Controls	50	61.91	20.89			62.07	20.69		
Flexibility (cm)	Exercised	50	18.50	7.21	-0.840	0.403	19.12	6.97	-1.255	0.21
	Controls	50	17.40	5.79			17.54	5.53		
Vertical Jump (cm)	Exercised	50	28.33	2.03	-0.679	0.499	28.65	1.94	-1.587	0.11
	Controls	50	28.8	1.62			28.09	1.55		

*P<0.05, ** P<0.01

There was no a significant difference statistically between hand griping strength, leg strength, flexibility and vertical area video exercise group and control group.

Table 3. *Comparison of Fitness Variables Between Female and Male Groups During Pre and Posttest*

Variables	During	**Females**					**Male**			
		N	**Mean**	**ss.**	**t**	**p**	**Mean**	**ss.**	**t**	**p**
Right Handgrip Strength (kg)	Pretest	25	14.70	5.60	-5.146	0.01**	17.41	7.05	-4.405	0.01**
	Posttest	25	15.31	5.54			17.92	6.97		
Left Handgrip Strength (kg)	Pretest	25	13.26	4.80	-6.042	0.01**	16.84	6.91	-5.000	0.01**
	Posttest	25	13.91	4.55			17.54	6.88		
Double Leg Strength (kg)	Pretest	25	55.32	16.31	-4.226	0.01**	70.96	33.06	-2.189	0.04*
	Posttest	25	55.80	15.79			71.40	32.96		
Flexibility (cm)	Pretest	25	18.32	7.13	-4.226	0.01**	18.68	7.43	-3.928	0.01**
	Posttest	25	18.96	6.87			19.28	7.20		
Vertical Jump (cms)	Pretest	25	27.76	1.93	-3.843	0.01**	28.90	2.00	-1.901	0.01**
	Posttest	25	28.16	1.95			29.14	1.85		

*P<0.05, ** P<0.01

There was a statistically significant difference between pretest and posttest values of video exercise application group.

4. Discussion and Conclusion

The main purpose behind conducting this study was to examine the effect on strength, vertical jump and flexibility properties of video games in children between the ages of 12-15. Finding indicate that significant differences were observed in the pre- and post-test motoric characteristics of children exercising with AVGs. These differences indicate that the post-test motoric performances of the group playing AVGs

increased. However, difference in motor test performance of children who did exercise application with AVGs compared to children who did not do exercise application wasn't observed. In addition to this, children spend have funny time during practice and want to continue the game despite the end of their duration are among our observations. The fact that there is no difference between the groups is thought to be due to the fact that children between the ages of 12-15 are in the play age period and that they take part in activities that are related to continuous physical activity.

Together with the development of technology, studies that connected with AVGs have increased each passing day, but studies on this subject are limited. Till our age; studies have generally been limited to investigate physiological variables and the psychological and aggression of children with AVGs [16]. When the demographic characteristics of the children participating in the study were examined, no difference was found between exercise and control groups (Table 1). These groups were observed to be homogenous.

When as the flexibility values, are looked, many studies related to body composition and flexibility values are related to body types are observed [17]. In our study, there was a statistically significant difference between the pre-test flexibility values of the exercise group and the post-test flexibility value, but no difference was found between the control group. In a study comparing the flexibility values according to age groups and gender in adolescents between 13-17 years of age who do regular sports and do not do regular sports, it is reported that the difference occurs in the 16-year-old group and it is reported that the sportsmen are more flexible. It has been reported that the decrease in daily physical activity is the predisposing factor for the decrease in flexibility and that the reorganization of the physical education curriculum in schools may correct this effect [17]. Physical activity and physical fitness in children on the study of the factors, 12 year old girls were reported as 20.76 cm, 13-year-old girls as 18.55cm, and 14-year-old girls as 18.48cm. Other sides in boys, 12 years of age was reported as 18.02 cm, 13 years of age as 18.55cm and 14 years of age as 18.48cm [18]. In our study, there was a statistically significant difference between the pre-test flexibility values of the exercise group and the post-test flexibility value, but no difference was found between the control group.

In a study comparing the flexibility values according to age groups and gender in adolescents between 13-17 years of age who do regular sports and do not do regular sports, it is reported that the difference occurs in the 16-year-old group and it is reported that the sportsmen are more flexible. It has been reported that the decrease in daily physical activity is the predisposing factor for the decrease in flexibility and the reorganization of physical education curriculum in schools may correct this effect [19]. The literature data suggest that regular physical activity increases the flexibility value and presents similar results with our research. The program content of the applied AVGs is thought to be effective in making a significant difference in the development of flexibility. It is reported by the researchers that the high flexibility value is important in preventing sports injuries and shortening the healing process. A total of eight muscle groups are effective in the grip strength test. One of the measurements performed in many studies examining body composition and body mass index is the grip strength test [20,21]. It is known that grip strength values and body structure interact. In the comparison of physical and physiological measurement results of 13-14 age group experimental and control students, grip strength was determined as 23,36 ± 6,93 right hand grip force 21,18 ± 6,81 left hand grip force. Pre-test grip strength (right) 16.05 ± 6.45, grip strength (left) 15.05 ± 6.16 and final test values grip strength (right) 16.61 ± 6.37, grip strength of exercise group participants (left) 15.72 ± 6.06 were determined. In the literature review, it was reported that the right hand grip strength of the 12-14 age group was determined as 18.38 ± 3.65 and the left hand grip strength of 17.43 ± 3.78 [22]. In a study examining the physical fitness of students between the ages of 12-17 and engaged in sports, hand grip strength (kg) was found in girls; In the 12-13 age group, 17.65 were reported to be 13.75 for those who did not do sports, while 27.55 for those who did not do sports, and 18.30 for those who did not do sports. 19,30 in sports and 16,65 in the same age range; it was reported that 27.35 people who do sports and 24,80 who do not do sports [23]. This shows that age factor and gender factors are important in grip strength and most importantly, the average strength values of students who do sports are higher than those who do not do sports.

The present study, there was a statistically significant difference between the right and left hand grip strength values in the exercise group ($p < 0.05$). It is thought that the grip strength values are affected by the average values depending on the use of the hand in the game played. It is thought that javelin throwing movement can be effective on hand grip strength in athletics branch game especially in video exercise. Unfortunately, it is considered as a foresight because there is not enough literature about these games.

A statistically significant difference was found between the pre-test and post-test results of the exercise group in leg strength performance tests ($p < 0.05$). However, there was no statistically significant difference between the control and exercise groups ($p > 0.05$). It was reported that there was a significant increase in leg strength values at the end of 16-week movement training in which the effect of movement training on physical fitness characteristics was investigated on 202 boys aged 10-12 years [24]. It is known that there is a relationship between vertical jump and body structure [25]. Therefore, there is an interaction between body weight and jump performance [22]. It was reported that there was a statistically significant increase in vertical jump values at the end of 16-week movement training in which the effect of movement training on physical fitness characteristics was investigated on 202 boys aged 10-12 years [24]. In our study, no statistically significant difference was found between exercise group and control group. However, it was observed that the vertical jump post-test values of the exercise group increased statistically ($p < 0.05$). It is thought that volleyball game can be effective on vertical jump in video exercises. Researchers in Turkey by the number of users increasing day by day motion-sensor controls a games console and play Exercise plays, which increases the motivation to exercise the player to spend more time and more energy expenditure during exercise showed that contribute to the [26]. Current evidence suggests that gaming has the potential to improve health through increased physical activity. This potential is often inadequate and further development such as customized exercise games is needed [27].

Exercise games among Americans are seen as a new and exciting strategy to reduce obesity and improve physical activity. Based on data from 27 studies, there was a strong association in increased energy intake with exercise games. The majority of the AVGs tested was reported to be obtained at moderate levels of physical activity to meet health and fitness guidelines at the American College of Sports Medicine [28]. In a study, it was found that balance training with both wobble board and active video games improved dynamic balance in children in similar way. According to this result, it can be suggested that active video games, which are not yet used for sportive purposes in our country, can be used as an alternative method [29]. The combined AVGs can have a favourable effect on children's motor skill competence, musculoskeletal fitness and body mass index so that AVGs can be an alternative school-based program to supplement traditional Physical and Education [30].

There are a limited number of studies examining physiological variables with active video games [31]. Research by Graf et al., (2009) in the play of AVGs, Increases Energy Expenditures in Children in his research; The energy spent during active video game is comparable to moderate intensity walking [32]. Therefore, physically active games seem to be a safe, fun and valuable means of encouraging energy expenditure for children who spend a lot of time wanting to have fun and play electronic screen games. The stated that AVGs is not sufficient in physical activity. When the literature is reviewed, it is considered that AVGs and exercise are mild and moderate physical activity [33]. Exergaming is a positive effect in promoting preschool children's moderate-to-strong physical activity at school and has the potential to increase perceived competence and motor skill competence [34] . A research by Jenney et al. (2013) also showed no difference between active video game and traditional training groups [35]. Two groups increased over time, most of which ultimately showed greater skill test performance in post-intervention evaluation than in the control group

Conclusions

As a result, changes in the motoric abilities of children who were actively practicing video games were observed. Frequency, duration and intensity of the preferred game are important in video game selection.

Active video games are thought to increase the habit of doing sports and increase the motivation of children to exercise.

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References

1. Sallis JF, Prochaska JJ, Taylor WC. A review of correlates of physical activity of children and adolescents. *Medicine and Science in Sports And Exercise*, 2000; 32(5): 963- 975. Doi 10.1097/00005768-200005000-00014
2. Lakka HM, Laaksonen DE, Lakka TA, Niskanen LK, Kumpusalo E, Tuomilehto J, et al. The Metabolic Syndrome And Total And Cardiovascular Disease Mortality in Middle-Aged Men. *Jama*, 2002; 288(21): 2709-2716. Doi 10.1001/jama.288.21.2709.
3. Biddiss E, Irwin J. Active video games to promote physical activity in children and youth. *Arch Pediatr Adolesc Med,* 2010; 164: 664-672. Doi: 10.1001/archpediatrics.2010.104.
4. Hallal PC, Bauman AE, Heath GW, Kohl HW, Lee IM, Pratt M. Physical activity: more of the same is not enough. *The Lancet,* 2012; 380(9838), 190-191.Doi 10.1016/S0140-6736(12)61027-7.
5. Çelik A, Şahin M. Sports and child development [*Spor ve çocuk gelişimi].* The Journal of Academic Social Science Studies Jasss-*International Journal of Social Science*, 2013; 6(1): 467-478.
6. Mustafaoğlu R, Yasacı Z. Negative effects of digital gaming on children's mental and physical health. *Journal of Dependence,* 2018;19(3): 51-58.
7. Koçyiğit S, Tuğluk MN, Kök M. Play as educational activity in the child's development process, *Atatürk University Journal of Kazım Kazım Karabekir Education Faculty,* 2007, (16): 324– 342.
8. Telama R, Yang X, Laakso L, Viikari J. Physical activity in childhood and adolescence as predictor of physical activity in young adulthood. *American Journal of Preventive Medicine,* 1997; 13(4): 317-323. Doi 10.1016/S0749-3797(18)30182-X
9. Kimm SYS, Glynn NW, Kriska AM, Barton BA, Kronsberg SS, Daniels SR, et al. Decline in physical activity in black girls and white girls during adolescence. *New England Journal of Medicine,* 347(10): 709-715. Doi 10.1056/NEJMoa003277.
10. Baranowski T, Buday R, Thompson DI, Baranowski J. Playing for real: video games and stories for health-related behavior change. *American Journal of Preventive Medicine*, 2008; 34(1): 74-82. Doi 10.1016/j.amepre.2007.09.027.
11. Hartley J. *Communication, cultural and media studies: the key concepts.* 2002, 4th Ed. London and New York: Routledge. Taylor &Francis group.
12. Jabbar AIA, Felicia P. Gameplay engagement and learning in game-based learning: a systematic review. review of Educational Research, 20015; 85.4: 740-779. Doi 10.3102/0034654315577210.
13. Salem Y, Gropack SJ, Coffin D, Godwin EM. Effectiveness of a low-cost virtual reality system for children with developmental delay: a prelim-inary randomised single-blind controlled trial. *Physiotherapy,* 2012; 98(3): 189-195.
14. Barnett LM, Van BE, Morgan PJ, Brooks LO, Beard JR. Does childhood motor skill proficiency predict adolescent fitness? *Med Sci Sports Exerc,* 2008;40(12): 2137–2144. Doi 10.1249/MSS.0b013e31818160d3.
15. Papastergiou M. Exploring the potential of computer and video games for health and physical education: a literature review. *Computers & Education*, 2009; 53(3): 603-622. Doi 10.1016/j.compedu.2009.04.001
16. Gentile DA, Lynch PJ, Linder JR, Walsh DA. The effects of violent video game habits on adolescent hostility, Aggressive Behaviors, and School Performance, *Journal of Adolescence*, 2004; 27: 5–22.
17. Segal NA, Hein J, Basford JR. The effects of pilates training on flexibility and body composition: an observational study1. *Archives of Physical Medicine and Rehabilitation*, 2004, 85(12): 1977-1981.
18. Saygin E, Karacabey K, Saygın Ö. Investigation of Physical activity and physical fitness of children, *International Journal of Human Sciences*, 2011;8(2).

19. Düzgün İ, Baltacı G. Age and gender variation of flexibility test results in adolescents with and without regular sports. *Physiotherapy Rehabilitation*, 2009; 20(3): 184-189.
20. Çimen O, Cicioğlu İ, Günay M. The physical and physiological profiles of male and female young national table tennis players. *Gazi Journal of Physical Education and Sport Sciences,* 1997; 2(4): 7-14.
21. Biçer Y, Savucu Y, Kutlu M, Kaldırımcı M, Pala R. The effect of strength and strength exercises on movnt skills and abilities of children with intellectual disabilities. *Eastern Anatolia Region Surveys*, 2004; 3: 173-9.
22. Kızılakşam E. Comparison of eurofit test batteries application results of 12-14 age group active and non - physical education students in Edirne province primary schools(master's thesis). *Trakya University Institute of Health Sciences Department of Physical Education and Sports,* Master Thesis.2006.
23. Bilim AS, Çetinkaya C, Dayı A. Investigation of physical fitness of 12-17 years old and non-sports students. *Journal of Sports and Performance Research,* 2016; 7(2): 53-60.
24. Saygın Ö, Polat Y, Karacabey K. The effect of movement education on physical fitness characteristics in children. *Fırat University Journal of Medical Sciences*, 2005; 19(3): 205-212.
25. Özkan A, Koz M, Ersöz G. Determination of optimal load in wingate anaerobic power test. *Journal of Physical Education and Sport Sciences*, 2011; 9(1): P. 2-3.
26. Irmak AY, Erdoğan S. Digital game addiction in adolescents and young adults: a current look. *Turkish Journal of Psychiatry,* 2016;27(2): 128-137.
27. Benzing V, Schmidt M. Exergaming for children and adolescents: strengths, weaknesses, opportunities and threats. *Journal of Clinical Medicine,* 2018; 7(11): 422. doi.org/10.3390/jcm7110422
28. Sween J, Wallington SF, Sheppard V, Taylor T, Llanos AA, Adams-Campbell LL. The role of exergaming in improving physical activity: a review. *Journal of Physical Activity and Health*, 2014; 11(4): 864-870. Doi 10.1123/jpah.2011-0425
29. Demir A, Akın M. Comparison of Active Video Games and Wooble Board Balance Training Effect on Dynamic Balance in 6 Years Old Children, *Gaziantep University Journal of Spor Sciences,* 2018; 3(4): 109-121. Doi: 10.31680/ gaunjss.461858.
30. Ye S, Lee JE, Stodden DF, Gao Z. Impact of exergaming on children's motor skill competence and health-related fitness: a quasi-experimental study, *Journal of Clinical Medicine,* 2018; 7(9), 261Doi 10.3390/jcm7090261
31. Clevenger KA, Howe CA. Energy cost and enjoyment of active videogames in children and teens: X box 360 kinect. *Games For Health Journal*, 2015; 4.4: 318-324.
32. Graf DL, Pratt LV, Hester CN, Short KR. Playing active video games increases energy expenditure in children. *Pediatrics*, 2009; 124(2): 534-540.
33. Liang Y, Lau PWC. Effects of active videogames on physical activity and related outcomes among healthy children: a systematic review. Games for Health: Research, *Development, and Clinical Applications*, 2014; 3(3): 122-144.
34. Gao Z, Zeng N, Pope ZC, Wang R, Yu F. Effects of exergaming on motor skill competence, perceived competence, and physical activity in preschool children, *Journal of Sport and Health Science,* 2019, 8(2), 106-113.
35. Jenney CT, Wilson RJ, Swanson JN, Perrotti LI, Dougall AL. Exergame use as a gateway to the adoption of and adherence to sport-specific and general physical activity. *Journal of Applied Biobehavioral Research,* 2013; 18 (4),198-217. Doi 10.1111/jabr.12012.

Interactive Technologies in Developing Student's Motivation in Physical Education and Sport

Roman S. Nagovitsyn[1], Olga I. Vaganova[2], Maxim M. Kutepov[3], Lada N. Martyanova[4], Oleg V. Kosenovich[4], Yuri V. Moeseev[4], Maria S. Vorotova[4] and Aleksander Y. Osipov[567]

[1]*Department of Physical Culture, Methodology and Sports, Glazov State Pedagogical Institute, Russia.*

[2]*Department of of Professional Education and Management of Educational Systems, Kozma Minin Nizhny Novgorod State Pedagogical University, Russia.*

[3]*Department of Physical Education and Sports, Kozma Minin Nizhny Novgorod State Pedagogical University, Russia.*

[4]*Department of Physical Education, Izhevsk State Agricultural Academy, Russia.*

[5]*Department of Physical Culture, Siberian Federal University, Russia.*

[6]*Department of Physical Culture, Krasnoyarsk State Medical University named after professor V.F. Voyno-Yasenetsky, Russia.*

[7]*Department of Physical Culture, Siberian Law Institute of the Ministry of Internal Affair of Russia, Russia.*

Abstract

Despite significant development of various aspects of young people motivation to physical activity, an insufficiently studied issue is the development of motivation for physical education and sports among university students using interactive technologies. In this regard, we determined the purpose of the study: to identify the main groups of motives for students to engage in physical education and sports and experimentally prove the effectiveness of interactive technologies introduction in theoretical, methodological and practical classes to form an internal positive motivation for physical education. For the experiment, we selected students from four academic groups whose major is "Professional training (by industry)" in the 3rd year under the undergraduate program (n = 115). After experimental work on the basis of interactive technologies introduction into the process of vocational training, the number of EG students with internal positive motivation increased from 15% to 49%. A fundamentally new result was obtained in the work in the planning strategy of increasing indicators of young people motivational-value attitude to the implementation of motor activity in the process of teacher education.

Keywords: Interactive technology, physical culture, motivation, educational process

1. Introduction

Modern education system of the Russian Federation has undergone a number of significant changes, which were indicated by the requirements of scientific and technological progress, the state and society [1]. The traditional system of education which was characterized by the transfer of ready-made knowledge from teacher to student has lost its relevance [2]. It was replaced by a new educational paradigm formed under the influence of the competence approach [3]. Together with it, innovative educational technologies began to be introduced into educational process [4]. The intensification of education process required the search for new ways to improve students' training contributing to their activation which caused the relevance of the topic of interactive technologies use [5,6]. Interactive technologies contribute to both theoretical and practical training [7]. This is extremely important for students of pedagogical University [8]. They will have to apply the acquired knowledge, formed competences in educational process [9]. Interactive training allows organizing effective interaction of both students and teacher and students [10]. Knowledge exchange, problem solving, modeling of situations, assessment of the actions of others and their own activity, creating an atmosphere of business cooperation - all this allows to implement interactive technologies [11]. The educational process, organized with the use of interactive technologies, is built taking into account the inclusion of each student in interaction which allows achieving specifically planned educational results [12]. Thus, the technologies under research are a great success in training students [13]. Joint activity means that each of the participants makes a separate contribution to their work [14]. There is an exchange of knowledge,

ideas and ways to solve the problem [15]. In the process of preparing students, motivation is important taking into account their desire to study disciplines [16].

Education of student teachers in modern student training "Physical Culture and Sports", "General Physical Training" and "Sports Section" [17]. It is the quality implementation of these disciplines that makes it possible to achieve the training of a harmoniously developed young specialist, not only mentally, but also physically [18]. In the process of preparing students for these disciplines, motivational-value attitude of young people to performing physical exercises is of particular importance [12]. To determine the level of motivation, it is necessary to determine the main motives that motivate students to implement these courses [19]. It is possible to increase the effectiveness of vocational training through interactive technologies [14]. Interactive technologies can be used both in independent work of students and in classroom settings [20]. In our presentation, there should be significant theoretical and methodological aspects of the development of students' clear ideas concerning the role and importance of physical education and sport in their professional development.

2. Literature Review

The development of the issue of the implementation of non-traditional and interactive technologies in the implementation of physical education and sports was carried out by Russian and foreign scientists [17-19,21]. Interactive learning involves organizing cognitive activities with specifically set, predictable goals, with the creation of comfortable conditions when a student realizes his success and consistency in the implementation of physical exercises [22]. Among the main tasks of interactive technologies are: developing interest in physical education and sports, in-depth study of the material, creating conditions for success [23]. For implementation of interactive technologies master classes, business and role-playing games, projects, brainstorming, "round" table are held [24]. Interactive technologies in the process of teaching students physical culture are also implemented through lectures, visualizations and demonstration simulators [9]. At the same time, they should be associated with verbal presentation, explanation, use of visual AIDS [7]. The use of electronic technologies can significantly expand the possibilities of presenting educational development, strengthen students' motivation [18]. Motivation is of great importance in teaching students physical culture [25]. Its development affects the desire of students to study the course and improve their knowledge as well as the quality of training [26]. Its development influences students' desire to study the course, improve their physical development, thereby improving the quality of professional training at the university [13].

Experts prove that the implementation of interactive technologies in the process of physical activity allows students to increase their activity over a longer period of time in an independent and creative mode [12,27]. At the same time, the level of motivation increases, and the interaction between the teacher and students begins with the help of direct and feedback based on the focus on the predominant development of new motor and behavioral skills [16,28].

Despite significant elaboration of various aspects to motivate young people to physical activity [19], the development of motivation for physical education and sports among university students with using interactive technologies is necessary to be taken into consideration [29,30]. In this regard, we determined the purpose of the study: to identify the main groups of motives for students to engage in physical education and sports and experimentally prove the effectiveness of interactive technologies introduction in theoretical and methodological and practical classes to form an internal positive motivation for physical education.

3. Method

3.1. Participants

For the experiment, we selected students from four academic groups studying in the field of study "Professional training (by industry)" in the 3rd year under the undergraduate program (n = 115). The study participants were selected from those students who were interested in getting knowledge of the upcoming experiment at the university. The study was implemented during the 2018-2019 school year (September 2018

- July 2019) for two academic semesters (autumn and spring). In turn, all students in the experimental sample were randomly divided into two groups: the experimental group, then the EG (n = 62) and the control group, then the CG (n = 53). In the process of implementing the subjects "Physical Culture and Sports", "General Physical Training" and "Sports Sections", a set of special interactive technologies was used by the EG.

3.2. Materials

To conduct the experiment with the help of preliminary theoretical research, we compiled a set of various types of motivations for physical education and sports [17]. The task of students before starting the experimental work is to set the appropriate rank of individual motivation for physical education and sports (Table 1):

Table 1. *An experimental questionnaire for students on the choice of an individual group of motives for physical education and sports*

Motive groups	Motive content	Rang
Educational and creative	Physical education and sports develop personality skills in self-training and self-control. Systematic physical exercises contribute to the development of moral-volitional qualities, as well as the education of patriotism and citizenship. Through knowledge of the enormous resources of his own body during physical exercises, a person begins to look for new opportunities in his spiritual development.	
Wellness	The most powerful motivation of young people to exercise is the ability to strengthen their health and prevent disease. The beneficial effect on the body of physical exercises can be considered in two interrelated directions: the development of a healthy lifestyle and a decrease in the likelihood of diseases, including occupational ones; therapeutic effects of exercise in many types of diseases.	
Aesthetic	The motivation of students to engage in physical exercises is to improve the appearance and impression made by others (improving physique, emphasizing the "winning" features of the figure, increasing the plasticity of movements). This group is closely related to the development of the "fashion" for physical education and sports.	
Competitively-competitive	This type of motivation is based on a person's desire to improve their own sports achievements. The whole history of mankind, the process of evolution was built on the spirit of rivalry, on the competitive spirit of relationships. The desire to achieve a certain sports level, to win in the contests of an opponent is one of the powerful regulators and a significant motivation for active physical exercises.	
Administrative	Physical education classes are required in higher education institutions of Russia. To obtain control results, a set-off system has been introduced, one of which is in physical education units. Timely passing the test in this course, avoiding conflict with the teacher and the administration of the educational institution encourage students to engage in physical education.	
Communicative	Exercising with a group of associates, for example, in interest clubs (jogging, hiking, cycling, sports, etc.), is one of the significant motivations for visiting sports facilities. Joint physical education and sports contribute to improving communication between social and sexual groups.	
Oriented-professions	The group of this motivation is associated with the development of physical education classes focused on professionally important qualities of students of	

	various specialties, in order to increase their level of preparation for their upcoming work activities. Professionally-applied physical training of students contributes to the development of the psycho-physical readiness of the student for the future profession.
Cultural and sociological	This motivation is acquired from the younger generation with the influence exerted by the media, society, social institutions, in the development of the individual's need for physical exercises. It is characterized by the influence on the personality of the cultural environment, the laws of society and the laws of the "group".
Leadership Status	Thanks to the development of physical qualities in the younger generation, their vitality increases. An increase in personal status in the event of conflict situations resolved in the course of physical influence on another person, as well as an increase in resilience potential in extreme personality conflicts, activates youth participation in physical culture and sports.
Motor activity	Continuous performance of mental activity leads to decrease in the percentage of perception inability and to a greater number of professional errors. Performing special physical exercises for the muscles of the whole body and visual apparatus significantly increases the effectiveness of relaxation than passive rest, and the pleasure of the process of physical exercises.
Cognitive-developing	This motivation is closely related to the desire of a person to know his body, his abilities, and then improve them with the help of physical culture and sports. Motivation is based on the desire to defeat yourself, your laziness, and not the opponent in the competition. The motivation presented is the desire to maximize the physical abilities of your body, improve your physical condition and increase your fitness.
Psychologically-significant	Exercise has a positive effect on the mental state of growing young people, especially students: gaining self-confidence; removal of emotional stress; prevention of the development of stressful conditions; distraction from unpleasant thoughts; relieving mental stress; recovery of mental performance.

The processing of the results according to the experimental questionnaire (Table 1) was carried out according to the following formula: M1 * 3 + M2 * 2 + M3 + M4 - 1 = X, where M1 is the motive of rank 1, M2 is the motive of rank 2, M3 is the motive of rank 3 , M4 - motive 4 rank X - the total number of points. Each motive had different initial points: health - 10, motor-activity - 9, educational and creative - 8, psychologically significant - 7, cognitively developing - 6, professionally oriented - 5, cultural and sociological - 4, competitively competitive - 3, aesthetic - 2, communicative - 1, status - 0, administrative - (-1).

For an experimental study, three levels of students' motivation for physical education and sports were identified. High level - internal positive motivation was determined [17] - more than 41 points (inclusive). Medium level - external positive motivation was revealed [23]. - from 20 to 40 points (inclusive). Low level - there is a lack of motivation or external insignificant motivation - less than 19 points (inclusive) [17].

3.3. Procedure

During the experimental period, in the process of implementing theoretical and methodological and practical classes in physical culture and sports, interactive technologies were introduced through the creation of group projects. Students used LMS Moodle electronic tools. On this electronic platform there was a material to which students had constant access and in case of questions could address to it at any time. With the help of the "private messages" tool, they could ask a question personally to the teacher. In the process of creating projects on physical education and sports topics, students used slides, videos, graphics,

creating instructions for performing exercises. Students created educational video materials that helped to get to know and master the technique of physical exercises and various elements of physical activity for themselves and junior students. In this process, selecting relevant materials on the technique of performing exercises, identifying the benefits of the influence of these exercises on the body, they more deeply studied the courses of "Physical Culture and Sports", "General Physical Training" and "Sports sections". In this case, special attention was paid to students' individual typological characteristics of and the level of their physical and motor activity.

Students were divided into subgroups, each of which chose several physical exercises for themselves. During the project, students had to identify four main ideas: the history of this exercise; the benefits of exercise; execution technique; recommendations for different levels of physical fitness of students. In the course of the project, students actively carried out communication, discussed emerging issues, and exchanged experiences. To present the video at the final lesson, a report was prepared with the main conclusions. The result of the project was to independently gain in-depth knowledge, gain experience in individual physical culture and sports activities, and develop self-management skills in cognitive activities. Nowadays, organization of appropriate conditions for solving the tasks and the development of clear ideas about the need for physical education in the development of a highly qualified specialist as a graduate of a pedagogical university is of utmost importance.

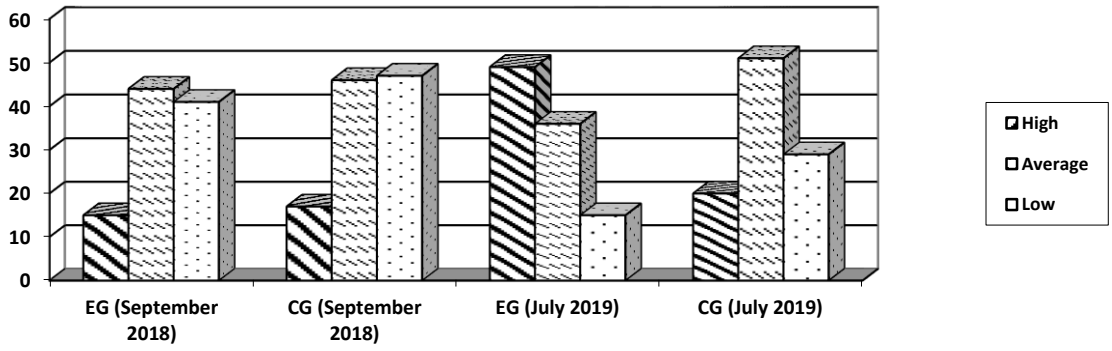
After completing the experimental work, we implemented a second study of students' motivation using the experimental questionnaire (Table 1) for students choosing an individual group of motives for physical education and sports.

3.4. Statistical analysis

Processing the results of the study was carried out using the statistical program SPSS Statistics 20. The significance of differences in the results was determined using Chi-square (X^2) at $p<0.05$. Mathematical and statistical processing was carried out between the indicators of all experimental groups for each indicator proposed in the study. The choice of this criterion for mathematical and statistical processing is determined by the following characteristics: it allows you to compare distributions regardless of whether they are normally distributed or not, and also regardless of the different number of respondents in focus groups. Application of the criterion is possible when the results of focus groups according to the state of the indicator being studied are distributed into more than two categories, in our case (high, average, low).

4. Results

As can be seen from Fig. 1, as a result of the analysis of the results of the pre-experiment (September 2018) and final testing after the experiment (July 2019), it was found that students in the EG in% ratio, compared with the CG in% ratio, having intrinsic positive motivation (high level) to physical education and sports has become significantly more ($p>0.05$):



To identify the reliability of the experimental work, due to the unequal number of participants in the EG and the CG, the number of students was transferred in each group in%. This allowed us to qualitatively conduct comparative statistical processing of the quantitative results obtained in the study. Mathematical and statistical analysis by Chi-square (X^2) revealed a statistical inaccuracy of the results of EG and CG before the experiment at $p>0.05$.

This proves that prior to the implementation of the experimental work, the formed focus groups were statistically equal in the number of participants with low, medium and high levels of motivation for physical education and sports. However, after experimental work, mathematical and statistical processing of the obtained data revealed the significance of differences at $p<0.05$. EG students with positive internal motivation increased from 15% before the experiment to 49% after the introduction of interactive technologies in the process of professional training.

Prior to experimental work, the first place for students of both groups was primarily on the 1st rank of administrative, communicative and aesthetic groups of motives, at lower ranks - wellness, motor-activity and professionally oriented. Modern students are aware of the need for physical education and sports to maintain their health, but for the most part they associate exercise with both the need to obtain a positive assessment and the values of the fashion to maintain their body in good shape. Nevertheless, the implementation of experimental work contributed to a change in students' motives in the direction of professionally oriented motives. EG students began to realize the influence of physical culture and sports on the development of professional competence, the development of themselves as a highly qualified able-bodied specialist.

5. Discussion and Conclusion

The results obtained in the study are consistent with a number of scientific works that prove that professional training of a future teacher should be carried out not only on the basis of mental studies, but also on the basis of the ativization of motor activity during the academic and extracurricular time of students [22,24,27,31]. The full-fledged process of the development of a teacher should be accompanied by an immersion in the educational space of the university [19,23], in which each student should play a key role in a healthy and healthy lifestyle [14]. Especially those students who had a negative [22,25] or formal motivational-value attitude to physical education and sports activities [17,24,28]. As the results of this study showed, it was active, goal-oriented activity using interactive technologies in theoretical and methodical-practical classes in physical culture and sports that allowed us to reliably obtain positive dynamics of internal and sustainable motivation for students to implement a physical education lifestyle.

The characteristics of the student's motivation for physical education and sports that appear in the study when immersed in a new educational space [18,19] revealed in the study complement the theoretical and practical studies of Russian and foreign scientists [17,21,28]. When substantiating this condition, some scientists give the main emphasis to the psychological and physiological characteristics of the person [13,26,29], and some researchers determine the level of health based on this phenomenon and competitively oriented [20,21,27]. However, in the presented study, an attempt was made to synergistically combine all known groups of motives for physical education and sports among students and to identify one important component in understanding this motivation. It is the professionally-oriented and health-improving motivation of the student through the implementation of interactive technologies in the process of training [23,24] that can systematically supplement the content of the process of forming a positive and harmonious orientation to the implementation of future professional activities [20,21].

The presented work is limited to a sample of students of the Pedagogical University, studying in the direction in the direction of study "Vocational training (by industry)." The number of study participants was heterogeneous in number. The sample obtained does not make it possible to cover the entire target audience, since the study was conducted only among students of the same field of study. In accordance with this, the results can be determined as preliminary, and for further more detailed analysis it is necessary to conduct a comparative analysis of several areas of study, different higher education institutions. A large sample of the

same size will provide more diverse involvement into the course.

The study identified the main groups of students' motives for physical education and sports: educational, creative, improving, aesthetic, competitively competitive, administrative, communicative, profession-oriented, cultural-sociological, status-leadership, motor-activity, cognitive-developing and psychologically significant motives. Their classification falls into three levels: internal positive motivation, external positive motivation and external insignificant motivation. Effectiveness of introducing interactive technologies in theoretical and methodological exercises in the courses "Physical Culture and Sports", "General Physical Training and "Sports" has been experimentally proved.

A fundamentally new result was obtained in the planned strategy development to increase indicators of the motivational-value attitude of young people to the implementation of motor activity in the process of teacher education. New scientific data on the processes of increasing physical education and sports activities of students and patterns existing in the studied pedagogical science on this issue are revealed. What ultimately, may be one of the key conditions for improving the quality indicators of professional training and the overall effectiveness of the training system for future teachers.

References

1. Kamenez N, Vaganova O, Smirnova Z, Kutepova L, Vinokurova I. Development of content of educational programs of additional education for professor-teaching composition in organization of educational services of training with disability. Amazonia investiga 2019; 8(18):267-278.
2. Nagovitsyn RS, Bartosh DK, Ratsimor AY, Neverova NV. Modernization of regional continuing pedagogical education in the «School-College-Institute». European Journal of Contemporary Education 2019; 8(1):144-156. DOI: 10.13187/ejced.2019.1.144
3. Smirnova ZV, Kamenez NV, Vaganova OI, Kutepova LI, Vezetiu EV. The experience of using the webinar in the preparation of engineering specialists. Amazonia Investiga 2019; 8(18):279-287.
4. Ilyashenko LK, Markova SM, Mironov AG, Vaganova OI, Smirnova ZV. Educational environment as a development resource for the learning process. Amazonia investiga 2019; 8(18):303-312.
5. Nagovitsyn RS, Zamolotskikh EG, Potashova II, Rybakova LV. Model of the system of raising the social status of the teacher in the region on the basis of a pedagogical university. European Journal of Contemporary Education 2019; 8(2):315-327. DOI: 10.13187/ejced.2019.2.315
6. Nikonova NP, Vaganova OI, Smirnova ZV, Chelnokova EA, Kutepov MM. Methodological support in partnerships with the institution of additional education and teachers.
7. Vaganova OI, Odarich IN, Popkova AA, Smirnova ZV, Lebedeva AA. Independent work of students in professional educational institutions. Amazonia Investiga 2019; 8(22):295-304.
8. Vaganova OI, Konovalova EYu, Abramova NS, Lapshova AV, Smirnova ZV. Increasing the level of teachers' readiness for pedagogical project. Amazonia Investiga 2019; 8(22):286-294
9. Nikonova NP, Vaganova OI, Smimova ZV, Bystrova NV, Markova SM. Providing partnerships and promotion of additional educational services.
10. Nagovitsyn RS, Bartosh DK, Ratsimor AY, Maksimov YG. Development of social tolerance among future teachers. European Journal of Contemporary Education 2018; 7(4):754-763. DOI: 10.13187/ejced.2018.4.754
11. Markova SM, Zanfir LN, Vaganova OI, Smirnova ZV, Tsyplakova SA. Department of educational process in conditions of implementation of interactive training of future engineers. Amazonia Investiga 2019; 8(18):450-460.
12. Baena-Extremera A, Gomez-Lopez M, Granero-Gallegos A, Ortiz-Camacho MD. Predicting satisfaction in physical education from motivational climate and self-determined motivation. Journal of teaching in physical education 2015; 34(2):210-224. DOI: 10.1123/jtpe.2013-0165
13. Brown SA, Huber D, Bergman A. A perceived benefits and barriers scale for strenuous physical activity in college students. American Journal of Health Promotion 2006; 21(2):137-140. DOI: 10.4278/0890-1171-21.2.137

14. Butt J, Weinberg RS, Breckon JD, Claytor RP. Adolescent physical activity participation and motivational determinants across gender, age, and race. Journal of physical activity & health 2011; 8(8):1074-1083. DOI: 10.1123/jpah.8.8.1074
15. Sedykh EP, Zanfir LN, Vaganova OI, Smirnova ZV, Bulayeva MN. Use of training technology in the preparation of students of engineering specialties. Amazonia Investiga 2019; 8(18):461-470.
16. Kilpatrick M, Hebert E, Bartholomew J. College students' motivation for physical activity: Differentiating men's and women's motives for sport participation and exercise. Journal of american college health 2005; 54(2):87-94. DOI: 10.3200/JACH.54.2.87-94
17. Nagovitsyn RS, Tutolmin AV, Maksimov YG, Dimova IA, Karoyan AA, Skryabina DY, Volkov SA. Motivation for physical activity of people of different ages. Gazzetta Medica Italiana - Archivio per le Scienze Mediche 2019; 178(10):799-806. DOI: 10.23736/S0393-3660.18.03965-7
18. Conesa PV, Juan FR. Motivational climate in physical education and sport and physical activity in leisure of students from Spain, Costa Rica and Mexico. Retos- nuevas tendencias en educación física, deporte y recreación 2016; 29:195-200
19. Cervello EM, Jimenez R, Del Villar F, Ramos L. Goal orientations, motivational climate, equality, and course of spanish physical education students. Perceptual and motor skills 2004; 99(1):271-283. DOI: 10.2466/pms.99.1.271-283
20. Kulavic K, Hultquist CN, McLester JR. A comparison of motivational factors and barriers to physical activity among traditional versus nontraditional college students. Journal of American College Health 2013; 61(2):60-66. DOI: 10.1080/07448481.2012.753890
21. Molanorouzi K, Khoo S, Morris T. Motives for adult participation in physical activity: type of activity, age, and gender. BMC Public health 2015; 15:66. DOI: 10.1186/s12889-015-1429-7
22. Brunet J, Sabiston CM. Exploring motivation for physical activity across the adult lifespan. Psychology of Sport and Exercise 2011; 12(2):99-105. DOI: 10.1016/j.psychsport.2010.09.006
23. Diehl K, Fuchs AK, Rathmann K, Hilger-Kolb J. Students' Motivation for Sport Activity and Participation in University Sports: A Mixed-Methods Study. BioMed Research International 2018:9524861. DOI: 10.1155/2018/9524861
24. Moreno-Murcia JA, Alvarez TZ, Oliveira LM, Perez LM, Gimeno EC. Perception of the usefulness and importance of physical education according to motivation generated by the teacher. Revista de educacion 2013; 362:380-401. DOI: 10.4438/1988-592X-RE-2011-362-165
25. Wang CKJ, Biddle SJH. Young people's motivational profiles in physical activity: A cluster analysis. Journal of Sport and Exercise Psychology 2001; 23(1):1-22. DOI: 10.1123/jsep.23.1.1
26. Ryan RM, Frederick CM, Lepes D, Rubio N, Sheldon KM. Intrinsic motivation and exercise adherence. International journal of sport psychology 1997, 28(4):335-354
27. Sevil J, Sánchez-Miguel PA, Pulido JJ, Práxedes A, Sánchez-Oliva D. Motivation and Physical Activity: Differences Between High School and University Students in Spain. Perceptual and Motor Skills 2018; 125(5):894-907. DOI: 10.1177/0031512518788743
28. Markland D, Ingledew DK. The measurement of exercise motives: Factorial validity and invariance across gender of a revised exercise motivations inventory. British journal of health psychology 1997; 2(4):361-376. DOI: 10.1111/j.2044-8287.1997.tb00549.x
29. Gill DL, Gross JB, Huddleston S. Participation motivation in youth sports. International journal of sport psychology 1983; 14(1):1-14.
30. Vaskovskaya GA. Features of implementation of pedagogical technologies of profile training. Balkan Scientific Review 2018; 1:76-79.
31. Ilyashenko LK, Gladkova MN, Kutepov MM, Vaganova OI, Smirnova ZV. Development of communicative competencies of students in the context of blended learning. Amazonia Investiga 2019; 8 (18):313-322.

Trainer Behaviors and Athlete Character Relationship

İhsan Kuyulu[1] and Enes Beltekin[2]
[1,2] Physical Education and Sport School, Bingol University, Turkey.

Abstract

The study group of this research, which was carried out to examine the effect of trainers' sportsman behavior levels on athletes' character levels, consists of 252 athletes aged 14-17 who participate in wrestling competitions in Eastern Anatolia Region. In order to obtain data for the purpose of the research, "Sports Character Scale" and "Trainers' Sportsman Behavior Scale" were used. Personal information questions regarding the demographic characteristics of the athletes participating in the study were asked. The study was performed out in SPSS 22 statistical package program and the degree of significance was taken as 0.05. In dual comparisons, Mann Whitney-U and multiple comparisons were applied in Kruskal Wallis Test. The Regression analysis was done to determine the effect level between the variables. According to the answers given by the athletes participating in the study according to their age, "do you have any success" and "at what level your coach has a success", there was a significant difference between the groups in athlete character levels. There was also a significant difference between the groups in the answers of the athletes perceived by their coaches to the question of "at what level if you have a success". According to the results of the regression analysis, it was determined that the level of sportsmanship behavior perceived by the athletes from their coaches affected the character of the athlete.

Keywords: Trainer Behavior, Athlete Character, Sportsmanship

1. Introduction

Sports engages in the life of the child from an early age with birth and is accepted as the most appropriate and important training method in the education and development of children (1). The idea that sports create character is a thought that continues from past to present. However, the debate on this issue is about the direction of the character. While some studies suggest that the changes created by sports are positive, some argue that these effects may be negative (2). Sports as a moral, just like everyday, ordinary life, is on top of all this, in parallel and indirectly related. What distinct sport and makes it important is that it is quintessentially a moral. Principles and characteristics that determine sports also determine this morality or way of living (3). We consider sports and sports activities within the context of education. If we consider sports as a physical and spiritual education as a form of education, we can state that sports and education are identical (4). Character education is a kind of moral education that teaches students moral values such as respect, compassion, responsibility, will and loyalty (5). A good character is at the center of moral education. Without a good character, individuals do not have the desire to do the right thing. Good character is the basis of psychological and social good life (6). Good character means not only being problem-free but also having positive personal characteristics (7). Mallet (8) determined that the sports environment mainly consists of the relationship between the coach, the athlete and the training environment. Since these patterns have a social and dynamic structure, they are complex and require special effort to understand.

Within this complex structure, trainers are generally evaluated over outputs such as the competition won, the number of medals, and the number of players sent to the upper leagues or national teams. Many national or top trainers find financial support from various sources or end their duties according to these qualifications. Many models have been developed in the body of the literature to explain the complex pattern between trainer, athlete and training environment (9). Studies based on these models show that coaching behaviors directly affect the development of the athlete (10, 11, 12).

Elite sports that require high performance have a structure that focuses on success and failure is not welcomed. Athletes who fail in elite sports over time; there is a fear of failure due to exposure to criticism, high expectations, fear of making mistakes, and the thought that it will fail again, and this affects their sports lives (13).

The Stars category is an important period when the foundation of sports ethics was formed. The behaviors and attitudes of the trainers are an important factor on the moral development and sports character characteristics of the athletes in this period. Coaches, which are mostly focused on winning, cause athletes to behave against sports virtue and moral values or ignore a negative situation. These behaviors, which are repeated for a long time, also determine the sports character structure, which is accepted as the features that athletes later acquired (14).

Trainer-athlete relationship is a concept used to describe how the athlete and his coach are mutually affected by each other's emotions, thoughts and behaviors (15). The positive coach-athlete relationship also contributes to the individual and social development of athletes (16). The coach-athlete relationship is usually one of the most important and influential relationships in the success of youngsters (17, 18, 19,). The quality of communication and relationship between the coach and the athlete (20) and leadership style (21) is very important in the success of the athletes.

In adolescence, which is considered as one of the most important processes of character development, it is a question of whether trainers have an influence on the character of athletes, and if their behavior has an effect on the level of athlete character. This study was carried out to investigate whether trainer behaviors have an effect on athletes' characters.

2. Material - Method

The study group of this research, which was carried out to examine the effects of perceptions of athletes 'sportsmanship behavior on athletes' sports character levels, consists of 252 athletes aged 14-17 who participate in wrestling competitions in Eastern Anatolia Region. In our research, "survey method" was used as a data collection tool. The survey consists of 3 sections and 58 questions. In the first part, there are 7 expressions about demographic variables. In the second part, "Sports Character Scale" adapted to Turkish by Görgüt and Tuncel (22), which was developed by Jang (23), consisting of 27 expressions, developed by Bolter Weiss (24) and adapted to Turkish by Sezen-Balçıkanlı et al. (25) consisted of 24 questions in the third part. At this point, Turkish adaptation was done by researchers the "Sportsmen Behavior Scale of the Trainers" was applied in the study.

The data acquired through sportsman behavior scales of sports characters and coaches were analyzed through the statistical package program SPSS.22 program and the results were interpreted. Descriptive statistics including arithmetic mean, standard deviation, frequency and percentage distributions are presented in order to obtain an idea about demographic information and other group questions. Regression test was applied to determine the effect of trainers 'perception of sportsmanship and the effect of athletes' sports character levels. In order to determine the perceptions of athletes' behaviors of athletes and the sports character levels of athletes and the sub-dimensions of these variables with some demographic variables, the normality of the distributions (Kolmogorov-Smirnov) and then (Skewness and Kurtosis) tests were examined. In the research, "normal" expression scores of the individuals are; Z value varies between -3 and +3, "extreme values" are scores whose Z value is outside the range of -3 and +3. Besides, according to Shao (26), the normal distribution of the data to be used in the study depends on the values of Skewness and Kurtosis between ± 3. According to the test results, Mann Whitney-U was used in independent binary comparisons and Kruskal Wallis tests were used in multiple comparisons between demographic variables. If there is a difference between groups in multiple comparisons between demographic variables, Mann Whitney-U tests were used to determine which group or groups originated from this difference. The results were evaluated at 95% confidence interval and the significance level is at $p < 0.05$.

3. Findings

This is the section where the statistical results of the study will be explained. Statistical analysis based on the demographic characteristics of the people participating in the research will be included.

Table 1. *Distributions of Participant Wrestlers Depending on Demographical Variances;*

	Demographical Variances	N	%
Age	14	56	22.2
	15	47	18.7
	16	48	19.0
	17	101	40.1
How long have you been wrestling?	1 year and below	103	40.9
	2-3	74	29.4
	4-5	45	17.9
	6 years and above	30	11.9
Do you have any success?	Yes	194	77.0
	No	58	23.0
Does your current trainer have any success?	Yes	228	90.5
	No	24	9.5
How long have you been training with your current trainer?	1 year and below	126	50.0
	2-3	73	29.0
	4-5	35	13.9
	6 years and above	18	7.1
		252	**100**
If you have any success at what level is it?	Groups Champion	61	31.4
	City Champion	100	51.5
	TurkeyChampion	22	11.3
	International Championship	11	5.7
		194	**100**
If you trainer has any success at what level is it ?	Groups Champion	22	9.6
	City Champion	61	26.8
	Turkey Champion	76	33.3
	International Championship	69	30.3
Total		**228**	**100**

When Table 1 is examined, 22.2% of the wrestlers participating in the study were 14 years old, 18.7% were 15 years old, 19.0% were 16 years old, 40.1% were 17 years old, 40.9% were 1 year or less, 29.4% were 2-3 years, 17.9% were 4-5 years, 11.9% wrestled6 years and over. It was determined that 77.0% of the wrestlers found success and 23.0% did not have any success. Again, it was determined that 90.5% of the wrestlers' trainer had success and 9.5% of the trainers had no success.

Table 2. *Comparison of trainers' sportsman behavior perceptions and athletes' sports character levels depending on age question*

	Sub Dimensions	Age	N	X	S.s	Sd	X^2	p
Trainer Sportsmanship Behavior Level Sub Dimensions	Creating Expectation towards Sportsmanship	a14	56	3.96	1.034	3	2.872	.412
		b15	47	4.09	1.054			
		c16	48	3.84	1.060			
		d17	101	4.07	1.092			
	Punishment of Unfair Behavior	a14	56	3.75	1.073	3	3.263	.353
		b15	47	4.01	.962			
		c16	48	3.71	1.05			
		d17	101	3.92	1.127			

	Teaching of Sportsmanship	[a]14	56	4.06	.936	3	2.149	.542	
		[b]15	47	4.05	.972				
		[c]16	48	3.83	1.074				
		[d]17	101	4.09	1.042				
	Supporting Sportsmanship	[a]14	56	3.96	.938	3	.968	.809	
		[b]15	47	3.96	1.085				
		[c]16	48	3.80	1.122				
		[d]17	101	3.97	1.033				
	Beating's Priority To Sportsmanship	[a]14	56	3.83	1.100	3	.657	.883	
		[b]15	47	3.85	1.103				
		[c]16	48	3.78	.997				
		[d]17	101	3.87	1.131				
	Creation of a Model for Sportsmanship	[a]14	56	4.10	.852	3	3.302	.347	
		[b]15	47	4.17	.867				
		[c]16	48	3.80	1.075				
		[d]17	101	4.07	1.022				
Athlete Character Level Sub Dimensions	Honesty	[a]14	56	3.55	1.035	3	11.045	**.011***	**d> a**
		[b]15	47	3.58	1.154				
		[c]16	48	3.68	1.014				
		[d]17	101	4.00	1.015				
	Anti-social	[a]14	56	2.75	1.076	3	5.169	.160	
		[b]15	47	2.86	1.174				
		[c]16	48	2.66	1.163				
		[d]17	101	2.45	1.256				
	Mercy	[a]14	56	3.56	1.042	3	3.161	.367	
		[b]15	47	3.78	1.001				
		[c]16	48	3.63	.977				
		[d]17	101	3.84	.896				
	Sportsmanship	[a]14	56	3.66	1.239	3	3.803	.283	
		[b]15	47	3.78	1.061				
		[c]16	48	3.71	1.144				
		[d]17	101	3.98	1.043				
	Justice	[a]14	56	3.90	1.043	3	2.051	.562	
		[b]15	47	3.95	1.162				
		[c]16	48	3.75	1.168				
		[d]17	101	4.01	1.021				
Trainer Sportsmanship Behavior Level General Total		[a]14	56	3.94	.81162	3	2.291	.514	
		[b]15	47	4.02	.936				
		[c]16	48	3.79	1.008				
		[d]17	101	4.00	.995				
Athlete Character Level General Total		[a]14	56	3.45	.690	3	6.232	.101	
		[b]15	47	3.56	.847				
		[c]16	48	3.49	.725				
		[d]17	101	3.68	.664				
Total			**252**						

p<0.05*

When we consider Table 2, there was no significant difference between the sportsman behavior perceptions of trainers and sub-dimensions according to the age variable of the wrestlers who participated in the study, whereas there was a significant difference between the athlete character levels of the wrestlers between the groups (p <0.05).

Table 3. *Comparison of sportsman behavior perceptions of trainers and athletes' sports character levels depending on the question that whether there is any success in competitions*

	Sub Dimensions	Do you have Success?	N	X	S.s	U	P
Trainer Sportsmanship Behavior Level Sub Dimensions	Creating Expectation towards Sportsmanship	Yes	194	3.96	1.085	5069.500	.242
		No	58	4.15	.984		
	Punishment of Unfair Behavior	Yes	194	3.80	1.093	4845.000	.104
		No	58	4.05	.976		
	Teaching of Sportsmanship	Yes	194	4.00	1.035	5255.000	.436
		No	58	4.14	.928		
	Supporting of Sportsmanship	Yes	194	3.89	1.033	5036.500	.219
		No	58	4.06	1.044		
	Beating's Priority To Sportsmanship	Yes	194	3.78	1.100	4830.000	.097
		No	58	4.05	1.030		
	Creation of a Model for Sportsmanship	Yes	194	4.02	.969	5172.000	.342
		No	58	4.12	.985		
Athlete Character Level Sub Dimensions	Honesty	Yes	194	3.77	1.077	5495.000	.788
		No	58	3.75	1.003		
	Anti-social	Yes	194	2.64	1.218	5511.000	.813
		No	58	2.59	1.099		
	Mercy	Yes	194	3.70	.988	5272.500	.466
		No	58	3.83	.893		
	Sportsmanship	Yes	194	3.80	1.119	5357.500	.576
		No	58	3.89	1.101		
	Justice	Yes	194	3.84	1.109	4538.000	**.023***
		No	58	4.21	.929		
Trainer Sportsmanship Behavior Level General Total		Yes	194	3.91	.952	4908.500	.138
		No	58	4.10	.920		
Athlete Character Level General Total		Yes	194	3.55	.748	5466.500	.743
		No	58	3.62	.620		
Total			**252**				

p<0.05*

When Table 3 is monitored, according to the answers given by the wrestlers participating in the study to the question of whether you have any success, there was no significant difference between the groups in terms of trainers sportsman behavior perceptions general scores and their sub-dimensions, whereas there was a significant difference among groups in the sub dimension of justice (p < 0.05).

Table 4. *Comparison of trainers' sportsman behavior perceptions and athletes' sports character levels depending on the question "If you have any success which level is it?"*

	Sub Dimensions	If any success which level is it?	N	X	S.s	Sd	X^2	p	
Trainer	Creating	[a]Groups Champion	61	4.15	1.054	3	8.096	**.044**	**a,c>**

Sportsmanship Behavior Level Sub Dimensions	Expectation for Sportsmanship	[b]City Champion	100	3.96	1.024				**d**
		[c]Turkey Champion	22	4.12	1.037				
		[d]International Championship	11	3.23	1.308				
	Punishment of Unfair Behavior	[a]Groups Champion	61	4.08	1.037	3	14.225	**.003****	**a,c> d a> b**
		[b]City Champion	100	3.73	1.042				
		[c]Turkey Champion	22	4.14	1.039				
		[d]International Championship	11	3.11	1.188				
	Teaching of Sportsmanship	[a]Groups Champion	61	4.23	.934	3	8.755	**.033***	**a> d**
		[b]City Champion	100	3.93	1.010				
		[c]Turkey Champion	22	4.16	.997				
		[d]International Championship	11	3.38	1.252				
	Supporting of Sportsmanship	[a]Groups Champion	61	4.19	.987	3	13.745	**.003****	**a> d a> b**
		[b]City Champion	100	3.81	1.010				
		[c]Turkey Champion	22	4.06	1.066				
		[d]International Championship	11	3.25	1.145				
	Beating's Priority to Sportsmanship	[a]Groups Champion	61	4.01	1.142	3	8.650	**.034***	**a> b**
		[b]City Champion	100	3.71	1.033				
		[c]Turkey Champion	22	4.08	1.106				
		[d]International Championship	11	3.51	1.067				
	Creation of a Model for Sportsmanship	[a]Groups Champion	61	4.27	.936	3	11.676	**.009****	**a> d a> b**
		[b]City Champion	100	3.93	.951				
		[c]Turkey Champion	22	4.11	1.012				
		[d]International Championship	11	3.48	1.048				
Athlete Character Level Sub Dimensions	Honesty	[a]Groups Champion	61	3.87	1.095	3	2.903	.407	
		[b]City Champion	100	3.67	1.055				
		[c]Turkey Champion	22	3.85	.974				
		[d]International Championship	11	3.83	1.053				
	Anti-social	[a]Groups Champion	61	2.55	1.216	3	4.279	.233	
		[b]City Champion	100	2.60	1.162				
		[c]Turkey Champion	22	3.10	1.224				
		[d]International Championship	11	2.52	1.124				
	Mercy	[a]Groups Champion	61	3.77	1.015	3	3.833	.280	
		[b]City Champion	100	3.78	.878				
		[c]Turkey Champion	22	3.46	1.184				
		[d]International Championship	11	3.39	.953				
	Sportsmanship	[a]Groups Champion	61	3.85	1.174	3	.909	.823	
		[b]City Champion	100	3.82	1.090				
		[c]Turkey Champion	22	3.66	1.111				

		[d]International Championship	11	3.84	1.041			
	Justice	[a]Groups Champion	61	3.98	1.095			
		[b]City Champion	100	3.94	1.044			
		[c]Turkey Champion	22	3.85	1.215	3	3.037	.386
		[d]International Championship	11	3.48	1.059			
Trainer Sportsmanship Behavior Level General Total		[a]Groups Champion	61	4.15	.913			
		[b]City Champion	100	3.84	.908			
		[c]Turkey Champion	22	4.11	1.003	3	12.629	**.006****	**a> d**
		[d]International Championship	11	3.33	1.092			
Athlete Character Level General Total		[a]Groups Champion	61	3.61	.765			
		[b]City Champion	100	3.54	.713			
		[c]Turkey Champion	22	3.61	.652	3	1.653	.647
		[d]International Championship	11	3.45	.662			
Total			**194**					

P<0.05* p<0.01**

Considering Table 4, there was not any significant difference between the groups of athletes' character levels and sub-dimension according to the answers given to the question of success level of wrestlers participating in the study, whereas there is a significant difference determined between the trainers' perception of sportsman behavior and their general scores (p <0.05).

Table 5. *Comparison of trainers' sportsman behavior perceptions and athletes' sports character levels depending on the question ; Does your trainer have any success?*

	Sub Dimensions	**Does your current trainer have any success?**	**N**	**X**	**S.s**	**U**	**P**
Trainer Sportsmanship Behavior Level Sub Dimensions	Creating Expectation for Sportsmanship	Yes	228	4.00	1.059	2480.500	.441
		No	24	4.09	1.127		
	Punishment of Unfair Behavior	Yes	228	3.83	1.080	2282.000	.175
		No	24	4.12	.961		
	Teaching of Sportsmanship	Yes	228	4.00	1.025	2369.500	.270
		No	24	4.27	.853		
	Supporting of Sportsmanship	Yes	228	3.92	1.035	2410.000	.330
		No	24	4.10	1.060		
	Beating's Priority to Sportsmanship	Yes	228	3.82	1.093	2387.500	.298
		No	24	4.04	1.044		
	Creation of a Model for Sportsmanship	Yes	228	4.04	.972	2618.500	.724
		No	24	4.08	.988		
Athlete Character Level Sub Dimensions	Honesty	Yes	228	3.77	1.068	2492.500	.473
		No	24	3.66	.986		
	Anti-social	Yes	228	2.61	1.192	2443.000	.386
		No	24	2.84	1.164		
	Mercy	Yes	228	3.75	.947	2498.500	.483

		No	24	3.55	1.143		
	Sportsmanship	Yes	228	3.83	1.123	2556.500	.591
		No	24	3.75	1.046		
	Justice	Yes	228	3.91	1.081	2579.500	.638
		No	24	4.01	1.083		
Trainer Sportsmanship Behavior Level General Total		Yes	228	3.93	.946	2376.000	.286
		No	24	4.11	.955		
Athlete Character Level General Total		Yes	228	3.57	.727	2656.500	.815
		No	24	3.53	.668		
Total			**252**				

p>0.05

According to the answers given to the question of whether wrestlers participating in the study "Does your current trainer have any success", when Table 5 is examined, there was no significant difference found between the general scores and the sub-dimensions of the trainers' sportsman behavior perception and the general scores and the sub-dimensions of the athlete character levels (p> 0.05).

Table 6. *Comparison of trainers' sportsman behavior perceptions and athletes' sports character levels depending on If your trainer have any success at what level is it? question*

	Sub Dimensions	**If any success which level is it ?**	**N**	**X**	**S.s**	**Sd**	**X²**	**p**
Trainer Sportsmanship Behavior Level Sub Dimensions	Creating Expectation for Sportsmanship	[a]Groups Champion	22	4.05	1.082	3	.240	.971
		[b]City Champion	61	4.05	1.007			
		[c]Turkey Champion	76	4.00	1.071			
		[d]International Championship	69	3.97	1.115			
	Punishment of Unfair Behavior	[a]Groups Champion	22	4.13	.854	3	4.171	.244
		[b]City Champion	61	4.02	.995			
		[c]Turkey Champion	76	3.78	1.146			
		[d]International Championship	69	3.72	1.099			
	Teaching of Sportsmanship	[a]Groups Champion	22	4.21	.766	3	1.663	.645
		[b]City Champion	61	4.03	1.036			
		[c]Turkey Champion	76	4.07	1.057			
		[d]International Championship	69	3.93	1.018			
	Supporting of Sportsmanship	[a]Groups Champion	22	4.22	.863	3	2.344	.504
		[b]City Champion	61	3.97	1.077			
		[c]Turkey Champion	76	3.93	1.057			
		[d]International Championship	69	3.82	1.029			
	Beating's Priority to Sportsmanship	[a]Groups Champion	22	4.03	1.029	3	2.249	.522
		[b]City Champion	61	3.89	1.074			
		[c]Turkey Champion	76	3.90	1.053			
		[d]International Championship	69	3.68	1.153			
	Creation of a Model for	[a]Groups Champion	22	4.39	.669	3	2.687	.442
		[b]City Champion	61	4.00	1.018			

	Sportsmanship	[c]Turkey Champion	76	4.03	1.014				
		[d]International Championship	69	3.98	.964				
Athlete Character Level Sub Dimensions	Honesty	[a]Groups Champion	22	4.08	1.024	3	11.316	**.010***	**a> b**
		[b]City Champion	61	3.39	1.163				
		[c]Turkey Champion	76	3.89	.981				
		[d]International Championship	69	3.85	.988				
	Anti-social	[a]Groups Champion	22	2.41	1.220	3	7.682	.053	
		[b]City Champion	61	2.92	1.167				
		[c]Turkey Champion	76	2.41	1.146				
		[d]International Championship	69	2.68	1.207				
	Mercy	[a]Groups Champion	22	3.73	1.013	3	5.779	.123	
		[b]City Champion	61	3.64	.927				
		[c]Turkey Champion	76	3.91	.980				
		[d]International Championship	69	3.61	.960				
	Sportsmanship	[a]Groups Champion	22	3.81	1.110	3	13.233	**.004****	**c> b**
		[b]City Champion	61	3.46	1.175				
		[c]Turkey Champion	76	4.11	1.043				
		[d]International Championship	69	3.82	1.064				
	Justice	[a]Groups Champion	22	4.21	1.062	3	6.870	.076	
		[b]City Champion	61	3.63	1.202				
		[c]Turkey Champion	76	4.01	1.100				
		[d]International Championship	69	3.99	.911				
Trainer Sportsmanship Behavior Level General Total		[a]Groups Champion	22	4.17	.754	3	2.313	.510	
		[b]City Champion	61	3.99	.971				
		[c]Turkey Champion	76	3.95	.982				
		[d]International Championship	69	3.85	.946				
Athlete Character Level General Total		[a]Groups Champion	22	3.68	.676	3	5.765	.124	
		[b]City Champion	61	3.39	.856				
		[c]Turkey Champion	76	3.66	.636				
		[d]International Championship	69	3.59	.673				
Total			**228**						

p<0.05* p<0.01**

When Table 6 is examined, while the wrestlers' answers to the question of if your current trainer has any success at what level it is, there is no significant difference among the groups in terms of trainers sportsman behavior perceptions and their sub-dimensions, whereas there was difference found among groups in athlete character levels in terms of honesty and sportsmanship dimension (p <0.05).

Table 7. Regression analysis of trainers' sportsman behavior levels and athletes' character levels;

		Variances	Beta (ß)	S. Error	*t*	*p*	R^2
Independent Variance	**Trainer Sportsman Behavior**	ASD»SK	.381	.042	9.139	**.000*** **	.25
Dependent Variance	**Athlete Character**						

p<0.001***

When Table 7 is examined, it is seen that the results of the regression analysis performed to determine the effects of the sportsman behavior perceptions of the trainers and the sports character levels of the athletes, it was found that the trainers' sportsman behavior perceptions affect the character levels of the wrestling athletes in the sport (R2 = .25, p <0.001).

4. Discussion and Result

The study was performed out with the purpose of examining the effects of students' trainers on the development of athletes' characters in high school and engaged in wrestling. The research group consists of 252 male students in the 14, 15, 16 and 17 age groups studying at high schools in 2019-2020.

When the table about age finding is examined, there was no significant difference between the trainers' perceptions of athletes and their sub-dimensions according to the age variable of the wrestlers participating in the study, while there was a significant difference between the athletes character levels of the wrestlers in the honesty sub-dimension. It has been determined that the honesty scores of the 17-year-old athletes are higher than the 14-year-old athletes. When the body of literature is examined; In the study conducted by Imamli and Unver (2), it is seen that there is a significant difference between the first variable (17-23 years) and the second group (24-30 years) in the age variable, honesty sub-dimension. This situation shows that; it can be interpreted that athletes' level of honesty increases with the increasing of the age (14).

Another finding in the study, according to the answers given by the wrestlers to the question of whether they have any success, there was no significant difference between the athletes' character levels and the sub-dimension of the wrestlers in the justice sub-dimension. It has been determined that the athletes who do not have any success have higher perception of justice than the students who have success. Based on this result, it can be said that athletes who have success may have moved away from justice in order to achieve success or to maintain success.

According to the answers given to the question of the level of wrestlers participating in the study, "if you have any success, at what level is it?", there was no significant difference between the overall scores of the athlete character levels and their sub-dimension, whereas there was a significant difference between the general scores of the wrestlers 'trainers' perceptions of athletic behavior and their sub-dimensions. When we look at the findings in general, we can say that as the level of success increases, athletes understand the coaches' perceptions of sportsman behavior get better. The reason for this is; the successful athletes spend more time with their trainers and know what they want as sportsmanship and understand that what is important is not to be beaten, but to be aware of that it is sportsmanship.

When we look at the studies on coach behavior in the literature; Güven and Öncü (27) As a result of the research conducted; it is observed that the perceptions of athletes change according to the national athlete variable. It was determined that the perception scores of non-national athletes are higher than the national athletes. According to Dilek (28), there is no significant difference between athletes 'assessment levels of trainers according to the scale of athletes' medals in national championships. However, a significant difference was found in favor of athletes with medals in the sub-factors of "Goal Setting" and "Development of Technical Skills".

According to the answers given by the wrestlers to the question of whether their current trainer have any success, there was no significant difference between the groups' overall scores and sub-dimensions of

athletes' perceptions of athletes' behaviors and their overall scores and sub-dimensions. Based on this result, it has been observed that the success of the coaches does not affect their perception of sportsman behavior and the characteristics of the athletes.

Considering Table 6, while the wrestlers' answers participating in the study "Does your current trainer have any success? If yes, at what level is it?",there is no significant difference between the groups in terms of their athletes 'perception of sportsman behavior and their sub-dimensions, whereas athletes' character levels are significantly different in terms of honesty and athletics. And also there were differences determined. Based on this result, we can say that athletes with low levels of success are more honest and athletes with high levels of success are showing more sportsmanship.When we look at the studies on coach behavior in the literature; Dilek (28), there is a significant difference in favor of trainers with medals between the levels of evaluation of trainer behaviors for athletes according to the status of their medals in international competitions as trainers of Turkish athletes. Although the scores of the trainers with medals were higher in the scale, significant results were obtained to confirm the hypothesis only in the sub-factors of "Goal Setting" and "Competition Strategies". On the other hand, in the study of Gül (29), it was stated that the athletes have more positive thoughts about coaches who did not win medals in international competitions. In a research on the leadership attitudes of coaches, it is stated that the successful athletes' history of coaches has no effect on their leadership attitudes and behaviors (30).

In the study of Tazegül (31) it was determined that sports education had an effect on students' personalities, a decrease in the neurotic personality dimension score, and an increase in scores of extroversion, acquiescent and responsibility dimensions. Kirkcadly et al. (32) found that regular exercise has positive effects in terms of positive self-image and that individuals who do sports are more resistant to alcohol and substance abuse. Talbot (33) emphasizes that children's physical education helps them develop respect for themselves and others, contributes to the integrated development of the mind and body, improves self-confidence and self-esteem, increases social development, cognitive development and academic success. As it is seen, sports can have many positive and negative effects on character structure. Therefore, it can be said that sports have an important effect on character structure. However, whether the sport will have a positive or negative effect on the person's character; situations that the person will experience completely are shaped in the shade of individual factors (14). In the study, Toros (34); there is a relationship between pre-tournament and post-tournament coaching behavior, goal orientations, team concussion, motivational climate and collective competence, and their levels can change.

According to the study we have conducted; when the results of the regression analysis were considered; it was conducted to determine the effects of the athletes' perceptions of the sportsmen and the sports character levels of the athletes, it was found that the athletes' perceptions of the sportsman behavior affect the character levels of the wrestling athletes in the sport.

As a result, it is possible to add more to the similar results obtained from previous studies as a result of the literature review and the findings obtained from this research. It should be remembered that sports have an effect on the development of the human character positively or negatively. In particular, the effect of coaches is inevitable in the development of the athlete's character in a positive or negative way. Because athletes can sometimes take role models other than family members. They can act as people they take models and try to think like them. In this regard, coaches should develop themselves in this direction, while developing the physiological, psychological, technical and tactical aspects of athletes, while also thinking that they can affect the character of athletes. They should not reflect their personal problems or daily problems to their athletes in sports environments considering the possibility that athletes can act by taking role models.

References

1. Aydoğan Y, Özyürek A, Akduman GG. Okul öncesi dönem çocuklarının spora ilişkin görüşlerinin incelenmesi. International Journal of Science Culture and Sport, 2015; 4(1): 103-115.

2. İmamlı H, Ünver G. Spor karakterinin demografik nitelikler açısından incelenmesi. Akdeniz Spor Bilimleri Dergisi, 2018; 1(1): 36-49.
3. Erdemli A. Temel sorunlarıyla spor felsefesi. E Yayınları, İstanbul, 2016.
4. Ünlütepe Ş. Spor ve eğitim ilişkisi. İstanbul Üniversitesi İletişim Fakültesi Dergisi, 2016; 10: 171-174.
5. Park N. Character strengths and positive youth development. The ANNALS of the American Academy of Political and Social Science, 2004; 591: 40-54.
6. Park N. Peterson, C. Moral competence and character strengths among adolescents: The development and validation of the Values in Action Inventory of Strengths for Youth. Journal of Adolescence, 2006a; 29: 891–909.
7. Park N. Peterson C. Character strengths: Research and practice. Journal of College and Character, 2009; 10(4) DOI: 10.2202/1940-1639.1042.
8. Mallett CJ. Modelling the Complexity of the coaching process: A commentary. International journal of sports science and coaching, 2007; 2(4): 407-409.
9. Yapar A. İnce ML. Sporcular için antrenör davranışlarını değerlendirme ölçeğinin türkçe uyarlaması (SADDÖ): Geçerlik ve güvenirlik çalışması. Spor Bilimleri Dergisi, 2014; 25(4): 203–212.
10. Chelladurai P. Leadership in Sport. In J.M. Silva, R.S. Weinberg (Eds.) Psychological Foundations of Sport. Champaign, IL; Human Knetic, 1984; 329-339.
11. Côté J, Salmela JH, Russell SJ. The knowledge of high performance gynastic coaches: competetion and training considerations. The Sport Psychologist, 1995; 9: 76-95.
12. Smoll FL, Smith RE. Leadership research in youth sports. In J. M. Silva III & R. S. Weinberg (Eds.), Psychological foundations of sport, Champaign, IL: Human Kinetics,1984; 371-386.
13. Yıldız M, Var L, Yıldız Ö. Genç millî güreşçilerin başarısızlık korkusuna yönelik görüşleri. Türk Spor Bilimleri Dergisi, 2019; 2(1): 22-30.
14. Güvendi B, Güçlü M, Güvendi Y, Türksoy-Işım A. Türkiye şampiyonasına katılan yıldız güreş kız sporcuların spor karakter yapıları ile ahlaki karar alma tutumları. 2. Beden Eğitimi, Spor, Rekreasyon ve Dans Kongresi Tam Metin Kitabı. Alanya Alaaddin Keykubat Üniversitesi. Asos Yayınevi, 2019.
15. Avcı KS, Çepikkurt F, Kale EK. Examination of the relationship between coach-athlete communication levels and perceived motivational climate for volleyball players. Universal Journal of Educational Research, 2018; 6(2): 346-353.
16. Bezci Ş. Investigating the relationship between the perceptions of taekwondo athletes towards coach-athlete relationship, task and ego orientation in sports, and motivation in sports. Internatıonal Journal Of Envıronmental & Scıence Educatıon, 2016; 11(15): 8436-8447.
17. Cumming SP, Smoll FL, Smith RE, Grossbard JR. Is winning everything? The relative contributions of motivational climate and won-lost percentage in youth sport. Journal of Applied Sport Psychology, 2007; 19: 322–336.
18. Fry MD, Newton M. Application of achievement goal theory in an urban youth tennis setting. Journal of Applied Sport Psychology, 2003; 15: 50–66.
19. Ashley E. Stirling-Gretchen AK. Abused athletes' perceptions of the coach-athlete relationship. Sport in Society, 2009;12(2): 227-239.
20. Donuk B. Liderlik ve spor. Ötüken Neşriyat A.Ş. İstanbul, 2007.
21. Filiz B, Demirhan G. Antrenörlük davranışı değerlendirme ölçeği'nin türk kültürüne uyarlanması. Spormetre Beden Eğitimi ve Spor Bilimleri Dergisi, 2017; 15(1): 1-10.
22. Görgüt İ, Tuncel S. Spor karakter ölçeğinin türkçeye uyarlanması. Spormetre Beden Eğitimi ve Spor Bilimleri Dergisi, 2017; 15(3): 149-156 DOI: 10.1501/Sporm_0000000319.
23. Jang CY. Development and validation of the sport character scale. Doctorate thesis, The University of Utah, USA, 2013.
24. Bolter ND, Weiss MR. Coaching for character: development of the sportspersonship coaching behaviors scale (SCBS). Sport, Exercise, and Performance Psychology, 2012; 1(2): 73-90.

25. Sezen-Balçıkanlı G, Aktaş İ, Sezen M. Antrenörlerin sportmen davranış ölçeğinin türkçe uyarlama çalışması. Spormetre Beden Eğitimi ve Spor Bilimleri Dergisi, 2018; 16(4): 236-245.
26. Shao AT. Marketing research: An aid to decision making. Cincinnati, Ohio: South-Western/Thomson Learning, 2002.
27. Güven Ö. Öncü E. Antrenörlerin etik dışı davranışları ile ilgili sporcu algısı ölçeğinin geliştirilmesi. SPORMETRE Beden Eğitimi ve Spor Bilimleri Dergisi, 2012; 10(2): 67-75 DOI: 10.1501/Sporm_0000000222.
28. Dilek AN. Antrenör davranışları ile ilgili sporcu algısının araştırılması: Türkiye ve Bosna-Hersek örneklerinin karşılaştırılması. Ondokuz Mayıs Üniversitesi Sağlık Bilimleri Enstitüsü Beden Eğitimi ve Spor Anabilim Dalı, Doktora Tezi, Samsun, 2017.
29. Gül M. Türkiye'de güreş antrenörlerinin sporcularına karşı davranış tarzlarının analizi. Ondokuz Mayıs Üniversitesi, Sağlık Bilimleri Enstitüsü, Doktora Tezi, Samsun, 2015.
30. Bektaş Z. İstanbul Büyükşehir Belediyesi Spor A.Ş.'de çalışan antrenörlerin liderlik tutum ve davranışlarının incelenmesi. Dumlupınar Üniversitesi Sağlık Bilimleri Enstitüsü, Yüksek Lisans Tezi, Kütahya, 2014.
31. Tazegül Ü. Sporun kişilik üzerindeki etkisinin araştırılması. The Journal of Academic Social Science Studies, 2014; 25(1): 537-544.
32. Kirkcaldy BD, Shephard RJ, Siefen RG. The relationship between physical activity and self- image and problem behaviour among adolescents. Soc Psychiatry Psychiatr Epidemiol. Nov, 2012; 37(11): 544-50.
33. Talbot M. The case for physical education. In: Doll-Tepper G, Scoretz D, eds. World Summit on Physical Education. Berlin, Germany: ICSSPE, 2001; 39-50.
34. Toros T. Genç erkek basketbolcularda, turnuva öncesi ve turnuva sonrası sporcuların algıladıkları antrenörlük davranışı, hedef yönelimleri, takım sargınlığı, algılanan motivasyonel iklim ve kolektif yeterlik arasındaki farklılığın analizi. Pamukkale Journal of Sport Sciences, 2011; 2(1): 39-39.

Investigation of the Effect of Oscillation (Swing) and Zumba Training on Body Fat Percentage Values in Women

Mustafa Said Erzeybek[1]

[1]Dumlupınar University, Physical Education and Sport, Department of Physical Education and SportsKütahya, Turkey.

Abstract

Aim; The aim of this study is to examine the oscillation and zumba workouts applied in women over the eight-week period on body composition values

Material and Method; While some of the participants participated in Zumba training, others were randomized to the training protocol using the oscillation device (GD Sportlinestyletics Classic Oscillation)3 days a week (Monday-Wednesday-Friday) for 8 weeks.The average age of female participants in the zumba group participated in the study was 26.5 ± 1.8 years, on the other hand, it was 28.3 ± 3.2 years in the Oscillation group.Tanita BC 418 equipment was used to determine the arm, leg and body fat percentages of the participants.Simple effects and repeated measures anova test were used in SPSS 20.0 statistical program to evaluate arm, leg, body fat percentages and body mass index before and after the training period process

Findings; According to the findings of the study it was found that the first measurement for body weight of the Oscillation group and the last measurement were statistically significant (F1,15; 24,834; p<0,05). Furthermore, when Oscillation group and Zumba group right leg fat were compared, the first test and the post test of the Oscillation group was significant (F1,15; 15,429; p <0.05). Moreover, when Oscillation group and Zumba group left arm fat were compared the first and last test of the oscillation group was found significant (F1,15; 17,219; p <0.05). Finally, in the comparison of Oscillation group and Zumba group body fat (%), the loss in the oil rate of the participants in the oscillation group was statistically significant (F1,15; 19,600; p <0.05).

Result; At the end of the training period, there was a significant decrease in the arm, leg and body fat percentages of the female participants who were training with the oscillation device compared to the zumba group. There was no significant change in body mass index values in both training groups. As a result, oscillation training was found to be effective in reducing the percentage of left arm, trunk, and right and left leg body fat.

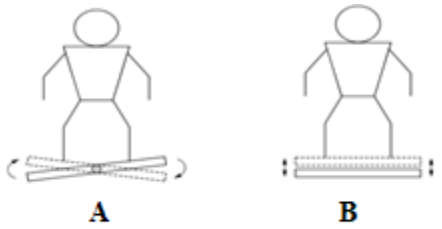
Keywords: Anaerobic Power, CrossFit, Dynamic Balance, wrestling

1. Introduction

What is Oscillation? Oscillation or swing is the name for any measurable, repeated changes according to a Central value (Usually a Balance Point), or usually time between two or more states [13]. In addition, vibrations produced in an oscillating platform are transferred to the human body or parts of it, producing a completely vibrating effect [5]. Vibration is a mechanical stimulus model characterized by oscillation motion. Its results in the body have indirect or direct effects [10]. Indirect effects are seen as a neuroendocrine response [7]. In direct effect, muscles and tendons act on spring-like elements that store and release mechanical energy, such as their vibrations [5]. Vibration is a mechanical stimulus model characterized by oscillation motion. The biomechanical variables that determine its density are frequency and amplitude. The scope of the oscillating movement is expressed in the amplitude of the vibration (from peak to peak, in mm), while the repetition rate of the oscillation movements is determined by the frequency of vibration (in hz) [3]. Low-amplitude, low-frequency mechanical stimulation with vibrating devices has been shown to be an effective and safe method of application in musculoskeletal structures. In addition, people who exercise with specially designed exercise equipment have been reported to increase muscle strength and strength [2,15]. It provides vibration through oscillating plates using two different systems on specially designed vibrating plates that produce sinusoidal vibrations of whole body vibrations (WBVs): (a) moving vertical

displacements on the left and right side of a bearing; (b) All plate WBV training devices that uniformly swing up and down provide vibrations at various frequencies (15–60 hz) and displace between 1 and 10 mm [3].. Zumba was discovered in 1990 by Colombian Dancer Beto Perez. The word meaning is to act fast. It is a sport that contains many dances in Zumba. It is a Fitness Program with different dances such as Salsa, Hip-Hop, Mambo, Samba and Oriental accompanied by Latin Dances. The Zumba group is salsa and aerobic based and also includes strength, balance and endurance training elements [4].. This activity is defined as a Latin-inspired dance exercise program, usually performed in large groups of participants, combining Latin rhythms and aerobic steps, involving all body movements and creating a kind of choreography that is less formal than other group exercise classes [6]. In their research on female individuals who practice oscillation training, Oscillation and Zumba & Tai-Bo trainings lead to improvement on the Modified Y balance values, but the level of development of the participants in the oscillation group is more effective than the Zumba & Tai-Bo group [14].

Figure 1: *Different swing (A) and vibration (B) platforms Zumba*



3. Method

3.1. Participants

Throughout the week, 3 days a week (Monday-Wednesday-Friday) and for 8 weeks, some of the participants were included in the Training Protocol with the Zumba and the other part with the Oscillation Device (GD SportlineStyletics Classic Oscillation). The Average Age of the Female Participants in the Zumba Group Participating in the Study (n = 9) was 26.5 ± 1.8 Years, while it was 28.3 ± 3.2 years in the Oscillation Group (n = 9). The average size of the Zumba group was 163,375 ± 5,829, while the oscillation group was 163,588 ± 5,745.

3.2. Materials

Those with platinum or applied screws in the spine or any joint in their body, pacemaker, vertigo, varicose veins, MS patients and those with neurological problems were not included in the oscillation (swing) and Zumba training sessions. Participants who have a health report stating that there is no harm in exercising by a specialist physician are included. Voluntary consent form was signed. Oscillation Devices Provide Vibration at 5-12 Hz Frequencies. Platform Changes (Amplitude) between 1 and 16 mm. Speed Stages Available in 1-40 Stages. They practiced the exercise with Oscillation speed of 12 Times per second. On the other hand, Zumba dance was performed as a group lesson with 45 minutes of music accompanied by 10 minutes of active warm-up on Monday, Wednesday and Friday by participants who are experts in their fields. At the end of the session, Cooling Exercises were applied.

3.3. Procedure

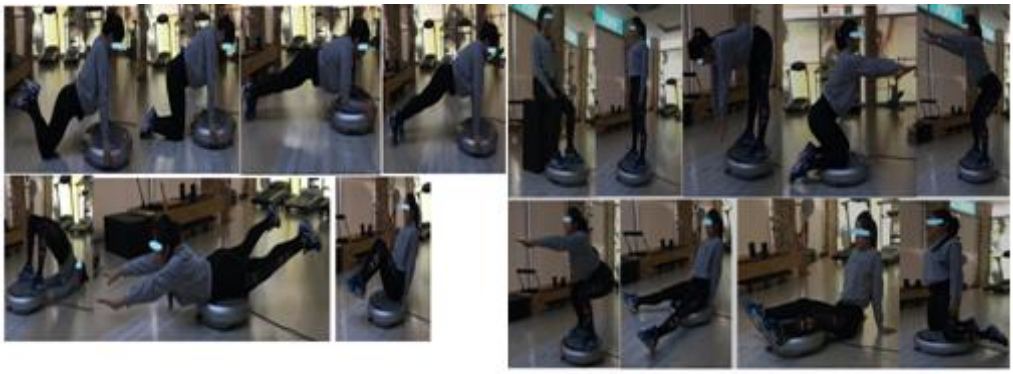
The vibration generation speed of the device is produced in 40 stages. As the speed stage increases, the swing speed of the platform increases. 1st Week Speed Range 5-15; Movement Application Time 30 seconds and rest 30 seconds; 16 Movements Applied Over 2 Sets. 2nd, 3rd and 4th Week Speed Range 20; Movement Application Time 30 seconds and rest 30 seconds; 16 Movements Applied on 3 Sets. 5th and 6th Week Speed Range 30; Movement Application Time 30 seconds and Rest 30 seconds; 16 Movements were

applied over 3 Sets. 7th and 8th Week Speed Range 40; Movement Application Time 45 seconds and rest 45 seconds; 16 Movements Applied on 3 Sets. The device on the wrist of the applicator can interfere with all the oscillating devices active during training at the same time. The vibration rate of the device is produced in 40 stages. As the speed stage increases, the swing speed of the platform increases.

Picture 1. *GD Sportlinestyletics Classic Oscillation Device (http://www.gdsportline.net) to evaluate the data.*

Picture 2.*Oscillation equipment introduction and Oscillation equipment test*

Picture 3. *Oscillation equipment posture work and Tanita BC 418 Device*



Picture 4. *Motion Patterns Using Oscillation (Swing) Training*

Zumba Dance Training Protocol

45 minutes Aerobic level movements(accompanied by dance figures) were performed with music suitable for dancing.[1]

Picture 5. *Zumba Dance*

In the analysis of data, the data was organized for Windows in MS Excel (2007) spreadsheet program and graphs were prepared. The data was written in MS Word (2007) for Windows. Statistical analyses were written in SPSS (17.0) program for Windows. Two way ANOVA was used for repeated measures in the determination of differences between the pre and post measurement of the anaerobic power and balance values of participants in the experimental and control group.

Tanita BC 418 Device was used to determine the Percentage of Arm, Leg and Body Fat of the Participants Simple effects and repeated measures anova test were used in the SPSS 20.0 statistical program to evaluate the data.

4. Results

According to the descriptive statistics of the participants, while the average age values of wrestlers in the experimental group (n=20) were 21.5 ± 2.35 years, length values were Table 1. Comparison of Anova and Simple Effect with Oscillation group and Zumba group body weight.

Table 1. *Comparison of Anova and Simple Effect with Oscillation group and Zumba group body weight.*

	Group	Average	Std. Deviation	F	p
Pretest	ZumbaTai-bo	63,338	10,914	,267	0,613
	Oscillation	72,922	10,307		

Posttest	ZumbaTai-bo	61,763	10,454
	Oscillation	71,067	10,223

According to the results of the data analysis, when the changes in the body weight values of the participants in the Zumba group and the changes in the body weights of the participants in the Oscillation group were compared, there was no statistically significant difference between the groups ($F_{1,15}$; 0,267; p>0,05). According to the Simple Effect test results, both the weight loss between the first measurement of the zumba group and the last measurement ($F_{1,15}$; 904; p<0,05) and the weight loss that occurred between the first measurement of the Oscillation group and the last measurement were statistically significant ($F_{1,15}$; 24,834; p<0,05).

Table 2. *Comparison of body mass index Anova and Simple Effect with the oscillation group and Zumba group*

	Group	Average	Std. Deviation	F	p
Pretest	ZumbaTai-bo	23,663	3,666	,685	,421
	Oscillation	27,300	4,635		
Post test	ZumbaTai-bo	23,100	3,480		
	Oscillation	27,700	5,654		

According to the repeated measurements results of Anova test, when the differences between the first and last measurements of both groups were compared with each other, there was no statistical difference between the two groups ($F_{1,15}$; 1,962; p>0,05). According to the simple effect test results, the change in the BMI values between the first and last measurements of the zumba group ($F_{1,15}$; 0,442; p> 0.05) and the change in the BMI values that occurred between the first measurement and the last measurement of the Oscillation group were not statistically significant ($F_{1,15}$; 0.251; p> 0.05). However, although there is no statistical difference, there is a decrease in the BMI ratio in the zumba group, while there is an increase in the oscillation group.

Table 3. *Comparison of Oscillation group and Zumba group right leg fat (%) Anova and Simple Effect*

	Group	Average	Std. Deviation	F	p
Pretest	ZumbaTai-bo	31,775	3,137	3,751	,072
	Oscillation	36,833	4,742		
Post test	ZumbaTai-bo	31,325	3,201		
	Oscillation	35,233	4,935		

When the data analysis results are examined, when the change between the first and last test values of the zumba group and the change between the first and the last test of the oscillation group, it was found that there was no statistically difference between the two groups ($F_{1,15}$; 3,751; p> 0.05). However, according to the simple effect test results, the difference between the first test and the post-test belonging to the zumba group was insignificant ($F_{1,15}$; 1,085; p> 0.05), the difference between the first test and the post test of the Oscillation group was significant ($F_{1,15}$; 15,429; p <0.05).

Table 4. *Comparison of Oscillation group and Zumba group right leg Muscle (kg) Anova and Simple Effect*

	Group	Average	Std. Deviation	F	p
Pretest	ZumbaTai-bo	7,475	,899	3,867	,068
	Oscillation	7,811	,686		
Post test	ZumbaTai-bo	7,363	,880		
	Oscillation	7,989	,855		

According to the results of the data analysis, the first and last measurement development in the zumba group and the development in the oscillation group were not statistically different from each other ($F_{1,15}$; 3,867; p> 0.05). In the simple effect test results, the change between the first and last tests of the zumba group was not significant ($F_{1,15}$; 1,097; p> 0.05). Likewise, the difference between the first test of the oscillation group and the post-test was not significant ($F_{1,15}$; 3,082; p> 0.05). However, while there was a decrease in the fat ratio and muscle values in the zumba group, there was a decrease in the oil ratio in the oscillation group. It is noticeable that there is an increase in muscle values.

Table 5. *Comparison of Oscillation group and Zumba group left leg fat (%) Anova and Simple Effect*

	Group	Average	Std. Deviation	F	p
Pretest	ZumbaTai-bo	31,750	3,520	1,936	,184
	Oscillation	36,500	5,007		
Posttest	ZumbaTai-bo	31,175	3,519		
	Oscillation	35,144	4,989		

It was found that there was no statistically significant difference between the decrease in the fat rate of the participants in the zumba group and the decrease in the oil rates of the participants in the oscillation group ($F_{1,15}$; 1.936; p> 0.05). According to the simple effect test results, the change between the first and last test in the fat ratios of the participants in the zumba group was not statistically significant ($F_{1,15}$; 1,984; p> 0.05). However, the change in fat ratio in the oscillation group was statistically significant ($F_{1,15}$; 12,405; p <0.05).

Table 6. *Comparison of Oscillation group and Zumba group left leg Muscle (kg) Anova and Simple Effect*

	Group	Average	Std. Deviation	F	p
Pretest	ZumbaTai-bo	7,313	,849	3,249	,092
	Osilasyon	7,711	,675		
Posttest	ZumbaTai-bo	7,200	,842		
	Osilasyon	7,822	,806		

According to the data analysis, when the changes that occurred at the end of the training period of the participants in the zumba group and the changes in the oscillation group were compared, there was no statistically significant difference between the two groups ($F_{1,15}$; 3,249; p> 0.05). When the simple effect test results were reviewed, the change in the muscle ratio of the participants in the zumba group was not statistically significant ($F_{1,15}$; 1.553; p> 0.05). Similarly, the change in the muscle ratio of the participants in the oscillation group between the first and last test results was not statistically significant ($F_{1,15}$; 1.705; p> 0.05). However, while the participants in the Zumba group had a decrease in both fat and muscle ratio, there was a decrease in the oscillation group and an increase in the muscle ratio.

Table 7. *Comparison of Oscillation group and Zumba group right arm fat (%) Anova and Simple Effect*

	Group	Average	Std. Deviation	F	p
Pre test	ZumbaTai-bo	28,163	7,306	2,913	,108
	Oscillation	34,622	6,937		
Post test	ZumbaTai-bo	27,525	6,870		
	Oscillation	32,733	7,052		

When the data analysis results are analyzed, when the change between the first and last test values of the oil group of the zumba group and the change between the first and the last test of the oscillation group, it was found that there was no statistically significant difference between the two groups ($F_{1,15}$; 2.913; p> 0.05).

According to the simple effect test results, it is seen that there is a decrease in the oil rate in the oscillation group as well. However, while the decrease in the zumba group was not statistically significant ($F_{1,15}$; 1,428; p> 0.05), the decrease in the oscillation group was significantly detected ($F_{1,15}$; 14,105; p <0.05).

Table 8. *Comparison of Oscillation group and Zumba group right arm Muscle (kg) Anova and Simple Effect*

	Group	Average	Std. Deviation	F	p
Pre test	ZumbaTai-bo	2,050	,233	3,444	,083
	Oscillation	2,256	,255		
Post test	ZumbaTai-bo	2,000	,273		
	Oscillation	2,267	,229		

In the comparison of the ratio of muscle as well as the ratio of fat, the change in the participants in the zumba group and the change in the participants in the oscillation group were not statistically different from each other ($F_{1,15}$; 3.444; p> 0.05). When the simple effect test results are examined, there is a decrease in the participants in the zumba group and an increase in the oscillation group. However, neither the change in the zumba group ($F_{1,15}$; 4.355; p> 0.05) nor the development in the oscillation group is statistically significant ($F_{1,15}$; 0.224; p> 0.05).

Table 9. *Comparison of Oscillation group and Zumba group left arm fat (%) Anova and Simple Effect*

	Group	Average	Std. Deviation	F	p
Pre test	ZumbaTai-bo	28,938	7,480	1,153	,300
	Oscillation	35,467	7,022		
Post test	ZumbaTai-bo	27,775	6,960		
	Oscillation	33,600	7,065		

According to the results of the data analysis, it is seen that both the participants in the zumba group and the participants in the oscillation group have a decrease in the fat rate. However, this decrease in both groups revealed that there was no statistical difference between the two groups compared to each other ($F_{1,15}$; 1,153; p> 0.05). When simple effect test results as well as repetition measurements anova test results are examined, although there is no difference between the two groups, the change between the first and last test of the participants in the zumba group ($F_{1,15}$; 5,936; p <0.05) and the first and last test of the oscillation group was found significant ($F_{1,15}$; 17,219; p <0.05).

Table 10. *Comparison of Oscillation group and Zumba group left arm Muscle (kg) Anova and Simple Effect*

	Group	Average	Std. Deviation	F	p
Pre test	ZumbaTai-bo	2,050	,288	,146	,708
	Oscillation	2,278	,273		
Post test	ZumbaTai-bo	2,025	,301		
	Oscillation	2,267	,269		

According to repeated analysis of variance analysis, unlike other reference regions, both the participants in the zumba group and the participants in the oscillation group have a decrease in muscle ratio ($F_{1,15}$; 0.146; p> 0.05). Unlike other reference regions, a decrease in muscle ratio is observed in both groups according to the simple effect test results. Neither the change in the first and last test of the zumba group ($F_{1,15}$; 0,894; p> 0.05) nor the change in the oscillation group were statistically significant ($F_{1,15}$;0,199; p> 0.05).

Table 11. *Comparison of Oscillation group and Zumba group body fat (%) Anova and Simple Effect*

Group	Average	Std. Deviation	F	p

Pre test	ZumbaTai-bo	22,738	7,624	2,915	,108
	Oscillation	29,089	5,511		
Post test	ZumbaTai-bo	21,838	7,425		
	Oscillation	27,033	5,726		

When the data in group time interaction dimension was evaluated, it was found that there was a decrease in both the fat ratio of the participants in the zumba group and the fat rates of the participants in the oscillation group. However, when the rate of decline in these two groups was compared with each other, there was no difference between the groups ($F_{1,15}$; 2,915; p> 0.05). However, when the simple effect test results were analyzed, the loss in the fat ratio of the participants in the zumba group was not statistically significant ($F_{1,15}$; 3.340; p> 0.05), while the loss in the oil rate of the participants in the oscillation group was statistically significant ($F_{1,15}$;19,600; p <0.05).

Table 12. *Comparison of oscillation group and Zumba group body Muscle (kg) Anova and Simple Effect*

	Group	Average	Std. Deviation	F	p
Pre test	ZumbaTai-bo	24,725	2,168	2,219	,157
	Osicillation	26,111	2,195		
Post test	ZumbaTai-bo	24,425	2,195		
	Oscillation	26,267	2,121		

According to the results of the analysis, as in the other reference regions, there is a decrease in the muscle ratio of the participants in the zumba group, while there is an increase in the muscle ratio of the participants in the oscillation group. When the exchange rates of both groups were compared with each other, it was found that there was no statistically different between the two groups. When the simple effect test results are examined, the change between the first test and the last test of the zumba group was not significant ($F_{1,15}$; 1.818; p> 0.05). Likewise, the change in the oscillation group is statistically insignificant despite the increase ($F_{1,15}$; 0.550; p> 0.05).

5. Discussion and Conclusion

Today, At the end of the process, significant decreases were observed in the Arm, Leg and Body Fat Percentages of the Women Participants Training with the Oscillation Device compared to the Group Making Zumba. There was no significant change in Body Mass Index Values in Both Training Groups. As a result, it is seen that the Oscillation Training is effective in the reduction of the body fat percentage of the Left Arm, Body, Right and Left leg. In addition, while there was a decrease in fat and muscle percentages in the Zumba group, there was an increase in muscle mass as well as a decrease in fat percentages in the oscillation group. In terms of body fat impedance results, the decrease in the Fat Rate of the Participants is significantly lower than the zumba group, and it can be said that the oscillation exercises are more effective than the zumba group in terms of metabolic circulation with the effect of gravity.

Along with the types of exercise, exercise tools are also increasing. One of them, the whole body vibration training (TVTA), has been used frequently as an exercise and training method [12]. TVTA is defined as "the application of mechanical oscillations to the body through a vibration platform" [11]. The effects of vibration are included in the law of motion as stated by Sir Isaac Newton; It is essentially that the force (F) of an object is equal to the mass (M) multiplied by its acceleration (A) (F = M × A). Thus, functional force can be improved by applying more mass or more acceleration to a body [8]. TVTA is made using a device called vibration platform. The three-way vibration created by the device increases the force of gravity, so that the desired muscle groups work very intensively throughout the training. In line with this scope, the purpose of this research, which was designed by considering the possibility of getting good results in individuals who do not do sports in a short time period; to reveal the change in physical fitness parameters of sedentary female students who participated in and did not participate in vibration training. The vibrating

stimulus aspect indicates that the average responses of the oscillation (oscillation) devices of the vastus lateralis and gastrosnemius are significantly higher than the vibration platform moving vertically in the body vibration exercises. However, in the responses of the Tibialis anterior, the effect of the vertical moving vibration platform has been found to have higher significance than oscillation [1].

In the light of these studies, the resistance produced by the body against the resistance caused by the oscillation, especially oscillation, and with this resistance, it helps to decrease the muscle impedance and positively contributes to the muscle mass by stimulating the deep muscles (presenal) muscles. Zumba exercises are a lot of fun, especially aerobic exercise. Zumba exercises contribute to the reduction of fat impedance, but they contribute less than the acceleration, acceleration and resistance caused by oscillation. In conclusion, although both models contribute to the reduction of fat percentage, it can be said that oscillation makes more contribution to the case (kg). In addition, the usage areas of the oscillation device appeal to every age group, except for those who do not mind health. But. The application forms of the oscillation device can be further expanded and application areas can be increased. Oscillation and zumba lessons are effective in terms of fat (burning), but can be used for oscillation support in terms of FFM.

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References

1. Abercromby, A.F.,Amonette, W.E., Layne, C.S., McFarlin, B.K., Hinman, M.R.andPaloski, W.H. (2007). Variation in neuromuscularresponsesduringacutewhole-body vibrationexercise. Medicine&Science in Sports &Exercise, 39: 1642–1650. (https://journals.lww.com/acsm-msse/Fulltext/2007/09000/Variation_in_Neuromuscular_Responses_during_Acute.27.aspx)
2. Bosco C, Colli R, Introini E,etal.(1999)Adaptive responses of human skeletal muscle to vibration exposure.Clin Physiol,1999;19:183–7.(https://www.scopus.com/record/display.uri?eid=2-s2.0-0033060486&doi=10.1046%2fj.1365-2281.1999.00155.x&origin=inward&txGid=1d963cb42273184d1a5c369e100ebbe6)
3. Cardinale, M. A. J. W.,&Wakeling, J. (2005). Whole Body Vibration Exercise: are Vibrations Good For You?.British Journal Of Sports Medicine, 39(9), 585-589.(https://bjsm.bmj.com/content/bjsports/39/9/585.full.pdf)
4. Donath, L.,Roth, R., Hohn, Y., Zahner, L., & Faude, O. (2014). The effects of Zumba training on cardiovascular and neuromuscular function in female college students. European Journal of Sport Science, 14(6), 569-577.(https://www.tandfonline.com/doi/pdf/10.1080/17461391.2013.866168)
5. Rittweger,J. (2010). "Vibration As An Exercise Modality: How İt May Work, And What İts Potential Might Be," European Journal Of Applied Physiology, Vol. 108, No. 5, Pp. 877–904. (https://link.springer.com/article/10.1007/s00421-009-1303-3)
6. Luettgen M, Foster C, Doberstein S, Mikat R, Porcari J. (2012). Zumba; Is the "fitness-party" a good workout? J Sports SciMed;11: 357-358.(https://search.proquest.com/docview/2295558367?pq-origsite=gscholar)
7. Prisby, R. D.,Lafage-Proust, M. H., Malaval, L., Belli, A., &Vico, L. (2008). Effects of whole body vibration on the skeleton and other organ systems in man and animal models: what we know and what we need to know. Ageing researchreviews, 7(4), 319-329. (https://www.sciencedirect.com/science/article/pii/S1568163708000317).
8. Park, S. Y., Son, W. M., ve Kwon, O. S. (2015). Effects of whole body vibrationtraining on body composition, skeletalmusclestrength, andcardiovascularhealth. Journal of exerciserehabilitation, 11(6): 289.
9. Santos-Filho, S. D.,Meyer, P. F., Ronzio, O. A., Bonelli, L., Fonseca, A. S., &Bernardo-Filho, M. (2010).

Whole body vibration exercise: what do you know about scientific interest. Fiep Bulletin, 80, 875-878.(https://www.academia.edu/checkout?feature=ADVANCED_SEARCH&trigger=large-banner-tall&upgradeRedirect=%2Fsearch%2Fadvanced%3Fq%3DSantos-Filho%2C%20S.%20D.%2CMeyer%2C%20P.%20F.%2C%20Ronzio%2C%20O.%20A.%2C%20Bonelli%2C%20L.%2C%20Fonseca%2C%20A.%20S.%2C%20%26amp%3B%20Bernardo-Filho%2C%20M.%20(2010).%20Whole%20body%20vibration%20exercise%3A%20what%20do%20you%20know%20about%20scientific%20interest.%20Fiep%20Bulletin%2C%2080%2C%20875-878.&btv=search_specific)

10. Tomás, R., Lee, V., Going, S. (2011). TheUse of VibrationExercise in ClinicalPopulations. ACSM'S Health ve FitnessJournal, Volume 15(6): 25-31.(https://journals.lww.com/acsm-healthfitness/Fulltext/2011/11000/THE_USE_OF_VIBRATION_EXERCISE_IN_CLINICAL.8.aspx)
11. Yılmaz, A., Kin İşler, A. (2013). Farklı Frekanslarda Uygulanan Akut Tüm Vücut Titreşiminin Tekrarlı Sprint Performansına Etkisi, Pamukkale Journal of SportSciences, Vol.4, Special Issue, 22-32(https://dergipark.org.tr/en/download/article-file/191825)
12. .www.Osilasyon.Nedir.Org (Erişim Tarihi: 05.12.2019).
13. Yüksel, O., Erzeybek, M.S., Şentürk, A., Yenisoy, A. (2019). Investigation of the Effects of Oscillation - Oscillation and Zumba & Tai-Bo Workouts on Modified Y Balance Values in Women,4th International Eurasian Conference Sport Education and Society, International Juried Arts Mixed Exhibition on National Cultures 6-8 December 2019, Denizli, TURKEY, p.98, (http://www.iecses.org/Archive/4th_International_Conference_fulltexts_book.pdf).
14. Verschueren, S. M., Roelants, M., Delecluse, C., Swinnen, S., Vanderschueren, D., & Boonen, S. (2004). Effect of 6-month whole body vibration training on hip density, muscle strength, and postural control in postmenopausal women: a randomized controlled pilot study. Journal of bone and mineral research, 19(3), 352-359. (https://www.ncbi.nlm.nih.gov/pubmed/15040822)

The Effect of the Core Exercises on Body Composition, Selected Strength and Performance Skills in Child Soccer Players

Harun Genç[1] and Ali Erdem Ciğerci[2]
[1]*Bingol University, School of Physical Education and Sports, Bingöl, Turkey.*
[2]*Kastamonu University, School of Physical Education and Sports, Kastamonu, Turkey.*

Abstract

The purpose of the study is to examine the effect of the core exercises on body composition and selected strength and motor skills in child soccer players. The universe of the research consists of 20 soccer players. Two groups were formed, core training group (CTG, n=10, age; 12,90±0,73 year, height; 155,83±9,64 cm, body weight; 48,34±10,52 kg) and control group (CG, n=10, age; 12,80±0,63 year; height; 157,05±5,84 cm, body weight; 47,46±9,53 kg) from volunteers between 11-13 years old. 10 soccer players in CTG performed core exercise and soccer training, and 10 soccer players in CG performed only soccer training. The study lasted a total of 8 weeks, with 3 workouts per week. Age, height, body weight (BW), body mass index (BMI), body fat percentage (BFP), 10 and 30 m speed, flexibility (FL), back strength (BS), leg strength (LS), right hand grip strength (RHGS), left hand grip strength (LHGS), standing long jump (SLJ), leg lift (LL), plank (PL), back isometric (BI), push-ups (PU), shuttle (ST) tests were applied to the volunteers. Paired Samples T-Test and Independent Sample Test were used for analysis of groups in SPSS 22. Level of error was accepted as $p<0,05$. According to the results, a statistically significant difference was found in the height, BW, BMI, and BFP in CTG, also a significant difference was seen in CG in pre and post-test of physical measurement parameters as height, BW ($p<0,05$). When the post-test results of the athletes in the CTG and CG were examined, a statistically significant difference was found in favor of the CTG in LS, LL, BI and ST test in the performance parameters ($p<0,05$). After in-group analysis, while there was a statistically significant difference in all parameters except for 10 m and 30 m sprint in CTG; a statistically significant difference was found in FL, BS, LL, SLJ results of CG ($p<0,05$). In conclusion, it can be said that core exercises performed for 8 weeks have an impact on the increasing their ability to perform selected strength and motor skills of child soccer players.

Keywords: Child Soccer Players, Core Exercise, Body Composition,Strength, Motor Skills

1. Introduction

Soccer is the most popular sport in the world and is performed by men and women, children and adults with different levels of expertise (Stølen et al., 2005). Soccer is a team sport of intense tackles.(Afyon, 2016). During a 90-minute game, elite-level players run about 10km at an average intensity close to the anaerobic threshold (80–90% of maximal heart rate. Within this endurance context, numerous explosive bursts of activity are required, including jumping, kicking, tackling, turning, sprinting, changing pace, and sustaining forceful contractions to maintain balance and control of the ball against defensive pressure (Nesser, 2009).

Core stability and core strength are both necessary for sport movement. The player must have a high level of strength to perform these activities. Muscular strength and stability from the lower extremity to the upper extremity is needed to make a good, competitive soccer player. The area named "core" includes the abdominals in the frontside of the body, that is, hypochondrium and hypogastrium muscles; serratuses right next to hypochondrium muscles; Oblique Right nextto hypogastrium muscles; and the muscle groups from the waist to neck that help the skeleton have a correct posture (External Oblique, Internal Obliques, Transversus Abdominis, Multifidi Psoas). "Coretraining" refers to the training of the above abdominal and lumbarregions. Strengthening the coreregion is not only necessary for sportive endurance, but it also provides a correct posture (Fahey, Insel and Roth, 2011). Based on the results of the current and previous researches, it is believed core training is necessary for optimal sport performance and should not be

dismissed (Nesser, 2009). Providing strength development among children of this age with their own body weights is a more appropriate method. Core trainings have been used by trainers in order to improve performance of soccer players. Also a weak core is believed to interrupt the transfer of energy, resulting in reduced sport performance and risk of injury to a weak or under developed muscle group. These trainings are preferred because they can be done in any field without any need for tools, and they contribute to strength development in a short time (Basset and Leach, 2011). Therefore, the purpose of this study was to examine the effect of the core exercises on body composition and selected strength and motor skills on soccer players.

2. Method

2.1. The Model of the Research and Study Group

The universe of the research consists of 20 soccer players. After the pre-test period, 20 athletes were divided into two groups; 10 core training group (CTG) (n=10, age; 12,90±0,73 year, height; 155,83±9,64 cm, body weight; 48,34±10,52 kg) and control group and 10 control group (CG) (n=10, age; 12,80±0,63 year; height; 157,05±5,84 cm, body weight; 47,46±9,53 kg). A core training program of 8 weeks was applied to football players during the application phase of the study, excluding their training days. During the training period, players did not participate in any training programs for basic motoric features, but only in their team's technical and tactical trainings. CTG participated in the approximately 60-minute training program including warm-up and cool-down exercises on Monday, Wednesday and Friday.

2.2. Materials

Anthropometric Measurements

The height, weight, body mass index (BMI), body fat percentage (BFP), waist, hip, waist/hip ratio measurements of the subjects will be explained. Height was measured to the nearest 0.1 cm in anatomical position (barefoot) using a stadiometer (Holtain, Ltd, UK). Weight was measured with a sensitivity of 0.01 kg in anatomical position (barefoot) and the result was recorded as "kg". BMI values were calculated by using "BMI = weight (kg) / (height)2" formula. BFP measurements were performed by bioelectrical impedance analysis (Tanita BC 418, Japan). Waist circumference was measured midway between the lowest rib and the top of the iliac crest at the end of gentle expiration. Hip circumference was measured over the great trochanters. Circumferences were measured over the naked skin and noted to the nearest 0,1 cm (Fredriks et al., 2005).

Performance Measurements

Various tests were used to determine the performance characteristics of football players.

Muscular strength tests

The hand grip, back, and leg strength of the subjects were measured as mentioned before (Heyward and Gibson, 2002). The best of three trials were recorded as "kg".

Speed and acceleration test

10 and 30 meter test was used to measure the speed and acceleration skills of subjects. The subjects started the test 1 meter behind from the starting line and the acceleration and speed values were recorded with the photocells placed 10 and 30 meters (Newtest 2000; Newtest Oy, Oulu, Finland). The better of two trials were recorded as "seconds".

Explosive power test

Standing long jump test was used to measure the explosive power. The participant stands behind the starting line and is instructed to push off vigorously and jump as far as possible. The participant has to land with the feet together and to stay upright. The distance is measured from the take-off line to the point where the back of the heel nearest to the take-off line lands on the mat (Castro-Piñero et al, 2009). The best of three

trials were recorded as "cm".

Flexibility test

The sit-and-reach test was used to measure flexibility and the application procedure was as mentioned previously (Heyward and Gibson, 2002). The better of two trials were recorded as "cm".

Core stability and endurance tests

Leg lifting, plank, isometric back extension endurance, sit up and push up tests were used by analyzing core stability and endurance features of football players. In leg lifting test, the subject lay supine with the legs straight and arms by the side of the body. While lifting both legs to about 90 degrees the subject inhaled. The subject then lowered the legs to approximately 15 cm (6 inches) off the floor (Strongoli, Gomez and Coast, 2010). In plank test, It is performed by first positioning the elbows directly underneath the shoulders so the upper arms are perpendicular to the floor. The hips are positioned so that a straight line can be drawn from the shoulders to the ankles through the hips. The test required subjects to hold the prone plank position for as long as possible (Cowley, 2009). In isometric back extension endurance test, endurance was evaluated by timing (holding time measured in seconds) how long the subject was able to hold the upper part of the body horizontal, while lying prone, with no support beyond the upper border of the iliac crest. The hands were kept behind the neck and the thighs and ankles were fixed to the table by 2 wide straps. Subjects were instructed to hold the position as long as they could (Ropponen et al., 2005). In sit up and push up tests, these tests were performed for 1 minute and only the appropriate applications were accepted.

2.3. Training Plan

CTG exercises were performed in the football field under the supervision of researchers. The training was scheduled at 17:00. During the first week of the training program, 10 repetitions and 2 sets for each movement were determined and the number of repetitions was increased each week, also the number of repetitions was increased in some weeks. The players were given 1 minute between repetitions and 3 minutes between sets in order to provide complete recovery. Table 1 shows the 8 week core training program applied to CTG.

***Table 1**. 8-week calisthenics training program*

Movements	1st Week	2nd Week	3rd Week	4th Week	5th Week	6th Week	7th Week	8th Week
Uneven Plank	2X10	2X15	2X20	2X25	2X25	2X30	2X30	2X35
Crunch	2X10	2X15	2X20	2X25	2X25	2X30	2X30	2X35
Abdominal Oblique Side Plank	2X10	2X15	2X20	2X25	2X25	2X30	2X30	2X35
Super Plank with Leg Raise	2X10	2X15	2X20	2X25	2X25	2X30	2X30	2X35
Lying Side Crunch	2X10	2X15	2X20	2X25	2X25	2X30	2X30	2X35
Superman	2X10	2X15	2X20	2X25	2X25	2X30	2X30	2X35
V-Up					2X25	2X30	2X30	2X35
Windshield Wipers					2X25	2X30	2X30	2X35
One Arm / Leg Plank Balance					2X25	2X30	2X30	2X35
Mountain Climber							2X30	2X35
Single Leg Bridge							2X30	2X35
Air Bike Crunches							2X30	2X35

2.4. Statistics and Data Analysis

The data obtained was compared by using Paired Samples T-Test was used for inter-group analysis and Independent Sample Test was used for intra-group analysis with SPSS 22 package program. Level of

significance was accepted as p<0,05.

3. Results

Table.2. Descriptive Statistics of Participants

Variable	Group	N	Mean	Std. D.
Age (years)	CTG	10	12,90	0,73
	CG	10	12,80	0,63
Height (cm)	CTG	10	155,83	9,64
	CG	10	157,05	5,84
BW (kg)	CTG	10	48,34	10,52
	CG	10	47,46	9,53

BW: Body Weight

In Table 2, while the average age of CTG is 12,90±0,73 years, of CG is 12,80±0,63 years. The height of the subjects are determined as 155,83±9,64 cm in CTG and 157,05±5,84 cm in CG. The mean BW of the subjects is determined as 48,34±10,52 kg in CTG and 47,46±9,53 kg in CG.

Table 3. Comparison of Pre-test and Post test Measurements between Groups

Variable	Group	N	Pre-test			Pos-test		
			Mean Std. D.	t	p	Mean Std. D.	t	p
Height (cm)	CTG	10	155,83±9,65	-0,342	0,736	156,29±9,64	-0,329	0,746
	CG	10	157,05±5,85			157,47±5,95		
BW (kg)	CTG	10	48,34±10,52	0,225	0,825	48,80±10,45	0,206	0,839
	CG	10	47,46±9,53			48,00±9,45		
BMI (kg/m2)	CTG	10	18,45±2,81	-1,557	0,137	18,29±2,80	-1,664	0,113
	CG	10	20,39±2,75			20,35±2,73		
BFP (%)	CTG	10	15,03±3,68	-2,059	0,054	14,92±3,70	-2,099	0,051
	CG	10	18,17±3,10			18,12±3,08		
10 m (sec)	CTG	10	2,19±0,12	-0,216	0,831	2,18±0,10	-0,777	0,447
	CG	10	2,20±0,79			2,22±0,11		
30 m (sec)	CTG	10	5,51±0,22	0,954	0,353	5,52±0,21	1,081	0,294
	CG	10	5,42±0,20			5,43±0,15		
FL (cm)	CTG	10	13,09±4,86	-0,457	0,653	14,56±5,17	0,016	0,987
	CG	10	14,18±5,77			14,52±5,76		
BS (kg)	CTG	10	65,40±22,47	0,265	0,794	78,14±23,24	1,492	0,153
	CG	10	63,37±9,05			66,56±7,86		
LS (kg)	CTG	10	49,70±24,12	0,723	0,479	63,52±23,43	2,223	0,039*
	CG	10	43,65±10,93			45,34±10,92		
RHGS (kg)	CTG	10	21,38±7,60	0,274	0,787	23,79±7,25	1,092	0,289
	CG	10	20,55±5,79			20,59±5,77		
LHGS (kg)	CTG	10	22,57±8,45	0,457	0,653	24,00±8,30	0,898	0,381
	CG	10	21,08±5,91			21,11±5,87		
SLJ (cm)	CTG	10	188,59±18,32	0,530	0,603	189,37±18,54	0,523	0,607
	CG	10	184,63±14,91			185,39±15,33		
LL (sec)	CTG	10	29,92±16,62	-0,173	0,865	46,95±15,04	2,383	0,028*
	CG	10	31,08±13,43			31,59±13,75		
PL	CTG	10	114,39±29,32	0,021	0,983	140,32±27,21	1,019	0,322

(sec)	CG	10	113,87±72,18			115,73±71,25		
BI (sec)	CTG	10	79,84±36,40	1,187	0,251	101,20±38,12	2,289	0,034*
	CG	10	70,72±23,06			69,93±20,31		
PU (pieces)	CTG	10	16,20±4,28	-0,432	0,671	19,60±4,55	1,278	0,217
	CG	10	16,90±2,80			17,50±2,50		
ST (pieces)	CTG	10	19,40±2,59	0,851	0,406	23,60±2,31	4,316	0,000*
	CG	10	18,30±3,16			18,60±2,83		

*p<0,05

BW: Body Weight, **BMI:** Body Mass Index, **BFP:** Body Fat Percentage, **FL:** Flexibility, **BS:** Back Strength, **LS:** Leg Strength, **RHGS:** Right Hand Grip Strength, **LHGS: Left Hand Grip Strength, SLJ:** Standing Long Jump, **LL:** Leg Lift, **PL:** Plank, **BI:** Back Isometric, **PU:** Push-Ups, **ST:** Shuttle

As seen in Table 3, when the pre-test and post-test results of the athletes in CTG and CG, it is understood that there is no statistically significant difference between the variables of body composition measurements as height, BW, BMI, BFP (p> 0,05). There is no statistically significant difference in performance parameters of the subjects for pre-test results (p> 0,05). As seen in Table 3, for post-test results, it is understood that there is a statistically significant difference in favor of CTG in the parameters of LS, LL, BI and ST (p <0,05); There is no statistically significant difference in other variables (p>0,05).

Table 4. *Comparison of Pre and Post-test Measurements in-Groups*

Variable	**Test**	**N**	**Experimental Group**			**Control Group**		
			Mean Std. D.	**t**	**p**	**Mean Std. D.**	**t**	**p**
Height (cm)	Pre	10	155,83±9,65	-15,057	0,000*	157,05±5,84	-11,699	0,000*
	Post	10	156,29±9,64			157,47±5,95		
BW (kg)	Pre	10	48,34±10,52	-12,393	0,000*	47,46±9,53	-5,063	0,001*
	Post	10	48,80±10,45			48,00±9,45		
BMI (kg/m2)	Pre	10	18,45±2,81	9,798	0,000*	20,39±2,75	1,500	0,168
	Post	10	18,29±2,80			20,35±2,73		
BFP (%)	Pre	10	15,03±3,69	3,498	0,007*	18,17±3,10	3,000	0,150
	Post	10	14,92±3,70			18,15±3,08		
10 m (sec)	Pre	10	2,19±0,12	0,762	0,466	2,20±0,79	-0,498	0,630
	Post	10	2,18±0,10			2,22±0,11		
30 m (sec)	Pre	10	5,51±0,22	-1,392	0,197	5,42±0,20	-0,728	0,485
	Post	10	5,52±0,21			5,43±0,15		
FL (cm)	Pre	10	13,09±4,86	-8,363	0,000*	14,18±5,77	-3,900	0,004*
	Post	10	14,56±5,17			14,52±5,76		
BS (kg)	Pre	10	65,40±22,47	-23,979	0,000*	63,37±9,05	-5,066	0,001*
	Post	10	78,14±23,24			66,56±7,86		
LS (kg)	Pre	10	49,70±24,12	-17,667	0,000*	43,65±10,94	-6,687	0,001*
	Post	10	63,52±23,44			45,34±10,93		
RHGS (kg)	Pre	10	21,38±7,60	-9,886	0,000*	20,55±5,79	-1,500	0,168
	Post	10	23,79±7,25			20,59±5,77		
LHGS (kg)	Pre	10	22,57±8,45	-8,683	0,000*	21,08±5,91	-1,000	0,343
	Post	10	24,00±8,30			21,11±5,87		
SLJ (cm)	Pre	10	188,59±18,54	-3,228	0,010*	184,63±14,91	-3,161	0,012*
	Post	10	190,37±18,32			185,39±15,33		
LL (sec)	Pre	10	29,92±16,62	-12,640	0,000*	31,08 ±13,42	-1,199	0,261
	Post	10	46,95 ±15,04			31,59 ±13,75		

PL (sec)	Pre	10	114,39±29,32	-26,237	0,000*	113,87±72,18	-,979	0,353
	Post	10	140,32 ±27,21			115,73±71,25		
BI (sec)	Pre	10	79,84±36,41	-14,460	0,000*	70,72±23,06	0,335	0,745
	Post	10	101,20±38,12			69,93±20,31		
PU (pieces)	Pre	10	16,20±4,28	-12,750	0,000*	16,90 ±2,80	-1,964	0,081
	Post	10	19,60 ±4,55			17,50±2,50		
ST (pieces)	Pre	10	19,40±2,59	-12,860	0,000*	18,30 ±3,16	-0,758	0,468
	Post	10	23,60 ±2,31			18,60±2,83		

*p<0,05

BW: Body Weight, **BMI:** Body Mass Index, **BFP:** Body Fat Percentage, **FL:** Flexibility, **BS:** Back Strength, **LS:** Leg Strength, **RHGS:** Right Hand Grip Strength, **LHGS: Left Hand Grip Strength, SLJ:** Standing Long Jump, **LL:** Leg Lift, **PL:** Plank, **BI:** Back Isometric, **PU:** Push-Ups, **ST:** Shuttle

In Table 4, it is seen that there is a statistically significant difference in the height, BW, BMI and BFP test results for experimental group (p <0,05), it is understood that there is a statistically significant difference in height and BW test results for control group (p <0,05). Also in Table 4, there is no statistically significant difference in the sprint results of 10-30 m (p> 0.05) and a statistically significant difference is found in FL, BS, LS, RHGS, LHGS, SLJ, LL, PL, BI, PU, ST tests for experimental group (p <0.05). There is no significant difference is detected in the results of 10-30 m speed, RHGS and LHGS, LL, PL, BI, PU (p> 0,05), a statistically significant difference is found in FL, BS, LS, SLJ tests for control group (p <0,05).

5. Discussion and Conclusion

In this study the effect of the core exercises on body composition and selected strength and motor skills in child soccer players was examined. Age, height, body weight, BMI, BFP, 10 and 30 m speed, flexibility, back strength, leg strength, right hand grip strength, left hand grip strength, standing long jump, leg lift, plank, back isometric, push-up, shuttle tests were applied.

Due to the fact that there was no statistically significant difference between groups in pre-test results, it could be said that the two groups were homogeneous. In body composition measurements, although there was no statistically significant difference between groups; in inter-group analysis, a statistically significant difference was found for all parameters in CTG and there was a statistically significant difference in height and body weight in CG. When the literature was examined, the studies those investigating the effects of core exercises on body composition were limited. Some studies (Otto et al. 2012; Bayrakdar et al., 2019; Genç and Ciğerci, 2019; Rogers and Gibson, 2009; Jago, R., Jonker, Missaghian and Baranowski, 2006; Nindl et al, 2017; Mehdizadeh, 2015; Cruz-Ferreira et al., 2009) reported that core exercises improved body composition; on the other hand some studies (Kloubec, 2010; Segal et al., 2004; Sekendiz et al., 2007) reported that core exercises had no effect on body composition. It was thought that increase in height and body weight parameters for both group was due to the natural course of this process since the subjects were in the period of growth and development, decrease in BMI and BFP values in CTG was also thought to be due to the positive effect of core training.

When the performance post-test results of the athletes were examined, a statistically significant difference was found in favor of CTG in the parameters of LS, LL, BI and ST test. For in-groups results, it was seen that while a statistically significant difference was found in FL, BS, LS, RHGS, LHGS, SLJ, LL, PL, BI, PU and ST tests in CTG; there was a significant difference in FL, BS, LS, and SLJ tests in CG. Turna (2020) reported that after 6-week core training, the balance, hand grip strength, abdominal crunch and sprint tests of soccer players increased significantly. Afyon and Boyacı (2016) showed that 8-week core on soccer players enhanced the vertical jump, throwing medicine ball, push-ups, shuttle, plank and speed. Balaji and Murugavel (2013) reported that after 8 weeks of core strength training, handball players' speed, agility, leg explosive strength and upper body strength increased significantly. In another study, Tse et al. (2005) examined the effect of the core endurance exercise program in rowers. After the core endurance training program applied twice a week for eight weeks, no significant change in long jump and vertical jump performances was reported. In their study,

Bassett and Llyod(2011) found that an improvement in the strength performances, plank positions and core regions of elite gymnastics athletes was achieved as a result of core training. In her study, Axel (2013) applied an 8-week core training program to 19 surfer with an average age of 15 years and found that there were statistically significant differences between pre-test and post-test measurements of strength, balance, and agility. Carpes et al. (2008) stated in their study that regular core training improved back and leg strength. Reed et al. determined that core exercises caused an increase in athlete's performance in their systematic review. Hoshikawa et al. (2013) reported significant improvements in unilateral hip muscle strength and jump performance in adolescent soccer players following the combination of core stability/strength training and regular soccer training as compared with single soccer training. In the study, Huichao (2014) found statistically significant differences in four different physical measurements and determined that core strength caused a significant increase in students' muscular fitness and endurance characteristics. Steffen et al (2008) declared that the training program aimed at core stabilization, they did not see improvement in lower extremity isokinetic Strength, isometric hip Strength, jumping ability, 40m sprint and long distance kick. Santana (2005) found that core training applied to competitor male swimmers increased their strength. Samson et al. (2007) found that 5-week core training improved strength in the central area of the body on tennis players.

There was no difference in 10-30 m speed tests in CTG and CG. Speed is an inherent genetic ability. However, it is known that speed feature can be improved by 10-15% with special and systematic exercises (Bompa and Haff, 2017). Therefore, it is considered that since there are no special exercises to improve speed in the core training program implemented in this study, the speed parameter does not develop. It is also seen that the flexibility feature increased in both groups. In literature, it was reported that children's flexibility skills were stable from 5 to 8 years old, at 12-13 years old, it reached the extreme point and decreased with age unlike other physical fitness parameters (Günay, Şıktar, E., Şıktar, E., 2017). It was thought that the increase in flexibility characteristics in both groups in our study was due to the effect of the growth and development process since the participants had not reached puberty yet and also that the reason for this could be increased muscle size, height and weight due to the children in development age, attending school physical education and sports activities or participating in daily extra physical activities. On the other hand, from the studies in literature, there are results that support our study, as well as those with differences, it is see that this difference may have resulted from the frequency, duration and load intensity of the training sessions, whether the subjects were athletes or not, gender, genetic differences, age group or the level of athletes.

In conclusion, it can be said that core exercises performed for 8 weeks have a positive effect on selected strength and motor skills of child soccer players.

References

1. Afyon, Y.A., Boyacı, A. (2016). The effect of 8-week center core (core) training on the development of some motoric features in football players aged 18. Journal of Human Sciences, 13 (3): 4595-4603.
2. Axel, T.A. (2013). The effects of a core strength training program on field testing performance outcomes in junior elite surf athletes. California State Univ, Master Thesis, Long Beach.
3. Balaji, E., Murugavel, K. (2013). Motor fitnes parameters response to core strength training on Handbal Players. International Journal for Life Sciences and Educational Research, 1(2), 76–80.
4. Bassett, S.H., Llyod, L,L. (20011). The effect of an eight-week training programme on core stability in junior female elite gymnasts. African Journal for Physical, Health Education, Recreation and Dance (AJPHERD), Suppl: 9-19.
5. Bayrakdar, A. (2018). The Effect of Calisthenic Exercises on Stable and Unstable Soils in Swimming Children on Balance, Gazi University, Institute of Health Sciences, Ph.D. Thesis, Ankara.
6. Bompa, T.O., Haff, G. (2017). Periodization: Training Theory and Method. T. Bağırgan (Trans). Ankara: Bağırgan Publishing House.
7. Carpes, F.P., Fernanda, B.R., Carlos, B.M. (2008). Effects of A Program For Trunk Strength And Stability On Pain, Low Back And Pelvis Kinematics, And Body Balance: A Pilot Study. Journal of Bodywork And Movement Therapies. 12 (1), 22-30.

8. Castro-Piñero, J., González-Montesinos, J. L., Mora, J., Keating, X. D., Girela-Rejón, M. J., Sjöström, M., Ruiz, J. R. (2009). Percentile values for muscular strength field tests in children aged 6 to 17 years: influence of weight status. The Journal of Strength & Conditioning Research, 23(8), 2295-2310.
9. Cowley, P. M., Fitzgerald, S., Sottung, K., Swensen, T. (2009). Age, weight, and the front abdominal power test as predictors of isokinetic trunk strength and work in young men and women. The Journal of Strength & Conditioning Research, 23(3), 915-925.
10. Cruz-Ferreira, A. I. C., Pereira, C. L. N., Fernandes, J. A. (2009). Effects Of Three Months Of Pilates-based Exercise In Women On Body Composition: 1447. Medicine & Science in Sports & Exercise, 41(5), 1617.
11. Fahey, T, Insel, P, Roth, W. (2011). Fit and Well: Coreconcepts and labs in physical fitness and wellness. 9th Edition Active, Softcover, Canada.
12. Fredriks, A. M., van Buuren, S., Fekkes, M., Verloove-Vanhorick, S. P., & Wit, J. M. (2005). Are age references for waist circumference, hip circumference and waist-hip ratio in Dutch children useful in clinical practice?. European Journal of Pediatrics, 164(4), 216-222.
13. Genç, H., Ciğerci, A.E., Sever, O. (2019). Effect of 8-week core training exercises on physical and physiological parameters of female handball players. Physical education of students, 23(6):297–305. https://doi.org/10.15561/20755279.2019.0604
14. Günay, M., Şıktar, E., Şıktar, E. (2017). Training Science. Ankara: Gazi Bookstore.
15. Heyward, V. H., Gibson, A. L. (2002). Advanced fitness assessment and exercise prescription (Seventh edition). Champaign, IL: Human Kinetics, 156, 314.
16. Hoshikawa, Y., Iida, T., Muramatsu, M., Ii, N., Nakajima, Y., Chumank, K., Kanehisa, H. (2013). Effects of stabilization training on trunk muscularity and physical performances in youth soccer players. J Strength Cond Res, 27(11), 3142– 3149.
17. Huıchao, L. (2014). Experimental research of applying the core strength training to the football elective course teaching in civil aviation universities. J Chemical Pharmaceutical Res, 6(1): 52-56.
18. Jago, R., Jonker, M. L., Missaghian, M. and Baranowski, T. (2006). Effect of 4 weeks of Pilates on the body composition of young girls. Preventive medicine, 42 (3), 177-180.
19. Kloubec, J. A. (2010). Pilates for improvement of muscle endurance, flexibility, balance, and posture. The Journal of Strength & Conditioning Research, 24(3), 661-667.
20. Mehdizadeh, R. (2015). The effect of core stability training on body composition and lipoprotein in menopausal older women. Iranian Journal of Ageing, 10(2), 156-163.
21. Nesser, T.W., Lee, W.L. (2009). The Relationship Between Core Strength And Performance In Division I Female Soccer Players. Fitness And Training, Journal of Exercise Physiology Online (JEP Online), 12(2): 21-28.
22. Nindl, B.C., Harman, E.A., Marx, J.O., Gotshalk, L.A.(2000) "Regional Body Composition Changes in Women After 6 Months of Periodized Physical Training",Journal of Applied Physiology, 88(6): 251-259.
23. Otto 3rd W.H., Coburn, J.W., Brown, L.E., Spiering, B.A. (2012). Effects of weightlifting vs. kettlebell training on vertical jump, strength, and body composition. The Journal of Strength & Conditioning Research, 26(5), 1199-202.
24. Reed, C. A., Ford, K. R., Myer, G. D., & Hewett, T. E. (2012). The effects of isolated and integrated 'core stability'training on athletic performance measures. Sports Medicine, 42(8), 697–706. https://doi.org/10.1007/BF03262289
25. Rogers, K., Gibson, A. L. (2009). Eight-week traditional mat Pilates training program effects on adult fitness characteristics. Research Quarterly for Exercise and Sport, 80 (3), 569-574.
26. Ropponen, A., Gibbons, L. E., Videman, T., Battié, M. C. (2005). Isometric back extension endurance testing: reasons for test termination. Journal of Orthopaedic & Sports Physical Therapy, 35(7), 437-442.
27. Samson, K.M., Sandrey, M.A., (2007). A Core Stabilization Training Program For Tennis Athletes. Human Kinetics - ATT IZ(3), 41-46.
28. Santana, J.C., (2005), Strength Training for Swimmers: Training the Core Strength and Conditioning Journal, 27(2),40-42.

29. Segal, N. A., Hein, J., Basford, J. R. (2004). The effects of Pilates training on flexibility and body composition: an observational study. Archives of Physical Medicine and Rehabilitation, 85 (12), 1977-1981.
30. Sekendiz, B., Altun, Ö., Korkusuz, F., Akın, S. (2007). Effects of Pilates exercise on trunk strength, endurance and flexibility in sedentary adult females. Journal of Bodywork and Movement Therapies, 11(4), 318-326.
31. Steffen, K.,Bakka, H. M., Myklebust, G., Bahr, R, (2008). Performance aspects of an injury prevention program: a ten-week intervention in adolescent female football players. Scandinavian Journal of Medicine & Science in Sports,18(5), 596-604.
32. Stølen, T, Chamar, K, Castagna, C,Wisløff, U.(2005). Physiology of Soccer Sports Medicine 35:(6), 501–536.
33. Strongoli, L. M., Gomez, C. L., Coast, J. R. (2010). The effect of core exercises on trans diaphragmatic pressure. Journal of Sports Science & Medicine, 9(2), 270.
34. Tse, M.A., McManus, A.M., Masters, R.S.W. (2005). Development and validation of a core endurance intervention program: Implications for performance in college-age rowers. J Strength Cond Res, 19, 547–552.
35. Turna, B. (2020). The Effects of 6-Week Core Training on Selected Biomotor Abilities in Soccer Players. Journal of Education and Learning, 9(1), 99-109.

A.S. Makarenko's Ideas Interpretation in Soviet Sport Success by A.V. Tarasov

Elena Ilaltdinova[1], Irina Lebedeva[2], Ramilya Arifulina[3], Svetlana Frolova[4], Tatiana Belyaeva[5] and Marina Lebedeva[6]

[1] Professor, Minin Nizhny Novgorod State Pedagogical University, Russia.
[2,3,4,5] Associate professor, Minin Nizhny Novgorod State Pedagogical University, Russia.
[6] Associate professor, Nizhny Novgorod State Linguistic University, Russia.

Abstract

The article reveals the pedagogical experience of A.V. Tarasov, a great Soviet athlete and hockey player, a coach, and a founder of the Russian hockey school. The idea of the organic connection between the sports pedagogy of A.V. Tarasov and the educational theory and practice of A.S. Makarenko is stated and proved in the article. The coaching and educational activities of A.V. Tarasov and his concept of work on the formation of a sports team are analyzed considering documentary, archival, and biographical sources. The authors prove undoubtful succession of Tarasov's pedagogy of sports with Makarenko's pedagogy. Based on Tarasov's study of pedagogical works, the methodological foundation of his innovative contribution to upbringing of an athlete as a member of a sports team is disclosed. The work reveals the similar views of A.V. Tarasov and A.S. Makarenko on the problems of forming a team of like-minded people, the principles of the division of duties in sports and work, the rules of forming leaders in the team, and the development of civic values of its participants. It also designates fundamental moral values of the great teacher and the great coach as educators of youth and reformers of pedagogy and sport.

Keywords: sports pedagogy, team sports, education, collective, A.S.Makarenko, vospitanie

1. Introduction

1.1. Literature Review

From the middle of the 1950s to the beginning of the 1960s the interpretation of ideas and experience of A.S. Makarenko as "pedagogy for children" and "school of study" was successfully transformed into "adult pedagogy" based on universal principles of education presented as 'vospitanie' in Russian tradition. From the 1960s to early 1980s Makarenko's legacy was actively used in the development of social psychology, pedagogy, sociology, and ethics. Since the 1970s the experience of purposeful application of organizational and pedagogical views of A.S. Makarenko in the system of production, economy, management of enterprises and organizations has begun to accumulate (Ilaltdinova, 2014).

Some researchers remark that from 1988 to 1989 in the period of "perestroika" in the USSR, many famous economists, for example, L.I. Abalkin and G.Kh. Popov wrote about the need of referring to Makarenko's legacy when developing a new approach to the improvement of the Soviet economy (Akseyonov, 2012, Ilaltdinova, 2015). In the early 2000s, the problem regarding the connection between the social and pedagogical creativity of A.S. Makarenko and the phenomena and processes occurring in various spheres of economic and social development of Russia and some foreign countries, such as Brazil, Chile, Israel, USA, got intensified (Ilaltdinova, 2013, Frolov, 2011, Frolov, Ilaltdinov, Aksenov, 2015).

Only recently the attention of researchers has been attracted by the effective use of A.S. Makarenko's ideas in sport, mainly in the Soviet ice hockey. This is thoroughly described in the works of A.V. Tarasov published in the 1960s-1980s. [Hockey tactics (1963), Age of Majority. Hockey. Hockey players. 3rd ed. (1970), Hockey of the Day to Come 2nd ed. (1971), Way to yourself (1974), Hockey without secrets (1988)]. It is known that A.V. Tarasov (1915-1995) was one of the founders of the Russian ice hockey school, Honored Master of Sports, Honored Coach of the USSR (1957), the champion of the USSR in the 1948–1950s and had PhD in Pedagogical Sciences.

1.2. Research Question

What is the relationship of coaching system of A.V. Tarasov which proved to be a success and educational ideas of A.S. Makarenko and to what extend is it resulting from the pedagogical instruments?

2. Material and Methods

To answer the research question the comparative approach to content analysis of works of A.S. Makarenko and A.V. Tarasov on education of young people is applied. The methods of comparative analysis form the research strategy, aiming at explanations of relationships and connections between the educational theory and practice of two great educators of different periods of soviet history involved in the context of youth education in different social spheres. A description of educational phenomena by comparing them across systems and through time is given on the basis of a goal-oriented point of reference. The universal features of education as 'vospitanie' cannot be identified without comparing educational phenomena from different contexts (labour and sport). Comparative research presupposes an extensive theoretical argument underlying it, which is the methodology of education integrating corresponding purpose, means and results which allow to ponder over the relationship between the education cases under review.

3. Results and Discussion

Like A.S. Makarenko, A.V. Tarasov was a native of the working environment, and in the early 1930s he became an employee of the tool shop of the aviation plant. "The attitude of the workers to us, teenagers, was the most heartwarming as if we were their own sons. They carefully taught us how to work skillfully, to live conscientiously, to value time, and they demanded conscientiousness, discipline and honesty. They were real craftsmen, who loved their profession and work in general" (as cited in Tarasov, 1988, p.174). A.V. Tarasov was not even 20 years old, when he enthusiastically began to play football and ice hockey, studied at the school of future trainers and soon became a coach of his plant's hockey team. At the very beginning of the book "Age of Majority" A.V. Tarasov (1968) writes, "... I must immediately invite two great teachers, Anton Semenovich Makarenko and Konstantin Sergeyevich Stanislavsky, to be co-authors of this book" (p.3).

"... We, coaches, have adopted one of the basic Makarenko's principles. The more respect for a person you have, the bigger demands should be" (as cited in Tarasov, 1968, p. 18). Collectivism is defined as the foundation of brilliant and steady success of the Soviet hockey at that period [ibid.]. "Collectivism inspires the game" (as cited in Tarasov, 1968, p. 42).

Another aspect of Makarenko's ideas which is clearly represented in A.V. Tarasov's book is his fundamental thesis. Pedagogy is not invented; it objectively exists in educational practice of society and is an important factor of its functions and development. The aim of pedagogical science is to adequately and prospectively realize the principles, forms and means of working social pedagogy according to "the present and future social needs". A.V. Tarasov thoroughly understood and used the views of A.S. Makarenko in the practice of sports, viewing him as a social teacher and reformer, a prominent representative of the domestic socio-economic system. The observance of principles of human education became the foundation of the achievements of the Soviet ice hockey in 1948-1967, and the ideology of patriotism, friendship, sports brotherhood is a spiritual basis of the Russian school of ice hockey existed from 1946 to 1980. Makarenko's approach led A.V. Tarasov to the most important decision. When preparing a professional athlete, the main thing is the person and his development, and only then professional training. A.S. Makarenko stated that professionalization is unacceptable when speaking about the underage. Only basic professional training is possible, but readiness for the "human profession" dominates. It turns out that it is also peculiar in relation to adults. Foreign researchers of the views and educational practices of A.S. Makarenko confirm these conclusions. For example, I. Adizes talks about modern training of management and human resources specialists. "It is easier to hire a person and give him knowledge, thus, making a person out of him than to hire someone who has already got knowledge (Ilaltdinova, Lebedeva, Frolova, Arifulina, Aksenov, 2016, Frolov, Ilaltdinova, Aksenov, 2015, p. 9). The priority of upbringing in education (even when teaching literacy) is the main thing in the pedagogical views of P. Freire (Frolov, 2011).

In this context it should be noted that A.V. Tarasov contributes a lot to the interpretation of collectivism, its theory and practice. He characterizes collectivism as "real", "natural", "modernly understood" (Tarasov 1988, Semler R. Maverick, 2007), i.e. caused by life practice, objective need for the unity of the collective and personal in achieving lasting success. He is against "forced" collectivism that is acted "by order" only for the sake of officially adopted principle, without support by the structure of collective actions. This usually results in formalism and disappointment, denial of the very essence of collectivism. A.V. Tarasov (1968) was sure that in a new system of sports, a coach and an athlete are united, equally belong to their team and their sports club and are equally responsible for the sports community and their fans (p. 99). This is the highest level of collectivism, respectful demand on a person in sports. "We have fought for the culture of an athlete. An intellectual person always plays better, he is actually creative on the field, and he doesn't just fulfill the instructions of the coach. He plays on a grand scale and with pleasure ... We would like the players themselves to decide which of them deserves to wear red sweaters with the letters "USSR" on them" (p. 121). This principle is directly related to the idea and practice of a united team implemented in educational organizations of Makarenko, the Gorky Colony and the Dzerzhinsky Commune.

The practice of sport confirms fundamental importance of labour in new methods of upbringing and pedagogy of A.S. Makarenko. "Labour has always been the basis for human life and culture" (Frolov, Ilaltdinova, Aksenov, t. 6, p. 105). Outside of work, there is no socially and morally full personality, a person's well-being and happiness. "Efficiency", "diligence", and "labour honor" are often used in A.S. Makarenko's and A.V. Tarasov's books. Makarenko's theory and practice of education with the help of labour strongly overpass the characteristics of labour only as a "labour process" in the aspect of professional skills of an employee. It is a question of free labor, attraction of workers to "housekeeping", management of a united team or a "collective" of adults and children, whose activities are supported by the state and society. In ice hockey, as shown in Tarasov's book, this principle is peculiarly adopted in different aspects, for example, general meetings of a sports team, the coaches' council, cooperation of a coach and athletes to determine the strategy and tactics of the game, to take into account and to evaluate mutual and individual actions of the players, recruitment of a hockey team and its primary team, or the "core element", reasonable distribution of functions of attackers and defenders, development of spiritual and moral relations. Thus, Makarenko's pedagogy is realized in its integral feature. Such pedagogy is "not direct, but rather parallel". Educational influences become less artificial, and they act as sensible requirements for a successful work process, or sport performance in our case, where pedagogical and sports achievements are inseparable.

In the Gorky Colony and the Dzerzhinsky Commune production and upbringing are "parallel ". Production remains productive and at the same time is subjective to the pedagogical goals Frolov, Ilaltdinova, Aksenov, t. 4, p. 209).

Experience of applying Makarenko's ideas into sports and used by Tarasov in his pedagogy discovers many other features of Makarenko's interpretation of a "collective" (team) and "collectivism", which are not yet appreciated by teachers and researchers. Among these principles, the most important one is that a team or a "collective" is a voluntary association, and sports clubs and sport teams clearly demonstrate this primary feature. In 1925, A.S. Makarenko wrote, "The Colony [named after Gorky] is organized as an open institution. Those, who do not like being in it, can freely leave it" (Frolov, Ilaltdinova, Aksenov, t. 1, p. 142). Later he said, "Our colony was a free association of people, no one was forced to live here" Frolov, A.A, Ilaltdinova, E,Yu, Aksenov, S.I. t. 6, p. 153). In his practice, the voluntary nature of being a part of the colony was combined with the voluntary acceptance of everyone in the team and with the right to exclude the unworthy. When receiving newcomers, they were given 1-2 days to familiarize with the colony and make a decision about staying in it. In such a way upbringing of vital qualities, such as independence, personal and mutual responsibility began, also moral and psychological means of attracting an individual to the team were used. From the experience of A.V. Tarasov follows that athletes from regional sports organizations were sent to the country's leading hockey teams, recommendations of reputable athletes were taken into account as well. Mutual and individual guarantee and trust led to serious moral obligations; a newcomer

accepted in the team had to follow the moral principles, discipline, regime, household routine (in particular, quitting smoking and alcohol) established in the team. This approach can be truly considered the principle of erasing boundaries between mutual (collective) and individual. Today, the idea of correlation of sport-physical qualities of a young athlete and his moral principles is successfully proved. "A healthy body is the basis of a healthy mind, and a healthy, stable mind, in its turn, contributes to a healthy body and overcoming diseases. Such interdependence gives the right to talk about mental culture and the culture of the spirit within the boundaries of physical culture. Without these cultures a person in a modern society can maintain both physical and mental health with difficulty" (Volozhanin, 2017).

A.V. Tarasov (1968, 1971) distinguished "technical collectivism", that is manifested in "pass", transferring the puck from one player to another, and "tactical", a game without a puck.

In "technical collectivism" the number of passes, the speed of the puck, the number of sharp game moments, and the dynamics of attack development are greatly important. In foreign teams, pass is managed by the one who owns the puck. This means that four players depend on one. Therefore, the players' activity and initiative are reduced. The pass turns into a universal means of conducting the attacks, it leads to a destructive pattern, and "the schematic thought and action" arises. The game is led by the "star player" and his superiority.

In the new system of a game, "technical collectivism" acquires new features. A large number of passes enhance the attack impact, its speed (the puck is always faster than the player), the pass becomes secretive, unexpected for the opponent, confuses his game plan (Tarasov, 1968).

Researchers of educational creativity of A.S. Makarenko emphasize the importance of a new educational phenomenon in implementation of the principle of collectivism, this principle is "pedagogical techniques" (Ilaltdinova, 2015, 2010, Frolov, 2006). A mutual (collective) action needs to be structurally organized, providing for everyone's effective and creative participation and avoiding the prominence of one at the expense of others. A collective action becomes multifunctional; it encourages creating a universal player. A.V. Tarasov's books represent Makarenko's idea of primacy of an inductive method in pedagogy, with the guidance of deductive positions and their experimental and practical examination. The problem of the relationship between the system and the method in pedagogy is also solved in a corresponding manner. The search for an efficient pedagogical system organically includes the need for its constant, dialectically contradictory development.

In the practice of development of the strategies and tactics of an ice hockey "battle", A.V. Tarasov often used Makarenko's "pedagogical risk" due to the fact that creative decisions cannot be made without it.

The trainer believed that a sensible use of "risky experiments" was a driving force of innovation, leading to a new quality of pedagogical theory and sports practice. All mistakes are recommended to be referred wisely as they can be made in any activity. A.V. Tarasov wrote that in the desire for sporting victories, "one should not be afraid of defeat, it is beneficial; with a panic fear of defeat no experiments are possible, no verification of a new tactic takes place" (as cited in Tarasov, 1971, p. 42). A.S. Makarenko has a similar statement. "We need a very careful, strictly dialectical attitude to mistakes, because very often what seems to be an error, with more patient testing, turns out to be a useful factor" (Frolov, Ilaltdinova, Aksenov, v. 3, p. 56).

One of the most important problems of a team (collective) is the attitude towards the "stars", which are objectively "born" in any community. Practice shows that this topic remains consistently relevant and develops in many formats, including the paradigm "leader – collective". Today, key characteristics of a leader are actively studied. Their main features are the following, to focus on the group, the ability to set goals and work out development strategies, readiness to coordinate their goals with group goals, level of self-control, organizational culture and self-discipline; the level of development of organizational skills, skills to establish effective communication relationships with the group, etc. (Bicheva, Filatova, 2017, Ilaltdinova, Frolova, Lebedeva, 2018). These characteristics fully reflect the image of both the coach himself and the "stars" he has created. In this context it should be noted that in a new system of A.V. Tarasov's game the position and character of the "star" is fundamentally changed. They did not prevent each player from

showing all his skills, including his superiority in a one-on-one game. It was difficult for the opponent to play against the three who could score pucks and play up to the teammate. An example is the famous "star" trio, A. Almetyev, K. Loktev, and V. Aleksandrov. "Versatile, technical, intelligent, they are amazingly united ... they could do everything their predecessors could, but they went further (they couldn't help but go: because ice hockey as a whole, like life, progresses) ... They managed to get rid of the tendency of individual play" (as cited in Tarasov, 1968, p. 14). With their well-coordinated "star" game, they proved Makarenko's idea. Genuine collectivism is not only the most important condition for overall success, but also the best environment for the development of an individual. This is a game "with equal skill, without trying to stand out, literally forgetting about yourself so that a partner can play successfully" [ibid.]. In 1964 at the Olympic Games in Innsbruck the organizers could not decide which team to award with a special prize. The decision was to give the prize to B. Mayorov's team, so that the teammates themselves would decide who was the worthy. In this context it is better to refer to the principle of "pedagogical expediency" stated by A.S. Makarenko. For him, pedagogy is a practice-oriented social science, i.e. "socially active", "practically purposeful" and "responsible" before a person and society, "overtaking society in its human creativity" (Frolov, Ilaltdinova, Aksenov, t. 6, p. 73, 235, 242). Like A.S. Makarenko's, A.V. Tarasov's pedagogical work is a continuous creative search, definition and consolidation, development of effective organizational and technological means of pedagogical process. New ideas and decisions are tested by practice, embodied in reasonable theoretical assumptions. Both researchers of pedagogical science and "pedagogical" sports are closely related to understanding of its social foundations and social significance, need to bring pedagogical knowledge "to masses", to the broad sphere of life and activity of children and young people. In the preface to the book "Hockey of the Days to Come" A.V. Tarasov writes (Tarasov, 1971),"I was fortunate enough to meet with great athletes who were looking for their own way to excellence, with creative coaches, with famous masters of foreign teams. It was an excellent school of life experience and ice hockey wisdom". It should be noted that A.S. Makarenko and A.V. Tarasov both went through their professional career from ordinary participants to executives. In A.V. Tarasov's book "Age of Majority" his life path is reflected in the title of one of the chapters "Coach: a specialist, teacher, director, and psychologist." The author puts the specialist first. It means that a true specialist is a person experienced in the business that he manages. It is known that A.V. Tarasov was an ordinary ice hockey player for several years. A.S. Makarenko was a teacher-tutor for 9 years (1905-1917, with a 3-year break for studies at a teacher's institute and service in the military). Both teachers categorically denied direct psychological intervention in pedagogical process. That means, a psychologist with no previous special experience (an ice hockey player or a teacher) and a psychologist who is limited to "studying the personality " and is not able to productively influence the organization of a certain activity (sports, labor), since he practically does not know it. The attitude to the experience accumulated in collective work also made a great coach and a great teacher. The topic of generation interaction was a priority for both; they understood that succession of traditions, the connection between the experience of achieved victories and new goals not only retain the strength of the collective, but make it sturdier, more stable and stronger. Thus, Makarenko's practice presents the connection of generations at the level of an "educational collective" of a pedagogical institution (unified for its pupils and employees) and at the level of a "children collective", when A.V. Tarasov stated this connection in the process of forming a sports team, gathering its "links". The veterans of sports learned how to properly treat the renewal of players, became mentors of young people, enriching pedagogy of sports. However, practice has shown that leaving the team (for Makarenko, from an educational institution) is not always painless for team members. This issue is tackled by both A.S. Makarenko, (1983-1986) and A.V. Tarasov (Tarasov, 1968). "They must understand, if the highest point of their skill has been reached, it's time to give the way to a young athlete. If you stay longer, you start unwittingly not helping but harming your team" (Tarasov, 1968, p.93). Awards to athletes, titles, extensive use of rituals, musical accompaniment, symbols were also part of the pedagogy that A.S. Makarenko always used in his activities (games, salutes, gatherings, marches) (Frolov, Ilaltdinova, Aksenov, t. 8, p. 279, 298). It is known that sports awards and medals were always awarded in a festive atmosphere, which gave rise to a high degree of emotion, both among athletes and fans.

It is clear that the public worship of Soviet teams was accompanied by the government's attention to athletes, but the material never prevailed over the moral in the consciousness and life values of Soviet athletes. In A.V. Tarasov's works the issues of nutrition, recreation, medical care for athletes were ignored but usually they are important in sport, but apparently the author, according to the ideology of the time, considered that this was not directly related to pedagogy. History shows that at the early stages of Soviet ice hockey, athletes had to endure serious hardships. They had to train in tough conditions, experience domestic inconveniences, overcome everyday difficulties, deal with bad equipment, but thanks to their persistence, victories, courage, and care of coaches, Soviet sports clubs gradually gained significant governmental financial support and became more equipped. It should be noted that the problem of financing sports clubs is not fully resolved even now. Researchers note that "lately Russia has increasingly faced financial problems in such a popular sphere for many people as sports. Unfortunately, this is so much the case when teams with a rich history and years of traditions cease to exist being not able to overcome the difficulties. Such fate befell, for instance, FC Moscow, FC Saturn and many other famous sport clubs. As a rule, different sport clubs, fully or partially, depend on the regional budget, which is normally used to finance their existence. In addition, if in the old days with a more or less stable economic situation in the country such financing raised no doubts of the government, nowadays, when they tighten up everything as much as possible, financing of regional sport clubs and sports as a whole has been significantly reduced" (Skitnevskiy, Amenitsky, Novozhilova, 2018, p. 96).

Conclusions

In the Soviet Encyclopedia (1978) the list of founders of Russian ice hockey starts with A.V. Tarasov's name. "The formation and development of the Russian school of ice hockey is primarily associated with the names of such coaches as A.V. Tarasov, A.I. Chernyshev, V.K. Egorov, honored masters of sports V.M. Bobrov, E.M. Babich, V.G. Shuvalov and others ". A.V. Tarasov managed to create a unique pedagogical system of sportsmanship; the methodology of development of Russian hockey that still exists, which has been built on the scientific understanding of collective pedagogy of A.S. Makarenko. The comparative analysis proves that A.V. Tarasov is the brightest follower of A.S. Makarenko, the creator of invasion team sports pedagogy. His coaching system is a key to Russian ice hockey school success in soviet times. It involves the purposeful solutions of the problems of forming a team, dividing the duties in sports and work, dealing with leaders, and developing of moral values.

References

Akseyonov, S.I. (2012). Pedagogicization of child-adult production in the experience of A.S. Makarenko. Public Education, 7, 255-258

Bicheva, IB, Filatova, O.M. (2017). Formation of a teacher-leader in the university educational process. Vestnik of Minin University, 3

Frolov, A.A. (2006). Makarenko, A.S. In the USSR, Russia and the world: a historiography of the exploration and development of its legacy (1939-2005, critical analysis). N.Novgorod: Publishing house of the Volga-Vyatka Academy of State. Services, 417

Frolov, A.A. (2010). "Man in the Production System" by F. Fukuyama and A. Makarenko. Voprosy Economiki. Moscow, 8

Frolov, A.A. (2011). A.Makarenko and P.Freire: Comparison of the foundations of social and educational activities. Historical and pedagogical knowledge at the beginning of the III millennium ... VII national scientific conf. M: 154 -157

Frolov, A.A., Ilaltdinova, E.Yu., Aksenov, S.I. (2015). Iskhak Adizes and Anton Makarenko: Development is the basis of an organization's success. N. Novgorod: Publishing house of the Minin University, 22

Hockey. Great Soviet Encyclopedia. (1978). Vol.28. Moscow: Soviet Encyclopedia, 283-285.

Ilaltdinova , E. Y., Frolova , S. V., & Lebedeva , I. V. (2018). Top Qualities of Great Teachers: National and Universal. Advances in Intelligent Systems and Computing. V.677, 44-52. DOI:10.1007/978-3-319-67843-

6_6
Ilaltdinova E.Y., Lebedeva I.V., Frolova S.V., Arifulina R.U., Aksenov S.I. (2016). Methodology for collaborative management of Makarenko and Adizes. International Review of Management and Marketing. V. 6. № 5, 149-153.
Ilaltdinova, E.Yu. (2010). The official pedagogy and social pedagogical initiative in the history of exploration and development of the legacy of Makarenko, A.S.: 1939 – mid 1970s. N.Novgorod, 219
Ilaltdinova, E.Yu. (2013). Management methodology of I. Adizes and A.S. Makarenko. Continuity and development. Public education, 2, 84
Ilaltdinova, E.Yu. (2014). National history of exploration and development of the Makarenko's legacy: 1975-2013. N.Novgorod: Minin University, 149
Ilaltdinova, E.Yu. (2015). Educational results: the basis - the logic of pedagogical expediency of the educational space. Conference proceedings SIC Sociosphere, 43, 9-10
Makarenko, A.S. (1983-1986). Pedagogical works: in 8 volumes, comp.: Frolov, A.A. on all volumes, Gordin, L.Yu and Vinogradova, M.D. on individual volumes. Moscow: Pedagogy
Makarenko, A.S. (2007-2015). School of life, labor, education. Educational book on the history, theory and practice of education. Parts (volumes) 1-8, comp. and comments. Frolov, A.A, Ilaltdinova, E,Yu, Aksenov, S.I. N.Novgorod
Semler R. Maverick. (2007). The success story of the most unusual company in the world. Translation: N. Bystrozorov. Moscow: Publishing House "Dobraya Kniga", 384 (Published in Sao Paulo, Brazil, 1993)
Skitnevskiy, V.L.; Amenitsky, A.V.; Novozhilova, J.S. (2018). Peculiarities of Financing of Sport Clubs In Russia And Abroad (Case Study: Football Clubs). Modern journal of language teaching methods. Vol. 8. Issue: 1, 96-104
Tarasov, A. V. (1988). Hockey without secrets. Moscow: "Molodaya Gvardia", 270
Tarasov, A.V. (1968). Age of majority, Lit. O. Spassky's record. Moscow: Publishing house "Molodaya Gvardia", 130
Tarasov, A.V. (1971). Hockey of the Days to Come, Lit. O. Spassky's record. Moscow: "Physical Culture and Sport", 2nd ed., 359
Volozhanin, S. E. (2017). The value of physical culture in the education of students. Vestnik of Minin University, vol. 6, 3

The Relationship of the Running Distances of the Teams Participated in the Fifa Women World Cup with the Age and Estimated Oxygen Consumption Capacities

Mustafa Karakuş[1] and İrfan Marangoz[2]
[1]*Assist. Prof. Dr., Erciyes University School of Physical Education and Sports, Kayseri, Turkey.*
[2]*Assoc.Prof. Dr., Ahi Evran University, School of Physical Education and Sports, Kırşehir, Turkey.*

Abstract

Background and Study Aim: The purpose of this study is to examine the relationship of the running distances of the teams participated in the FIFA Women World Cup age and estimated oxygen consumption capacities .

Material and Methods: The average values of the matches they played during the organization were taken in calculating the running distances of these teams. SPSS 22.0 software was used to evaluate the data .

Results: According to the research results, the average age of the teams participated in the event was 26,11±3,92, the oldest team was the US team with the average age of 28,69±4,23, the average running distance of the athletes was 104,13 km. – 6,94 km., the teams having the longest running distance were Sweden and Canada with 109,5 km. – 7,3 km., the team having the shortest running distance was Nigeria with 95,75 km. – 6,38 km. VO2 Max average of the teams was 40,44 ml/kg/min. The highest VO2 Max was Sweden and Canada's teams with 43,11 ml/kg/min, and the lowest was Nigeria's with 36,26 ml/kg/min. It was determined that the relationship between the team running averages, athletes running averages and estimated maximum oxygen capacity was positive, hence, high oxygen capacity affects team running average and athlete running average in the direction of increase.

Conclusions: According to the result of the study, it can be stated that there is a significant relationship between performance, VO2max and age, thereby low average age affects team running average and individual performance positively .

Keywords: Football, Women football players, Running Distance, Oxygen

1. Introduction

Football natural conditions, in other words, country specific characteristics or the physical differences of the players cause the occurrence of different game styles in every geography, even in every country (1). Football game includes both aerobic and anaerobic components (2). Aerobic strength is an important performance variable for athletes. It is known that the factors affecting aerobic performance are age, gender, genetics, body composition, condition level and exercise model. Considering gender among these factor, it has been reported that aerobic performance is lower in females than males (3).

The hormonal differences between females and males can explain the large part, if not most, of the differences in athletic performance. Testosterone secreted from the male testicles has a strong anabolic effect. Although some performance differences between females and males can be explained by estrogen, the effect of the estrogen is far from the testosterone's effect. It is known that estrogen increases the fat accumulation in especially breasts, hips and subcutaneous tissue. This is a disadvantage if the highest level of athletic performance depends on the ratio of the performance speed or total body muscle strength to body weight (4).The requirements in football differ depending on the game style, the position in the game and the level of the competition. The energy consumed during the football game requires the presence of some physiological capacities in the players. These capacities are related to the conditions and training methods of the players (5). Maximum oxygen consumption (MaxVO2), one of the most important parameters of the condition, is the amount of maximum oxygen consumed by the body weight per kilogram per minute. In the related researches, it was stated that MaxVO2 increases with training (6), and decrease with age (7). Decrease in MaxVO2 depending on age can also be seen in elite athletes as well as in sedentary individuals. However,

this decrease can be less clear depending on the exercises done in endurance trainings(8).

2. Literature Review

There are some recent studies explicitly proposing different types of...

3. Method

3.1. Participants

FIFA Women World Cup was held in France between the dates of 07 June and 07 July 2019. 24 countries and 552 athletes participated in the tournament.

3.2. Materials

The data of the teams participated in the tournament was recorded from FIFA official web site. The ages and the running distances in all matches of the athletes (n=552) playing in the teams (n=23) participated in the World Cup were recorded one by one. The average values of the matches they played during the organization were taken in calculating the running distances of these teams. While the averages of the teams and players were calculated, each match was taken as 90 min. E.g., Argentina could not pass the group stage, and played total 3 matches. The average of the team running; the running distances recorded in 3 matches are 97 km +101 km + 98 km respectively, and total 296 km / 3 matches = 98,66 km. The average of player running was found by dividing the average running distance to the total playing athlete number: 98,66 /15= 6,58 km. If the match went into extra-time, the added 30 min. (1/3 of the 90 min. for each extra-time, 0,33), were added to 90 min. and calculated as 120 min. (For instance, Australia could not pass the level of the last 16, and played total 4 matches. The averages of the team running were respectively 104 km + 105 km + 103 km + 147 km, and total 459 km / 4.33 matches = 106 km. The player running average was also found by dividing the running distance to the total playing athletes as 106 /15= 7,07 km (9). In addition, the altitudes of the participated countries were also determined. In calculating the estimated oxygen consumption capacities of the teams, the formula of (M-0.3138)/0.0,278 developed by Cooper was used by modifying (10). [distance (M) covered in 12 minutes is turned into 1 mile (1609m)]. In the modified formula, it is possible to calculate over 36 minutes by taking 3 times the numbers in the formula designed over 12 minutes. The remaining average of 9 minutes of football played over 45 minutes passes in passive periods (penalty, free throw, foul, goal kick, etc.). An approximate value calculation would give an approximate value of running distances. As a result, a new VO2 Max calculation formula that could give the approximate value of the running distance in football matches was formed. To this formula, the running distances of the teams were calculated and the estimated oxygen consumption calculations were done.

VO2 Max= Running Distance-0,9414/0,0834 [Running Distance/1 mile (1,609m)]

A direct VO2max measurement can be very dangerous since it is required to be used close to the borders of respiratory and circulatory systems, and especially heart system. In fact, in many VO2max measurements, the presence of a team for medical intervention is obligatory. Nevertheless, as mentioned above, methods have been developed to estimate VO2max levels (11).

3.3. Statically Analysis

SPSS 22.0 software was used in the statistical analysis of the obtained data, and the results were evaluated at the significance level of $p<0,05$. The test of normality was performed to determine whether the data are suitable for the normal distribution. The number of the examined team in the study is 24. The number of the examined athletes from separate countries is 24. Since this number is below 30, Shapiro-Wilk table was surveyed. According to Shapiro-Wilk table, there was a normal distribution since there were variables ($p>0.05$). Therefore, parametric test was implemented to the variables. Descriptive analysis was performed for descriptive statistics (Table 1, Table2, Table 3), and Correlate-PARTIAL analysis was performed for multiple comparison (Table 4, Table 5).

4. Results

According to the research results, the average age of the teams was 26,11±3,92 years, the country having the oldest team was the US with the average age of 28,69±4,23 years, the country having the youngest team was Italy with the average age of 23,04±3,22 years, the average running distance of the teams and players was 104,13 km. – 6,94 km., the teams having the longest team and player running distance were Sweden and Canada's with 109,5 km. - 7,3 km., the team having the shortest team and player running distance was Nigeria's with Nigeria 95,75 km. - 6,38 km. VO_2 Max average of the teams was 40,44 ml/kg/min, Sweden and Canada teams had the highest VO_2 Max with 43,11 ml/kg/min, and Nigeria team had the lowest VO_2 Max 36, 26 ml/kg/min

Table 1. *Descriptive Statistics of the Ages of the Teams*

Countries (N=24)	N	Min.	Max.	x±sd
The USA	23	20,00	36,00	28,69±4,23
Japan	23	19,00	35,00	27,82±4,57
Brazil	23	21,00	41,00	27,56±4,71
Sweden	23	21,00	34,00	27,47±3,99
Holland	23	20,00	34,00	27,17±3,63
England	23	20,00	33,00	27,00±3,41
Thailand	23	20,00	33,00	26,95±4,07
Canada	23	21,00	31,00	26,82±2,77
Argentina	23	17,00	37,00	26,78±4,56
Spain	23	21,00	36,00	26,56±4,13
New Zealand	23	19,00	31,00	26,52±3,57
People's Republic of China	23	21,00	30,00	26,34±2,99
France	23	20,00	33,00	26,00±3,82
Norway	23	19,00	39,00	25,78±4,27
South Africa	23	17,00	33,00	25,52±4,45
South Korea	23	20,00	33,00	25,52±3,30
Germany	23	17,00	33,00	25,47±3,75
Chile	23	17,00	31,00	25,43±4,11
Australia	23	16,00	34,00	25,39±4,47
Nigeria	23	18,00	33,00	25,04±4,55
Scotland	23	20,00	30,00	24,86±2,81
Cameroon	23	18,00	36,00	24,82±4,83
Jamaica	23	19,00	32,00	24,08±3,83
Italy	23	17,00	29,00	23,04±3,22
Average	**23**	**16-29**	**29-41**	**26,11±3,92**

Table 2. *The Average Running Distances of the Teams and Players (km)*

Countries	Team Average (km)	Player Average (km)
Canada	109,5	7,3
Sweden	109,47	7,3
Japan	108,75	7,25
Norway	108,63	7,24
Germany	108,6	7,24
New Zealand	107,66	7,18
Chile	106,66	7,11
Australia	106	7,07
The USA	106	7,07

The PRC	105,25	7,02
South Korea	105	7
Spain	104,25	6,95
England	103,71	6,91
Thailand	103,66	6,91
France	103,56	6,9
Holland	103,41	6,89
Scotland	102	6,80
Brazil	101,15	6,74
South Africa	101	6,73
Jamaica	100,66	6,71
Italy	100,2	6,68
Cameroon	99,5	6,63
Argentina	98,66	6,58
Nigeria	95,75	6,38
General Averages	**104,13**	**6,94**

Table 3. *The Estimated Oxygen Capacities, Altitudes and Tournament Ranks of the Teams*

Countries	Player Average (m)	Estimated VO_2 max (ml/kg/min)	Altitudes of the Countries	Rank
Sweden	7300	43,11	320	Semifinal (Third)
Canada	7300	43,11	487	Last 16
Japan	7250	42,74	438	Last 16
Germany	7240	42,67	263	Quarterfinal
Norway	7240	42,67	460	Quarterfinal
New Zealand	7180	42,22	388	Couldn't Pass the Group Stage
Chile	7110	41,7	1871	Couldn't Pass the Group Stage
Australia	7070	41,4	330	Last 16
The USA	7020	41,03	760	Final (Champion)
The PRC	7020	41,03	1840	Last 16
South Korea	7000	40,88	282	Couldn't Pass the Group Stage
Spain	6950	40,5	660	Last 16
England	6910	40,21	162	Semifinal
Thailand	6910	40,21	287	Quarterfinal
France	6900	40,13	375	Quarterfinal
Holland	6890	40,06	30	Final (Second)
Scotland	6800	39,39	162	Couldn't Pass the Group Stage
Brazil	6740	38,94	320	Last 16
South Africa	6730	38,86	1034	Couldn't Pass the Group Stage
Jamaica	6710	38,72	340	Couldn't Pass the Group Stage
Italy	6680	38,49	538	Quarterfinal
Cameroon	6630	38,12	667	Last 16
Argentina	6580	37,75	595	Couldn't Pass the Group Stage
Nigeria	6380	36,26	380	Last 16
AVERAGES	**6941,25**	**40,44**	**541,21**	

Table 4. *The Relationship between the Variables in terms of Age, Countries, the Altitudes of the Countries and the Running Averages of the Teams (km)*

			Countries	Team Running Average (km)	Player Running Average (km)	Estimated Oxygen Capacity (ml/kg/min)	The Altitudes of the Countries (m)
Age (year)	Team Running Average (km)	r	,197				
		p	,367				
	Player Running Average (km)	r	,195	**1,000****			
		p	,373	**,000**			
	Estimated Oxygen Capacity (ml/kg/min)	r	,195	**1,000****	**1,000****		
		p	,373	**,000**	**,000**		
	The Altitudes of the Countries (m)	r	,019	,100	,101	,101	
		p	,933	,651	,647	,646	
	Rank	r	,076	-,093	-,091	-,091	-,007
		p	,729	,672	,678	,679	,975
			Team Running Average (km)	Player Running Average (km)	Estimated Oxygen Capacity (ml/kg/dk)	The Altitudes of the Countries (m)	Rank
Countries	Player Running Average (km)	r	**1,000****				
		p	**,000**				
	Estimated Oxygen Capacity (ml/kg/min)	r	**1,000****	**1,000****			
		p	**,000**	**,000**			
	The Altitudes of the Countries	r	**,065**	**,066**	,066		
		p	**,770**	**,765**	,765		
	Rank	r	-,107	-,105	-,105	-,007	
		p	,627	,633	,634	,973	
	Age	r	**,431***	**,431***	**,431***	-,055	-,016
		p	**,040**	**,040**	**,040**	,804	,942
			Team Running Average (km)	Player Running Average (km)	Estimated Oxygen Capacity (ml/kg/min)	Rank	Age (year)
The Altitudes of the Countries (m)	Player Running Average (km)	r	**1,000****				
		p	**,000**				
	Estimated Oxygen Capacity (ml/kg/min)	r	**1,000****	**1,000****			
		p	**,000**	**,000**			
	Rank	r	-,098	-,096	-,096		
		p	,656	,661	,663		
	Age (year)	r	,407	,407	,407	-,032	
		p	,054	,054	,054	,884	
	Countries	r	,095	,093	,093	,081	-,198

		p	,666	,672	,672	,712	,366
			Player Running Average (km)	Estimated Oxygen Capacity (ml/kg/min)	Rank	Age (year)	Countries
Team Running Average (km)	Estimated Oxygen Capacity (ml/kg/min)	r	**,981*****				
		p	**,000**				
	Rank	r	,205	,237			
		p	,348	,276			
	Age (year)	r	,028	,010	,008		
		p	,900	,964	,970		
	Countries	r	-,231	-,222	,092	-,261	
		p	,290	,310	,678	,229	
	The Altitudes of the Countries (m)	r	,145	,157	,002	-,095	,024
		p	,509	,475	,994	,667	,915

Notes. *p<0.05 ** p<0.01 *** p<0.001

r: Interpretation of Pearson (r) correlation coefficient; 0.00-0.25 very weak, 0.26-0.49 weak, 0.50-0.69 middle, 0.70-0.89 high, 0.90-1.00 very high.

In terms of age, countries and team running averages;

A positive very high relationship was determined between the team running average (km) and player running average (km) (r=.1000, p<0.001), between the Team Running Average (km) and Estimated Oxygen Capacity (r=.1000, p<0.001) and between the Player Running Average (km) and Estimated Oxygen Capacity (r=.1000, p<0.001).

Also, in terms of countries;

A positive weak relationship was determined between the Team Running Average (km) and age (r=.431, p<0.05), between the Team Running Average (km) and age (r=.1000, p<0.001) and between the Player Running Average (km) and age (r=.1000, p<0.001)

Table 5. *The Relationship between the Variables in terms of Running Averages of the Players (km) and Estimated Oxygen Capacity*

			Estimated Oxygen Capacity	Rank	Age	Countries	The Altitudes of the Countries
Player Running Average (km)	Rank	r	,204				
		p	,350				
	Age	r	-,087	,007			
		p	,693	,973			
	Countries	r	,003	,091	-,260		
		p	,989	,679	,230		
	The Altitudes of the Countries	r	,088	,002	-,095	,024	
		p	,690	,994	,665	,914	
	Team Running Average (km)	r	-,092	-,206	-,024	,231	-,144
		p	,677	,346	,913	,288	,511

			Rank	Age	Countries	The Altitudes of the Countries	Team Running Average (km)
Estimated Oxygen Capacity	Age	r	,007				
		p	,974				
	Countries	r	,091	-,260			
		p	,679	,231			
	The Altitudes of the Countries	r	,002	-,095	,024		
		p	,994	,665	,915		
	Team Running Average (km)	r	-,238	-,006	,222	-,156	
		p	,274	,978	,308	,477	
	Player Running Average (km)	r	-,204	,088	-,003	-,088	,283
		p	,350	,690	,989	,691	,191

No significant difference was determined between the Player Running Average (km) and the Estimated Oxygen Capacity and the other variables (age, countries, and the altitudes of the countries) and Team Running Average (km).

5. Discussion and Conclusion

It was determined that the parameters of the teams participated in the FIFA Women's World Cup 2019 held in France were as follows: the average age was 26,11±3,92 years, the average running distance of the teams was 104,13 km., the average running distance of the players was 6,94 km., and VO2 Max average was 40,44 ml/kg/min.

In the study, it was found that the relationship between Player Running Average and estimated maximum oxygen capacity was positive, accordingly, high oxygen capacity affects the team running average and player running average in the direction of increase. High oxygen capacity is required in the football branch, where aerobic and anaerobic capacities are intertwined (12, 13).

Studies related to professional footballers have revealed that the aerobic capacities of footballers are very high. It has been stated that during a match, a player makes 10 km distance on average, and there is a very significant relationship between this distance and maxVO2. In addition, it has also been indicated that anaerobic threshold level occurs largely depending on maxVO2 (14).

The higher the aerobic capacity of the player, the longer the time to enter the anaerobic threshold, and the fatigue will occur later in the athlete (15).

In a study, Müniroğlu et al. (1999) found that the champion team had higher VO2 max values than the team last in the league (16).

Özen et al. (2012), in their study on swimmers, found that as the maximum oxygen capacity increased, swimmers' performances were also affected positively (17).

Oxygen consumption capacity is defined as the transmitting the oxygen required to obtain energy during exercise to skeletal muscles with the help of the pulmonary and cardiovascular systems and the oxygen utilization capacity of the muscles (18). Accordingly, the skills of the athletes to deliver the oxygen they need to skeletal muscles with the help of pulmonary and cardiovascular systems and muscles' skill to use the oxygen explain the significant relationship between the Player Running Average and estimated maximum oxygen capacity.

In this study, a significant relationship was determined between team running average, player running average and age. It was found that as the athletes' ages decreased, team running average and player running average increased positively.

Exercise endurance performance reduces in the middle age, and it decreases fast in the later aging process (19).

In a study related to elite footballers, it was found that as the age increases, the performance values related to strength and endurance decrease (20). There are studies stating that performance decreases with age (21). In the light of these evaluations, the decrease in performance is thought to be caused by the decreases in VO2max due to the increase in the age (19). The studies in the literature state that VO2max decreases gradually with the increasing age, so they support this study (22).

Considering the results of the study, it can be stated that there is a significant relationship between performance, VO2max and age, so low average age affects team running average and individual performance positively.

References

1-Wahl A. Ayaktopu Futbolun öyküsü. editor İleri C. İstanbul: Yapı Kredi Yayınları; 2005.
2-Bohner JD, Hoffman JR, McCormack WP, Scanlon TC, Townsend JR, et al. Moderate altitude affects high intensity running performance in a collegiate women's soccer game. Journal of Human Kinetics. 2015;47(1): 147-154.
3- Marangoz İ. Fiziksel performans ölçümünde sık kullanilan bazı testler ve hesaplama programları. Ankara: Gazi Kitapevi; 2019.
4- Guyton Arthur C, Hall Jhon E, editor Çavuşoğlu H. Textbook of medical physiology. 9nd ed. İstanbul: Nobel Tıp Kitabevleri; 1996.
5- Reilly T. Physiological Demands of Soccer. Spor Hekimliği Dergisi.1991; 26 (1): 41–46.
6- Skinner JS, Wilmore KM, Krasnoff JB, Jaskólski A, Jaskólska A, et al. Heterogeneous Population: The HERITAGE Family Study. Medicine and Science in Sports and Exercise.2000; 32(1), 57-161.
7- Rogers MA, Hagberg JM et al. Decline in VO2max with aging in master athletes and sedentary men. J Appl Physiol. 1990; 68(5):2195-2199.
8- Cureton KJ. Matching of male and female subjects using VO2 max. Res Q Exercise Sport. 1981;52(2):264-268.
9- https://www.fifa.com/womensworldcup/teams/08.07.2019
10- Cooper KH. A Means of assessing maximum oxygen intake. JAMVA. 1968; 203: 135-38.
11- Marangoz İ. The analysis of running distances in national teams in 2010 and 2014 FIFA world cup and estimation of oxygen consumption capacity based on these distances. Journal of Education and Training Studies. 2018;6(8):102-107.
12- Castagna C, Impellizzeri FM, Chamari K, Carlomagno D, Rampinini E. Aerobic fitness and Yo-Yo continuous and internittent tests performances in soccer players: A correlation study. J Strenght Cond Res. 2006; 20: 320-325.
13- Stolen T, Chamari K, Castagna C, Wisloff U. Physiology of soccer. Sports Med. 2005; 35: 501-536.
14- Güzel NA, Açak M, Eikoğlu Örer G, Savaş S, Coşkuner Z. Comparison of max vo2 levels of elite and deaf footballers. 2012;2(12):607–10.
15- Hazar F, Recep K. P repuberte çocuklarda sürat ile aerobik dayanıklılık (vo 2max) arasındaki ilişkinin belirlenmesi, Uluslararası İnsan Bilimleri Dergisi. 2009;(2)6, 807-811
16- Müniroğlu S, Atıl M, Erongun D, Marancı B. Futbol takımlarının bazı fiziksel özelliklerinin başarılı olmalarında etkilerinin incelenmesi. Futbol Bilim ve Teknoloji Dergisi. 1999; 2: 21-25.
17- Özen Ş, Esen Ö, Çotuk B, Kepoğlu A, Aktaş Ş. Paletli yüzme bayan sporcularında bisiklet ergometresinde Vo2-Max ölçümü ve 100m su üstü dereceleri ile ilişkisi. 5.Ulusal Sualtı Hekimliği Ve Hiperbarik Tıp Kongresi Su Sporları Sempozyumu; 2012 March 30-31; İstanbul. 2012. p.124-128.
18- Ankaralı S, Bayramlar Z. The Relationship between aerobic capacity and cognitive performance. Anadolu Klin Tıp Bilim Derg. 2019;24(2):159–69.
19- Tanaka H, Seals DR. Endurance exercise performance in Masters athletes: Age-associated changes and underlying physiological mechanisms. J Physiol. 2008; 586(1):55-63.

20- Bayraktar B, Kurtoğlu M. Sporda performans, etkili faktörler, değerlendirilmesi ve artırılması. Klin Gelişim. 2009;22:16–24.
21- Galloway MT, Kadoko R, Jokl P. Effect of aging on male and female master athletes' performance in strength versus endurance activities. Am J Orthop. 2002;31(2):93-8.
22- Tanaka H, Desouza CA, Jones PP, Stevenson ET, Davy KP, Seals DR. Greater rate of decline in maximal aerobic capacity with age in physically active vs. sedentary healthy women. J Appl Physiol. 1997; 83(6):1947-1953

Examination of the Relationship between the Teaching-Learning Conceptions and Humor Styles of Physical Education Teacher Candidates

Mehmet Behzat Turan[1] and Barış Karaoğlu[2]
[1] *Erciyes University, Faculty of Sports Sciences, Kayseri, Turkey.*
[2] *Bingöl University, School of Physical Education and Sports, Bingöl, Turkey.*

Abstract

This study aims to examine the relationship between the teaching-learning conceptions and humor styles of physical education and sports teacher candidates. 200 4th-grade teacher candidates studying in the Physical Education and Sports Teaching department of the Faculty of Sports Sciences at Erciyes, Selçuk, Ahi Evran, Ömer Halisdemir and Dumlupınar Universities voluntarily participated in the study. The participants were asked to fill out a four-question Demographic Information Form related to their gender, age, GPA and current university, the "Teaching-Learning Conceptions Scale" developed by Chan and Elliot (2004) and translated into Turkish by Aypay (2011), and the "Humor Styles Questionnaire" developed by Martin et al. (2003) and translated into Turkish by Yerlikaya (2003). IBM SPSS (Statistical Package for the Social Sciences) 20 statistical package program was used for data analysis. The arithmetic mean and standard deviation values of the participants' scores were displayed as X±Sd. The Pearson Product-Moment Correlation Analysis was performed to reveal the relationship between the data obtained from the scales. $p<0.05$ was considered to be significant.In conclusion, the present study was conducted with the aim of determining the relationship between the teaching-learning conceptions and humor styles of the teacher candidates. In the study, it was concluded that the constructivist and traditional conceptions affected humor styles directly and significantly. In this context, it is suggested that teachers in educational organizations where learning, teaching and development are expected should adopt humor styles to be able to provide effective education and training, establish a healthy environment in their schools and have higher levels of teaching and learning conceptions.

Keywords: Physical Education and Sports Teacher, Teaching-Learning Conceptions, Humor

1. Introduction

In today's world, rapid changes occur in all aspects of life (Karakuş & Köse, 2018). Education plays a key role in putting these rapid changes into practice. For teachers, who are of critical importance in terms of approaching these rapid changes and passing them on to the society in the developing and changing world, teaching-learning conceptions, teaching methods and techniques, etc., are the primary subjects that need to be addressed. While being an essential need of human nature, learning is also an indispensable phenomenon for people to maintain their life and adapt to changing circumstances (Turan&Koç, 2018).

Nowadays, universities are no longer the places where uniform information are transferred, and they have evolved into living systems that try to provide the equipment that will be needed by future generations in every aspect (Turan&Koç, 2018).

Teaching and learning conceptions indicate teachers' opinions on their preferred methodologies of teaching and learning. In other words, they encompass the meaning of teaching-learning and the roles of teachers and students (Aypay, 2011; Chan and Elliott, 2004). Developments in different periods of educational sciences have led to the differences in teaching-learning conceptions. These different conceptions of teaching and learning in education are related to two basic approaches, traditional and constructivist (Aypay, 2011; Chen & Elliot, 2004; Cheng, Chan, Tang, & Cheng, 2009). Teaching is conceptualized within the framework of these two conceptions. The first of these is specified as a teacher-oriented conception as the main emphasis is placed on the transfer of knowledge or content, and the second is specified as a learner-oriented conception as the main emphasis is on the discovery and construction of knowledge by the learner. The main difference between these two conceptions is related to the roles attributed to the teacher and the

student (Kember, 1997). The traditional conception of teaching-learning, which perceives the individual as the passive receiver of knowledge, is defined as the constructivist teaching-learning conception. When both approaches are considered, it is observed that there are various roles and responsibilities in terms of both teachers and students.

An effective teaching-learning process is based primarily on a certain system. There are elements such as students, teachers, materials, programs, content, etc. within the teaching system. The teaching process is affected by many factors including the attitude and expectations of parents, students and teachers' locus of control, quality of teaching material, non-verbal behavior of teachers in the classroom and their attitude while asking questions. These variables constitute a very complex interaction network (Açıkgöz, 2003). It is known that factors such as educational environment, teacher-student relations, student attitudes, attendance, habits, etc. are important for students to go through an effective learning process. In addition to these factors, it is thought that the effectiveness of the teaching-learning process can be increased with the use of humor.

Dictionary of the Turkish Language Association (1969) defines humor as "The type of phrasing or writing that expresses certain thoughts in an ornamental manner using wit, jokes and teasing".

Sense of humor is a friendly and philosophical emotion that is among the qualities of self-realized individuals who possess interpretation and intellection skills. The positive or negative use of humor affects the nature of the individual and others, positively or negatively (Özbay et al. 2012). The individual differences in the use of humor are discussed in four dimensions. Two of these dimensions consist of positive humor styles (Affiliative and Self-Enhancing) while the other two consist of negative humor styles (Aggressive and Self-Defeating) (Martin et al., 2003). The positive humor styles are expected to make individuals happier while the negative humor styles are expected to make individuals unhappy and unable to overcome difficulties comfortably.

In the literature, there are studies examining teaching-learning conceptions or humor styles in groups consisting of children and teenagers (Erickson and Feildstein, 2007; Yörükoğlu, 1970), university students (Kağan and Atalay 2018; Erözkan and Yılmaz, 2006; Erözkan, 2009), teachers in various branches (Baş 2014; Ekinci, 2016; Akkaya, 201; Cengiz, Kayhan and Acet., 2016), teacher candidates in various branches (Aydın, Tunca, Şahin 2015; Baş and Beyhan 2013; Bıkmaz, 2017) and school administrators (Otrar, Fındıklı 2014), however, no studies examining the relationship between the teaching-learning conceptions and humor styles of physical education and sports teacher candidates were found.

The aim of the present study is to examine the relationship between the teaching-learning conceptions and humor styles of physical education and sports teacher candidates.

2. Method

In the present study, descriptive and correlational survey models were used to reveal the existing situation. The Descriptive survey model is a research method that aims to describe past or present situations in detail. It is aimed to describe the events, individuals or objects included in the study as they are and in their own conditions. Therefore, these elements are not changed or affected in any way. Correlational survey models aim to determine the presence and/or degree of covariance between two or more variables (Karasar, 2004).

2.1. Selection of Volunteer Groups

200 4th-grade teacher candidates studying in the Physical Education and Sports Teaching department of the Faculty of Sports Sciences at Erciyes, Selçuk, Ahi Evran, Ömer Halisdemir and Dumlupınar Universities voluntarily participated in the study.

2.2.Data Collection Tools

2.2.1.Demographic Information Form

The participants were asked to fill out a four-question Demographic Information Form related to their

gender, age, general academic avarege and current university.

Table 1. *Descriptive Statistics of the Participants*

	Variables	N	%
Gender	Male	115	57.5
	Female	85	42.5
	Total	200	100
Age	18-20	38	19
	21-23	118	59
	24 and older	44	22
	Total	200	100
General Academic Avarege	1.25-1.99	27	13.5
	2.00-2.99	133	66.5
	3.00-4.00	40	20
	Total	200	100
University	Erciyes	40	20
	Selçuk	40	20
	Ahi Evran	40	20
	Ömer Halisdemir	40	20
	Dumlupınar	40	20
	Total	200	100

Table 1 shows that 57.5% of the participants are male while 42.5% are female, 19% are aged 18-20 while 59% are aged 21-23 and 22% are 24 or older. 13.5% of the participants have a GPA of 1.25-1.99 while this ratio is 66.5% for the 2.00-2.99 range and 20% for the 3.00-4.00 range. It is also observed that 20% of the participants are from Erciyes University while this ratio is 20% for Selçuk University, 20% for Ahi Evran University, 20% for Ömer Halisdemir University and 20% for Dumlupınar University.

2.2.2.Teaching-Learning Conceptions Scale

The "Teaching-Learning Conceptions Scale" developed by Chan and Elliot (2004) and translated into Turkish by Aypay (2011) was used to determine the teaching-learning conceptions of the teachers. The study group consisted of teacher candidates. The scale consists of 30 items and five-point grading. Since a single session and a single measurement tool was used in the reliability and validity process, the Cronbach-Alpha coefficient for internal consistency was calculated as 0.84. On the basis of sub-dimensions, the Cronbach-Alpha coefficient was calculated as 0.88 for the first sub-dimension (constructivist teaching-learning conception) and 0.83 for the second sub-dimension (traditional teaching-learning conception) (Aypay, 2011).

2.2.3.Humor Styles Questionnaire

The Humor Styles Questionnaire is a self-report measure developed by Martin et al. (2003) and translated into Turkish by Yerlikaya (2003). It is a 7-point Likert questionnaire consisting of 32 questions with options ranging between (1) Totally Disagree and (7) Totally Agree. The questionnaire separates humor into genres by classifying humor styles into four sub-dimensions. Each sub-dimension consists of 8 items. These four sub-dimensions can be listed as Affiliative (Social) Humor: 1, 5, 9, 13, 17, 21, 25, 29; Self-Enhancing Humor: 2, 6, 10, 14, 18, 22, 26, 30; Aggressive Humor: 3, 7, 11, 15, 19, 23, 27, 31 and Self-Defeating Humor: 4, 8, 12, 16, 20, 24, 28, 32.

In the translation of the questionnaire into Turkish, the Cronbach-Alpha internal consistency coefficients for each sub-scale were determined as 0.74 for Affiliative Humor, 0.78 for Self-Enhancing Humor, 0.69 for Aggressive Humor, and 0.67 for Self-Defeating Humor. The Cronbach-Alpha values obtained during the development of the original questionnaire by Martin et al. (2003) ranged between 0.77

and 0.81. Items 1-7-9-15-16-17-22-23-25-29-31 are reverse-scored. The possible score range of each sub-dimension is 7-56. In each sub-dimension, scores indicate the humor styles' frequency of use (Yerlikaya 2003).

2.3.Statistical Analysis

The acquired data from Personal Information Form, Teaching-Learning Conceptions Scale, Humor Styles Questionnaire' scale and the attained scores, were registered in SPSS 20.0 package program and analyzes were made through this program. Personal information about applicants, inventory total scores and factor scores were given by determining the frequency (f) and percentage (%) rates. In order to put forth the relation between the scores that were gathered from the scales Pearson Product-Moment Correlation Coefficient analysis (r) and to determine whether the scores that were gathered are predictive or not, Multiple Regression Analysis was applied (β).

Table 2. The Skewness-Kurtosis and Shapiro-Wilk Test Significance Values of the Questionnaire Scores

	N	Skewness	Kurtosis	p
Constructivist	200	-.018	-.171	.039
Traditional	200	-.764	.390	.000
Affiliative (Social) Humor	200	.114	.552	.003
Self-Enhancing Humor	200	.315	.594	.000
Aggressive Humor	200	-.056	.741	.000
Self-Defeating Humor	200	-.288	.000	.000

When the Shapiro-Wilk Test results in Table 2 are examined, it is observed that the scores obtained by the participants from the Teaching-Learning Conceptions Scale and the Humor Styles Questionnaire had significant levels of deviation from normality. Büyüköztürk states that there are no excessive deviations from normality if skewness and kurtosis values are in a range of ±1 (Büyüköztürk, 2007, 40). Additionally, Cooper-Cutting states that it is suitable in terms of normality if skewness and kurtosis values are in a range of ±2 (Cooper, 2018). In light of this information, it was accepted that the data were normally distributed. The arithmetic mean and standard deviation values of the participants' scores from the Teaching-Learning Conceptions Scale and the Humor Styles Questionnaire were displayed as X±Sd. The Pearson Product-Moment Correlation Analysis was performed to reveal the relationship between the data obtained from the scales. $p<0.05$ was considered to be significant.

3. Findings

Table 3*. Descriptive Statistics of the Participants' Scores from the Teaching-Learning Conceptions Scale and the Humor Styles Questionnaire*

		K (Number of Items)	N	Min	Max	X±Sd	X/K
Teaching-Learning Conceptions	**Constructivist**	12	200	22.0	60.0	46.76±8.67	3.89
	Traditional	18	200	34.0	90.0	66.50±12.93	3.69
Humor Styles	**Affiliative (Social) Humor**	8	200	24.0	43.0	32.72±3.47	4.09
	Self-Enhancing Humor	8	200	16.0	51.0	34.74±6.49	4.34
	Aggressive Humor	8	200	24.0	36.0	31.14±1.74	3.89

	Self-Defeating Humor	8	200	15.0	49.0	33.81±7.38	4.22

When Table 3 is examined, it was observed that from the sub-headings of the Teaching-Learning Conceptions Scale, the constructivist conception level of the participating teacher candidates was 46.76±8.67 while the traditional conception level was 66.50±12,93. From the sub-headings of the Humor Styles Questionnaire, the Affiliative (Social) Humor level was 32.72±3.47, the Self-Enhancing Humor level was 34.74±6.49, the Aggressive Humor level was 31.14±1.74 and the Self-Defeating Humor level was 33.81±7.38.

Table 4. *The Relationship between the Teaching-Learning Conceptions and Humor Styles of the Participants*

		1	**2**	**3**	**4**	**5**	**6**
Constructivist [1]	**r**	1					
	p						
	N	200					
Traditional[2]	**r**	.749	1				
	p	.000**					
	N	200	200				
Affiliative (Social) Humor[3]	**r**	-.023	-.256	1			
	p	.752	.000**				
	N	200	200	200			
Self-Enhancing Humor[4]	**r**	.391	.446	-.309	1		
	p	.000**	.000**	.000**			
	N	200	200	200	200		
Aggressive Humor[5]	**r**	-.041	.009	-.115	-.054	1	
	p	.564	.895	.000**	.447		
	N	200	200	200	200	200	
6.Self-Defeating Humor[6]	**r**	.365	.415	-.349	.595	.058	1
	p	.000**	.000**	.000**	000**	.419	
	N	200	200	200	200	200	200

When Table 4 is examined, it is observed that there was no relationship between the Teaching-Learning Conceptions sub-dimension of Constructivist Conception and the Humor Styles sub-dimensions of Affiliative (Social) (r=-.023, p=.752) and Aggressive Humor (r=-.041, p=.564). A low level of positive relationship was determined with the sub-dimensions Self-Enhancing Humor (r=.391, p=.000) and Self-Defeating Humor (r=.365, p=.000).

While no relationship was found between Traditional Conception and the Humor Styles sub-dimension of Aggressive Humor (r=.009, p=895), a low level of negative relationship was found with the Affiliative (Social) Humor (r=-.256, p=.000) sub-dimension. A moderate level of positive relationship was determined with the Self-Enhancing Humor (r=.446, p=.000) and Self-Defeating Humor (r=.415, p=.000) sub-dimensions.

Table 5. *Regression Table for the Prediction of Humor Styles by the Constructivist Teaching-Learning Conception*

		B	**SHB**	**β**	**t**	**p**	**R**	**R²**	**F**	**p**
Constructivist	**Humor Styles**						.448	.201	12.250	.000
	Affiliative (Social)	.376	.173	.150	2.166	.032				
	Self-Enhancing	.287	.108	.290	3.577	.000				
	Aggressive	-.111	.323	-.022	-.343	.732				

Self-Defeating	.289	.096	.246	3.007	.003

When Table 5 is examined, it is observed that the model generated between the Constructivist Conception sub-dimension and humor styles presents a significant relationship (R=.448, R2=.201, p<0.00). When the t-test results regarding the significance of the regression coefficient were examined, it was observed that the Constructivist Conception predicted the Affiliative (Social) (t=2.166, p=.032), Self-Enhancing (t=3.577, p=.000) and Self-Defeating (t=3.007, p=.003) humor styles and explained 20% of the total variance (F4,195 = 12.250, p=.000).

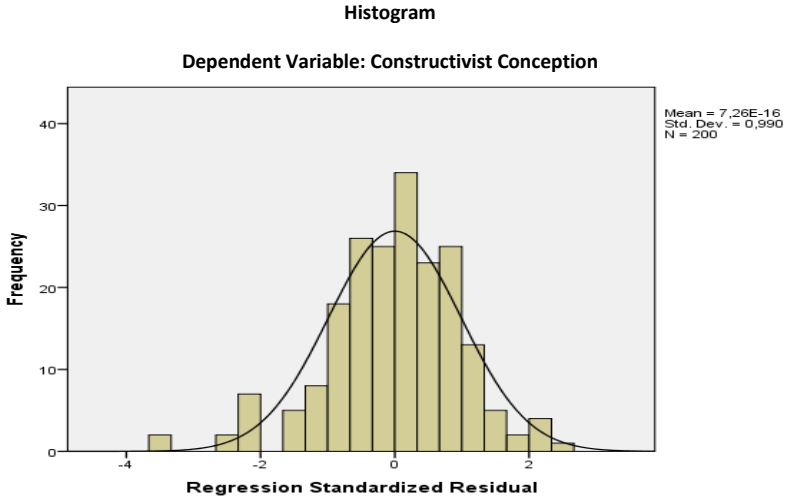
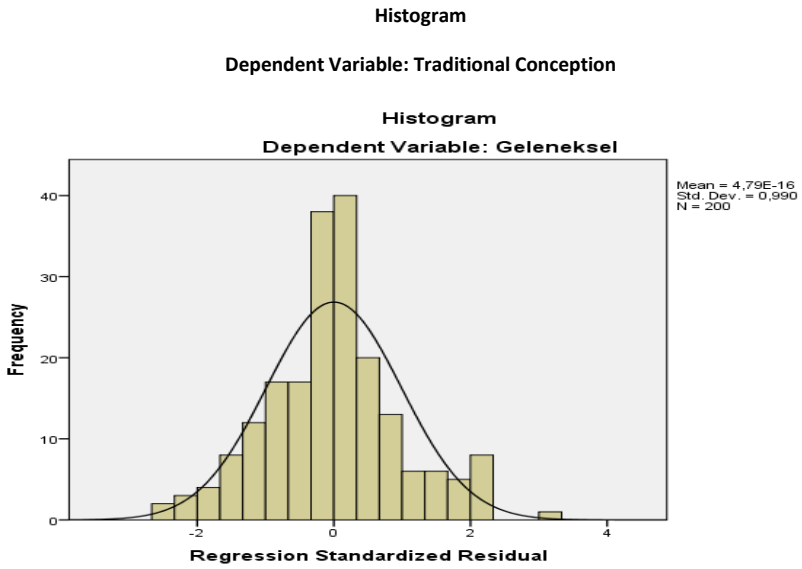


Table 6. *Regression Table for the Prediction of Humor Styles by the Traditional Teaching-Learning Conception*

		B	SHB	β	t	p	R	R^2	F	p
	Humor Styles						.491	.241	15.494	.000
Traditional	**Affiliative (Social)**	-.344	.252	-.092	-1.365	.174				
	Self-Enhancing	.587	.157	.295	3.733	.000				
	Aggressive	.021	.470	.003	.044	.965				
	Self-Defeating	.363	.140	.207	2.596	.010				

When Table 6 is examined, it is observed that the model generated between the Traditional Conception sub-dimension and humor styles presents a significant relationship (R=.491, R^2=.241, p<0.00). When the t-test results regarding the significance of the regression coefficient were examined, it was observed that the Traditional Conception predicted the Self-Enhancing (t=3.733, p=.000) and Self-Defeating (t=2.596, p=.010) humor styles and explained 24% of the total variance (F4,195 = 15.494, p=.000).



4. Discussion and Conclusion

In order for all stakeholders in the society to adapt to the changes taking place within the education system, they must also adapt their perspectives on educational environments. For this reason, perspectives of individuals on teaching and learning conceptions in educational environments are of importance. Determination of the Teaching and Learning Conceptions of teachers, who are an essential element of educational environments, is a subject that requires special attention and emphasis (Aslan, 2016).

According to Table 3, while the teacher candidates' score average for the Constructivist Conception sub-dimension of the Teaching-Learning Conceptions Scale is (X/K=3.89), their score average for the Traditional Conception sub-dimension is (X/K=3.69). Based on this, it can be said that the teacher candidates have adopted the Constructivist Conception more than the Traditional Conception. Considering that Constructivism has been the philosophical core of the programs implemented since 2005, it is very important in terms of Teaching-Learning Conceptions that the teacher candidates have adopted the Constructivist Conception more. However, the fact that the teacher candidates' score average for the Traditional Conception was moderate shows that this conception is not rejected and still adopted despite the implementation of new programs. In the literature, it was concluded by Cheng et al. (2009), Aypay (2011), Oğuz (2011), Yener-Yılmaz (2017), Aydın, Tunca, Şahin (2015), Turan (2019) and Saçıcı (2015) in their studies on teacher candidates and by Akyıldız (2014), Memduhoğlu and Çıkar (2017), Baş (2015), Ekinci (2016), Engin and Daşdemir (2015) in their studies on teachers that the Constructivist Conception was adopted more than the Traditional Conception. In contrast to the present study, Eren (2009) concluded that teacher candidates tended to adopt the Traditional Approach more and related this to the role models encountered by teacher candidates in teaching applications.

When the score averages from the Humor Styles Questionnaire are examined, it is observed that the score averages were (X/K=4.09) for the Affiliative (Social) Humor Style sub-dimension, (X/K=4.34) for the Self-Enhancing Humor Style sub-dimension, (X/K=3.89) for the Aggressive Humor Style sub-dimension and (X/K=4.22) for the Self-Defeating Humor Style sub-dimension. Based on this, it was determined that Self-Enhancing Humor was the most common type of humor possessed by the teacher candidates while Aggressive Humor was the least common humor type.

When the literature is examined, it was determined by Cesur (2018) in his study on teacher candidates and by Bayraktaroğlu (2016) in her study on high-school students that Self-Enhancing Humor was the most

common humor style, in parallel with the present study. It was determined by Yılmaz (2011) and Fındıklı (2013) in their study on school administrators, by Sayar (2012) in his study on university students, by Yelikaya (2007) in her study on high-school students, by Ay (2011) in his study on high-school students, and by Özdemir, Sezgin, Kaya and Recepoğlu (2011) in their study on teachers that Affiliative Humor was the most common humor style. According to these results, the fact that teachers adopt a positive humor style such as Affiliative Humor may indicate that they are tolerant and harmless, prioritize self-improvement and retain their humorous perspective even in the face of stress and negative situations.

The fact that teachers possess positive humor styles is very important in terms of both organizational life and development of the teaching process. That is because teachers interact with students, school administrators and parents in the process of enabling students, who are the reason for the existence of schools, to adopt terminal behaviors (Yılmaz, 2011). Humor also affects the social life of teachers, their relationship with colleagues, quality of life and worldview (Özdemir and Recepoğlu, 2010).

When Table 4 was examined, while there was no relationship between the Teaching-Learning Conceptions sub-dimension of Constructivist Conception and the Humor Styles sub-dimensions of Affiliative (Social) Humor and Aggressive Humor, a low level of positive relationship was determined between the Self-Enhancing Humor and Self-Defeating Humor sub-dimensions. In the present study, it was determined that the Constructivist Conception was related to both the positive and negative sub-dimensions of Humor Styles. In the learner-oriented Constructivist Conception (Akınoğlu, 2013; Şaşan, 2002), teachers are expected to "possess high self-confidence and skills in teaching, enable students to take their own responsibilities, motivate them and plan activities towards improving their skills" (Aydın, Tunca & Alkın-Şahin, 2015).

While no relationship was found between the Traditional Conception and the Humor Styles sub-dimension of Aggressive Humor, a low level of negative relationship was found with the Affiliative (Social) Humor sub-dimension. A moderate level of positive relationship was determined with the Self-Enhancing Humor and Self-Defeating Humor sub-dimensions. It was determined that the Traditional Conception was also related to both the positive and negative sub-dimensions of Humor Styles.

When the prediction of humor styles by the Teaching-Learning Conceptions sub-dimensions were examined, it was determined that the Constructivist Conception and Traditional Conception sub-dimensions predicted Humor Styles (Tables 5,6). Aydın (2006) determined that students were more comfortable and able to express themselves freely and creatively in the lessons carried out using humor. It was also concluded that humor provided them with a wide perspective in terms of reaching linguistic and paralinguistic meaning through the use of implication, inference, presupposition and semiological signs. Ulloth (2002) states that in environments where humor is used, individuals learn and recall knowledge faster and their ability to learn increases. This view indicates the positive relationship between Teaching-Learning Conceptions and Humor Styles.

In conclusion, the present study was conducted with the aim of determining the relationship between the teaching-learning conceptions and humor styles of the teacher candidates. In the study, it was concluded that the constructivist and traditional conceptions affected humor styles directly and significantly. In this context, it is suggested that teachers in educational organizations where learning, teaching and development are expected should adopt humor styles to be able to provide effective education and training, establish a healthy environment in their schools and have higher levels of teaching and learning conceptions.

Suggestions

- Activities towards developing the opinions of teacher candidates on the Constructivist Conception and Self-Enhancing and Affiliative (Social) Humor styles can be carried out.
- There are other tools to measure Teaching-Learning Conceptions and Humor Styles. It may be beneficial to conduct future studies with various scales.
- Similar studies can be carried out with different educational institutions by widening the scope of the study in order to reach more detailed data.

- It is also suggested to investigate the relationship of the current topic with demographic features in teacher candidates.

References

1. Açıkgöz, K. (2003). Etkili Öğrenme ve Öğretme, İzmir: Eğitim Dünyası Yayınları, 22.
2. Akkaya M (2011). Sınıf Öğretmenlerinin Sınıf Yönetme Becerileri ile Mizah Tarzları Arasındaki İlişkinin İncelenmesi, Sempozyum: 20. Ulusal Eğitim Bilimleri Kurultayı, Pegem, İstanbul.
3. Akyıldız, S. (2014). Lise Öğrencilerinin Epistemolojik İnançları ile Öğretme -Öğrenme Anlayışları Arasındaki İlişkinin İncelenmesi (Yayınlanmamış Doktora Tezi). Fırat Üniversitesi, Eğitim Bilimleri Enstitüsü.
4. Akınoğlu, O. (2013). Öğretim Kuram ve Modelleri, Tan, Ş.(Ed.), Öğretim İlke ve Yöntemleri, Pegem Akademi Yayıncılık, Ankara, 137-190.
5. Aslan B.Ö. (2016). Okul Öncesi Öğretmenlerinin Öğretme ve Öğrenme Anlayışlarının İncelenmesi: Sakarya İl Örneği. I. International Academic Research Congress, Antalya, Türkiye
6. Ay, Ö. (2011). Orta Öğretim Öğrencilerinin Mizah Tarzları Ve Yaratıcılık Düzeylerinin Yaşam Doyum Düzeylerini Açıklayıcı Rolü. Gaziosmanpaşa Üniversitesi, Sosyal Bilimler Enstitüsü, Yüksek Lisans Tezi, Tokat.
7. Aydın, İ. S. (2006). Türkçe Derslerinde Mizah Kullanımının Öğrenci Tutum Ve Başarısına Etkisi, (Yayımlanmamış doktora tezi). Dokuz Eylül Üniversitesi, Sosyal Bilimler Enstitüsü, İzmir.
8. Aydın, Ö., Tunca N. and Şahin S.A. (2015). Fen Bilgisi Öğretmen Adaylarının Öğretme ve Öğrenme Anlayışlarının Çeşitli Değişkenler Açısından İncelenmesi ***K. Ü. Kastamonu Eğitim Dergisi, 23 (3), 1331-1346.***
9. Aypay, A. (2011). Öğretme ve Öğrenme Anlayışları Ölçeği'nin Türkçe Uyarlaması ve Epistemolojik İnançlar ile Öğretme ve Öğrenme Anlayışları Arasındaki İlişki. Kuram ve Uygulamada Eğitim Bilimleri, 11(1), 7-29.
10. Baş, G. (2014). İlköğretim Öğretmenlerinin Öğretme-Öğrenme Anlayışlarının Bazı Değişkenler Açısından Değerlendirilmesi Dicle Üniversitesi Ziya Gökalp Eğitim Fakültesi Dergisi, 22; 18-30.
11. Baş, G. (2015). Öğretmenlerin Eğitim Felsefesi İnançları ile Öğretme-Öğrenme Anlayışları Arasındaki İlişki. Eğitim ve Bilim, 40 (182), 111-126.
12. Baş G. and Beyhan Ö (2013). Öğretmen Adaylarının Öğretme-Öğrenme Anlayışları ile Öğrenci Kontrol İdeolojileri Arasındaki İlişki Hacettepe Üniversitesi Eğitim Fakültesi Dergisi (H. U. Journal of Education) Özel Sayı (1), 14-26.
13. Bayraktaroğlu, E. (2016). Lise Öğrencilerinin Ahlaki Olgunluk Düzeyleri ile Mizah Tarzları ve Şiddet Eğilimleri Arasındaki İlişkinin İncelenmesi, Yüksel Lisans Tezi, Gazi Üniversitesi, Eğitim Bilimleri Enstitüsü, Ankara.
14. ***Bıkmaz F. (2017).*** Öğretmen Adaylarının Öğretme-Öğrenme Anlayışları ve Bilimsel Epistemolojik İnançlarının Araştırılması: Boylamsal Bir Çalışma, Eğitim ve Bilim Cilt 42, Sayı 189; 183-196.
15. Büyüköztürk Ş. (2007). Sosyal Bilimler İçin Veri Analizi El Kitabı (7.Baskı), Pegem Akademi Yayıncılık, Ankara, 40.
16. Cengiz, R., Kayhan, M. and Acet, M. (2016). Beden Eğitimi Öğretmenlerinin Mizah Tarzları İle Algılanan Duygusal Bezdirme Üzerine Araştırma, International Journal of Science Culture And Sport 4 (Special Issue 2) 4: 490-501.
17. Cesur, S. (2018). Öğretmen Adaylarının Bağımsız Çalışabilme ve Sorumluluk Alabilme Yetkinliği İle Mizah Tarzları ve Zaman Yönetimi Becerileri Arasındaki İlişki, Yüksek Lisans Tezi, Kırşehir Ahi Evran Üniversitesi, Eğitim Bilimleri Anabilim Dalı, Kırşehir.
18. Chan, K. W. and Elliot, R. G. (2004). Relational Analysis of Personal Epistemology and Conceptions About Teaching and Learning. Teaching and Teacher Education, 20, 817-831.
19. Cheng, M. M. H., Chan, K-W., Tang, S. Y. F., and Cheng, A. Y. N. (2009). Pre-service Teacher Education Students' Epistemological Beliefs and Their Conceptions of Teaching. Teaching and Teacher Education,

25(2), 319-327.
20. Cooper CJ. SPSS, Descriptive Statistic, Http:// Psychology. Illinoisstate. Edu/Jccutti/ (15.06.2018).
21. Ekinci, N. (2016). Sınıf Öğretmenlerinin Öğretme-Öğrenme Anlayışları ve Öğrenen Özerkliğini Destekleyici Davranışları Arasındaki İlişkiler, Volume 10, Issue 19; 1-16.
22. Engin, G. and Daşdemir, İ. (2015). Sınıf Öğretmenlerinin Öğretme ve Öğrenme Anlayışlarının Çeşitli Değişkenler Açısından İncelenmesi. The Journal of Academic Social Science Studies, 33, 425-432.
23. Eren, A. (2009). Examining the Teacher Efficacy and Achievement Goals As Predictors of Turkish Student Teachers' Conceptions about Teaching and Learning. Australian Journal of Teacher Education, 34(1), 69-87.
24. Erickson S.J. and Feildstein S.W (2007). Adolescent Humor and Its Relationship to Coping, Defense Strategies, Psychological Distress and Well-Being, Child Psychiatry and Human Development, 37(3), 255-271.
25. Erözkan, A. (2009) Üniversite Öğrencilerinin Kişiler Arası İlişki Tarzları ve Mizah Tarzları Dokuz Eylül Üniversitesi Buca Eğitim Fakültesi Dergisi, 26, 56-66.
26. Fındıklı, E.B. (2013). Okul Yöneticilerinin Mizah Tarzları İle Yaşam Doyumları Arasındaki İlişki, Yeditepe Üniversitesi Sosyal Bilimler Enstitüsü, Yüksek Lisans Tezi, İstanbul.
27. Erözkan, A. and Yılmaz, B. (2006). Üniversite Öğrencilerinin Mizah Tarzları ve Bağlanma Stilleri" XV. Ulusal Eğitim Bilimleri Kongresi, Muğla Üniversitesi, Muğla.
28. Kağan, M. and Atalay, M. (2018). Üniversite Öğrencilerinin Mizah Tarzlarının Psikolojik İyi Oluş Düzeylerine Etkisinin İncelenmesi Journal Of Social And Humanities Sciences Research (Jshsr) Vol:5 Issue:27 Pp:3112-3121.
29. Karakuş, M. and Köse, A. (2018). Ülkemizdeki Yerli Turistlerin Nevşehir –Kozaklı Bölgesindeki Termal Kaplıca Tercihlerindeki Faktörler İleRekreatif Etkinliklerin Yeterlilik Durumlarının İncelenmesi, Spor Bilimleri Alanında Yenilikçi Yaklaşımlar, Aralık 2018;269-284
30. Karasar, N. (2004). Bilimsel Araştırma Yöntemi, Nobel Yayıncılık, Ankara, 52.
31. Kember, D. (1997). A Reconceptualisation of the Research into University Academics' Conceptions of Teaching. Learning and Instruction, 7(3), 255–275.
32. Martin, R. A., Puhlik-Doris, P., Larsen, G., Gray J. and Weir, K. (2003). Individual Differences in Uses of Humor and Their Relation to Psychological Well-Being: Development of the Humor Styles Questionnaire. Journal of Research in Personality, (37), 48-75.
33. Memduhoğlu, H.B. and Çıkar, İ. (2017). Öğretmenlerin Öğretme-Öğrenme Anlayışları ile Sınıf Yönetimi Yeterlilikleri Arasındaki İlişki. Eğitim ve Öğretim Araştırmaları Dergisi, 6(2).
34. Yelikaya, N. (2007). Lise Öğrencilerinin Mizah Tarzları ile Stresle Başa Çıkma Tarzları Arasındaki İlişkinin İncelenmesi, Yüksek Lisans Tezi, Çukurova Üniversitesi, Sosyal Bilimler Enstitüsü, Adana.
35. Oğuz, A. (2011). Öğretmen Adaylarının Demokratik Değerleri ile Öğretme ve Öğrenme Anlayışları. Değerler Eğitimi Dergisi, 9(22), 139-160.
36. Otrar, M. and Fındıklı, E.B. (2014). Okul Yöneticilerinin Mizah Tarzları ile Yaşam Doyumları Arasındaki İlişkinin İncelenmesi (Ataşehir Örneği) Eğitim Bilimleri Dergisi, 39, 145-157
37. Özbay Y, Palancı M, Kandemir M, Çakır O (2012). Üniversite Öğrencilerinin Öznel İyi Oluşlarının Duygusal Düzenleme, Mizah, Sosyal Öz yeterlik ve Başa çıkma Davranışları ile Yordanması. Türk Eğitim Bilimleri Dergisi Bahar 10 (2), 325-345.
38. Özdemir, S., Sezgin, F., Kaya, Z., and Recepoğlu, E. (2011). İlköğretim Okulu Öğretmenlerinin Stresle Başa Çıkma Tarzları İle Kullandıkları Mizah Tarzları Arasındaki İlişki. Kuram Ve Uygulamada Eğitim Yönetimi, 17(3), 405-428.
39. Özdemir, S. and Recepoğlu, E. (2010). Örgütsel Sağlık ve Mizah, V. Ulusal Eğitim Yönetimi Kongresi. Antalya: Gazi Üniversitesi & EYEDDER., 219-229.
40. Saçıcı, S. (2013). The İnterrelation Between Pre-service Science Teachers' Conceptions of Teaching and Learning, Learning Approaches and Self-efficacy Beliefs (Yayımlanmamış Yüksek Lisans Tezi). Orta Doğu Teknik Üniversitesi.

41. Sayar, B. (2012). Üniversite Öğrencilerinin Mizah Tarzları İle Umutsuzluk Ve Boyun Eğici Davranışları Arasındaki İlişkinin İncelenmesi, Sakarya Üniversitesi Eğitim Bilimleri Enstitüsü, Yüksek Lisans Tezi, Sakarya.
42. Şaşan, H. H. (2002). Yapılandırmacı Öğrenme. Yaşadıkça Eğitim. 74-75, 49-52.
43. Turan M.B. (2019). The Relationship between University Students' Epistemological Beliefs and Teaching/Learning Conceptions, International Journal of Progressive Education, 15 (1), 184-194.
44. Turan M.B. and Koç, K. (2018). Analysis of the Relationship between Ego Identity Status and
45. Personality Traits and General Self-Efficacy with Structural Equation Modeling, Higher Education Studies, 8 (4), 190-199
46. Turan M.B. and Koç, K. (2018). The Impact of Self-Directed Learning Readiness on Critical Thinking and Self-Efficacy among the Students of the School of Physical Education and Sports, International Journal of Higher Education, 7(6), 98-105
47. Türk Dil Kurumu Sözlüğü. (1969). Gözden Geçirilmiş 5. Baskı. Ankara: Türk Dil Kurumu Basımevi.
48. Ulloth, J. K. (2002). The Benefits of Humor in Nursing Education, Journal of Nursing Education, 41(11) , 476-81.
49. Yener, D., Yılmaz M. (2017). Öğretmen Adaylarının Öğrenme Öğretme Anlayışları ve Fen Öğretimine Yönelik Özyeterlik İnançları. Abant İzzet Baysal Üniversitesi Eğitim Fakültesi Dergisi, 17 (2), 1016-1038.
50. Yerlikaya, E. (2003). Mizah Tarzları Ölçeğinin Uyarlama Çalışması, Yüksek Lisans, Çukurova Üniversitesi, Sosyal Bilimler Enstitüsü, Adana.
51. Yılmaz, K. (2011). Okul Yöneticilerinin Mizah Tarzlarının Çeşitli Değişkenler Açısından İncelenmesi. İnönü Üniversitesi Eğitim Fakültesi Dergisi, 12(1), 27-44.
52. Yörükoğlu, A. (1970) "Çocuklarda Mizah Duygusu ile Ruhsal Çatışmaların İlişkisi", Çocuk Nöropsikiyatrisi Dergisi, 6: 105-119.

Male and Female Differences in Motor Creativity at the Age of 6 and 7 Years

Ouhassine Ibrahim[1], Seghir Nour-Eddine[2], Guerrach Ladjel[3], Cheikh Yaaqoub[4], Boufadene Othmane[5], Chenouf Khaled[6], Zemali Mohamed[7], Boufaden Outhman[8], Agboubi Habib[9] and Benmostefa Ismail[10]

[1, 2, 3, 4,10] laboratoire d'activité physique et sportif chez l'enfant et l'adolescent.

[5,6,7,8,9] Laboratoire des sciences appliquées au mouvement humain.

[1] Ph.D Student in sciences and techniques of physical and sports activities, Université des Sciences et de la Technologie d'Oran Mohamed Boudiaf (Ustomb), Algérie.

[2,3]Senior Lecturer in sciences and techniques of physical and sports activities, Université des Sciences et de la Technologie d'Oran Mohamed Boudiaf (Ustomb), Algérie.

[4] Doctor in sciences and techniques of physical and sports activities, Université des Sciences et de la Technologie d'Oran Mohamed Boudiaf (Ustomb), Algérie.

[5,6,7,8,9] Senior Lecturer in sciences and techniques of physical and sports activities, Université des Sciences et de la Technologie d'Oran Mohamed Boudiaf (Ustomb), Algérie.

[10] Ph.D Student in sciences and techniques of physical and sports activities, Université des Sciences et de la Technologie d'Oran Mohamed Boudiaf (Ustomb), Algérie.

Abstract

The present study aims to identify the statistical differences existing between the two sexes (males and females) with regard to the motor creativity variable for 6-and 7-year-old children in the first year of primary school. For that purpose, our research team followed the descriptive comparative approach. The research sample was selected randomly from different classes of the first year of primary school, distributed over a number of primary schools from the same city. The sample included 63 children (30 males and 33 females) during the 2018/2019 academic year. The research tools used in this study are the Bertsch' Test of Motor Creativity, Statistical Package for the Social Sciences (SPSS) software, Pearson's correlation test, the T-test (For two independent samples). The most important results obtained suggested that there are no statistically significant differences between the two genders, (males and females), with regard to the creativity variable and its three components, namely Motor Fluency, Motor Flexibility and Motor Originality.

Keywords: Motor creativity, Motor fluency, Motor flexibility, Motor originality

1. Introduction

The majority of educators throughout the world may now agree that the individual capacities (cognitive, physical, behavioral, etc.) can vary from one learner to another, from one age to another, and from the male gender to the female gender. It is also important to note that motion is the most important factor in upgrading the creative characters of a child during his early years, while attending the primary stage of education.Indeed, Torrance indicated that it is very likely that young children start expressing their creativity in a dynamic manner as they are in the **sensory** and **motor** development stage; they consider that movement is the most appropriate way for them to express their ideas and opinions [6]. This finding aroused the interest of a number of researchers for the purpose of documenting the importance of creativity and developing it in elementary schools [13]. This last research team defined Motor creativity as a mixture of perceptions of the new movement patterns; these perceptions may represent a solution to a specific problem, which is an issue that has previously been investigated. This may be viewed as an effort from children to produce movements which are responses to motor stimuli or solutions to motor problems [19]. Motor creativity consists of three components, namely *Motor fluency* which is defined as the "*individual's ability to produce several motor responses that he achieves in a specific and fixed unit of time*" [21], *Motor flexibility* represented by his "*ability to change and diversify the transition from one category of motor behavior to a different*

category that is suitable to the stimulator in a specific period of time" [1], and *Motor originality* which is the "*individual's ability to perform motor responses that are not common in motor activity that leads to the achievement of his goal*" [22]. In the same context, a number of researchers have noticed that only a limited number of studies have so far compared the motor creativity levels between the two genders. It is widely admitted that until now the differences in creativity between the two sexes have confused researchers for a long time [7]. For example, Kogan (1974) conducted a study on the relationship between sex and creativity; he found out that there is a relative equality in creativity between males and females [12]. Similarly, Sali Güneş and Koksal Aysel (2015) indicated through their study that the gender variable in children was not related to their creativity level [10]. Moreover, Dorothy carried out a study in 1971 on the same topic and her findings turned out to be in good agreement with the previous results encountered in the literature. She indicated that there were no statistically significant differences between males and females with regard to the motor creativity variable for children aged between 10 and 12 years [5]. In the same context, an Italian research team, i.e. Patrizia Scibinetti et al. (2004), conducted a study which suggested that a significant difference existed between the two sexes, for children aged between 6 and years, with regard to the motor creativity variable. On the other hand, the study performed by Amira Abdel Wahed and Karim in 2014 established that the motor creativity level was much better in females than in males for 5-year-old children [2]. Furthermore, another research investigation done by Tegano Debora and James Moran in 1989 indicated that the difference between the two genders, regarding creativity during the primary education cycle, appears at the beginning of the third grade. These authors added that there are no statistically significant differences between female and male children with respect to the creativity variable during preparatory education [20]. Consequently, based on these different results, on the one hand, and on the other, due to the lack of local research studies attesting that there are differences between the two sexes regarding the motor creativity variable, it can be said that further research on these differences is needed to have more detailed information about the way to deal with the two genders during a physical education and sports session in first year classes of primary education and also to prepare the different educational situations. As a consequence, our research team was deeply motivated to study the topic, starting from answering the following question: "***Are there any statistical differences between the two genders, (males and females), with regards to the results of the motor creativity test among 6 and 7-year-old first-year primary school children?***"

2. Method

Before starting the study, the researchers obtained the administrative approval from the Directorate of Education in the Wilaya (Province) of Tlemcen (Algeria) under the number 365 / CE / 2019, as well as from the parents of children involved in the study sample, in accordance with the recommendations of the Laboratory of Physical and Sport Education for the child and teenager in the Physical and Sports Education Institute at Mohamed Boudiaf University of Science and Technology in the City of Oran - (Algeria). It is useful to mention that the present study was carried out within the above mentioned educational institution.

With regard to the field procedures of the study, the selected sample was tested on the primary school yards or playgrounds that are intended for the physical and sports education classes. This was done in compliance with the recommendations of the Motor Creativity Test. The research team asked a group of first year primary teachers and some educational assistants and supervisors to help block the area where the test took place so that the integrity and independence of each child could be guaranteed during the implementation of the different test activities. For that purpose, the researchers used some empty classrooms or preparatory classrooms when available.

2.1. Participants

The sample for this study consisted of 63 children, (30 male and 33 females), between the ages of 6 and 7 years, who were randomly selected from the first year classes of primary education. They were all involved in normal and regular educational programs in five different primary schools in the town of Maghnia and the Wilaya (Province) of Tlemcen (Algeria).

- Note: The results regarding some new students and many others who were absent during their physical and sports education classes were automatically excluded from the test activities. Also, all dubious or unclear results were discarded. We sometimes asked for some help from another research team consisting of physical and sports education professors, to conduct the tests in separate institutions that have the same timing for the physical education classes.

2.2. Materials

The test tool used are: *Bertsch Test* of *Motor Creativity* ''This test provides measurements of motor creativity by means of two separate versions (form A and B) composed of four tasks each to be performed on the floor, with a bench, a hoop or a ball, respectively. Although the four tasks vary from mainly gross motor (floor, bench) to mainly fine motor (hoop, ball) coordination demands, the two forms vary in the degrees of freedom of the movement tasks, with form A providing no specific performance modality and form B partially defining it. For instance, to perform the bench task in its form A, children standing in front of the bench are free to do anything they want for a certain period of time. In the form B of the bench task, they are instead constrained not to loose body contact with the bench while freely moving around it, we must selected form B in line with general recommendations by Torrance (1988) on how to study the creativity process. Each child participated individually to the four motor creativity tasks in randomized order during school hours for a total test duration of about 30 min. The tasks lasted 2 min and 30 sec (hoop and floor) or 3 min (ball and bench). Children who stopped performing were encouraged to stay on task by prompting them again to follow the original instructions, described in the following for each task and ending with the common sentence: ''Try to find ways that are original and that other children may not think about, The test has an acceptable internal consistency, as indexed by the Cronbach's alpha coefficient across the four tasks (**α = 0.76**), Thus, the Bertsch test provides reliable measures of individual differences in children's motor creativity, [15]'' .

Hoop : Two parallel lines were put at a distance of 3.50 m. Children were asked to carry a hoop and move from one line to the other in whatever way they wanted. The verbal instruction was: ''Your task is to move the hoop from one line to the other. You can let it go on its own or take it with you. Show me anything you can do that comes to mind''.

Ball : Children were situated in the middle of a square measuring 2.50 m on each side. Their task was to use a ball to hit, one at a time, seven 1 m large targets on the wall, floor, or ceiling areas outside the square. The child was free to use the ball in whatever way he or she wanted. The verbal instruction was: ''You see all the targets around you. Imagine they are glasses. Imagine breaking them with this ball without going out of your home (i.e., the square). What's important is not so much to break all the glasses but to try to break them every time in a different way''.

Bench : A bench was located in the middle of a room or the square and two hoops were positioned at the two ends of the bench representing the starting and arrival point, respectively. The verbal instruction was: ''You have to go from one hoop to the other and back, keeping a part of your body always in contact with the bench''. The child was free to perform the task in any way he or she could think of.

Floor : Two parallel lines delimited a 2.50 squared-meter area on the floor. The verbal instruction was: ''Your task is to move from one line to the other. '' You are free to do anything you want between these two lines. Show me all possible ways you know or that may come to your mind to do that [15]''.

3. Results

Table 1. *Table showing the results of the T-test for gender differences in motor creativity variables*

Variable	*Gender*	*Number*	**Arithmetic Mean**	**Standard Deviation**	**Levene's - Test**		***Independent T-Test***	
					f	*Sig*	*t*	*Sig*
Motor Fluency	***Male***	30	9.55	2.71	0.48	**0.49**	0.32	**0.49**
	Female	33	9.78	3.02				

Motor Flexibility	***Male***	30	5.35	1.85	0.11	**0.74**	0.11	**0.92**
	Female	33	5.41	1.94				
Motor Originality	***Male***	30	3.35	1.72	1.15	**0.28**	1.23	**0.22**
	Female	33	2.78	1.98				
Motor Creativity	***Male***	30	18.26	4.93	1.11	**0.29**	0.21	**0.83**
	Female	33	17.97	5.85				

significance level (sig = 0.05)

Once the statistical data are reported in Table (1), then the following comments could be made:

The arithmetic mean and standard deviation regarding the motor fluency variable were respectively 9.55 and 2.71 for males, and 9.78 and 3.02 for females. Moreover, it turned out that the P-value is equal to 0.48 for a probability value Sig = 0.49 which is greater than the significance level (0.05). Therefore, it becomes more logical to reject the alternative hypothesis and accept the null hypothesis which states that the two samples of males and females have similar results regarding the motor fluency variable. However, the t-test value is equal to 0.32, and the probability value Sig = 0.49 which is greater than the significance level (0.05). Therefore, one may reject the alternative hypothesis and accept the null hypothesis which says that there are no statistically significant differences between the male and female genders with respect to the motor fluency variable.

It is also noted that the arithmetic mean and standard deviation for the motor flexibility variable were 5.35 and 1.85 for males, and 5.41 and 1.94 for females, respectively. However, the P-value was found equal to 0.11 for a probability value Sig = 0.74 which is greater than the significance level (0.05). Consequently, we can decline the alternative hypothesis and accept the null hypothesis which states that the two samples of males and females give similar results regarding the motor flexibility variable. In addition, the t-test value was found equal to 0.11, and the probability value Sig = 0.92 which is greater than the significance level (0.05). Therefore, one may reject the alternative hypothesis and accept the null hypothesis which says that there are no statistically significant differences between the male and female genders with regard to the motor flexibility variable.

Similarly, it was noted that the arithmetic mean and standard deviation of the motor Originality variable, were 3.35 and 1.72 for males, and 2.78 and 1.98 for females, respectively. However, the P-value was found equal to 1.15 for a probability value Sig = 0.28 which is greater than the significance level (0.05). Consequently, the alternative hypothesis can be rejected and the null hypothesis is accepted. The null hypothesis states that the two samples of males and females give similar results for the motor Originality variable. In addition, the t-value was equal to 1.23, and the probability value Sig = 0.22 which is greater than the significance level (0.05). Therefore, we can reject the alternative hypothesis and accept the null hypothesis which says that there are no statistically significant differences between the male and female genders with regard to the motor originality variable.

Regarding the motor creativity variable, it was observed that the arithmetic mean and standard deviation were 18.26 and 4.93 for males, and 17.97 and 5.85 for females, respectively. However, the P-value was found equal to 1.11 for a probability value Sig = 0.29 which is greater than the significance level (0.05). Consequently, the alternative hypothesis can be rejected and the null hypothesis is accepted. The null hypothesis suggests that the two samples of males and females give similar results regarding of the motor creativity variable. As for the t-value, it was found equal to 0.21, and the probability value Sig = 0.83 which is greater than the significance level (0.05). Therefore, we reject the alternative hypothesis and accept the null hypothesis which says that there are no statistically significant differences between the male and female genders with regard to the motor creativity variable.

4. Discussion and Conclusion

The statistical results summarized in Table 1 suggest that there are no statistically significant differences between males and females with regard to the motor creativity variable. In order to discuss the

results obtained, the researcher examined some articles previously published in the field of children's creativity. He found out that the number of studies related to that topic is very limited, specifically those related to the comparison of motor creativity between the two genders. With regard to the impact of gender on the motor creativity variable, some studies indicated that there are differences in creative performance between males and females, while others did not report any differences between the two genders [18]. Furthermore, in 2016 Prado et al. analyzed the results of 30 articles dealing with *gender differences in creativity* among Brazilian students; they found out that there is no gender-based differences related to creative performance [16]. On the other hand, Liikanen (1975) conducted a follow-up study on creativity in children; i.e. 82 boys and 86 girls, during the elementary education stage from Finnish schools. She indicated that no differences were found in creativity development components, namely fluency, flexibility, and originality, between the two sexes [14]. These findings constitute some of the reasons for the lack of significance of the differences between genders vis-à-vis the motor creativity variable. This may be attributed to the continuous development of creativity in children in the primary educational stage, since one cannot observe any differences between genders. Furthermore, the study of Roberta Varda et al. (1977) investigated the possible relationship between the creative activity and the gender variable in primary school children, i.e. 80 boys and 56 girls aged between 9 and 12 years. They concluded that there was no statistically significant relationship between creative thinking and the gender variable [17].The author believes that creative thinking is one of the processes upon which the different child's responses are based, while taking into account various motivations and stimuli. Furthermore, creative thinking is viewed as one of the means or tools that affect the creativity outcome with its various components; it is related to motor creativity. Indeed, Karima Alaq and Fatima Senawi (2015) commented in the same context that: "*Creative thinking is a trait that is not affected by the gender variable*" [3]. This finding was previously reported in the studies conducted by Flynn in 1994 [4]. Based on these observations, it may be said that there are no *significant gender differences* in motor creativity due to the fact that there are no differences in the creative thinking variable. Furthermore, Deborah Tegano and Moran (1989) conducted an investigation and found out that there are no statistically significant differences between the two genders with regard to the creative capacities of children in primary education [20]. Similarly, the study of Sali Güneş and Aysel (2015) indicated that gender has no impact on the creativity variable [10]. On the other hand, a number of studies have confirmed the results of our study which found out that there are no statistically significant differences between the two sexes regarding the motor creativity variable. For example, Dorothy Alston (1971) carried out a study that allowed confirming that no statistically significant differences exist between the two genders with regard to the motor creativity variable for children aged between 10 and 12 [5]. For her part, Sarah Shukri Faraj (2018) confirmed the same findings; her results showed that there are no individual differences with respect to the gender variable vis-à-vis motor creativity for children aged between 3 and 6 [9]. Likewise, Khorshi Selim (2019) corroborated the same findings saying that there are no statistically significant differences between genders regarding motor creativity [11]. This same researcher suggested that the reason for the lack of significant differences between sexes may be assigned to the fact that neither of the sexes received more experience than the other so they can exhibit any differences between them. This was also supported by the study of Cleland Frances and Gallahue (1993) on mobility differences among pupils of primary school with ages between 4 and 8; they indicated that no differences were found between the two genders vis-à-vis the mobility of these children [8].In this context, it is worth noting that the *tasks* of Bertsch' *Tests* of *Motor Creativity* (1983) are primarily dependent on the child's mobility by responding to the test stimulus.

Based on all the findings and conclusions mentioned above, it can be concluded that there are no statistically significant differences between the two genders regarding the motor creativity variable and its three components, namely motor fluency, motor flexibility and motor originality. This study concerned children in their first year of primary school in the town of Maghnia (Tlemcen - Algeria).

References

1. Abbasah H. Initiative marks and its relation to some skills of invention in students of the first year

average. University of Messila Institute of Science and Techniques for Physical and Sports Activities. Algeria. unpublished Master Thesis; March 08, 2014.
2. Abdel Wahed A , Karim N F. Relationship some Motor and Mental Games On The Motor for 5 Year Old Children. Journal of the College of Physical Education Baghdad 2014; 26(4) :152-166.
3. Alaq K, Senawi F. innovative thinking among the pupils of preparatory phase a comparative field study between enrolled and not enrolled pupils in preparatory education in relizane. Journal of Psychological and Educational Sciences 2015; 1 (1):139-168.
4. Al-Kinani M A M. The Psychology of the Creative Child.1st edition. Amman Jordan: el masira for Publishing Distribution and Printing;2011.
5. Alston D J. A Comparison of Motor Creativity with Verbal Creativity and Figural Creativity of Black Culturally Deprived Children. Greensboro. USA: A Dissertation Submitted to the Faculty of the Graduate School at The University of North Carolina at Greensboro in Partial Fulfillment of the Requirements for the Degree Doctor of Education Unpublished 1971.
6. Bournelli P , Makri A, Mylonas K. Motor Creativity and Self-Concept. Creativity Research Journal 2009; 21 (1):104–110.
7. Cheung P C, Lau S. Gender Differences in the Creativity of Hong Kong School Children Comparison by Using the New Electronic Wallach Kogan Creativity Tests. Creativity Research Journal 2010 ; 22 (2):194-199.
8. Cleland F E, Gallahue D L. Young Children's Divergent Movement Ability. Perceptualand Motor Skills 1993; 77 (2):535-544.
9. Faraj S Sh. Standardizing the Torrance creative thinking test in Action and movement for children from (3-6) years old at the Kingdom of Bahrain. Journal of Educational and Psychological Sciences 2018; 2 (8):115-135.
10. Güneş S, Aysel K A. Creativity of Preschool and Elementary School Teachers And Their Students. Perceptual & Motor Skills Learning & Memory 2015; 121 (3):759-765.
11. Khorshi S. Sensory-motor perception balance perception and its relationship to motor creativity to the children to Preparatory classes. sports creativity journal 2019;10(02):93-110.
12. kogan N. Creativity and sex defferences. The Journal of Creative Behavior 1974; 8 (1):1-14.
13. Konstantinidou E, Michalopoulou M, Agelousis N, Kourtesis T. Primary Physical Education Perspective on Creativity The Characteristics of the Creative Student and Their Creative Outcomes. International Journal of Humanities and Social Science 2013; 3 (3):234-247.
14. Liikanen P. ncreasing creativity through art education among preschool children. Jyväskylä Studies in Education Psychology & Social Research 1975; 29-44.
15. Patrizia S, Nicoletta T, Perse C. Motor Creativity and Creative Thinking in Children The Diverging Role of Inhibition.Creativity Research Journal 2011; 23(3):262–272.
16. Prado R M, Eunice M L, Fleith D S. Gender differences in creativity an analysis of brazilian studies. Boletim de Psicologia 2016; 66 (144):113-124.
17. Roberta M, Varda Y, Norman M. Creative Activity and Sex Role Identity in Elementary School Children. Perceptual and Motor Skills 1977; 45 (2):371-376.
18. Salama I M. Stimulating creative thinking in children. Debono Center for Thinking Education;2016.
19. Saracho O. Contemporary perspectives on research in creativity in early childhood education. United States Amirica: Intormation Age Publishing INC; 2012.
20. Tegano D W, Moran J. Sex differences in the original thinking of preschool and elementary school children. Creativity Research Journal 1989; 2: 102-110.
21. Yaqoubi F, The Impact of a Training Program with Moving Stories on the Development of Creativity motor among mentally Retarded Children who Can Learn. Sports Creativity journal 2014; 5 (01):141-148.
22. Zukari L. Innovation And Creativity motor in the share of physical education for early education. College of Education Partners of Excellence, Qatar University of Education; 2015.

Development of Creative Thinking of Secondary School Pupils at Physical Cultural Lessons in Ukraine: Realities and Perspectives

Inna Omelyanenko[1], Volodymyr Naumchuk[2], Alla Stepanyuk[3], Volodymyr Omelyanenko[4], Nadiia Grabyk[5] and Yaroslav Bodnar[6]

[1,2,4,5,6] *Associate Professor, Department of Theoretical Foundations and Methods of Physical Education, Ternopil Volodymyr Hnatiuk National Pedagogical University, Ukraine.*

[3] *Professor, Department of Chemistry and Biology, Ternopil Volodymyr Hnatiuk National Pedagogical University, Ukraine.*

Abstract

The article deals methods of development of creative thinking of pupils of the secondary school at classes of physical training have been offered. Its specific character lies in provision of stadiality characterized by the following features: each subsequent stage of development of creative thinking is a qualitatively new way of interaction with objects and subjects of pedagogical influence; the stages form both an invariant sequence and certain variational structures that are admitted; each stage is a hierarchical formation, since it integrates the methods of interaction of subjects, characteristic of the previous stages, and includes them in a more differentiated structure of the individual; passing from one stage of development to another, pupils are confronted with manifestations of problems that prompt them to seek a more perfect way of solving them. The experimental method involves three stages: basic, productive and creative. The purpose of the basic stage is the formation of the basis for development of creative thinking of adolescents at the classes of physical culture. Pedagogical activity within its limits is directed at the development of cognitive abilities that determine creative thinking (attention, memory, imagination) and formation of the base of movements and motor activities of pupils of the main school to create opportunities for realization of creative ideas by means of motor activity. The purpose of the productive stage is to improve the perfection of its main characteristics: independence, flexibility and divergent thinking. The goal of the creative phase is to improve the pupils' ability to produce new ideas through non-standard ways of solving motor tasks and combining motor skills for creation of new product activities.

Keywords: Pedagogical Strategy, Creative Thinking, Schoolchildren, Physical Education

1. Introduction

Modern tendencies in development of international community determine the importance of forming of a new type of personality – a creative personality with a high level of spirituality and culture. Such a personality acts as a potential for development of any country of the world, a guarantee of its prosperity and power. The pedagogical strategy that ensures formation of a creative personality in Ukraine is a constant expansion of educational space, the inclusion of each pupil in a variety of activities, which creates opportunities for creative self-realization. Consequently, life advances a public request for formation of a thinking and creative personality capable to think independently, to generate ideas, to take daring non-standard decisions, to argument them. However, the practice affirms that in many schools the educational process is often focused on reproductive activity of pupils. This causes inability to use the obtained knowledge in non-standard situations by school graduates; to make independent decisions; to generate and use new ideas, plans; to solve problem tasks in different spheres of life. The necessity of solving a contradiction between the demands of a society and the real state of personal growth of schoolchildren actualizes the problem of development of their creative thinking.

Development of creative thinking of schoolchildren is a sufficiently developed problem in pedagogical theory and practice [1; 2; 3; 4; 5]. Scientists interpret the development of pupils' creative thinking as an integral process that takes place at all stages of school education by means of various educational subjects [6; 7]. They affirm that one of the effective ways to meet the creative demands of schoolchildren is to practice

physical activity [8; 9; 10]. This conceptual idea determines the logic of our scientific search.

The problem of development of creative abilities of pupils at the lessons of physical culture received some working out by scientists. Thus, the possibilities of developing creative abilities of pupils of middle and senior school age in connection with motor skills and thinking [11] were studied; the conditions of development of creativity [12]; the use of principle of variability in development of creativity [13]. With the help of scholars' developments it is foreseen to develop motivational, activity, communicative, volitional, psychomotor components, as well as its cognitive component as a whole. However, the method of developing creative thinking, as the main component of pupils' cognitive and creative abilities, remains insufficiently substantiated.

2. Research Purpose

Purpose of the research: to work out and ground the methodology for developing creative thinking of secondary school pupils in the process of physical education.

3. Research Tasks

In accordance with the purpose of the research, the following research tasks were formulated:

1. To identify the attitude of teachers to the problem of development of creative abilities of schoolchildren by means of physical education and the state of development of creative abilities of pupils;

2. To develop and substantiate methodology of developing creative thinking of secondary school pupils at physical education classes.

4. Materials and Methods

A complex of methods of research has been used for solving tasks and reaching a goal of scientific research:

– *theoretical*: the analysis of problems on the basis of learning of normative documents and works in philosophy, psychology, pedagogy, methods of physical education; comparison, systematization and generalization of scientific and theoretical, and experimental data for clarification and specification of the essence of the main definitions of the research; modeling of the method of development of creative thinking of pupils in the process of physical education;

– *empirical*: pedagogical observation, questioning of teachers, testing of pupils, ranking, which made it possible to determine the real state of the problem in practice; staging and forming experiments to justify the effectiveness of the methodology of developing pupils' creative thinking in the process of physical education.

153 teachers of physical culture and 180 pupils of Ternopil, Khmelnytsky and Ivano-Frankivsk regions participated in the qualitative experiment. The formation experiment was conducted on the basis of Secondary schools No 9, 16, 24 of Ternopil during the 2018-2019 school year. 120 schoolchildren participated in it: 58 boys and 62 girls. It foresaw two diagnostic sections of determining the level of formation of creative abilities of schoolchildren: the entrance and the final. In the control classes, the pupils were trained in traditional, and in experimental classes – according to the author's methods of developing pupils' creative thinking. For confirmation of probability of the results of implementation of the experimental method, two diagnostic methods were used: "Determination of the level of formation of general creative abilities of the individual" [14], "Diagnosis of personal creative abilities" [15; 16].

5. Results

5.1. The problem of development of creative thinking of schoolchildren through the light of physical education teachers

For estimation of the state of realization of the problem of development of creative thinking at physical education classes, a questionnaire was conducted for teachers. Its results showed that 91.2% of respondents develop creative abilities of schoolchildren at physical education classes. However, ranking of the list of abilities of pupils by respondents which they improve during the process of physical education

showed that they lack proper attention in development of creative abilities from their side. Thus, according to the criterion of importance, the overwhelming majority of respondents identified the last rating place for them. The first place in rating was given to movement, on the second place – physical, on the third place – cognitive and on the fourth place – intellectual abilities. The reason for ignoring the problem of development of creative abilities of schoolchildren 77.8% of respondents named the lack of time at class. By this they confirmed secondary attitude of specialists in physical training to its solution.

Among respondents who assert that they purposefully develop creative thinking of schoolchildren, only 29.8% of them solve this problem as independent, 58.4% – as auxiliary, and 4.6% of specialists in pedagogical activity practice both variants for setting the task.

At the lack of knowledge about the possibilities of using means, methods, methodical methods of development of creative thinking, as well as the lack of tests for their assessment at physical education classes indicated 70.4% and 33% of respondents respectively. Most teachers (98%) consider physical exercises to be effective means of development of creative abilities of schoolchildren. In their opinion during the process of physical education the advantage should be given to: mobile games – 91.7%; relay races – 63.7%; musical-rhythmic complexes – 47,3%; sports games – 39.7%.

According to the results of the questionnaire the main factors determining the effectiveness of development of creative abilities of pupils have been revealed. The majority of respondents – 62.8% consider such attitude of pupils to classes. Almost equally the opinions of teachers in this issue have divided between the content of resources – 36.7% and the pedagogical conditions of conducting a physical training class – 32%.

Consequently, teachers of physical training realize wide possibilities of physical exercises in solving problems of development of creative abilities; however they do not use them fully in practical activity.

5.2. State of development of schoolchildren's creative ability

For confirmation of our conclusion pupils were questioned by the methods of M.Yantsur and E.Tunik (Table 1).

Table 1. *Levels of development of creative abilities of schoolchildren according to the results of the use of methodology of M. Yantsura and E.Tunik*

Methodology of M. Yantsura			Methodology E.Tunik			
Levels of development						
Low	Medium	High	Very low	Low	Medium	High
Together (%)						
6,4	83,7	9,7	0	16,1	80,7	3,2
boys(%)						
0	84,2	15,8	0	10,2	84,2	5,6
girls (%)						
16,7	83,3	0	0	25	75	0

The data obtained according to the method of M. Yantsur showed that 83.7% of pupils were characterized by an average level of creativity, 9.7% – a high and 6.4% – a low level of perfection. Girls have

somewhat better results of developing creative abilities than boys. Thus, 16.7% of young men showed a low and 83.3% showed an average level of development of creative abilities, against 84.2% of girls with an average and 15.8% with a high level of excellence in creative abilities.

Assessing the state of development of pupils' creative abilities according to the methodology of E. Tunik showed that 16.1% of the surveyed pupils were characterized by low, 80.7% – average and only 3.2% of pupils – by high levels. The boys showed lower level of development of creative abilities than girls: 75% of boys were characterized by average, and 25% – by low levels of development of personal creative abilities against 84.2% and 10.5% with the corresponding characteristics of girls. 5.6% of girls have a high level of development of creative abilities.

5.3. Fundamental principles of experimental methods of the development of creative thinking of secondary school students in the process of physical education

The analysis of the results of the observation experiment testifies that insufficient level of development of creative abilities of pupils is caused by: traditional approaches to conducting physical training classes; insufficient development of educational and methodological support for implementation of intellectual potential of physical training. This induced us to develop an experimental methodology for development of creative thinking, a methodology for developing creative thinking of secondary school pupils at physical training lessons. Its specifics lies in provision of stadiality of the corresponding process which is characterized by the following peculiarities: each subsequent stage of development of creative thinking is a qualitatively new way of interaction with objects and subjects of pedagogical influence; the stages form both an invariant sequence and certain variational structures are admitted; each stage is a hierarchical formation, since it integrates the methods of interaction of subjects, characteristic for the previous stages, and includes them in a more differentiated structure of an individual; moving from one stage of development to another, pupils come across manifestations of problems which induce them to seek a more perfect way of solving them. The experimental methodology foresees three stages: basic, productive and creative.

5.3.1. Characterization of the basic stage of the development of creative thinking of pupils

The purpose of the basic stage is formation of the basis for development of creative thinking of adolescents at lessons of physical training. Pedagogical activity within its limits is directed at development of cognitive abilities which determine creative thinking (attention, memory, imagination) and formation of the base of movements and motor activities of pupils of the main school to create opportunities for realization of creative ideas by means of motor activity.

At this stage, development of creative thinking of schoolchildren was carried out by means of track and field athletics. For development of attention of pupils at physical training classes running from a start, exercises for coordination of movements, line exercises and corresponding mobile games were used. We widely used tasks that foresaw a change in motor activities, ways of performing them on visual or auditory signals. For example, when running a race with an acceleration of 15-20 m, pupils started to the right or to the left of a teacher. The direction of the run was indicated by the teacher by means of lifting forward of the right or left hand. For development of attention we offered relay races with similar conditions of carrying out various tasks. For example, standing in front of a woodwork a teacher with the help of a whistle (or waving with a flag) made a stipulated signal, according to which pupils ran a certain number of times around the woodwork from the right or left. In a relay, which involves a jump over a pommel horse – to jump over it with legs separately, if the flag was raised or with legs bent if there was a signal with a whistle.

During physical training classes we livened functioning of verbal and logical, figurative, emotional and motor varieties of memory. Thus, visual memory was activated during perception of new motor actions demonstrated by the teacher. Verbal and logical memory during perception of teacher's explanations, self-control and mutual control while performing physical exercises. Movement memory – during the process of repeated reproduction or differentiation (increase, reduction) of spatial, temporal, dynamic, rhythmic

characteristics of motor activity. For development of memory we also used mobile games: "A fly-repeater", "Correct sequence", "Remember and do", "A detective" and others.

For development of imagination of schoolchildren techniques of exercising in imagination were used. Ideomotor exercises were used before the beginning of each new exercise, when a pupil imagined the sequence of movements and spatial, temporal and dynamic parameters of motor action. Exercises in immitation of movements are one more techniques of development of imagination. Its application forsaw imitation of sports techniques in simplified conditions. For example, performing a jerk using a gym stick instead of a horizontal bar for pulling-up or throwing without a device; creating an image of a boxer on a ring, a swimmer on land, a runner in the water, a skier on the sand. We also widely used the games and relays as ("Imaginary", "Crocodile", "Finish up the picture", "Association", "Build a figure", "Motorized puzzles", "By cells"). To increase motor luggage new exercises were systematically offered; changed the initial position of physical exercises, conditions for their implementation; partially changed the ways of conducting exercises, and every three weeks replaced the complex of general developmental exercises.

5.3.2. Characterization of the productive stage of the development of creative thinking of pupils

The purpose of the productive stage of the experimental method of developing creative thinking was to increase the perfection of its main characteristics. Its realization was achieved by solving the following tasks: to promote the development of independent thinking of schoolchildren by means of physical education; to develop flexibility of thinking of pupils of the main school in the process of physical education; contribute to the development of divergent thinking.

To influence the development of the main characteristics of the creative thinking of schoolchildren used basketball and mobile games.

The necessary prerequisite for the development of creative abilities of pupils in the process of physical education was the manifestation of their independence, since the creative activity of a human involves independent creation of new, original products. Independence of thinking is characterized by the ability of a man to set new tasks and solve them without resorting to other people's help. The autonomy of thinking is based on the consideration of the knowledge and experience of other people, but the person who inherits this quality, creatively approaches the knowledge of reality, finds new ways and means of solving cognitive and other problems.

Independence of thinking was developed through self-assessment by pupils and mutual evaluation of the correctness of the implementation of technical and tactical elements, the selection of individual exercises and their complexes on the instructions of the teacher, exercises for their own calculation taking into account individual characteristics (height, body weight, physical fitness). We also practiced the lessons with strengthening of the instructional function while reducing supervising function of the teacher. We widely used group method of organization and method of training, which create conditions for independent activity of pupils. During a two-way basketball game, pupils evaluated the game situation, predicted the possible actions of an opponent and players of his team and made an independent decision on their own motor activity. Involvement in the judging of games required pupils not only to know the rules, but also to respond to the game situation and timely and appropriate actions in accordance with the rules of the sports game. Any unpardoned teacher initiative and pupil's autonomy was encouraged.

Flexibility of thinking manifests itself in the ability of a person to quickly change their actions when changing the situation of activity, to expand the possibilities of functional use of a particular subject. It is an antithesis of rigid thinking, which often creates internal barriers to the generation of new ideas. For the development of flexibility of thinking we changed the rules known to pupils for sports and mobile games. Also, according to the teacher's instruction, pupils were offered the possibility of using standard equipment to solve problems that did not involve their use: the crossbar for tightening in the position of lying – for bending and extending the arms in the emphasis; medical balances – for balancing and other things. Pupils also suggested to use other subjects for the process of physical education. For example, children's sound toys – to control the amplitude of bending hands in the test case. The following mobile games were used: "The

hidden qualities of a subject", "Cross-nuts", "Various properties of a subject", "Color objects", "Confusion", "Exclusion of superfluous" and others.

5.3.3. Characterization of the creative stage of the development of creative thinking of pupils

The creative process involves not only the generation of ideas, but also the need to solve tasks that have many original and correct decisions, by choosing the optimal one. Therefore, divergent thinking is the basis of human creativity. For the development of divergent thinking, the method of "brainstorming" was used. Pupils reported a problem that needed a solution. The pupils expressed their own thoughts, and the teacher encouraged the introduction of new ideas and maintained the original. After analyzing all the proposals, the pupils took the best decision, taking into account the specific situation. Then in practice, the effectiveness of various methods for solving motor tasks was checked. For example, solved the following problem situations: "Which security rules would you apply during a particular game?", "What rules of the basketball game would you add, and which ones were excluded?", "Which tactics to choose to win the game? How to quickly overcome the barrier of obstacles? "," What exercise is better to do for the development of individual muscles? ","How to quickly overcome the obstacle? "," What exercise to choose for improving the specific motor activity, "and others. The following mobile games were used: "Islands", which involves the nomination and implementation of ideas about the collective way of acting in a non-standard situation; "Throw the ball", which requires pupils to demonstrate creativity and non-standard solution to the task; "Overcoming space", which involves choosing the mode of action in a non-standard situation; "Arka", which helps to develop the skills of generating ideas in the team, uniting its participants and shows that it is not necessary to immediately abandon the task, if the method of execution is not determined immediately.

The purpose of the creative stage of the experimental method was to improve the pupils' ability to produce new ideas. For its solving we used a solution of the following tasks: formation of skills for non-standard solution of motor tasks; formation of skills to combine motor skills for creation of new product activities.

At this stage, pupils performed individual creative tasks: they invented new exercises, rules for moving games, complexes of general development exercises, acrobatic combinations followed by their use during physical education lessons. We practiced inventions of new kinds of sports by pupils through the combination of already known kinds of sports. For example, schoolchildren were proposed to change the rules of the game of basketball using any gymnastic elements. Pupils put forward the idea of moving the court with dance steps only. At the suggestion of combining basketball with table tennis, pupils offered to push a tennis ball tennis with tennis rackets between team members for the longest possible time keeping it while moving within the basketball court.

5.3.4. Pedagogical conditions of development of creative thinking of pupils

The analysis of literary sources [17; 18; 19], teaching practices and own long-term experience has allowed us to identify the pedagogical conditions that ensure an effective implementation of the methodology for development of creative thinking of pupils in the process of physical education: the creation of a positive emotional atmosphere; creative and motor activity of schoolchildren as an example of a model of activity of a teacher-mentor.

The main ways of creating the first condition – a positive emotional atmosphere, were: organization of creative activity on optimistic principles, the teacher's faith in the child's ability; raising respect for the feelings and emotions of another person; providing emotional detection for each child. In addition, musical accompaniment, elements of novelty, game and competitive techniques were widely used.

An important role in development of creative abilities of schoolchildren in the process of physical education was played by creative and motor activity of pupils on the example of a teacher-tutor. Only a creative teacher endowed with vivid creativity can give impetus to development of creative abilities of pupils, to prepare them for creative activity. In the process of development of creative abilities, the teacher

showed artistry; created an atmosphere in the classroom that envisaged approval, support for the student's search activity, initiative, originality and independence in solving creative problems; contributed and stimulated the desire of children to express themselves in creative tasks. This happened against the background of the manifestation of positive feelings by a teacher, which is an integral part of the overall culture of a teacher's personality.

5.4. Efficiency of experimental methods of the development of creative thinking of secondary school students in the process of physical education

After conducting of the formal experiment, it was revealed (according to M. Yantsur's methodology) that there were no pupils with a low level of development of creative abilities among the pupils of both the Control group (CG) and the Experimental group (EG). The number of teenagers with an average level of development of creative abilities in the EG has not changed, and in the CG increased by 6.2%. The percentage of pupils with a high level of development of creative abilities in the EG has increased by 26.6%, but in the CG did not change, which indicates the effectiveness of the experimental method (Table 2).

Table 2. *Levels of development of creative abilities of schoolchildren before and after experimental training*

Group	By methodology of M. Yantsura			By methodology of E.Tunik			
	Levels of development						
	Low	Medium	High	Very low	Low	Medium	High
Control group before an experiment	6,2	81,2	12,5	0	18,7	75,1	6,2
Control group after an experiment	0	87,5	12,5	0	18,7	81,3	0
% of changes	- 6,2	6,2	0	0	0	6,2	- 6,2
Experimental group before an experiment	6,7	86,6	6,7	0	13,3	86,7	0
Experimental group after an experiment	0	66,7	33,3	0	6,7	66,7	26,6
% of changes	- 6,7	0	26,6	0	- 6,6	- 20	26,6

It has been determined that after the introduction of experimental techniques, the proportion of girls with low level of development of creative abilities in CG and EG has not changed, and among young men decreased by 6.2% and 6.7% respectively. The number of girls with an average level of development in the CG remained constant, and the boys – increased by 12.5%. In EG the number of boys and girls with an average level of development has decreased by 13.3%. Girls with a high level of development of creative abilities in CG have become less by 6,2%, and the rate of boys has not changed. In EG, the number of boys with a high level of development of creative abilities has increased by 13.3%, and girls by 20%.

The results of testing (according to E. Tunika's method) have showed that the number of pupils with low a level of development of creative abilities in CG did not change, and in EG – decreased by 6.6%; with an

average level – in the CG increased by 6.2%, and in the EG – decreased by 20%; however, with a high level in the EG increased by 26.6%, whereas in the KG – decreased by 6.2%, which indicates the effectiveness of the experimental methods.

After the introduction of the experimental method the specific weight of boys and girls of the CG and boys with a low level of development of creative abilities has not changed, while girls in the EG decreased by 6.7%. The number of boys in KG with an average level of development of creative abilities has not changed, and girls – grew by 6,2%. In the EG this indicator among boys decreased by 6.7%, and for girls - by 13.3%, with an increase in the number of both boys and girls by 6.7% and 20% with a high level of development of creative abilities. Among the boys of KG with the same characteristics of creative abilities, changes did not occur, and among girls - decreased by 6.2%.

6. Discussion

The conducted studies confirm the position of scholars that school age is favorable for development of creative abilities. Their initial average level of development in the majority of surveyed pupils shows that, despite the prevalence of reproductive education in school education, creative abilities develop as a result of natural formation of cognitive functions, activities of adolescents outside the school, and pedagogical influence at school.

Practically identical results of two diagnostic methods of assessing creative abilities of schoolchildren showed their validity. Higher outgoing position of girls over boys in development of creative abilities and a more significant increase in results after the implementation of experimental techniques for development of creative thinking is evidenced by the advanced pace of development of their cognitive abilities.

Development of creative thinking by means of physical education with subsequent improvement of the results of creative abilities of schoolchildren in the EG confirms the position of the scholars about its leading role as a structural component of creative abilities.

The increase of index of perfection of creative abilities after the introduction of the experimental method shows significant potential possibilities of the means of physical education in the formation of a creative person, which is probably due to positive attitude of the vast majority of schoolchildren to lessons of physical culture and, accordingly, the influence of an emotional factor and also vividly expressed activity character of development of abilities, which combines in itself motor and cognitive activity.

7. Conclusions

The introduction of a pedagogical strategy that ensures development of creative abilities of schoolchildren (expansion of the educational space, inclusion of each pupil in a variety of activities, in particular, physical exercises, which creates opportunities for creative self-realization), helps to overcome contradictions between the requirements of society and the real state of personal growth of schoolchildren and the significance of implementation of the developmental potential of physical education classes and the lack of educational and methodological support for this process.

The results of the conducted confirmatory experiment showed that specialists in Ukraine are aware of the role of physical education in solving problems of development of creative abilities of schoolchildren. However, teachers do not use their knowledge to the full extent in practice.

The method of development of creative thinking of pupils of the secondary school at the lessons of physical training has been offered. Its specifics lies in provision of phasic corresponding process which is characterized by the following features: each subsequent stage of development of creative thinking is a qualitatively new way of interaction with objects and subjects of pedagogical influence; the stages form both an invariant sequence and certain variational structures are admitted; each stage is a hierarchical formation, since it integrates the methods of interaction of subjects, characteristic of the previous stages, and includes them in a more differentiated structure of an individual; from one stage of development to another, pupils are confronted with manifestations of problems that prompt them to seek a more perfect way of solving them. The experimental method involves three stages: basic, productive and creative. They consistently

provide: the formation of the basis for development of creative thinking of adolescents at the lessons of physical culture, development of cognitive capabilities that determine creative thinking (attention, memory, imagination) and formation of the base of movements and motor activities of pupils of the main school to create opportunities to realize creative ideas by means of motor activity; increase in the level of formation of autonomy, flexibility and divergent thinking; improving pupils' skills to generate new ideas through non-standard ways of solving motor tasks and combining motor skills to create new product activities.

Implementation of the proposed methodology allows increasing the level of development of creative thinking of schoolchildren, to create a developing educational environment that corresponds to the present-day vocabulary. It will promote upbringing of a new generation of people with creative thinking that will allow them to adapt more qualitatively to the changing conditions of the modern information society.

Further researches of the problem is expedient to carry out in the direction of using interdisciplinary connections for development of pupils' creative thinking in the process of physical education, and training of future teachers for this kind of activity.

Conflict of interests

The authors declare that there is no conflict of interest.

References

1. Kotlyarova LT. Creativity of thinking in solving of cognitive tasks of a visual art character as one of the conditions of aptitude of pupils. *Herald of Kharkiv State Academy of Design and Arts*, (12), 21-26, 2002.
2. Kuriata YuV. Investigation of the influence of creative thinking on the socialization of young schoolchildren in modern conditions. *Scientific notes (Psychology and Pedagogy)*, 6 (1), 160 – 168, 2005.
3. Lebedev D. Development of creative thinking of a child in conditions of out-of-school educational institutions of scientific and technical profile. *Out-of-school activity and education and upbringing*, 2, 7-10, 2008.
4. Rozina IV. Features of development of creative forms of thinking in adolescence. 2009. Online available from http://dspace.pdpu.edu.ua/handle/123456789/639
5. Grytsyuk L, Pekarchuk O. Methodical aspects of development of creative thinking in designing, *Herald of "Lviv Polytechnica" National University*, 674, 27-31, 2010.
6. Ivanyuta OV. Development of creative imaginative thinking in adolescence age. *Science and education*, (5-6), 161-162, 2006.
7. Stepaniuk A. Schoolchildren's critical thinking formation in the process of biology study. *Knowledge. Education. Law. Management,* 4 (24), 234-244, 2018. doi: 10.5281/zenodo.2592631
8. Meinberg E. Main problems in sports education: an introduction. Wiss. Buchges,1995.
9. Shyian BM, Omelyanenko IO. Theory and methods of physical training education of schoolchildren. Navchalna knyha – Bohdan, Ukraine, Ternopil, 2012.
10. Naumchuk V. Technology of preparation and training of subject game classes of physical culture at comprehensive schools of Ukraine. State, prospects and development of rescue, physical culture and sports in the XXI century, TCSET of the International Conference, Bydgoszcz, Poland, Vol. 2, 337-354, 2015.
11. Ivanova GK. Formation of creative abilities of schoolchildren at the lessons of physical training. 1998. Online available from https://static.freereferats.ru/_avtoreferats/01000193686.pdf
12. Tsyhanok OV. Conditions of development of creativity of junior pupils at physical training classes. *Herald of Zaporizhzhya National University. Physical training and sports*, (2), 144-148, 2013.
13. Tytiak TA. Development of creative abilities and horizons of younger schoolchildren at physical training classes. *Mentor*, (1), 23-27, 2008.
14. Yantsur MS. Professional psychodiagnostics: Case study. MPU DCZ, MEU RDPI, Ukraine, Kyiv, 1995.
15. Tunic EE. Diagnostics of creativity Test E. Torrens. Adapted Option. St. Petersburg, 2006.

16. Kozlyakovskiy PA. General psychology. Mykolayv, Ukraine, Publishing house of P. Mohyla Mykolayiv State Humanitarian University, 2004.
17. Omelyanenko I. Modern Requirements to Formation of the Content of Physical Culture Education in Secondary Institutions. *Youth Scientific Bulletin of Lesya Ukrainka Eastern European National University. Physical education*, Vol. 21, 57-62, 2016.
18. Naumchuk V. General provisions of the methodology of teaching schoolchildren sports games. *Physical Education, Sports and Health Culture in Modern Society*, Vol. 4(20),165-170, 2012. Online available from https://sport.eenu.edu.ua/index.php/sport/article/view/604/568
19. Hrabyk N. Description of physical preparedness of rural children 10–12 years comparative with persons the same of age in 1985 year. *Slobozans`kij naukovo-sportivnij visnik*, Vol. 4(27), 35-40, 2011. Online available from http://journals.uran.ua/index.php/1991-0177/article/view/28618

The Effect of Protein and Carbohydrate Consumption during 10-Week Strength Training on Maximal Strength and Body Composition

Murat Ozan[1], Yusuf Buzdagli[2], Erdinc Siktar[3] and Izzet Ucan[4]

[1] *Kazim Karabekir Education Faculty, Department of Physical Education and Sport, Ataturk University, Erzurun, Turkey.*

[2,3] *Erzurum Technical University, Faculty of Sport Sciences, Erzurum, Turkey.*

[4] *School of Physical Education and Sport, Bayburt University, Bayburt, Turkey.*

Abstract

In this study, it was aimed to examine the effect of protein and carbohydrate consumption on repetitive maximal strength and body composition during the 10-week strength training. The mean age and height of the groups are as follows; experimental group CAR: (n=10) 20.04±1.38 years, 173.44±4.62 cm, PR (n=10) 21.29±2.44 years, 177.24±4.22 cm and placebo group; PLA (n=10) 20.14±2.19 years, 174.15±5.12 cm in total and 30 inactive male individuals participated in the evaluation. The research was conducted as a single blind study. Scitec Isolate Whey Protein and Hardline Carbopure supplementation was given to the experimental groups under the researcher supervision for 10 weeks in appropriate for daily use type and dose. 0.75 g/kg protein was given to the PR group two hours before the training, 0.75 g/kg protein was given immediately after the training and totally 1.5 g/kg 500ml water and protein supplement was given on the days of training. In carbohydrate supplementation, carbohydrate supplements were applied as 3.0 g/kg two hours before the training and 3.0 g/kg immediately after the training, and a total of 6 g/kg 500ml water on the days of training. In the research, synthetic colorant, which does not increase blood sugar, was given to the PLA group with 500ml water in equal amounts to the given supplement. As a result; while the use of carbohydrate and protein supplements in the 10-week strength training performed 4 days a week provided positive improvements on body composition and 1MT, especially the use of protein provided more positive developments on fat percentage and lean body mass.

Keywords: Body Composition, Carbohydrate, Maximal Strength, Protein

1. Introduction

Although the importance of exercising regularly for a healthy, energetic and quality life is better understood every passing day, living conditions, urbanization, intense working life and bad habits cause individuals to keep away from exercise. The individuals, who are conscious of this, have created significant differences for increasing the quality of life by engaging in various physical and sportive activities. In addition, throughout the human history, a well-formed body composition has been accepted as a characteristics that everybody wants to possess. Therefore, since the ancient times, individuals have used various substances believed to increase physical power and performance.

Energy and nutrient needs should be met by evaluating the individual characteristics at the determined time and amount during high-intensity and/or long-term trainings to maximize the effects of the training, to carry the body composition to the desired level and to protect the body weight and health of the athletes and sedentary individuals. While low energy intakes can cause the loss of muscle mass, loss of bone density, increased fatigue and risk of injury, a long-lasting recovery process can be experienced in case of disease.

Today, individuals engaged in sports use various products defined as ergogenic supplement because of various reasons such as increasing their performance and improve their physical appearances. The use of protein and carbohydrate is among the primary ergogenic supplements. The use of protein together with exercise will provide the body with amino acids for the build and repair of muscle tissue (2). In recent years, athletes, trainers and scientists are aware of the importance of both exercise and nutrition to facilitate the response of skeletal muscle size volume. There is an increase in protein requirements of the individuals

doing physical exercise. Daily protein intake level determined privately for athletes and sedentary individuals; determined by the International Society of Sports Nutrition (ISSN) is between 1.4 g/kg/day and 2.0 g/kg/day depending on the type, frequency and intensity of the exercise, which will create the reliability of protein intake and the positive effect (16).

Carbohydrate is an important energy source in exercises. Muscle and liver glycogen is synthesized from the carbohydrates consumed with the diet. Carbohydrates are very important for the individuals, who exercise, in long and high-intensity exercises and the determinant of the continuity of performance. Muscles and liver have the capacity to store large amounts of carbohydrates in the form of glycogen. For this reason, the level of carbohydrate consumption affects muscle glycogen stores and accordingly the ability to train and the duration of endurance (1). Carbohydrates are very important nutrients for endurance athletes. After a long-term exercise, muscle glycogen stores become empty. The emptying of glycogen stores in the liver and muscles leads to the emergence of excessive fatigue. The recommended daily carbohydrate need is 6-12 g/kg/day or 60-65% of total energy (12). It has been observed that the consumption of carbohydrates before exercise increases muscle glycogen stores and carbohydrate oxidation and enhance exercise performance. Timing and content of the meal consumed before exercise are important for metabolism, strength and endurance performance. Nutrients and liquids consumed before the exercise should primarily be rich in terms of carbohydrate content. Nutrients with high carbohydrate content enhance exercise performance. The carbohydrate consumed before exercise increases plasma glucose. As a result, insulin release from pancreas occurs, hepatic glucose release stops, glucose uptake begins in muscle cells. The increasing glucose in the muscles reduces glucose oxidation and fat oxidation while stimulating glycolysis. Liquids and nutrients with high carbohydrate amount enable the stability of the blood glucose leve and the protection of liver and muscle glycogen during the exercise. Nutrients with moderate amounts of protein, low fat and fiber content reduce gastrointestinal problems (15). Considering the physiological changes that occur after exercise, carbohydrates are the nutrients that are primarily used to renew muscle glycogen stores. At the end of exercise, while carbohydrate is required especially to renew liver and muscle glycogen stores, damage can occur in muscles after exercise and protein is needed for muscle repair.

In inactive individuals, the development of strength is very difficult and requires a long-term adaptation. In addition, it is a phenomenon desired by individuals to meet the physiological requirements of the body and achieve the ideal body composition for maximum efficiency. However, the importance of the consumed nutrients and the ergogenic supports to be used in order to reach the ideal body composition is very high. In this study, it was aimed to examine the effect of protein and carbohydrate consumption on repetitive maximal strength and body composition during the 10-week strength training.

2. Method

2.1. Research Group

Thirty physically inactive male individuals between the ages of 18-22 participated in this study. The groups were divided into three groups as the experimental group; CAR (n=10), PR (n=10) and PLE (n=10) groups. Analyses were performed by using the pretest-posttest method, the pretest results of the participants were obtained before giving any supplement and posttest results were obtained by applying strength training to each 3 group four times a week for 10 weeks. The research was conducted as a single blind study. In athletes, the conditions of being healthy, not having a chronic or acute disease and not having a movement limitation due to disability caused by any reason were sought and the necessary informed consent form was obtained.

2.2. Research Design

In the study, firstly, height measurements of the athletes and then body composition analyses were performed. The maximum dynamic force of the participants was measured by using the maximal repetition (1MT) squat (lower extremity) and bench press (upper extremity) test (29). According to the request of the participants, the load was increased by 5-10% in valid tests and decreased by 3-5% in invalid tests. In addition, a standard warm-up and preparation training were applied for 8-10 minutes to ensure reliability

(30). While performing 1MT power measurement, it was applied twice intermittently during the day and the best degree was recorded. Pretests were performed 1 day before the training program and posttests were performed on the next day after the training program was completed. The groups participating in the study were subjected to 10-week strength training in a way that each training unit was 60-70 minutes four times a week (Monday, Tuesday, Thursday, Friday). Training load was determined as 1 MT 40-60% and the number of repetitions was determined as 10 (44). In the first four weeks, the training load was 1MT 40%, it was increased to 50% in the 5th-8th weeks and 60% in the 9th and 10th weeks. A training unit included warm-up, basic phase, and cool-down sections. In the warm-up phase, jog exercises were performed for 5-7 minutes and stretching exercises were performed for 4-6 minutes at the severity of 40-60%. The basic phase plan was arranged as load: 1MT 40-60%, set: 3, repetition number: 10, resting between repetitions: 1 minute and resting between sets: 3 minutes and butterfly sit-up, air squat, dumbbell romanian deadlift, alternating dumbbell row, triceps push down, bulgarian split squat, hollow body hold, back lat pulldown, bench pres, leg press, leg extension, back leg extension, side-plank press, press-up and sit-up were performed in every training, respectively. Cool-down exercises were performed with active and passive stretching exercises for 8-10 minutes after each unit training.

2.3. Supplementation

Groups were divided into three groups as the experimental group CAR (n=10), PR (n=10) and plasebo group PLA (n=10). Scitec Isolate Whey Protein and Hardline Carbopure supplementation was given to the experimental groups under the researcher supervision for 10 weeks in appropriate for daily use type and dose. 0.75 g/kg protein was given to the PR group two hours before the training, 0.75 g/kg protein was given immediately after the training and totally 1.5 g/kg 500ml water and protein supplement was given on the days of training. In carbohydrate supplementation, carbohydrate supplements were applied as 3.0 g/kg two hours before the training and 3.0 g/kg immediately after the training, and a total of 6 g/kg 500ml water on the days of training (13). In the research, synthetic colorant, which does not increase blood sugar, was given to the PLA group with 500ml water in equal amounts to the given supplement. Based on the negative or positive changes that may occur in the data obtained from the participants, lifestyles, training programs and general nutrition programs of the participants were ensured not to disturb their daily routines in order to determine the effect of the supplementation in a reliable way. Furthermore, the daily routine nutrition programs of the participants were obtained and the excessive consumption of macronutrients such as supplementary protein, carbohydrate and fat, which might affect the result of our study, was avoided. In addition, during our study protocol, the use of any drug, vitamin, mineral or other supplement was not allowed in the diets of the participants. The athletes were not provided information about the substance given to them. In this way, the psychological effects that might occur in the participants were eliminated and the study was applied under more reliable conditions. Moreover, the participants were warned not to use alcohol and stimulants during the research process, and asked to take care of their nutritions and rests.

Table1. *Scitec İzole Whey Protein of Component (20).*

Scitec Isolate Whey Protein		
1 in service product	**% Daily Value**	
Energy	87 kcal	4%
Protein	21 gr	42%
Fat	0,1 gr	0%
Saturated Fat	0,1 gr	0%
Trans Fat	-	**
Carbohydrate	0,6 gr	1%
Sugar	-	0%

Fiber	-	0%
Salt	129 mg	2%
Glutamine	250 mg	0%
Amino Acid Profile for 1 Service Protein		
Leucine (BCAA)	2.226 mg	**
Isoleucine (BCAA)	1.344 mg	**
Valin (BCAA)	1.239 mg	**
Alanine	1.050 mg	**
Arginine	441 mg	**
Aspartic Acid	2.310 mg	**
Phenylalanine	630 mg	**
Glycine	294 mg	**
Glutamic Acid	4.051 mg	**
Histidine	357 mg	**
Lysine	2.016 mg	**
Methionine	462 mg	**
Proline	1.155 mg	**
Cool	966 mg	**
Cystine	462 mg	**
Tyrosine	546 mg	**
Treo	1.407mg	**
Tryptophan	294mg	**

**: Daily value has not been established.

Table 2. *Hardline Carbopure of Component (21).*

Hardline Carbopure		
1 in service product	**% Daily Value**	
Energy	184 kcal	9%
Carbohydrate	46.0gr	18%
Sugar	-	**
Fiber	-	**
Fat	0.0gr	0%
Saturated Fat		**
Protein	0.0	0%
Salt	-	**

**: Daily value has not been established

2.4. Height and Body Weight Measurement and Calculation of Body Mass Index

The heights of the participants were measured in cm with the Charder height measurement device. Body weights of the athletes were measured with Inbody 120 Bioimpedance Body Composition Analyzer.

2.5. Body Composition Analysis

In the study, the body composition analyses of the participants were performed by using the Inbody 120 Bioimpedance Body Composition Analyzer. Body composition analysis is to perform measurements

such as fat tissue, muscle tissue, body water and soft tissue of our body by using the body analysis device by sending light electric current to the body with the electrodes that contact hands and feet. The device measures bone rate, body water and muscle mass with great precision as well as measuring fat separately for each part of the body by using the highly sensitive body composition analysis systems "Tetrapolar Electrodes" with 8-point contact.

2.6. Statistical Analyses

In order to control whether the error terms showed normal distribution before selecting the tests to be applied to the data obtained in the research, Shapiro-Wilk normality test was performed and non-parametric tests were applied since normal distribution was not observed. The Wilcoxon signed rank test was used to evaluate the statistical differences of the pretests and posttests of each parameter. The research findings were expressed as mean and standard deviation. All statistical calculations were performed in SPSS 22.0 statistical package program.

3. Results

Table 3. *Characteristics of CAR, PR and PLE Participants*

		Groups		
Variables	**N**	**CAR**	**PR**	**PLA**
Age (year)	10	20,04±1,38	21,29±2,44	20,14±2,19
Height (cm)	10	173,44±4,62	177,24±4,22	174,15±5,12

The groups were homogeneously divided into three groups as the experimental groups CAR (n=10), PR (n=10) and the plasebo group PLA (n=10). Mean age and height of the participants are as follows: CAR 20.04±1.38 years, 173.44±4.62 cm, PR 21.29±2.44 years, 177.24±4.22cm and PLA 20.14±2.19 years, 174.15±5.12 cm.

Table 4. *CAR, PR and PLE Groups' Body Compositions Before and After Training and Repetitive Maximal Strength Analyses*

Groups	**CAR**		**PR**		**PLA**	
	Pre-test	**Post-test**	**Pre-test**	**Post-test**	**Pre-test**	**Post-test**
Variables	**M±S.D.**	**M±S.D**	**M±S.D**	**M±S.D**	**M±S.D**	**M±S.D**
Body weight (kg)	69,42±5,61	74,82±6,44**	71,13±7,32	74,59±7,13**	72,25±5,12	73,44±6,23*
BMI (kg/m²)	23,12±2,41	24,04±2,74*	22,71±2,13	23,61±2,28*	23,8±3,13	24,61±2,87*
Fat %	7,14±2,54	6,22±2,16	8,24±2,26	6,12±2,03**	7,18±3,26	6,89±2,17
Fat Mass (kg)	7,54±3,57	6,82±2,74*	7,48±3,31	5,84±3,27**	8,17±3,19	7,84±4,09
Fat Free Mass (kg)	62,14±2,43	64,94±2,97**	64,14±4,21	68,21±3,87**	65,36±4,12	66,23±4,58*
1MT	60,49±10,24	69,41±9,44**	62,23±9,57	72,18±8,74**	62,47±11,14	70,14±8,79**

Values are means ± SD Significant differences: *<.05 and **.001 CAR: Carbohydrate, PR: Protein, PlA:

Placebo

Body composition and 1MT strength analyses, mean pretest-posttest scores and standard deviations of the groups are shown in Table 2. There is a significant difference in CAR: body weight, fat free mass and 1MT; PR: body weight, fat, fat mass, fat free mass and 1MT; PLA: 1MT pretest and posttest values at the level of p<.001. There is a significant difference in CAR: BMI (body mass index) and fat mass; PR: BMI; PLA: body weight, BMI and fat free mass pretest and posttest values at the level of p<.05.

4. Discussion and Conclusion

The mean age and height of the groups are as follows; experimental group CAR: (n=10) 20.04±1.38 years, 173.44±4.62 cm, PR (n=10) 21.29±2.44 years, 177.24±4.22 cm and placebo group; PLA (n=10) 20.14±2.19 years, 174.15±5.12 cm in total and 30 inactive male individuals participated in the evaluation. There is a significant difference in CAR group's body weight, fat free mass and 1MT pretest and posttest values by p<.001 and BMI and fat mass values by p.05. When the literature is examined, carbohydrates are the fundamental fuels in strength/power trainings. Consuming a sufficient level of carbohydrate during the day supports glycogen stores during high-intensity training and competition and is also indirectly effective in the development of muscle tissues. Approximately 6-12 g/kg/day carbohydrate consumption is recommended. It should be considered that depending on the training intensity, age, body weight and gender, each athlete's energy and carbohydrate need may change and be different (12). The optimal time for carbohydrate consumption after activity is 15-30 minutes after the exercise. 1.5-3 g/kg carbohydrate (CHO) should be consumed as soon as possible after the exercise (2). It is suggested that a rich carbohydrate diet before a physical activity has a positive effect on performance (4, 37, 43, 33, 18, 24). The nutritional supplement received immediately after the activity is also used to accelerate the recovery process and benefit from the activity at the highest level (14, 26,). In some studies, it is stated that having a diet rich in CHO especially after intense and long-term physical activities will positively affect the recovery process (19, 42, 36). Some studies put forward that CHO and protein supplements increase performance and decrease muscle damage more than a nutrition only rich in CHO (19, 27, 34, 16). Carbohydrate loading for muscle before exercise reveals ergogenic characteristics for performance. In the literature, it was determined that approximately two times more normal muscle glycogen level could be stored in individuals with 3-day nutrition model rich in terms of carbohydrate content. It was also seen that endurance performance increased more than 1 hour when carbohydrate was consumed at regular intervals 2 hours before, during and after the exercise (1). In the organism, muscle glycogen storage size is shaped based on nutrition and previous physical loading. With a standard nutrition, skeletal muscles maintain an average of 1.5 g glycogen/100 g muscle tissue while with a nutrition having high carbohydrate content, this rate increases to 2 g. In case that the glycogen store is completely emptied with intensive training and subsequently refilled with proper nutrition, the muscle can store more glycogen. Glycogen stores can be refilled in forty six hours. Glycogen stores reach the initial level in about 24 hours with a nutrition having a carbohydrate level at the rate of 60-80% and when this nutritional style is continued, 2.5 g glycogen/100 g muscle can be reached (25).

There is a significant difference in PR group's body weight, fat free mass and 1MT pretest and posttest values by p<.001 and BMI and fat mass values by p.05. After strength/power training, muscle tissue and dietary protein requirements are higher. A sufficient level of high-quality protein is required at every meal to repair muscle tissue after exercise. 1.4-2.0 g/kg/day protein should be consumed. This amount corresponds to approximately 15-20% of energy (16). When an athlete aims to increase his muscle mass, 2.5-3.0 g/kg protein is recommended together with strength training (40). There have been significant discussions regarding the protein needs of athletes. In a different study, athletes were recommended to consume more than the amount specified by Recommended Dietary Allowance (RDA) in terms of protein (for example, 0.8-1.0 g/kg/day for children, adolescents and adults). However, the researches conducted in the past decade have shown that the athletes, who perform intensive training, should consume 1.5-2 times more than the amount specified by RDA in terms of protein in their diets (1.5-2.0 g/kg/day) to maintain their protein balance. If sufficient amount of protein is not obtained from the diet, an athlete will protect a

negative nitrogen balance which can increase protein catabolism and slow recovery. It is argued that this can cause lean muscle tissue loss and training instability over time (23). Protein consumption following a strength training has a positive effect by stimulating muscle protein synthesis to a large extent. The increase in protein synthesis is provided by the combination of carbohydrate and protein. For this reason, carbohydrate and protein should be consumed both before and after the exercise to increase muscle protein synthesis (13, 39). In the studies conducted, it was determined that the consumption of carbohydrate and protein together after the exercise reduces the decrease in blood glucose and significantly increases the concentration of arterial amino acids (3, 41).

Endurance exercise increases the synthesis of muscle myofibrillar proteins. A sufficient level of amino acids should be consumed to support the increasing synthesis. The effect of endurance exercise on muscle protein synthesis and net muscle protein lasts 48 hours or more. Therefore, consumption of protein in this period results in muscle protein synthesis and interactive effect on myofibrillar protein accumulation increased on net muscle protein. Any protein-containing food consumed within 24-48 hours following an endurance exercise session will contribute to muscle hypertrophy. For this reason, the idea that consuming higher amount of protein will provide more substrate for the synthesis of myofibrillar proteins that lead to higher hypertrophy results from the interactive reaction against endurance exercise and protein intake (39). Intense exercise, especially performing a high eccentric exercise, can complicate the next training sessions, increase muscle pains and increasing protein consumption to increase the potential to damage muscle proteins can help to reduce damage. It has been argued that high protein intake during recovery improves these damaging results of intense exercise.

The dimension in which protein supplement increases maximum strength in connection with strength training also depends on some factors besides protein. First of all, strength training program variables (such as density, volume and scope) can be listed as energy consumption in diet and nutritional supplements that can positively affect protein intake quality and strength. Considering each of these variables, the effects of supplementary protein consumption on maximum power increase vary. Hida et al. reported that recovery was not observed in the lower and upper body endurance of the females eating 15 g egg white protein (daily protein intake was increased to 1.23 g protein/kg/day) during an 8-week period compared to the placebo eating carbohydrates. In a meta-analysis conducted by Pasiakos et al. with untrained participants, it was reported that protein supplement could provide very few benefits to muscle hypertrophy and power in the first weeks of a resistance training program; however, as the duration, frequency and volume of the resistance training increased, protein supplement could positively affect skeleton (31). In a different research, higher gains were observed in the individuals who had more protein intake in body mass, protein synthesis and protein supplement (3.3 g/kg/day instead of 1.3 g/kg/day) within four weeks in resistance trainings of the individuals (11).

Tarnapolsky et al. showed that the individuals performing strength/power training should consume protein equivalent to 1.8 g/kg per day to maintain a positive nitrogen balance. This result is consistent with other studies revealing that protein intake between 1.4-2.4 g/kg/day maintains a positive nitrogen balance in the individuals who perform resistance training. In addition, although the objective of endurance athletes is not to maximize muscle size and strength, lean tissue loss has a negative effect on endurance performance . Therefore, these athletes need to protect their muscle mass to provide sufficient performance. Many studies reveal that protein intake for endurance athletes should be between 1.2-1.4g/kg/day to maintain positive nitrogene balance (38).

Farthing and Smith-Palmer evaluated the changes in the muscle mass, strength and myofibrillar (muscle contraction) protein catabolism in the individual in a resistance training program. The participants were randomly divided into three groups in a double-blind way: whey protein supplement group (1.2 g/kg whey protein plus 0.3 g/kg sucrose), soy protein supplement group (1.2 g/kg soy protein plus 0.3 g/kg sucrose) or placebo (1.2 g/kg maltodextrin plus 0.3 g/kg sucrose). For both protein sources, they determined that lean muscle mass and strength increased more than the placebo (10).

In another study conducted on healthy individuals, Cribb et al. evaluated the effects of different

proteins on muscle mass. In a double-blind style, during a 10-week controlled resistance training program, they compared hydrolyzed whey protein with casein protein on strength and body composition of 13 male bodybuilders. The participants were given a specific protein supplement of 1.5 g/kg per day. They found out that whey protein significantly improved lean muscle mass, reduced fat mass and achieved increased strength compared to casein (5). These various studies conducted on healthy individuals suggest that whey protein can increase muscle mass and power when evaluated both clinically and molecularly.

In another randomized controlled study, Denysschen et al. evaluated whether whey protein intake led to weight loss in 158 obese individuals (body mass index [BMI], 30-42 kg/m2). The participants in both groups lost weight due to an energy deficit of 500 kcal in their diets; however, those who took whey protein supplements lost more body fat compared to the control group and preserved their lean body mass better (6). Studies show that reaching and maintaining a healthy weight can contribute to our lives for many years and help to prevent weight-related complications including diabetes, cancer and heart disease. Diet plays an important role in any weight management program and adding protein supplements to our diets often helps to make a positive difference.

In the study of Dudgeon et al., the individuals performing strength training were divided into two groups as carbohydrate group and branched chain amino acids (DZAA) group; for 8 weeks, they received the specified supplements together with the bodybuilding training; in the DZZA group, fat mass decreased significantly; an increase in lean body mass was observed. Especially in the individuals engaged in strength sports, DZAA supplementation is recommended if fat tissue loss is targeted on the one hand and muscle mass increase is expected on the other hand (9). In the study of Schmitz et al., as a result of the intervention to the individuals, who performed strength exercise, with 9-week ergogenic supplement-containing athlete product, in the group receiving ergogenic supplement with creatine, carbohydrate, maltodextrin and protein content, LBM was found to be higher compared to the control group while BFP was lower compared to the control group (35). In the study conducted by Koopman et al. to investigate the effect of complex ergogenic athlete supplements on muscle protein synthesis, a product containing leucine + carbohydrate + whey protein was used; the ergogenic product was found to stimulate muscle protein synthesis and ensure protein balance in the body (22). In the study of Ormsbee et al., the effects of ergogenic supplements with complex content (containing conjugated linoleic acid, caffeine, green tea, DZAA) on the individuals, who did not perform physical exercise, were investigated and it was observed that such products did not have any effect on body composition in the individuals not performing any exercise (28).

There is a significant difference in PLA group's 1MT pretest and posttest values by p<.001, body weight, BMI and fat free mass pretest and posttest values by p.05. Protecting and improving skeletal muscle mass is essential for the sustainability of life quality and health. Skeletal muscle is essential in nutrient and energy consumption in the body and plays an important role in weight management (7). Strength exercises enhance muscle strength, mass and physical fitness. The hypertrophic response to strength training is a late adaptation of the muscle and the training should be performed for a minimum of 6-8 weeks. Especially in heavy resistance exercises, repetitive strong contractions and mechanical stress caused by these contractions activate many physiological events that play a role in the hypertrophy mechanism. The increase in anabolic hormone and growth factor release is the primary one among these events. The number of repetitions determines the long-term anabolic effects of the exercise. In short, if an anabolic effect will be created on the muscle, the exercises should be performed in 5-10 repetitions and at high intensity (32). The positive development observed in the PLA group is thought to result from the adaptation process to the 10-week strength training.

As a result; while the use of carbohydrate and protein supplements in the 10-week strength training performed 4 days a week provided positive improvements on body composition and 1MT, especially the use of protein provided more positive developments on fat percentage and lean body mass.

Applications in Sport

The health of athletes and inactive individuals body weight and body composition to the desired level

to maximize the effects of high intensity training done at the same time and/or long-term strength training conducted by evaluating individual properties identified during the correct time and amount of energy and nutrient needs must be met. In recent years, athletes, coaches and scientists have also been aware of the importance of both exercise and nutrition to facilitate the response of skeletal novelties. The most common ergogenic supplements used are protein and carbohydrate use. The use of protein together with strength training, muscle tissue construction and repair, while the use of carbohydrate will contribute to the filling of glycogen stores and recovery process.

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References

1. Alghannam, A. F. (2016). Nutrition for post-exercise recovery and training adaptation. Doctoral dissertation, University of Bath. United Kingdom.
2. American College of Sports Medicine, & American Dietetic Association. (2000). Joint Position Statement: nutrition and athletic performance. American College of Sports Medicine, American Dietetic Association, and Dietitians of Canada. Medicine and Science in Sports and Exercise, 32(12), 2130.
3. Bowtell, J. L., Gelly, K., Jackman, M. L., Patel, A., Simeoni, M., & Rennie, M. J. (1999). Effect of oral glutamine on whole body carbohydrate storage during recovery from exhaustive exercise. Journal of Applied Physiology, 86(6), 1770-1777.
4. Burke, L. M., Cox, G. R., Cummings, N. K., & Desbrow, B. (2001). Guidelines for daily carbohydrate intake. Sports Medicine, 31(4), 267-299.
5. Cribb, P. J., Williams, A. D., Carey, M. F., & Hayes, A. (2006). The effect of whey isolate and resistance training on strength, body composition, and plasma glutamine. International Journal of Sport Nutrition and Exercise Metabolism, 16(5), 494-509.
6. DeNysschen, C. A., Burton, H. W., Horvath, P. J., Leddy, J. J., & Browne, R. W. (2009). Resistance training with soy vs whey protein supplements in hyperlipidemic males. Journal of the International Society of Sports Nutrition, 6(1), 8.
7. Dideriksen, K., Reitelseder, S., & Holm, L. (2013). Influence of amino acids, dietary protein, and physical activity on muscle mass development in humans. Nutrients, 5(3), 852-876.
8. Dietitians of Canada, and the American College of Sports Medicine (2009). Position of the american dietetic association: nutrition and athletic performance. Journal of the American Dietetic Association, 109(3), 510-52.
9. Dudgeon, W. D., Kelley, E. P., & Scheett, T. P. (2016). In a single-blind, matched group design: branched-chain amino acid supplementation and resistance training maintains lean body mass during a caloric restricted diet. Journal of the International Society of Sports Nutrition, 13(1), 1. Doi: 10.1186/s12970-015-0112-9
10. Farthing, I., & Smith-Palmer, T. (2001). The effect of whey protein supplementation with and without creatine monohydrate combined with resistance training on lean tissue mass and muscle strength. International Journal of Sport Nutrition and Exercise Metabolism, 11, 349-364.
11. Fern, E.B., Bielinski, R.N. and Schutz, Y. (1991) Effects of exaggerated amino acid and protein supply in man. Experientia, 47, 168-172.
12. Fink, H.H., Burgoon, L.A., Mikesky, A.E. (2006). Practional applications in sports nutrition. Jones and Bartlett Publishers (pp.332, 363-428). Canada.
13. Fink, H. H., & Mikesky, A. E. (2017). Practical applications in sports nutrition. Jones & Bartlett Learning.
14. Green, M. S., Corona, B. T., Doyle, J. A., & Ingalls, C. P. (2008). Carbohydrate-protein drinks do not enhance recovery from exercise-induced muscle injury. International Journal of Sport Nutrition and Exercise Metabolism, 18(1), 1-18.
15. Hammond, K. M., Sale, C., Fraser, W., Tang, J., Shepherd, S. O., Strauss, J. A., ... & Stewart, C. (2019). Post-

exercise carbohydrate and energy availability induce independent effects on skeletal muscle cell signalling and bone turnover: implications for training adaptation. The Journal of Physiology, 597(18), 4779-4796.
16. Hawley, J. A., Burke, L. M., Phillips, S. M., & Spriet, L. L. (2011). Nutritional modulation of training-induced skeletal muscle adaptations. Journal of Applied Physiology, 110(3), 834-845.
17. Hida, A., Hasegawa, Y., Mekata, Y., Usuda, M., Masuda, Y., Kawano, H., & Kawano, Y. (2012). Effects of egg white protein supplementation on muscle strength and serum free amino acid concentrations. Nutrients, 4(10), 1504-1517.
18. Hulton, A. T., Edwards, J. P., Gregson, W., Maclaren, D., & Doran, D. A. (2013). Effect of fat and CHO meals on intermittent exercise in soccer players. International Journal of Sports Medicine, 34(02), 165-169.
19. Ivy, J. L., Res, P. T., Sprague, R. C., & Widzer, M. O. (2003). Effect of a carbohydrate-protein supplement on endurance performance during exercise of varying intensity. International Journal of Sport Nutrition and Exercise Metabolism, 13(3), 382-395.
20. Jeukendrup, A. E. (2010). Carbohydrate and exercise performance: the role of multiple transportable carbohydrates. Current Opinion in Clinical Nutrition & Metabolic Care, 13(4), 452-457.
21. Keri Marshall, N. D. (2004). Therapeutic applications of whey protein. Alternative Medicine Review, 9(2), 136-156.
22. Koopman, R., Wagenmakers, A. J., Manders, R. J., Zorenc, A. H., Senden, J. M., Gorselink, M., ... & van Loon, L. J. (2005). Combined ingestion of protein and free leucine with carbohydrate increases postexercise muscle protein synthesis in vivo in male subjects. American Journal of Physiology-Endocrinology and Metabolism, 288(4), 645-653.
23. Kreider, R. B., Wilborn, C. D., Taylor, L., Campbell, B., Almada, A. L., Collins, R. et al. (2010). ISSN exercise & sport nutrition review: research & recommendations. Journal of the International Society of Sports Nutrition, 7(1), 7. https://doi.org/10.1186/s12970-018-0242-y
24. Lima-Silva, A. E., Pires, F. O., Bertuzzi, R., Silva-Cavalcante, M. D., Oliveira, R. S., Kiss, M. A., & Bishop, D. (2013). Effects of a low-or a high-carbohydrate diet on performance, energy system contribution, and metabolic responses during supramaximal exercise. Applied Physiology, Nutrition, and Metabolism, 38(9), 928-934.
25. Little, J. P., Chilibeck, P. D., Ciona, D., Vandenberg, A., & Zello, G. A. (2009). The effects of low–and high–glycemic index foods on high-intensity intermittent exercise. International Journal of Sports Physiology and Performance, 4(3), 367-380.
26. Millard-Stafford, M., Childers, W. L., Conger, S. A., Kampfer, A. J., & Rahnert, J. A. (2008). Recovery nutrition: timing and composition after endurance exercise. Current Sports Medicine Reports, 7(4), 193-201.
27. Millard-Stafford, M., Warren, G. L., Thomas, L. M., Doyle, J. A., Snow, T., & Hitchcock, K. (2005). Recovery from run training: efficacy of a carbohydrate-protein beverage?. International Journal of Sport Nutrition and Exercise Metabolism, 15(6), 610-624.
28. Ormsbee, M. J., Rawal, S. R., Baur, D. A., Kinsey, A. W., Elam, M. L., Spicer, M. T., ... & Thomas, D. D. (2014). The effects of a multi-ingredient dietary supplement on body composition, adipokines, blood lipids, and metabolic health in overweight and obese men and women: a randomized controlled trial. Journal of the International Society of Sports Nutrition, 11(1), 37. Doi: 10.1186/1550-2783-11-37
29. Ozbay, S., & Ulupınar, S. (2019). Ust govde direnc egzersizlerinde 1TM, 5TM ve 10TM testlerinin guvenirligi. Turk Spor Bilimleri Dergisi, 2(1), 1-7.
30. Ozbay, S., Ulupınar, S., Cınar, V., & Akbulut, T. (2019). Ust govde kuvvetinin belirlenmesinde kullanılan kolay uygulanabilir laboratuvar dısı yontemlerin guvenirliligi. Turkiye Klinikleri Spor Bilimleri, 11(2), 74-81.
31. Pasiakos, S.M., Mclellan, T.M., Lieberman, H.R. (2015). The effects of protein supplements on muscle mass, strength, and aerobic and anaerobic power in healthy adults: a systematic review. Sports Med., 45, 111–131.

32. Phillips, S. M. (2014). A brief review of critical processes in exercise-induced muscular hypertrophy. Sports Medicine, 44(1), 71-77.
33. Rodriguez, N. R., Di, N. M., & Langley, S. (2009). American College of Sports Medicine position stand. Nutrition and athletic performance. Medicine and Science in Sports and Exercise, 41(3), 709-731.
34. Romano-Ely, B. C., Todd, M. K., Saunders, M. J., & Laurent, T. S. (2006). Effect of an isocaloric carbohydrate-protein-antioxidant drink on cycling performance. Medicine & Science in Sports & Exercise, 38(9), 1608-1616.
35. Schmitz, S. M., Hofheins, J. E., & Lemieux, R. (2010). Nine weeks of supplementation with a multi-nutrient product augments gains in lean mass, strength, and muscular performance in resistance trained men. Journal of the International Society of Sports Nutrition, 7(1), 40.
36. Siu, P.M., Wong, S.H., Morris, J.G., et al. (2004): Effect of frequency of carbohydrate feedings on recovery and subsequent endurance run. Medicine and Science in Sports and Exercise, 36, 315-323.
37. Stevenson, E., Williams, C., McComb, G., & Oram, C. (2005). Improved recovery from prolonged exercise following the consumption of low glycemic index carbohydrate meals. International Journal of Sport Nutrition and Exercise Metabolism, 15(4), 333-349.
38. Tarnopolsky, M. A., Atkinson, S. A., MacDougall, J. D., Chesley, A., Phillips, S., & Schwarcz, H. P. (1992). Evaluation of protein requirements for trained strength athletes. Journal of Applied Physiology, 73(5), 1986-1995.
39. Tipton, K. D. (2011). Efficacy and consequences of very-high-protein diets for athletes and exercisers. Proceedings of the Nutrition Society, 70(2), 205-214.
40. Tipton, K. D., & Wolfe, R. R. (2004). Protein and amino acids for athletes. Journal of sports sciences, 22(1), 65-79.
41. Tipton, K. D., Elliott, T. A., Ferrando, A. A., Aarsland, A. A., & Wolfe, R. R. (2009). Stimulation of muscle anabolism by resistance exercise and ingestion of leucine plus protein. Applied Physiology, Nutrition, and Metabolism, 34(2), 151-161.
42. Tsintzas, K., Williams, C., Boobis, L., Symington, S., Moorehouse, J., Garcia-Roves, P., & Nicholas, C. (2003). Effect of carbohydrate feeding during recovery from prolonged running on muscle glycogen metabolism during subsequent exercise. International Journal of Sports Medicine, 24(06), 452-458.
43. Wallis, G. A., Dawson, R., Achten, J., Webber, J., & Jeukendrup, A. E. (2006). Metabolic response to carbohydrate ingestion during exercise in males and females. American Journal of Physiology-Endocrinology and Metabolism, 290(4), 708-715.
44. Weineck, J. (2011) Futbolda kondisyon antrenmanı. Ceviri: Tanju Bagırgan. Ankara: Spor Yayınevi ve Kitabevi.

The Hematological Parameters of Ukrainian National Women's Wrestle Team before the Competition

Vita Vorona[1], Serhii Lazorenko[2], Hanna Dovhopolova[3], Anatoliy Ratov[4] and Mykola Chkhailo[5]

[1] Assistant Professor, Department of sports disciplines and physical education, Sumy State Pedagogical University named after A.S. Makarenko, Ukraine.

[2] Professor, Department of sports disciplines and physical education, Sumy State Pedagogical University named after A.S. Makarenko, Ukraine.

[3] Assistant Professor, Department of management of education and pedagogy of higher school, Sumy State Pedagogical University named after A.S. Makarenko, Ukraine.

[4,5] Professor, Department of theory and methodology of sport, Sumy State Pedagogical University named after A.S. Makarenko, Ukraine.

Abstract

Preparing athletes of high-level qualification for competitions requires a continuous biochemical monitoring. This research is conducted to examine the hematological parameters of female wrestlers while preparing for the Wrestling World Cup. The study involved 10 female athletes of the national team of Ukraine aged from 21 to 23 of different weight categories.

In most studies the authors state that hematological parameters may change while doing exercises. They may indicate overstrain and overtraining, but at the same time they were not useful markers for the early detection of overreaching. According to the results of our own research, the majority of female athletes had hematological parameters within the normal range. The four female wrestlers showed the signs of inadequate recovery. Timely detection of these features allowed us to make adjustments to the training process. The best results in the competition showed a female wrestler, whose biochemical examination data were within normal limits, and hemoglobin concentration was the highest among the surveyed. At the same time, two female athletes who won prizes had deviations from the norm of hematological parameters. In our opinion, in freestyle wrestling the result is determined by many factors. The classification of the wrestler, psychological and technical-tactical readiness, the level of the development of physical qualities and individual functionality are very important.

Keywords: hematological parameters, fatigue, overtraining, women wrestlers

1. Introduction

Modern wrestling is a dynamic and spectacular sport cultivated on all continents of the globe. In 2004 the women's freestyle was first presented at the Athens Olympics. Among women this sport is considered to be relatively «young» but it is actively developing, the competition among female athletes is increasing. This, in turn, requires specialists constantly finding the ways to improve the professional level of the athletes [1, 2].

Most scientists [3, 4, 5] have pointed to the need to focus as much as possible on the individual features of the wrestlers. Stelmach Y.Y. [6] proposes to take into account the gender differences in training and preparation of women in relation to the characteristics of the female body.

The effectiveness of the process of training female athletes in modern conditions, especially in women's sports, is largely due to the use of tools and methods of integrated control as a management tool, which allows to optimize the training process during pre-race training on the basis of qualitative and timely information on the status of women wrestlers [7].

The study of the athlete's adaptive capacity that is aimed at improving sports skills, expanding functional reserves and maintaining health in the meanwhile is an genuine problem during years of sports training. Biochemical control methods are most commonly used to control adaptive changes in the state of

the body's main energy systems [8]. Laboratory control, which is mainly based on the determination of blood biochemical parameters and hematologic parameters, also allows the athlete to solve some separate tasks, such as detecting the body's response to physical activity, assessing the level of fitness, the adequacy of the use of pharmacological and other remedies, the role of energy systems in muscle activity, the effect of climatic factors, etc.

Blood is used as one of the most important objects of biochemical research, because it reflects all the metabolic changes in tissue fluids and body lymph. The physical exercises can affect the blood parameters. Hematological parameters are necessary and important for such purposes as control, check, prevention and diagnosis in sports medicine [9]. Hematological examination is especially important for the evaluation of health and performances of the athletes in situations such as high training loads, strong psychophysiological stress during matches, changes in homeostasis and shifting of biochemical and hematological values out of physiological range [10, 11]. Changes in red blood cells and human iron metabolism are thought to play an important role in prediction of optimal physical performance by use of hematological parameters [12].

2. Method

2.1. Participants

The study involved 10 female athletes of the Ukrainian national freestyle wrestling team aged from 21 to 23 of different weight categories. The biochemical examination of the female athletes was conducted during the preparatory gathering one week before the participation in the World Wrestling Championships.

2.2. Materials and Procedure

Hemoglobin concentration, erythrocyte count, color score, and urea content of the athletes' blood were determined in peripheral blood at a rest, on an empty stomach, in the morning using a Diaglobal biochemical analyzer (Germany) with standard reagent kits of the same company.

Blood hemoglobin is one of the indicators that characterizes the aerobic capacity of the body's oxygen-transport system. This system is activated during aerobic energy supply of physical activity, as well as during the recovery of the body while resting after exercises. The concentration of hemoglobin in the blood and its fluctuations under the influence of physical activity indicate the degree of adaptation of the body of the athletes to perform specific exercises. With inadequate loading of the functional capabilities of the athlete's body, the concentration of hemoglobin in the blood is significantly reduced and such a level of hemoglobin is maintained for more than two or three consecutive days. The norm of hemoglobin in the blood for women at rest is: 125 - 150 g • l-1. [7]. As the level of training of the athlete is increasing, the concentration of hemoglobin in the blood is increasing as well and may exceed the upper limit of the rest norm, which indicates a high adaptation of the body to physical activity [8].

Erythrocytes are formed elements of blood containing hemoglobin, so a comprehensive assessment of the number of erythrocytes and hemoglobin concentration, based on the determination of color index, gives a more complete characterization of the processes of adaptation of the athletes to high physical activity and indirectly indicates the processes of erythropoiesis. Normal blood erythrocyte count at rest is 3.7–4.7 · 1012 / l for women. In endurance training, this index may increase, and with inadequate training loads, it may decrease due to hemolysis [8].

The color indicator reflects the content of hemoglobin in the erythrocyte. Norm is 0.85-1.05.

In the case of increased breakdown of tissue proteins, an excess intake of amino acids in the liver in the process of binding of toxic to the body of ammonia, a non-toxic nitrogen-containing substance – urea is synthesized. From the liver, urea enters the bloodstream and is excreted in the urine [7, 8]. Blood urea is an integral indicator of the transfer of the athletes training and competitive physical activity, the course of training and recovery processes. Determination of its level in the blood (in the morning at rest) allows to estimate in general the transfer of training loads.

The norm of urea in the blood at rest is: 3.5 - 6.5 mmol/l.

If the physical activity performed is adequate to the functionality of the body and a relatively rapid recovery of metabolism has occurred, then the content of urea in the blood in the morning returns to normal. This is due to the equilibration of the rate of synthesis and disintegration of proteins in the tissues of the body, which indicates its recovery. If the content of urea the next morning remains above normal, it indicates an incomplete recovery of the body or the development of fatigue [7].

3. Results

The medical and biological control, held in a week to attend national women team of Ukraine on freestyle wrestling competitions, provided an assessment of health status, capabilities of different functional systems, individual organs and mechanisms that carry the main load in training and competitive activities. The results of biochemical analysis of blood of female athletes were quite indicative and informative (Table 1).

Table 1. *Hematological parameters of female athletes*

Surname	Parameters					
	Hemoglobin, g • l-1			Erythrocytes, norm 3.7-4.7 $\cdot 10^{12}$/l	Color parameter, norm 0.85-1.05	Urea norm 3.5-6.5 mmol • l-1
	Low <125	Middle 125- 140	High >140			
Tkach Y.	115			4,30	0,80	7,3
Prokopevniuk I.		132		4,46	0,89	7,4
Shustova A.		134		4,81	0,84	6,6
Cherkasova A.		135		4,68	0,86	6,0
Bodnar S.		126		4,40	0,86	5,6
Chykhradze I.		125		4,39	0,85	6,3
Belinska A.	114			4,05	0,84	6,2
Livach O.	112			3,89	0,86	5,6
Kit T.		133		4,97	0,80	7,0
Bereza Khr.		127		4,27	0,89	4,8

According to the study, the concentration of hemoglobin and the number of erythrocytes in the blood are within normal limits of the majority of female athletes. However, the concentration of hemoglobin in the blood of such female athletes as Tkach Y., Livach O. and Belinska A. is below the physiological norm for women, which may be due to a number of reasons: the loads performed on the eve of training, the phase of the menstrual cycle, the presence of chronic diseases, unbalanced and irrational diet, etc.

The reduced level of color index of such female athletes as Tkach Y., Belinska A., Shustova A. and Kit T. may indirectly indicate a slight iron deficiency, which may be due to a number of reasons: the loads performed on the eve of training, the phase of the menstrual cycle, gastrointestinal problems, irrational and unbalanced diet, etc.

However, there are signs of under-recovery (high muscle tension body (in terms of urea)) of such athletes as Prokopevniuk I., Tkach Y., Shustova A. and Kit T.

Considering the results, the coach was amended in preparation for competitions. The following athletes as Prokopevniuk I., Tkach Y., Shustova A. and Kit T. were offered additional remedial procedures and made a correction of the training process. Tkach Y., Livach O., Belinska A., Shustova A. and Kit T. were offered to add to the diet food containing iron, vitamins C, B6, B12, folic acid. At the end of the training camp, all female athletes took part in World Championship (Table 2).

Table 2. *Senior World Championships-Oct 2018*

Rank	Wrestler	CP	VT	ST	TP	TP Gvn
Seniors-50						
3	Livach O	14	1	0	29	21
Seniors-53						
18	Bereza Khr.	1	0	0	1	6
Seniors-55						
10	Kit T.	4	0	0	6	7
Seniors-57						
14	Chykhradze I.	4	0	0	8	10
Seniors-59						
10	Bodnar S.	4	0	1	11	4
Seniors-62						
3	Tkach Y.	12	1	0	14	8
Seniors-65						
14	Prokopevniuk I.	1	0	0	4	5
Seniors-68						
1	Cherkasova A.	15	1	1	41	18
Seniors-72						
13	Belinska A.	1	0	0	1	12
Seniors-76						
21	Shustova A.	0	0	0	0	12

CP – Classification Points; VT – Victories by fall, default/forfeit/disqualification (5-0); ST – Victories by superiority (4-0 / 4-1); TP – Technical Points obtained; TP Gvn – Technical Points given

The best results in the competition showed athlete A. Cherkasova, whose biochemical examination data were within normal limits and hemoglobin concentration was the highest among the surveyed women wrestlers.

4. Discussion and Conclusion

According to the results of the majority of the studies, the dominant role of the freestyle wrestlers' physical qualities belongs to anaerobic capacity against the backdrop of a well-developed aerobic ability [13, 14, 15].

Conducted by V.V. Shian's [16] studies have also shown that a highly skilled wrestler's competition can be characterized as a glycolytic anaerobic load that results in significant shifts in the alkaline blood-alkaline equilibrium. This further emphasizes the importance of correcting the processes of recovery in the body of the wrestlers.

Kara E., et al [17] could not found any significant differences between the hemoglobin, hematocrit, erythrocyte, leukocyte, and thrombocyte levels of elite athletes involved in two different sports branches. Milic R., et al. [18] concluded that the predominant energy system required for participation in sport affects haematological parameters, sTfR and body iron proved to be reliable parameters for monitoring the dynamics of iron metabolism and could contribute to successful iron-deficiency prevention.

Saygin [19] compared the parameters of iron status of the wrestlers of different weights. The significant difference was found in values of iron. According to the author, the trainers may be offered to follow the hematological parameters and iron status, especially iron deficiency, as well as the physical performance of their wrestlers and to take the necessary measures. In our opinion, this only applies to male fighters. Iron status of women depends on the phase of the menstrual cycle. We found no difference in the parameters of iron status of women wrestlers of different weights.

Hesar Koushki et al. [20] reported the results of the study on 65 min of wrestling exercises, which showed that red cell distribution width (RDW) as one of the iron status factors was significantly decreased. This reduction was greater in the afternoon exercises as compared to the morning cycle. However, other iron indices such as haemoglobin and mean cell volume (MCV) had no significant changes.

According to the results of Morteza Tayebi [15], the study of acute response showed that wrestling exercises led to a decline of iron stores during exercises and reduced total iron binding capacity during a 24-hour recovery period.

According to the data of Beutler [21] significant force on the body can lead to traumatization of erythrocytes, their hemolysis, hemoglobinuria and/or metabolic changes, which cause an increase of plasma volume and the development of dilatory anemia, that is, an excessively large volume of plasma, even normal erythrocyte counts are not sufficient to adequately saturate the athlete's working muscles.

Ye Tian et all [22] investigated overtraining in a relatively large cohort of 114 elite women wrestlers during their normal training and competition schedules. The main finding was that the incidence of overtraining was relatively low overall but very high in a subgroup of 13 world-class wrestlers. The other main finding was that the blood variables creatine kinase, hemoglobin, testosterone, and cortisol were not useful markers for the early detection of overreaching.

Preparing athletes for high-level competitions requires constant biochemical control. Intense physical activity causes a number of complex adaptive reactions of the body, which are largely related to their energy supply. During training camps, in the process of adaptation of the athletes to special physical activities, a functional system is created, including metabolic indicators, which can collapse with the irrational organization of the training process. That is why, at this time, the biochemical analysis of the blood of female athletes makes it possible to assess the appropriateness and optimality of the methods and means chosen by the trainers to organize the training process of preparation for the responsible start of the year – the World Championship for Women Wrestlers.

According to the authors, we have found that hematologic parameters may change while doing exercises. They may indicate overstress and overtraining, but at the same time there were no useful markers for the early detection of overreaching. Female athletes are more likely than men to have a potential risk of iron deficiency due to their loss in the menstrual cycle, and also because of reduced food intake due to dietary restrictions in terms of quality and quantity. Timely detection of the problems with hematological analysis allows to make changes in the training process and offer the ways to successful iron-deficiency prevention.

Regarding our research: timely detection of under-recovery (high muscle tension body (in terms of urea)) of female athletes allows to make adjustments to the training process. The best results in the competition showed a female wrestler, whose biochemical examination data were within normal limits and the hemoglobin concentration was the highest among the surveyed.

In our opinion, in freestyle wrestling the result is determined by many factors. If, in cyclic sports, the result is directly dependent on the athlete's functionality, while in acyclic, which is a freestyle wrestling, the classification of the fighter, psychological and technical-tactical readiness, the level of the development of physical qualities and individual functionality are of great importance. Each wrestler has his own individual style of conducting a fight. Changing the «individual style» of performing a technical action that occurs in the case of physical fatigue, and, consequently, a decrease in the special performance of the wrestler, leads to a violation of the usual structure of the reception, which in turn reduces the possibility of its conduct in the real match.

References

1. Platonov VN. The system of training athletes in Olympic sports. General theory and its practical applications. K: Olympic literature; 2004. P. 808.
2. Pokulin S.L., Ruchka E.V., Ananchenko K.V. Improvement of technical-tactical and psychological training of freestyle wrestlers. Traektoriâ Nauki, 2016. 12. Accessed: php / ps / article / view / 267/303.

3. Boyko VF, Danko GV. Physical training of fighters. K: Olympic literature; 2004. P. 223.
4. Gierczuk D., Hubner-Wozniak E., Dlugolçcka B. Influence of training on anaerobic power and capacity of upper and lower limbs in young greco-roman wrestlers. Biology of Sport. Warshawa, 2012; 29: 235–239.
5. Sybil M.G., Pervachuk R.V., Trach V.M. Personalization of freestyle wrestlers' training process by influence the anaerobic systems of energy supply. Journal of physical education and sport. 2015; 15(2), Art 35: 225-228.
6. Stelmach Yu. Yu. Influence of training loads on the functional indicators of high-skilled female athletes in different phases of the menstrual cycle. Theory and Methodology of Physical education and sports. Kyiv. 2013; 1: 100-105.
7. Shinkaruk OA, Lysenko OM, Gunina LM, etc. Medical and biological support for the training of athletes of the national teams of Ukraine in the Olympic sports. K: Olymp. L-ra; 2009. P. 144.
8. Volkov N.I., Nesen E.N., Osipenko A.A., Korsun S.N. Biochemistry of muscle activity. K: Olympic literature; 2000. P.494.
9. Younesian A, Mohammadion M, Rahnama N. Haemathology of professional soccer players before and after 90 min match. Cell MolBiolLett, 2004; 9(2):133-136.
10. Banfi G. Reticulocytes in sports medicine. Sports Med, 2008; 38: 187-211.
11. Mercer K.W., Densmore J.J. Hematologic disorders in the athlete. Clin Sports Med, 2005; 24: 599-621.
12. Dopsaj V, Martinovic J, Dopsaj M, Kasum G, Kotur-Stevuljevic J, Koropanovski N. Hematological, oxidative stress, and immune status profiling in elite combat sport athletes. The Journal of Strength & Conditioning Research, 2013; 27(12): 3506-3514.
13. Sybil M., Pervachuk R., Zahura F., Shandrygos V., Yaremenko V., Bodnar I. Biochemical changes in cluster analysis indicators as a result of special tests of freestyle wrestlers of alactate and lactate types of power supply. Journal of physical education and sport. 2018; 18(1): Art 31,235-238.
14. Sazonov V. Characteristics of factors of fatigue of skilled athletes-combatants. Relevant Problems of Physical Culture and Sports, 2014; 29 (1): 68-74.
15. Morteza Tayebi S., Mahmoudi A., Shirazi E., & Sangi M. Acute Re-sponse of Some Iron Indices of Young Elite Wrestlers to Three Types of Aerobic, Anaerobic, and Wrestling Exercise. Montenegrin Journal of Sports Science and Medicine, 2017; 6(1):5-11.
16. Shiyan V.V. Perfection of special endurance of wrestlers M.: MON; 1979. P. 166.
17. Kara E, Özal M, Yavuz HU. Comparison of theblood parameters and respiratory functions of elitewrestlers and basketball players. Selcuk University-Journal of Physical Education and Sport Science 2010; 12: 36-41.
18. Milic, R., et al., Haematological and iron-related parameters in male and female athletes according to different metabolic energy demands. Eur J Appl Physiol, 2011; 111(3): 449-58.
19. Saygin, O. Examination of Some Physical, Hematological Parameters and Iron Status of Greco-Roman Wrestlers in the Age Category of Cadets by Weight Classes. Anthropologist 2014; 18(2): 325-334.
20. Koushi MH, Mollanovruzib A, Rashidlamirc A. The Effect of wrestling exercise in morning andafternoon on some hematological indices. Inter-national Journal of Applied Exercise Physiolo-gy, 2013; 2(1): 11-17.
21. Beutler E. Hemolitic anemia due to chemical and physical agents; 6-th Ed. Williams hematology. McGraw-Hill; 2001. P. 633-637.
22. Ye Tian, Zihong He, Jiexiu Zhao, Dalang Tao, Kuiyuan Xu, Adrian Midgley, Lars McNaughton. An 8-Year Longitudinal Study of Overreaching in 114 Elite Female Chinese Wrestlers. Jjournal of Athletic Training, 2015; 50(2): 217–223.

Does the Home Advantage Depend on Crowd Support in Major European Football League ?

Tugbay Inan
Faculty of Sport Sciences, Dokuz Eylul University, Izmir, Turkey.

Abstract

Home advantage in football has long been established as an important factor in determining the result of a game. Studies show that there is a constant home advantage across countries and leagues. There are many factors that affect the home advantage in football. The aim of this study was to demonstrate this effect using a new theoretical framework and backward multiple linear regression by crowd size. Data collected for three seasons of five major European Leagues was processed. For this reason, 3 seasons and n= 5478 matches were analysed starting from 2015 to 2019. Rather than evaluating home field advantage by the widely used percentage ratio of home points gained, we preferred investigating the determinants of the average home points per game earned by each team in the final standing table for each season. The model results suggest the presence of home field advantage for all major European Leagues with varying degrees and varying shares attributable to the crowd support.

Keywords: Home advantage, Football, Soccer, Crowd effects, Crowd size

1. Introduction

In recent years, sports studies related to the presence of home field advantage are frequently encountered. Wide range of studies show that in team sports competitions, home teams win games regardless of the opponent's qualification. The concept of home advantage in sports researches is not a new one, though there are several studies on the subject, it is still a quite up-to-date one. While some researchers conducted over time have reveal that the home advantage is only in individual sports competitions, it is seen that team sports have more intensive researches on the home advantage in branches such as football, basketball, handball, baseball and hockey.

In team sports such as football, we can consider home advantage as the ratio of points earned at home field to the overall points earned at the end of the season (1). Although the presence of the home advantage is mentioned as a phenomenon, it is particularly possible to talk about its reality in team sports. It is thought to be quite effective in determining the outcome of the match, especially in football. Leitte said in his study that if the home team wins more than 50% of the matches played at the end of the season, the home field advatnage can be mentioned (2). Schwartz and Barsky (1977) reported that home teams are more successful in American football, baseball, basketball and ice hockey branches in their study on American leagues (3). There are several studies on the subject in the literature. They are focused on developing conceptual models for the presence of home advantage, some of which are in team sports and some in individual sports. In 1981, Desmond Morris carried out the first study on home field advantage in football (4). On the other hand, a 1982 article by Jack Dowie was quite extensive. Dowie examined three F's - fatigue, familiarity and fans, each of which they thought to be contributing to home field advantage (5). Over a 40-year dataset, he sought the evidence that the performances of the visiting teams would decrease as the time progresses in the game, depending on the probability of scoring during the match. The visiting teams scored less than the home teams on average, but as the match progressed, this difference did not worsen against the visiting teams. Jurkovac T. (1985) dwelled on a different dimension of the home advantage, stating that the majority of players felt safer and better in front of an active and supportive crowd of spectators (6).

Pollard (1986) stated that the home advantage is an important variable affecting the result of the football match. (7) Courneya & Carron stated in their studies carried out in 1992 on different sports branches that the home field advantage can be found in many sports branches (8). After these basic studies, different sports branches where the home field advantage is examined have started to show up. In their study on

football, Nevill and Holder (1999) examined how various factors affect the home field advantage (9). In a meta-analysis study for ten different sports branches, Carron (2005) found the home field advantage in football as the highest value (10). The home field advantage has been studied since the beginning of the English Football League starting from 1888-1889 (1).

When the studies on the subject matter are examined, it is emphasized that having home field advantage is important especially in team sports. Jones, M. (2007) analyzed the quarters and overtime of all games played in the NBA for two seasons also various researchers also conducted studies some of which are: in handball (12), volleyball (13), rugby (14). It was also found in studies aiming at European football league in terms of home advantage that it is present as Russia 55.3%, Britain 56%, Germany 56.2%, Spain 61.2%, Turkey 61%, Belgium 60.7%, Portugal 56.4%, Italy 59.3, the Netherlands 57.5% and France 57% (2). Many studies have focused on different aspects of the home advantage, and almost all have found that the advantage is effective to different degrees. It seems that as long as the football is played on earth, the presence of this advantage will continue to be examined with different methods. When the studies in the field are analyzed in depth, we can see that the studies are classified into two basic concepts. The first is the quality of both teams and the other is the players' exposure to psychological factors. There are quite many variables that are thought to be affecting the player's performance during a competition, some of which are directly or indirectly contributing to home field advantage. Researches examining the effects of psychological factors on the performance of players in football matches have also been frequently encountered in recent years. There are many variables that affect the performance of football teams during the competition. The most important of these is the sportive quality of both the home team and the visiting team, and what changes the quality is both the players and the technical team. In order for one team to gain superiority over the other, its players are expected to have superior skills than the other. However, in some cases, not only players determine the result of a match, but a decision made by the referees, for instance, in case of penalizing any player with a red card, the tactical changes made by the coaches of the teams are also important variables affecting the fate of the game.

Familiarity is one of the important factors that can explain the home advantage. The players of the home team, who are accustomed to the local conditions of the competition, can become superior to the visiting team, both physically and psychologically. On the other hand, they can use these situations in favor of their own advantage. It is scientifically stated that the players living at high altitude and training here will become advantageous compared to the visiting teams during their home competitions. As one rises to a higher altitudes, some changes that can directly have some sort of effect on the performance of players such as respiratory changes, cardiovascular changes, heart rate, and heart rate could occur. When it is thought in terms of climate, the same situation may be more disadvantageous than the home team players, the players who go to a cold climate or a place with high humidity may be more disadvantageous than the home team players. Knowledge of specific conditions, such as wind, sun positions, and visual references which are previously obtained, benefit the home team when preparing or playing their tactics (5), (7), (1). As one of the most important indicators of this, there is this study that stating when a team moves to a new stadium, the advantage of the home field decreases. (11)

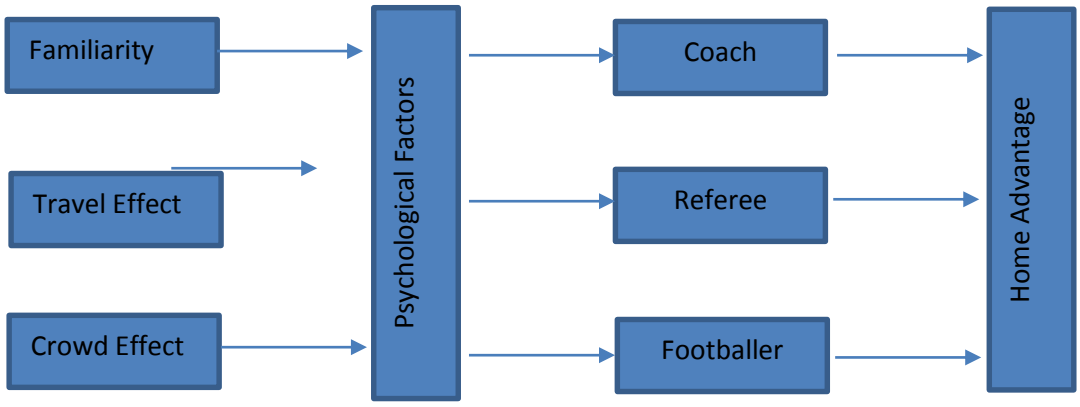
Another important variable that can explain the advantage for the home is referee bias. Some studies show that referees show more yellow and red cards to the players of the visiting teams, and more penalty decisions in favor of the home team (15-16-17-18) . According to the studies carried out by Nevill et al. (1996) it is stated that there is an increase in the number of fouls against the visiting team, in which the referees decide in favor of the home team (15). On the other hand, there are various determinations that the reactions of the spectator in the stadium may affect the referee's decision. (9)

Long travel durations, especially for international and sometimes intercontinental competitions, are used to explain the home advantage and are sometimes described as travel effects. Long travel times of players, travels carried out by various vehicles wear them physically and psychologically. Additionally, when eating and sleeping habits are added, some players cannot find the comfort of their homes at the hotels they go to. Some studies in Europe argue that the travel effect does not explain the presence of home field

advantage rates in competitions within the country (8), (19). However, Clarke and Norman (1995) stated that the distance between the teams is another variable that increases the rate of home advantage (20). This factor still awaits as a variable to be analyzed in depth.

Another important variable thought to be an advantage for the home team and which is the subject of this study is the crowd effect. Although the referee bias is seen as a determinant for the home advantage, this results in a successive process triggered by the crowd at the intermediate stage. It is estimated that the referees are affected by the pressure of the spectator, especially in competitions with high number of fans. In a study by Nevill, they expressed that the referees decided in favor of the home teams in their decisions (15). On the other hand, there are studies stating that the home team players will positively affect the performance of the teams, where the spectator will be better concentrated as a result of the cheers made by the spectators. Recently, very interesting studies have been carried out about the presence and effects of crowd effect. The aim of this study is to demonstrate this effect in major leagues in Europe by using a new framework and backward multiple linear regression, an econometric technique not previously used in this field, to the best of our knowledge. We will differentiate team capabilities that are always present regardless of the venue, and so we can find the effect of home advantage as shown in the Figure 1 below. This study focuses especially on crowd effects in home advantage by examining football matches from major leagues: EPL (United Kingdom), La Liga (Spain), Serie A (Italy), Bundesliga (Germany), and Ligue 1 (France).

Figure 1



Method

In this study, we present a theoretical approach different from previous studies. We will use the points earned per match at the end of the season to determine the home advantage, rather than the ratio of the points collected by the home team to the total points at the end of the season. We will divide it into two categories: the factors that are present, even if they have no impact on any home advantage, and the factors directly related to playing home.In this regard, we assume the average performance indicators of each team only for the away games and some other capability indicators (the total value of team squad, previous achievements, team brand and local sport ecosystem) as the factors that are present even in lack of any home field effect. And we assume the crowd support, physical factors and psychological factors as the factors present only at home.

Due to data limitations, however, we will test this theoretical framework by only performance indicators at away games as controlling for capability and crowd support as basic home field factor. We compiled seasonal average values from match level data of five major European Leagues (La Liga (Spain), Premier League (United Kingdom), Bundesliga (Germany), Serie A (İtaly) and Ligue 1 (France) for three seasons (2015-2016, 2016-2017 and 2017-2018).

	Premier League	Ligue 1	Bundesliga	Serie A	La Liga
Season	2015-18	2015-18	2015-18	2015-18	2015-18
Number of matches	1140	1140	918	1140	1140
Points Per Game at home	1,61	1,62	1,63	1,6	1,66

To this end, we constructed the econometric model formulated below:

$$\mathrm{AHP}_i = \beta_0 + \beta_1 \mathrm{NASN}_i + \beta_2 \mathrm{LNNASN}_i + \sum_k \beta_k \mathrm{AAC}_i^k + \sum_l \beta_l \mathrm{SD}_i^l + u_i$$

The variables in this model are explained below:

AHP_i	Average Home Points gained by team i,
NASN_i	Normalized Average Number of Supporters (in thousands) for team i,
LNNASN_i	Logarithm of Normalized Average Number of Supporters for team i,
AAC_i^k	kth Average Away Characteristic Performance Indicator value for team i,
SD_i^l	Dummy for the lth season for team i (1 if observation belongs to season l, 0 otherwise),
u_i	Error term for observation i.

Normalized average supporter number is the seasonal average supporters number normalized by the average supporter number of the last season in the dataset. This normalization is made to offset the effects of population change among seasons and to make seasons comparable with each other. We also add the natural logarithm of the normalized average supporter number to control for the existence of any non-linear relationship between average home points and number of supporters. Average away characteristic performance indicators are the indicators showing the performance of a team in away games where the crowd support is not present. We added average points gained away (AAP), average number of shots on target away (AASHT), average number of yellow cards away (AYC), average number of red cards away (ARC), average number of fouls committed away (AAFC), average number of corner kicks away (AACC) and average number of shots away (AASH) as away characteristic performance indicators to the actual regression model. All these are variables that are present in the model to control for the capability of a team even when there is no crowd support.

In this model, coefficients of average supporter numbers variables measure the effect of crowd support on average points gained at home. The coefficients of away characteristic performance indicators measure the effect of capabilities of a team which are present even in lack of crowd support and therefore not attributable to any home field effect. The dummy variables for seasons are included to check for if there is any difference in the nature of average home points gained among seasons. And finally, the constant term measures the total average effects of any other home field advantage factor except crowd support which are not included into the model due to measurement difficulties and data limitations.

Theoretically, we expect both the constant term and the coefficient of normalized average number of supporters to be positive implying that an increase in crowd support is expected to increase the average home points gained and even if the crowd support is lacking at home, other home field factors are expected to yield some level of contribution to the average home points gained ceteris paribus.

We applied the same procedure for all these five divisions by running this model with the backward multiple linear regression method of the SPSS 24.0 software and the results are presented in the next section. The data used in the experiments are publicly available. Match results, number attendance were downloaded from www.transfermarkt.com.

3. Results

Model results are shown in Table 1 below. In each turn of the backward multiple linear regression method of SPSS software, the variable with the highest p-value is excluded from the base model. This process continues until the all variables remaining in the model are statistically significant on 10 percent level of significance. Models shown in Table 1 are finally reached models for each country where the coefficients of all variables except the constant term are statistically significant on 5 percent level of significance. Although the constant term is not statistically significant for some countries, we keep it in the model throughout the process both to avoid biased predictions and, as it has a theoretical meaning of showing the average contribution of all other home field effects unrelated with the crowd support.

Interestingly, the most important control variables for away capability of a team appears as average points gained away and average shots on target which have both statistically significant coefficients for 4 of the 5 divisions in our dataset. It seems that given the sample size, these two variables are critical to reflect the effect of capability of a team in lack of crowd support on the average points gained at home. However, even when we control for capabilities of teams and the degree of crowd support, there seems to be significant differences on the points gained at home among the seasons and for Premier League (2016-2017), League 1 (2016-2017) and Serie A (2017-2018).

For all of the divisions, the presence of home field advantage is empirically validated. The signs of all coefficients are in line with our theoretical expectations. The share of average home points earned attributable to home filed factors, however, varies among divisions with a maximum of 51.4 percent for Premier League and with a minimum of 15.4 percent for La Liga. Interestingly, in addition to the low level of home field effect for La Liga, the crowd support also does not have any statistically significant effect on average home points earned. This might be due to the fact that La Liga has the most capable teams of the Europe and the differences in capabilities are much more important than the effects of home field conditions including crowd support. Also for League 1 (France), crowd support does not have any statistically significant effect on average home points earned, however, 51 percent of average home points earned are attributable to home field conditions. This implies that physical or psychological home field factors are more important for League 1 compared to the effect of crowd support.

For the other 3 divisions for which crowd support has statistically significant effects, the share of home field advantage attributable to crowd support varies between 89,8 percent (Bundesliga) and 23,1 percent (Premier League). Bundesliga appears to be the division for which crowd support has the highest effect on points earned at home.

Table 1. *Model results*

Division and Country	La Liga	Premier League	Bundesliga	Serie A	League 1
Mean of Dependent Variable (AHP)	1.659	1.615	1.634	1.603	1.627
Estimated Model Coefficients					
Home Field Effect Variables:					
Unexplained Home Field Effect:					
Constant Term	0.256 (0.189)	0.638 (0.312)	0.066 (0.264)	0.449 (0.175)	0.830 (0.108)
Crowd Support Indicators:					
NASN	*	0.005 (0.003)	0.013 (0,003)	0.011 (0.004)	*
LNNASN	*	*	*	*	*
Team Capability Variables:					
Achievement Indicators:					

AAP	0.523 (0.094)	0.338 (0.144)	*	0.413 (0.124)	0.656 (0.084)
AASHT	0.221 (0.102)	0.186 (0.083)	0.243 (0.064)	0.119 (0.069)	*
Defensive Indicators:					
AYC	*	-0.233 (0.139)	*	*	*
ARC	0.991 (0.455)	*	*	*	*
AAFC	*	*	*	*	*
Attacking Indicators:					
AACC	0.194 (0.057)	*	*	*	*
AASH	-0.092 (0.046)	*	*	*	*
Seasonal Dummies:					
S1617	*	0.207 (0.098)	*	*	0.206 (0.087)
S1718	*	*	*	-0.192 (0.083)	*
Number of Observations	63	60	54	60	60
Adjusted R Squared	0.708	0.593	0.454	0.689	0.511
Ave. Crowd Support / Home Field Ratio	**	0.231	0.898	0.380	**
Ave. Home Field Effect Ratio	0.154	0.514	0.396	0.452	0.510

Dependent Variable is AHP (Average Home Points)
Numbers in parenthesis are standard errors
* Dropped in backward regression process due to more than 10 percent level of significance
**Model results do not suggest any significant crowd support effect

4. Discussion and Conclusion

The results of the model used in this study indicate that there is a statistically significant home advantage for all major European leagues. However, the share of this advantage when compared in terms of crowd support differs significantly among leagues. No statistical effect of La Liga and League 1 crowd support on points earned at home field was detected. In a study of Scottish football leagues, although the mean crowd size in the top two leagues was four times larger compared to the third league, in the top two leagues the same level of HA was observed (about 60%), while the figure was found to be (51%) in the third league attracting fewer spectators. (Nevill, Newell and Gale, 1996) Analyzing English football leagues, Pollard found that HA was higher in the first four leagues (about 60%) than the lower five leagues (55%) as a percentage of home team points scored (15).

In many studies in the literature, it was stated that the number of spectators of the home team would exhibit a positive advantage in favor of the home team. Similar results were also found in Ligue 1 (France) and Premier League (England) in our study. Overall, most of the current studies suggest that collective support towards the home team is a factor that positively affects the performance of the home teams and also, the high number of spectators in the home matches may affect the visiting team psychologically and this may have a negative effect on the performances of the visiting team players.

The idea presented and empirically tested here may be applied to bigger data sets with more observations. Other aspects of home field advantage such as travel fatigue, aggressiveness of supporters,

tactical preferences made by teams at home and away and confidence levels of players may be integrated to the base model by gathering the required data for future study.

We believe that this methodology is a step further compared to the research investigating home field percentages of points without declaring any causal relationships among the determinants of home field advantage and points gained at home. Developing different models in leagues with high crowd density, the effect can be attempted to be clearly separated. However, many of the factors affecting the home advantage are strongly interrelated and some qualitative situations are difficult to express in quantitative terms. Nevertheless, it is possible to express the relationship between the home advantage and reasons as econometric models in many team sports. In future studies, it may be more beneficial to develop new models with variables such as increasing the number of leagues and the seasons, the number and density of spectators in the stadiums and their distance to the field. On the other hand, considering that the studies with artificial neural networks have increased in recent years, it can be thought that this type of methods can be used to determine the home field advantage.

References

1. Pollard R, Pollard G, Home advantage in soccer. A review of its existence and causes. International Journal of Soccer and Science, (2005); 3:1, 28–38.
2. Leite, W, Home advantage: Comparison between the major European football leagues. Athens Journal of Sports, (2017); 4:1, 65-74.
3. Schwartz B,and S. F. Barsky The Home Advantage, Social Forces, (1977); 55(3), 641–660.
4. Morris D, The Soccer Tribe. Lodon: Jonathan Cape; 1981
5. Dowie J, Why Spain should win the World Cup. New Scientist, (1982); 94, 693–695.
6. Jurkovac T, Collegiate basketball players' perceptions of the home advantage Unpublished master's thesis, Bowling Green State University, (1985); OH
7. Pollard R, Home advantage in soccer: A retrospective analysis. Journal of Sports Sciences, (1986); 4:3, 237–248.
8. Courneya K, Carron A,. Batting first versus last: Implications for the home advantage. Journal of Sport and Exercise Psychology 1990; 12:3, 312-316.
9. Nevill A, Holder R L,. Home advantage in sport: an overview of studies on the advantage of playing at home. Sports Medicine 1999; 28:4, 221–36.
10. Carron A, Loughhead M, Bray R,. The home advantage in sport competitions: Courneya and Carron's (1992) conceptual framework a decade later, Journal of Sports Sciences 2005; 23:4, 395-407.
11. Jones M,. Home advantage in the NBA as a game-long process. Journal of Quantitative Analysis in Sports 2007; 3:4.
12. Gutierrez A, Fernandez Romero J, Saavedra Garcia M,. Measuring Home Advantage in Spanish Handball. *Perceptual and Motor Skills* 2012; *114*:1, 329–338.
13. Marcelino R, Mesquita I, Palao M, Sampai, J,. Home advantage in high-level volleyball varies according to set number. J Sport Sci Med (2009); 8, 352-356.
14. Thomas S, Reeves C, Bellhome A,. Advantage in the six nations rugby union tournament. Percept Motor Skill 2008; 106:1, 113-116.
15. Nevill A. M., Newell S, Gale S,. Factors associated with home advantage in English and Scottish Soccer.Journal of Sports Sciences 1996;14, 181–186.
16. Boyko Ryan, Boyko Adam, Boyko Mark,. Referee bias contributes to home advantage in English Premiership football. Journal of sports sciences 2007; 25, 1185-94.
17. Poulter DR,. Home advantage and player nationality in international club football. Journal of sports sciences 2009; 27:8, 797-805.
18. Goumas Chris,. Home advantage and referee bias in European football. European journal of sport science 2014; 14:1, 243-249.
19. Smith DA, Ciacciarelli J, Lambert D,. Travel and the home advantage in professional sports. Sociology of

Sport Journal 2000; 17:4, 364-385.
20. Clarke SR,, Norman JM,. Home ground advantage of individual clubs in English soccer. Journal of the Royal Statistical Society: Series D (The Statistician) 1995; 44:4 509-521.

The Relationship Among the Humor Styles of Sensory Intelligence Levels of Hearing Impaired Athletes

Şıhmehmet Yiğit[1] and İbrahim Dalbudak[2]
[1]*School of Physical Education and Sports Namık Kemal University,Tekirdağ, Turkiye.*
[2] *Atabey Vocational School, Isparta University of Applied Sciences, Isparta, Turkey.*

Abstract

The aim of this study is to determine whether the sensory intelligence levels of the hearing impaired athletes is related to their humor styles. The sample of the study consists of 123 hearing-impaired athletes with different degree of hearing playing in different deaf clubs in Turkey. Participation was taken into consideration on the basis of volunteering. Sensory intelligence and humor styles of the hearing impaired athletes were analyzed according to the gender, disability status, sports branches, age groups, education status, income status and hearing level of the participants. In the study, a self-assessment scale which is The Schutte Emotional Intelligence Scale, Humor Styles Scale, developed by Schutte et al. (1998) and adapted to Turkish by Tatar et al. (2011), was developed by Martin et al. (2003), and adapted to Turkish by Yerlikaya (2003) was used. In this study, sensory intelligence and humor styles were analyzed and SPSS 22.00 Program which was used in quantitative research methods was used. Data were summarized by giving percentage and frequency tables. In this study, it was tested with 0.05 significance level. It was found that there was a significant difference between the emotional intelligence and sub-dimensions of hearing impaired athletes according to disability status and income ($p < .05$), but there was no difference according to age, gender, education, sport brach and levels of hearing loss ($p > .05$). In addition, it was found that there was a significant difference in humor styles and sub-dimensions of hearing-impaired athletes according to age, gender, income status and levels of hearing loss ($p < .05$), but there was no difference according to sport branch, education level and disability status ($p > .05$). Furthermore, there was no statistically significant relationship between emotional intelligence and humor styles ($p > .05$).

The results of the study showed us how the hearing impaired people use emotional intelligence and humor styles. In addition, a new study may be proposed to assess how hearing impaired athletes and other disabled individuals use and affect emotional intelligence and humor.

Keywords: Emotional Intelligence, Humor, Hearing Impaired, Sport

1. Introduction

It is claimed that Thorndike laid the foundations of emotional intelligence for the first time with the concept of "social intelligence". Thorndike examined his intelligence studies in 3 dimensions as social, concrete and abstract intelligence. The study of emotional intelligence for the first time in the experimental environment was realized by Salovey and Mayer's (1990) efforts to conceptualize emotional intelligence. This concept was reinforced by both the cognitive and non-cognitive research fields and the field of emotion research and developing cognition and influence at the University of Cape Town (Mayer and Salovey, 1993). Emotional intelligence is characterized by Mayer and Salovey as a pioneer. With the conclusion of emotional intelligence and different researches, a number of different ideas have emerged. As emotional intelligence became popular, many researchers started to make different definitions. Emotional intelligence is defined as "the state of influence cognition, in which there is joy, grief, fear, hate or interest, and being experienced in distinguishing the cognitive and voluntary structures of consciousness" (Random House Dictionary, 1973). Goleman defined emotional intelligence extensively as activating the person himself, progressing by not giving up despite all the setbacks, delaying reaching satisfaction by controlling the motives, balancing the mental state, not letting the problems affect the thinking negatively, understanding one's emotion and thoughts by thinking in the place of him/her, optimistic thinking and hope (Goleman, 1995). Emotional intelligence in a study by Bar-On (1997) is described as a series of non-cognitive abilities and competencies

that affect one's ability to cope with the demands and pressures of the environment (Bar-On, 1997). According to Cooper and Sawaf (2003); "It is the ability to sense, understand, and use effectively as a source of human energy, knowledge, relationships, and influence of the power and rapid perception of emotions" (Cooper &Sawaf, 2003).

When it is looked at the first usage areas of the term "mizah", which is called "humor" in English, it is seen that four different body fluids are called "humor" (blood, phlegm, black bile, and yellow bile) in Ancient Greek culture (Ruch, 1998). Humor is a concept that different sciences such as philosophy, sociology, psychology, literature have been interested in for centuries; that many thinkers and scientists such as Plato, Aristotle, Descartes, Kant, Schopenhauer, Spencer, Hobbes, Bergson, Darwin, Piaget and Freud tried to define and explain. Although a lot of things have been written on the subject, no clear compromised definition has been made about this concept (Yerlikaya, 2009). Humar is defined as "entertainment" that contains love and tolerance, does not involve fun by ridiculing with people's faults and deficiencies, and is made without waiting for any benefit (Kuiper & Martin, 1998). According to TDK Sözlüğü (2019), words of "mizah" and "güldürmece" are defined synonymously. The noun-meaning of the "gülmece" is defined as "irony which aims to entertain, laugh and tease about someone's behavior without hurting; the literature meaning of it is given as the type of literature, irony, which can reveal the comic aspects of reality. It can be understood that it is a very comprehensive concept that contains ridiculous behaviors and words that people do or say, perceived as funny and entertaining by everyone, and thus leads to laugh, and also requires the use of cognitive and emotional processes (Martin, 2007). Humor styles have been separated into groups step by step with the forming and development of humor according to the structure of societies and cultures and the purpose of use (Yardımcı, 2010). The four types of humor that we base in our study are self-enhancing humor, aggressive humor, affiliative humor and sub-types of self-defeating humor.

Self-Enhancing Humor: It is a sub-type of humor that enables the individual to cope with a situation by emphasizing and glorifying his/her self (Martin, 2007). This style includes having a generally humorous perspective towards life, having a tendency to have fun in the face of conflicts in life, and maintaining a humorous perspective even in negative situations (Kuiper, Martin, &Olinger, 1993).

Affiliative Humor: It is a kind of humor that a person makes with a loving attitude to make others laugh and entertain (Martin, 2007). According to Kazarian and Martin (2004), this style of humor, which is not hostile and includes a tolerant approach, can be used to increase loyalty and attractiveness in interpersonal relationships.

Aggressive Humor: It is a type of humor that one does with contemptuous and hurtful expressions in order to glorify one's own self (Martin, 2007). These individuals are said to tend to make sexist and racist jokes and use humor for the purpose of making irony, teasing, criticism or making fun (Kazarian& Martin, 2004).

Self- Defeating Humor: It is a type of humor created by using condescending, sarcastic and destructive expressions towards one's self to create comic and fun (Martin, 2007). According to Fabrizi and Pollio (1987), those who possess this high level of humor seem to be humorous and entertaining, but in fact, there is an escape, emotional neediness and low self-esteem under their use of humor.

In our country, considering the general population, it is accepted that there are 12.06% of individuals with disabilities, which represents approximately 8 million people with disabilities" (Ailevecalisma, 2019). Disabled person is the person who is unable to adapt to normal life and needs support even for the functions he / she can perform on his own because he / she loses his physical, mental, spiritual, emotional and social skills at different levels from birth or for any reason (Gür, 2001). Disabled person is unable to comply with the requirements of normal life due to the loss of his/her physical, mental, spiritual and social abilities in various degrees as a result of any illness or accident due to congenital or subsequent disease, and who has difficulties in meeting his daily needs and needs protection, care, rehabilitation, counseling and support services (Kaşıkçı, 2007). Hearing impaired person is defined as the person who has lost all or nearly all of the hearing function. Hearing findings can be found in all hearing-impaired individuals, although their grades differ (AICI, 2007). Hearing disability is the situation that a person needs special and supportive education

because of the difficulty of acquiring language, speaking and communication due to various degrees of hearing sensitivity for any reason. The person affected by this condition is the hearing impaired individual.

The word of sports is based on Latin, but in the sense that it spreads around the world, sports come from English. Derived from the Latin word "disportare", the sport has lost its first syllable since the seventeenth century and started to be used as it is today (Yüksel, 2019). It is observed that there are many definitions about sports in the literature. In modern life, sports are considered as a life form that holds the individual strong, dynamic and ready against the psychological and social threats that surround the individual (Canan&Ataoğlu, 2010). Within the framework of sports, there are organized human behaviors where one or more people come together as a professional athlete, the time and place are determined, a movement or all movements are expected to cause observable changes and are displayed around a purpose (Mathey, 1969).

To review hearing-impaired athletes in the scope of the study is one of the aspects of this study that differs from other studies of emotional intelligence and humor styles related to athletes. With this study related to emotional intelligence and humor styles of hearing-impaired athletes, the effects of sports on hearing-impaired individuals were searched.

This study which aims to learn emotional intelligence and humor styles were done with a total of 123 hearing-impaired athletes consisting of different hearing-impaired athletes in deaf clubs. Volunteering was taken into account in participation. The problems of the study in this framework:

- What are the emotional intelligence and humor styles of hearing-impaired athletes according to their gender?
- What are the emotional intelligence and humor styles of hearing-impaired athletes according to their disability?
- What are the humor styles of hearing-impaired athletes according to sports branches?
- What are the humor styles of hearing-impaired athletes by age groups?
- What are the humor styles of hearing-impaired athletes according to their educational status?
- What are the emotional intelligence and humor styles of hearing-impaired athletes according to their income status?
- What are the emotional intelligence and humor styles of hearing-impaired athletes according to their levels of hearing?
- What is the relationship between the humor styles and emotional intelligence?

2. Method

In obtaining the data, the "Personal Information Form" prepared by the researcher regarding the humor styles scale and demographic features is used and consists of three parts. The first part includes the personal information form (age, gender, educational status, sports branch, disability status, hearing level, income status, marital status) of hearing-impaired athletes.

In the second part, it was benefited from Schutte Emotional Intelligence Scale which was developed by Schutte et al. (1998), revised by Austin et al. (2004) and adapted to Turkish by Tatar et al. (2011). The Revised Schutte Emotional Intelligence Scale consists of 41 items to determine the level of Emotional Intelligence. The test is a 5-point likert type and was prepared according to the answer statements ordered from 1 to 5. These statements are listed as "Strongly Disagree = 1, Disagree = 2, No Idea = 3, Agree = 4, Strongly Agree = 5". The Cronbach Alpha internal consistency coefficient of the scale was found as 0.87 by calculating the total score correlations and Cronbach Alpha internal consistency coefficients. Austin et al. (2004) found the internal consistency coefficient of the original form of the scale as 0.85 in the study, which was revised as 41 items in the sample group consisting of 500 people. Again Austin et al. (2004) stated that the internal consistency coefficients of the scale ranged between 0.66 and 0.90 in their study and this result was found to be the same by different researchers (Tok, 2008).

The Humor Styles Questionnaire, developed by Martin et al. (2003), has four sub-dimensions. Self-Enhancing Humor and Affiliative Humor serve positively to mental health; Aggressive Humor and Self-

Defeating Humor are thought to have a devastating effect on mental health. The questionnaire, which has four sub-dimensions, consists of 32 items. 8 items were created to measure each sub-dimension. The Humor Styles Questionnaire was developed with data collected from participants aged 14-87 in Canada and reliability studies were conducted. Then factor analysis studies were carried out. Cronbach alpha values of the four sub-dimensions ranged between .77 and .81. The questionnaire is a 7-point Likert type and the participants will choose the most appropriate one among options with the "absolutely disagree" and "fully agree" options. The Turkish adaptation, validity and reliability studies of the questionnaire were conducted by Yerlikaya (2003).

3. Data Analysis

3.1. Emotional Intelligence Scale

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,788	,806	41

The Cronbach's Alpha value of the "Emotional Intelligence Scale" consisting of 41 items was found 0.788.

Sub-Scales

i. Optimism / Regulation of Mood

Items: 1, 2, 5, 7, 9, 11, 15, 16, 18, 19, 21, 25, 27, 29, 30, 31, 32, 33, 36, 37, 38

Cronbach's Alpha: 0.932

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,932	,932	21

ii. Evaluation of Emotions

Items: 3, 6, 8, 12, 17, 22, 24, 26, 28, 35, 39, 40, 41

Cronbach's Alpha=0.746

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,746	,751	13

iii. Use of Emotions

Items: 4, 10, 13, 14, 20, 23, 34

Cronbach's Alpha=0.744

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,744	,743	7

3.2. Humor Styles Scale

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,829	,804	32

Cronbach's Alpha value of the "Humor Styles Scale" consisting of 32 items was found 0.829.

Sub-Scales

i. Affiliative Humor

Items: 1, 5, 9, 13, 17, 21, 25, 29

Cronbach's Alpha= 0.813

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,813	,803	8

ii. Self-Enhancing Humor

Items: 2, 6, 10, 14, 18, 22, 26, 30

Cronbach's Alpha=0.832

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,832	,831	8

iii. Aggressive Humor

Items: 3, 7, 11, 15, 19, 23, 27, 31

Cronbach's Alpha=0.405

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,405	,363	8

iv. Self-Defeating Humor
Items: 4, 8, 12, 16, 20, 24, 28, 32
Cronbach's Alpha=0.608

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,608	,614	8

4. Whole Questionnaire (Emotional Intelligence + Humor Styles) 73 Items

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,803	,793	73

Emotional Intelligence Scale and Humor Styles Scale were combined and presented to the participants as a single questionnaire. Therefore, these two scales should be considered as a single scale. Cronbach's Alpha value of the scale consisting of 73 questions was found 0.803.

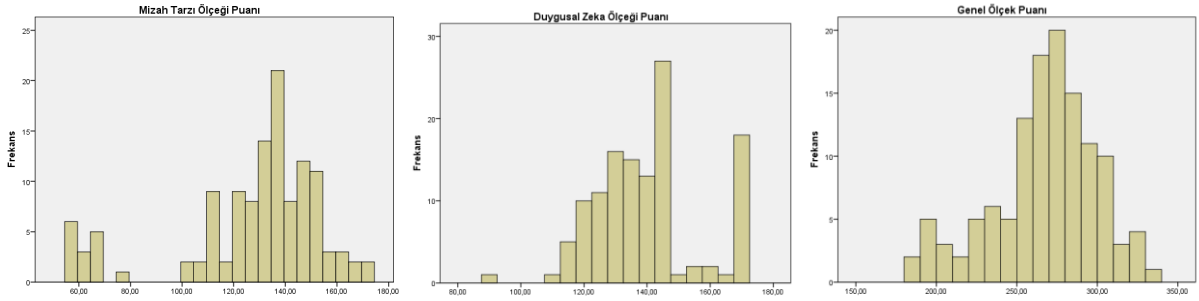
5. Relationships Among Variables

The total scores obtained by the participants' answers on the emotional intelligence scale with 41 questions and humor style scale with 32 questions were calculated. In the emotional intelligence scale consisting of 41 questions and 5 possible answers (absolutely disagree, disagree, no idea, agree, strongly agree), a participant can get a minimum of 41 and a maximum of 205 points. It is possible to score between 21 and 105 on the scale of "optimism / organization of mood", between 13 and 65 on the scale of "evaluation of emotions", and between 7 and 35 on the scale of "use of emotions" which are the sub-scales of emotional intelligence scale. The lowest score that can be obtained on the scale of humor styles consisting of 32 questions and 7 possible answers (I absolutely disagree, disagree, disagree, indecisive, agree a bit, agree, fully agree) is 32 and the highest score is 224. In the sub-scales (affiliative humor, self-enhancing humor, aggressive humor, self-defeating humor) consisting of 8 questions, minimum 7 and maximum 56 points can be obtained. Summary statistics are given for the total scores obtained in the table below.

	Minimum	Maximum	Average	Standard Deviation
Emotional Intelligence	90	171	139.95	16.83
Optimism/Mood Regulation	33	104	82.45	15.53
Evaluation of Emotions	15	64	33.47	9.00
Use of Emotions	10	34	24.03	6.04
Humor Styles	57	172	127.20	27.87
Affiliative Humor	14	56	43.69	11.64
Self-enhancing Humor	12	56	40.35	12.43
Aggressive Humor	8	37	15.79	6.44
Self-defeating Humor	11	53	27.37	9.83
Whole Scale (73 Items)	183	333	267.15	32.47

Variables of age, gender, educational status, sports branch, disability status, income status and hearing loss degree on the "emotional intelligence", "humor style" scales, their sub-scales and lastly their effects on the 73-item complete scale were analyzed by means of ANOVA analysis with an error of $\alpha = 0.05$. It should not be forgotten that in order to use ANOVA, the related dataset should conform to the normal distribution. It can be said that they come from the normal distribution by looking at the histograms of Emotional Intelligence Scale, Humor Styles Scale and General Scale scores. The p values obtained are less than 0.05, which indicates a significant difference.

5.1. Histograms



6. Findings

When the participants were examined in terms of demographic characteristics, the following findings were obtained.

Table. *Data Distribution According to Demographic Features*

Class	Frequency	Percentage (%)	Cumulative Percentage (%)
Age			
≤ 19	50	40.7	40.7
20 – 29	51	41.5	82.2
30 – 39	16	13.0	95.2
≥ 40	6	4.8	100.0
Total	**123**	**100**	

Gender			
Male	79	64.2	64.2
Female	44	35.8	100.0
Total	**123**	**100**	
Educational Status			
Primary School	9	7.3	7.3
High School	65	52.9	60.2
University	49	39.8	100.0
Total	**123**	**100**	
Sport Branch			
Individual	83	67.5	67.5
Team	40	32.5	100.0
Total	**123**	**100**	
Disability Status			
Congenital	97	78.9	78.9
Acquired later	26	21.1	100.0
Total	**123**	**100**	
Hearing Loss Level			
Mild	37	30.1	30.1
Moderate	42	34.1	64.2
Severe	44	35.8	100.0
Total	**123**	**100**	

50 (40.7%) of 123 participants were between 0 and 19 years old, 51 (41.5%) participants were between 20 and 29 years old, 16 (13.0%) participants were between 30 and 39 years old, 6 (4.8%) participants were at the age of 40 or older.

The gender of 79 (64.2%) participants is “male” and 44 (35.8%) participants is “female”.

Educational status of 9 (7.3%) participants is “primary school”, 65 (52.9%) participants is “high school” and 49 (39.8%) participants is “university”.

83 (67.5%) participants operate as "individual" and 40 (32.5%) participants act as "team" athlete.

The disability of 97 (78.9%) participants was “congenital” and the disability of 26 (21.1%) participants was “acquired later”.

Table. *Findings Regarding Participants' Emotional Intelligence and Humor Style Scores According to Age Groups*

		p-value (Sig.)
Age	**Emotional Intelligence**	0.658
	Optimism/Mood Regulation	0.068
	Evaluation of Emotions	0.136
	Use of Emotions	0.502
	Humor Styles	0.258
	Affiliative Humor	0.588
	Self-enhancing Humor	0.129
	Aggressive Humor	0.235
	Self-defeating Humor	0.041
	Whole Scale (73 Items)	0.213

It was observed that the ages of the hearing-impaired athletes had no effect on the other scales and

sub-scales, except for the "Self-Defeating Humor" subscale. For Self-defeating Humor subscale, p value is 0.041. It has been seen that people aged 40 or older use the self-defeating style of humor less frequently than people under the age of 40.

Table. *Findings Regarding Participants' Emotional Intelligence and Humor Styles Scores According to Gender*

		p-value (Sig.)
Gender	**Emotional Intelligence**	0.329
	Optimism/Mood Regulation	0.942
	Evaluation of Emotions	0.078
	Use of Emotions	0.767
	Humor Styles	0.159
	Affiliative Humor	0.173
	Self-enhancing Humor	0.018
	Aggressive Humor	0.770
	Self-defeating Humor	0.688
	Whole Scale (73 Items)	0.085

It was observed that the genders of the hearing-impaired athletes did not have any effect on the other scales and sub-scales except the "Self-Enhancing Humor" subscale. P value for "Self-Enhancing Humor" subscale is 0.018. It was concluded that women use self-enhancing humor more frequently than men. The average self-enhancing humor score of women (43.88) is higher than the average self-enhancing humor score (38.37) of men.

Table. *Findings Regarding Participants' Emotional Intelligence and Humor Style Scores According to Educational Status*

		p-value (Sig.)
Educational Status	**Emotional Intelligence**	0.500
	Optimism/Mood Regulation	0.691
	Evaluation of Emotions	0.566
	Use of Emotions	0.486
	Humor Styles	0.183
	Affiliative Humor	0.366
	Self-enhancing Humor	0.054
	Aggressive Humor	0.377
	Self-defeating Humor	0.140
	Whole Scale (73 Items)	0.256

It was observed that the educational status of hearing-impaired athletes had no effect on the scales and sub-scales.

Table. *Findings Regarding Participants' Emotional Intelligence and Humor Style Scores According to Sport Branch*

		p-value (Sig.)
Sport Branch	**Emotional Intelligence**	0.924
	Optimism/Mood Regulation	0.301
	Evaluation of Emotions	0.167
	Use of Emotions	0.387
	Humor Styles	0.705

	Affiliative Humor	0.823
	Self-enhancing Humor	0.111
	Aggressive Humor	0.094
	Self-defeating Humor	0.917
	Whole Scale (73 Items)	0.708

It was observed that being individual athletes or team athletes of hearing-impaired athletes did not have an impact on scales and sub-scales.

Table. *Findings Regarding Participants' Emotional Intelligence and Humor Style Scores According to Disability Status*

		p-value (Sig.)
Disability Status	**Emotional Intelligence**	0.043
	Optimism/Mood Regulation	0.213
	Evaluation of Emotions	0.403
	Use of Emotions	0.246
	Humor Styles	0.391
	Affiliative Humor	0.290
	Self-enhancing Humor	0.712
	Aggressive Humor	0.301
	Self-defeating Humor	0.974
	Whole Scale (73 Items)	0.760

It was observed that hearing impaired athletes' disabilities (congenital or acquired later) did not have an effect on other scales and sub-scales, except the "Emotional Intelligence" scale. It was found as p = 0.043 for the scale of "Emotional Intelligence". Emotional intelligence scale average scores of congenitally disabled athletes (141.54) are higher than the average scores of disabled athletes who acquired later (134.03). Therefore, it was concluded that congenitally disabled athletes have a more emotional intelligence than disabled athletes who acquired later.

Table. *Findings Regarding Participants' Emotional Intelligence and Humor Style Scores According to Income Status*

		p-value (Sig.)
Income Status	**Emotional Intelligence**	0.035
	Optimism/Mood Regulation	0.585
	Evaluation of Emotions	0.830
	Use of Emotions	0.001
	Humor Styles	0.077
	Affiliative Humor	0.064
	Self-enhancing Humor	0.966
	Aggressive Humor	0.049
	Self-defeating Humor	0.053
	Whole Scale (73 Items)	0.311

It was observed that the income status of the hearing-impaired athletes has no effect on other scales and scales except for the "Emotional Intelligence" scale (p = 0.035), the "Use of Emotions" subscale (p = 0.0049) and the "Aggressive Humor" subscale (p = 0.049). It was observed that athletes with an income level of 500-999 TL had less emotional intelligence than athletes with higher income. Also, the use of emotions of

athletes whose income was between 500-999 TL, subscale mean score was lower than athletes with higher income. The aggressive humor subscale average scores of the athletes with 500-999 TL income were higher than the athletes with higher income. Therefore, it was concluded that athletes with lower income levels use an aggressive humor structure more often.

Table. *Findings Regarding Participants' Emotional Intelligence and Humor Styles Scores According to Levels of Hearing Loss*

		p-value (Sig.)
Hearing Loss Levels	**Emotional Intelligence**	0.724
	Optimism/Mood Regulation	0.622
	Evaluation of Emotions	0.837
	Use of Emotions	0.727
	Humor Styles	0.007
	Affiliative Humor	0.102
	Self-enhancing Humor	0.067
	Aggressive Humor	0.638
	Self-defeating Humor	0.001
	Whole Scale (73 Items)	0.011

As a result of one-way ANOVA analysis, it was concluded that the hearing loss levels of individuals had an effect on the "Humor Style" scale (p = 0.007), the "Self-Defeating Humor" subscale (0.001) and the "Whole" scale (0.011) consisting of 73 items. According to the results obtained, it was seen that the athletes with severe hearing loss levels use the humor styles defined according to the athletes with mild and moderate hearing loss level, especially the self-defeating humor style more often. In addition, the overall scale average scores of the hearing impaired athletes consisting of 73 items (278.63) showed a statistically significant increase compared to the average scores of the athletes with mild hearing loss level (262.89) and moderate hearing loss level (258.90).

7. The Relationship Between Emotional Intelligence And Humor Style

Pearson correlation coefficient was used to investigate the relationship between Emotional Intelligence and Humor Style. The Pearson Correlation coefficient takes values ranging from -1 to +1. A positive value indicates the same directional relationship between the two variables, and a negative value indicates an inverse relationship between the two variables. As the correlation value gets closer to -1 and +1, the severity of the relationship between them increases. A correlation coefficient of 0 indicates that there is no relationship between the two variables. As it is got closer to 0, the severity of the relationship decreases. The level of dependency between the total scores of 123 athletes from their emotional intelligence and humor styles scales as well as their subscales are given in the tables below. Values in the cell show the correlation coefficient between the two variables, and the value in parentheses shows the value of p. A p value of less than 0.05 indicates a significant relationship between the two variables.

Table. *The relationship between Emotional Intelligence Scale and Humor Style Scale*

	Emotional Intelligence	Humor Style
Emotional Intelligence	1.000	-0.006 (0.946)
Humor Style	-0.006 (0.946)	1.000

The Pearson Correlation Coefficient was found to be -0.006 for the scores obtained by the athletes from the emotional intelligence scale and the scores from the humor style scale. In other words, the scales are independent from each other and it was observed that the responses of the athletes to the items in one scale did not affect the answers given in the other scale. As a result, no statistically significant relationship was found between emotional intelligence and humor styles of athletes.

8. Discussion and Conclusion

In this study, in order to learn the emotional intelligence and humor styles of hearing-impaired athletes, a total of 123 hearing-impaired athletes, 44 women and 79 men, participated.

It was observed that hearing impaired athletes didn't show significant difference according to age range of emotional intelligence and subscales ($p > 0.05$). In other words, emotional intelligence levels and subscales of people with different ages were at the same level. Halilbeyoğlu and Salman (2018) reported that there was no statistically significant difference between the emotional intelligence levels of badminton athletes and the sub-dimensions of the emotional intelligence scale of the age groups according to some variables. No significant difference was found between the groups as a result of the analysis conducted by Sarıkabak et al. (2018) in order to reveal the difference with age variable according to the emotional intelligence and academic procrastination behaviors of Bocce athletes. Mencik (2017) found that emotional intelligence did not differ according to age distribution as a result of his research on high school students. In the study of Harrod and Scheer (2005), it was determined that adolescents did not differ according to the age variables of emotional intelligence. The results of our study are similar to the results of the studies conducted by other researchers in this aspect. We think that the reason why emotional intelligence does not differ significantly among individuals with disabilities at different ages is that emotional intelligence is important for individuals at all ages, and it affects human life day by day as a part of life.

Emotional intelligence and subscales of hearing-impaired athletes did not differ significantly according to gender ($p > 0.05$). In other words, it does not affect the emotional intelligence levels and subscales of gender. As a result of the research conducted by Sarıkabak, Eyyuboğlu and Ayrancı (2018), no significant differences in emotional intelligence levels and subscales of athletes were detected. As a result of the research conducted by Alpullu, Uslu and Demir (2010) in order to determine the emotional intelligence awareness of individuals working as gym teachers in public and private institutions, there was no significant difference between the response rates of gym teachers according to their gender. As a result of the research carried out by Şenel (2015), statistically significant differences in emotional intelligence scores of students weren't obtained. The studies support our study. We can say that emotional intelligence and subscales are not effective on gender as hearing impaired athletes can express their emotions more successfully because of being disabled and social.

It was observed that the educational status of hearing-impaired athletes had no effect on emotional intelligence and its sub-scales ($p > 0.05$). There was no significant difference between different education levels. Çüçen (2014) concluded that there was no significant difference between emotional intelligence levels as a result of his research among individuals with different educational levels. Kahraman (2013) determined that emotional intelligence did not differ according to the education level of the mother and father in his study to determine nurses' emotional intelligence skills. We can say that the reason why there is no difference between the levels of education is not related to the level of education. The conclusion that emotional intelligence is not related to education levels in similar studies supports the study we have done.

It was observed that there was no significant difference between being individual athletes and team athletes of the hearing-impaired athletes since they didn't have effect on emotional intelligence and subscales ($p > 0.05$). In the study conducted by Taşkın (2008) to examine emotional intelligence levels at gym students, no significant difference was found when emotional intelligence was examined in terms of individual and team sports. In the study conducted by Salar, Hekim and Tokgöz (2012) for comparing the emotional state of the 15-18 age group individuals doing team and individual sports, it was found that there was no statistically significant difference between the team and individual sports branches. In the study conducted

by Kırımoğlu et al. (2014), the emotional intelligence levels of preservice teachers according to their sport status in terms of individual and team sports were examined and they observed that there was no significant difference. In many studies, we see that emotional intelligence has a positive effect on sports. We think that if individuals can control and regulate their emotions, direct their emotions and have themselves in the necessary places, as this will increase performance in sports, there is no significant difference between individual and team sports in terms of emotional intelligence and its sub dimensions. We can say that success is directly proportional to emotional intelligence. Since similar studies were conducted, the finding to support the idea in our study was obtained.

It was observed that hearing impaired athletes' disabilities (congenital or later) did not have an impact on the sub-scales, except the "Emotional Intelligence" scale. It was found as $p = 0.043$ for the scale of "Emotional Intelligence". Emotional intelligence scale average scores of congenital disabled athletes (141.54) were higher than the average scores of disabled athletes who acquired later (134.03). Therefore, it was concluded that congenitally disabled athletes had more emotional intelligence than disabled athletes who acquired later. There was a significant difference between emotional intelligence levels of congenital disabled individuals and those with disabilities acquired later ($p < 0.05$). As they are congenitally disabled, we can say that there is a significant difference between emotional intelligence levels compared to individuals with disabilities acquired later since they accept their disability as normal and continues their life as a disabled person and being together with the whole society. It is seen that emotional intelligence levels of disabled individuals who acquired later differs from the others since it takes much more time to accept their disability. We think that there is no difference between individuals' emotional intelligence levels in terms of being congenital or disabled later. Since there are no studies similar to the study we have done, any finding to support us couldn't be found.

It was found that hearing loss levels of hearing-impaired athletes did not have an effect on emotional intelligence and subscales. There was no significant difference between the emotional intelligence and subscales of mild, moderate and severe level of hearing impaired athletes ($p > 0.05$). We can mention that emotional intelligence is extremely effective on individuals and causes positive emotions on individuals. We can say that the reason why there is no difference between the hearing levels of the hearing-impaired athletes on emotional intelligence is that they have the ability to realize, use, guide their own emotions, and they can realize the emotions of other individuals.

It was observed that the ages of the hearing-impaired athletes had no effect on the other sub-scales except the "Self-Defeating Humor" subscale. For self-defeating humor subscale, p value was 0.041. Also, It was observed that people aged 40 or older use self-defeating humor style less frequently than people under 40 ($p < 0.05$). It was observed that humor and other subscales did not differ on age ($p > 0.05$). Özdemir and Recepoğlu (2010) did not find any relationship between the variables of age and seniority, and humor styles in his study on teachers. The results of the analysis conducted on the sub-dimensions of the humor styles scale in the study of the "humor styles of Goalball athletes according to different variables" by Bebek et al. (2018) reveals that there is no significant difference in terms of the sub-dimensions of the humor styles scale of the participants according to age. These studies support the current study. However, there are also some studies that do not support the findings of the current study in the literature. Individuals with self-defeating humor tend to make fun of themselves rather than others (Martin et al., 2003). In our study, we can say that the reason why self-defeating humor is high on the individuals under 40 and low on the ones more than 40 in the the sub-dimensions of humor is the result of a certain maturity that disabled individuals have. As age increases, maturity increases and individuals calm down.

It was observed that the gender of the hearing-impaired athletes did not have any effect on the other scales and sub-scales, except the "Self-Enhancing Humor" subscale. For "Self-Enhancing Humor" p value is 0.018. It is concluded that women use self-enhancing humor more frequently than men. The average self-enhancing humor score of women (43.88) is higher than the average self-enhancing humor score (38.37) of men ($p < 0.05$). It was observed that humor and other subscales did not differ on gender ($p > 0.05$). In the Sepetci's (2010) study examining the humor styles of school administrators, no significant difference was

found in all of the humor styles in terms of gender of school administrators. In the study conducted by Chen and Martin (2007), there was no significant difference among humor styles of Chinese students in terms of gender. In Avşar's (2008) study done with preservice teachers, the relationship between gender roles and humor styles was examined. It was stated that men use aggressive humor style and women use affiliative and self-improving humor styles more. In the study of Özdolap (2015), it was determined that there was a difference between the use of humor styles of men and women. It was concluded that men use aggressive humor style more than women. These studies support the current study, but there are also studies that do not support the findings of the current study in the literature. We can say that hearing-impaired women have higher self-improving humor compared to men because they are hearing-impaired. When hearing-impaired women begin to socialize, they aim to improve their missing sides and make them feel their presence in the society. We think that they want to be at the same level as individuals without disabilities. We can say that the emotions and thoughts of hearing-impaired athletes are same as there is no difference between humor and its sub-dimensions.

It was observed that there was no significant difference among humor styles of hearing impaired athletes in terms of their educational status as there was no effect of educational status on humor and its subscales ($p > 0.05$). The results of the analysis conducted on the sub-dimensions of the humor styles scale in the study named "analyzing humor styles of Goalball athletes according to different variables" by Bebek et al. (2018) revealed that the participants did not show any difference in terms of sub-dimensions of the humor styles scale according to their educational status. Sümer (2008) did not find a significant relationship in humor styles according to the grade levels of university students. In another study on humor styles, any significant difference was not found in terms of educational status (Balta, 2016) and it supports our study. These studies support the current study. We can say that humor is not effective on education if there is no significant difference in educational status.

It was observed that being individual athletes or team athletes of hearing-impaired athletes had no effect on humor and subscales ($p > 0.05$). We think that there is no significant difference in the humor and sub-dimensions of the hearing-impaired athletes as hearing impaired team and individual athletes enjoy their sports and show themselves in every field, accept their disability, joke with others, socialize, develop their relations with individuals without disabilities, get happy, make the others feel their presence in the society, become a part of the society and are able to do all sports even if they are disabled and represent their countries with their sport branches at home and abroad, cope with the difficulties of life, and act with thoughts rather than emotions. In short, we can say that hearing impaired individual and team athletes agree.

It was observed that disability status (congenital or acquired later) of hearing impaired athletes did not have an impact on humor and its subscales ($p > 0.05$). We think that being congenital or disabled later of individuals did not affect their humor and its sub-dimensions. We can say that the emotions, thoughts and expectations of individuals are in the same direction whether they are congenital or acquired later hearing impaired. Since there are no studies similar to the study we have done, no findings have been found to support us.

It was concluded that the hearing loss levels of the hearing-impaired athletes had an effect on the "Humor Style" scale ($p = 0.007$), the "Self-Defeating Humor" subscale ($p < 0.05$). According to the results obtained, it is seen that the athletes with severe hearing loss levels use the humor styles defined, especially the self-destructive humor style, more often than the athletes with mild and moderate hearing loss. In addition, the whole scale average scores of the severe hearing-impaired athletes consisting of 73 items (278.63) showed a statistically significant increase compared to the average scores of athletes with mild hearing loss level (262.89) and moderate hearing loss level (258.90). It was seen that severe level hearing impaired athletes had high levels of general humor and self-defeating humor. There is no difference in other sub-dimensions of humor. We can say that individuals with severe level hearing impairment try to show themselves up, draw others' attention and humiliate through humor as their hearing loss level is much higher compared to individuals with mild and moderate hearing impairment. As a result of this situation,

they draw attention. We can mention that humor is one of the ways an individual uses in order to prove or impose his/her presence in the society and to eliminate the problem caused by the disability. Since studies similar to the study we have done have not been conducted, no findings to support our study have been found.

The Pearson Correlation Coefficient was found to be -0.006 for the scores obtained by the athletes from the emotional intelligence scale and the scores from the humor style scale. In other words, the scales were independent from each other and it was observed that the answers of athletes to the items in one scale did not affect the answers given in the other scale. As a result, no statistically significant relationship was found between emotional intelligence and humor styles of athletes ($p > 0.05$). Individuals who can use their emotional intelligence effectively are those who can empathize, have self-awareness, have strong social skills, have self-control and are highly motivated. These individuals can reach fast and effective solutions by approaching the problems they face more positively (Salovey& Mayer, 1990). Humor, on the other hand, was defined as one of the healthy defense mechanisms in order to help individuals avoid negative emotions without losing their realistic perspective when they faced with negative situations (Freud, 1905). The sense of humor is not a one-dimensional concept, it is a group of skills and abilities built on having different components, structures and functions of humor (Martin et al., 2003). Since there is no significant difference between emotional intelligence and humor, we can say that they do not affect each other, there is no connection between them, and they are different concepts as it is understood from the definitions. Since there are no studies similar to the study we have done, there are no findings to support our study.

According to the results obtained in this study, it was determined how emotional intelligence and humor were effective on hearing impaired people doing sport. So that, it was observed that people with hearing disabilities who do sports can use their emotions more widely and emotional intelligence is not related to their humor styles. The most important finding is that emotional intelligence does not affect humor styles. Also, it is estimated that this study is the first study of emotional intelligence and humor styles on hearing impaired individuals. For this reason, it is thought that it will enrich the literature and make contribution in the application of such studies to different disability groups and different branches and doing new researches.

References

1. Alpullu, A., Uslu, A., &Demir, G. (2010). BedenEğitimiÖğretmenlerininDuygusalZekâFarkındalıklarınınİncelenmesi. 11th International Sports Sciences Congress, Antalya 10 to 12 October 2010.
2. Atıcı, İ. (2007. FizikselEngellilerveKentselMekanınKullanımı. GaziÜniversitesi, SosyalBilimlerEnstitüsü, YüksekLisansTezi, Ankara.
3. Austin, E. J., Saklofske, D. H., Huang, S. H. S.,&Mc Kenney D. (2004). Measurement of trait emotional intelligence: testing and cross-validating a modified version of Schutte et al.'s (1998) *Measure. Personality and Individual Differences, 36*: 555-562.
4. Avşar, V. (2008). ÖğretmenAdaylarınınMizahTarzlarıveCinsiyetRolleriİlişkisi. (YüksekLisansTezi). Marmara Üniversitesi, İstanbul.
5. Balta, E.E.(2016). EğitimdeMizahınKullanımınaİlişkinÖğretmenTutumları. İlköğretim Online, 15(4).
6. Bar-on, R. (1997). Emotional intelligence inventory.Technical Manual, Toronto: Multi Health Systems.
7. Bebek, Ö.,Acet, M.,&Işık, U. (2018). Goalball sporcularınınmizahtarzlarınınfarklıdeğişkenleregöreincelenmesi. UluslararasıHakemliAkademikSpor, Sağlıkve Tıp BilimleriDergisi.
8. Canan F. &Ataoğlu A. (2010). Anksiyete, depresyonve problem çözmebecerisialgısıüzerinedüzenlisporunetkisi. AnadoluPsikiyatriDergisi, 11, 38-43.
9. Chen, G.,&Martin, R.A. (2007). A comparison of humor styles, coping humor and menatl health between Chinese and Canadian university students. *International Journal of Humor Research, 20*(3), 215-234.
10. Cooper, R. K., &Sawaf, A., (2003). Liderlikteduygusalzekâ, (Çev. ZelalBedriye Ayman, BanuSancar), 3.

Baskı, İstanbul: SistemYayıncılık.
11. Çüçen, M. (2014). Duygusalzekâilebütüncülperformansınbirunsuruolarakörgütselvatandaşlıkdavranışlarıarasındakiilişki.YüksekLisansTezi, Aydın: Adnan Menderes Üniversitesi, SosyalBilimlerEnstitüsü.
12. Fabrizi, M. S. &Pollio, H. R. (1987). A naturalistic study of humorous activity in a third, seventh, and eleventh grade classroom. *Merrill-Palmer Quarterly, 33*, 107–128.
13. Freud, S. (1905). Jokes and their relation to the unconscious. London: Penguin Books.
14. Goleman, D., (1995). Emotional intelligence, New York: Bantam.
15. Gür, A., (2001). Özürlülerinsosyalyaşamauyumsüreçlerindesportifetkinliklerinrolü, BaşbakanlıkÖzürlülerİdaresiBaşkanlığıYayınları, Ankara.
16. Halilbeyoğlu.,&F.H, Salman., N. M. (2018). Badminton sporcularınınduygusalzekâdüzeylerininbazıdeğişkenleregöreincelenmesi, *Social Sciences Studıes Journal (SSSjournal), 4*(13): 242-248.
17. Harrod, N. R..,&Scheer, S. D. (2005). An exploration of adolescent emotional intelligence in relation to demographic characteristics. *Adolescence, 40*(159), 503-513.
18. Https://ailevecalisma.gov.tr/media/31492/istatistik-bulteni-kasim2019.pdf
19. Kahraman, N. (2013) HemşirelerinDuygusalzekâbecerilerininbelirlenmesi. YüksekLisansTezi, HacettepeÜniversitesiSağlıkBilimleriEnstitüs, Ankara.
20. Kaşıkçı, T., (2007). İnsanKaynaklarıYönetimiAçısındanSakatveEskiHükümlüÇalıştırmaYükümlülüğü. Marmara Üniversitesi, SosyalBilimlerEnstitüsü, YüksekLisansTezi, İstanbul.
21. Kazarian S. S.,&Martin, R. A. (2004). Humor styles, personality and well-being among Lebanese university students. *European Journal of Personality 18,* 209-219.
22. Kırımoğlu, H., Yeniad, S., &Çoban, E. (2014). Öğretmenadaylarınınsporyapmadurumlarınagöreduygusalzekâdüzeylerininincelenmesi (Mustafa Kemal Üniversitesi Örneği). *GaziantepUniversityJournal of SocialSciences*, *13*(1), 201-209.
23. Kuiper, N. A. &Martin, R. A. (1998). Is sense of humor positive personality characteristic. W. Ruch (Ed), The Sense Of Humor. New York, Mouton de Gruyter.
24. Kuiper N. A., Martin R. A. &Olinger L. J. (1993). Coping humor, stress and cognitive appraisals. *Canadian Journal of Behavioural Science, 25*(1), 81-96.
25. Martin R. A. (2007). The Psychology of Humor: An Integrative Approach. Elsevier Academic Press, San Diego.
26. Martin, R. A., Puhlik-Doris, P., Larsen, G., Gray, J., &Weir, K.(2003). Individual differences in uses of humor and their relation to psychological wellbeing: *Development of the humor styles questionnaire. Journal of Research in Personality; 37*(1):48–75.
27. Mathey, E. (1969). This thing culled sport. *Journal of Health Physical, 40*(2), 38.
28. Mencik, Y. (2017). Liseöğrencilerininduygusalzekâileakademikbaşarılarınınbazıdemografikdeğişkenleregöreincelenmesi. İstanbul: YüksekLisansTezi, NişantaşıÜniversitesiSosyalBilimlerEnstitüsü.
29. Özdemir, S., &Recepoğlu, E., (2010).Örgütselsağlıkvemizah, V. UlusalEğitimYönetimiKongresi, Antalya, 219-229
30. Özdolap, M. (2015). MizahTarzlarıvePsikolojikBelirtilerArasındakiİlişkininİncelenmesi. (YüksekLisansTezi). İstanbul BilimÜniversitesi, İstanbul.
31. Random House Dictionary (1973). New York: Random House.
32. Ruch, W. (1998). Sense of humor: A new look at an old concept. W. Ruch, (Ed). The Sense of Humor. New York: Mouton de Gruyter.
33. Salar, B., Hekim, M.,&Tokgöz, M. (2012). 15-18 yaşgrubutakımveferdisporyapanbireylerinduygusaldurumlarınınkarşılaştırılması. *Mehmet AkifErsoyÜniversitesiSosyalBilimlerEnstitüsüDergisi*Yıl: 4 Sayı: 6
34. Sarıkabak, M., Eyüboğlu, E. &Ayrancı, M. (2018). Bocce (Petank)

SporcularınınDuygusalZekâDüzeylerinin, AkademikErtelemeDavranışlarıÜzerineEtkisininİncelenmesi.*UluslararasıKültürelveSosyalAraştırmalarDergisi (UKSAD), 4*(1), 163-177.
35. Schutte, N. S., Malouff, J. M., Hall, L. E., Haggerty, D. J., Cooper, J. T., Golden, C. J. &Dornheim, L., (1988). Development and validation of a measure of emotional intelligence. *Personality and Individual Differences, 25*: 167- 177.
36. Sepetci, C.(2010). Okulyöneticilerininmizahtarzlarınınbetimlenmesi. (yükseklisanstezi). GaziOsmanpaşaÜniversitesi. Tokat
37. Salovey, P.,&Mayer, J. D. (1990). Emotional intelligence. *Imagination, Cognition & Personality, 9*(3): 185-211.
38. Sümer, M. (2008). OkulÖncesiÖğretmenliğiÖğrencilerininStresleBaşaÇıkmaStilleriveBazıDeğişkenlereGöreMizahTarzlarınınKarışlaştırılması. DoktoraTezi. SelçukÜniversitesiSosyalBilimlerEnstitüsü. Konya
39. Şenel, E. (2015). Bedeneğitimivesporyüksekokulundaöğrenimgörenöğrencilerinsosyaldestekalgıları, genelözyeterlikinançlarıveduygusalzekâdüzeylerinindeğerlendirilmesi. YüksekLisansTezi. MuğlaSıtkıKoçmanÜniversitesi, SağlıkBilimleriEnstitüsü. Muğla.
40. Taşkın, A. K. (2008). Bedeneğitimivesporyüksekokuluöğrencilerindeduygusalzekâdüzeylerininbazıdeğişkenleregöreincelenmesi. SelçukÜniversitesi, SağlıkBilimleriEnstitüsü, Konya.
41. Tatar A., Tok S., &Saltukoğlu, G.(2011). GözdengeçirilmişSchutteduygusalzekâölçeğininTürkçe'yeuyarlanmasıvepsikometriközelliklerininincelenmesi, KlinikPsikofarmakolojiBülteni, 21(4): 325-338.
42. TürkDilKurumu(TDK). (2019). Mizah.(www.tdk.gov.tr).
43. Tok, S. (2008). Performanssporcusuvesporyapmayanüniversiteöğrencilerindeduygusalzekâilekişiliközelliklerininkarşılaştırılması,DoktoraTezi, İzmir: EgeÜniversitesiSağlıkBilimleriEnstitüsü.
44. Yardımcı, İ. (2010). *Mizahkavramıvesanattakiyeri. UşakÜniversitesiSosyalBilimlerDergisi, 3*(2), 1-41.
45. Yerlikaya, E.(2003). Mizahtarzlarıölçeğinin (Humorstyles questionnaire) uyarlamaçalışması. ÇukurovaÜniversitesi: SosyalBilimlerEnstitüsü, YüksekLisansTezi. Adana.
46. Yerlikaya, E. E. (2009). Üniversiteöğrencilerininmizahtarzlarıilealgılananstres, kaygıvedepresyondüzeyleriarasındakiilişkininincelenmesi. (doktoratezi). ÇukurovaÜniversitesi. Adana.
47. Yüksel, C.(2019). SporYapanveYapmayanÜsküdarÜniversitesiÖğrencilerindeMizahTarzlarınınİncelenmesi,ÜsküdarÜniversitesi, SosyalBilimlerEnstitüsü, KlinikPsikolojiAnabilim Dalı YüksekLisansTezi. İstanbul.

Influence of the Kaatsu Training on the Strength Endurance of the Muscles of the Lower Extremities in Qualified Football Players

Alexander Golubev[1], Alla Samsonova[2] and Leonid Tsipin[3]

[1] Degree Candidate's name, Lesgaft National State University of Physical Culture, Sports and Health, St. Petersburg, Russia.

[2,3] Doctor of Pedagogical Sciences, Professor, Lesgaft National State University of Physical Culture, Sports and Health, St. Petersburg, Russia.

Abstract

The **purpose** of this study is to determine the influence of KAATSU Training in the development of strength endurance in qualified football players.

Methods. 18 qualified football players (mean age: 19), who were split into control and experimental groups, took part in the study. Athletes of both groups performed three exercises for the muscles of the lower extremities, which included barbell squats, seated leg extensions and lying leg curls to muscular failure. The experimental group performed strength exercises using KAATSU Training. The number of squats with a barbell with a weight of 40% of 1RM (one-repetition maximum) on the shoulders, acute pain levels and delayed onset muscle soreness (DOMS) were measured using the 10-point VAS scale.

Results. The influence of KAATSU Training on the strength endurance of the muscles quadriceps femoris (QF) was reliably proven. 26 days after the start of strength training using KAATSU Training, the number of repetitions of barbell squats was 38±3, which represented significantly higher results ($p<0.05$) compared to those shown by control group athletes (25±3). Change in DOMS clearly corresponded to muscle damage and subsequent regeneration.

Discussion. Significant changes in strength endurance occurred 7 days after the termination of KAATSU Training, which we associate with the accumulation of energy substances in muscle fibres and an improvement in their capillarisation.

Keywords: KAATSU Training, BFR, occlusion training, strength endurance

1. Introduction

Strength endurance occupies an important place in the physical fitness system of qualified football players, as the latter's ability to maintain maximum efforts in motor actions throughout the entire playing run depends on the level of the development of such muscular endurance [1, 2]. Special studies have demonstrated the existence of a relationship between muscular endurance of football players and the realization of their physical capabilities in the game [3, 4].

Currently, a variety of resistance exercises performed using the repeated effort method, with multiple instances of overcoming non-limiting resistance until significant fatigue, or the muscular failure method are used for the development of muscular endurance in football players [4]. The main period of training for the development of muscular endurance in football players is considered as a preparatory period [5].

The advantage of the muscular failure method is that, with its help, football players become resistant to fatigue and gain the ability to exercise muscle tension when performing technical and tactical actions throughout the match. The relative disadvantage of the method is that it may have an adverse impact on intramuscular coordination, which supports the coordinated operation of a football player's skeletal muscles when performing specific motor actions (such as receiving and handling the ball).

In addition to traditional methods of the development of physical abilities, innovative methods have begun to be introduced into sports routines in recent years. One such method is KAATSU Training.

The KAATSU Training system was developed and patented in Japan by Dr Yoshiaki Sato in the 1960s. KAATSU Training consists in encircling the upper part of the limb with a pneumatic cuff connected to an electric pressure regulation and control system, partially limiting the blood flow to muscles involved [6]. In

Europe, this technique is referred to as Occlusion Training or Blood Flow Restriction (BFR) and is generally accepted as a blood flow restriction training (BFRT). Y. Takarada et al. [7] identified an increase in local muscular endurance during knee extensions in a group of athletes performing exercises based on KAATSU Training compared to an identical training without using the system. Training was held twice a week for eight consecutive weeks. A. Kacin and K. Strazer [8] evaluated local muscle endurance in healthy men in an extension exercise based on KAATSU Training using the muscular failure method compared to a similar method without using KAATSU Training took place on a weekly basis over a four-week period. The underlying study showed that blood flow restriction significantly increased local muscle endurance/ K.A. Larkin et al. [9] evaluated the effect of KAATSU Training on increasing muscle endurance at two workouts per week for three consecutive weeks at a load of 40% of the maximum. They concluded that this technique has a greater impact on angiogenic factors, which may contribute to an increase in capillarisation, which, in their opinion, may contribute to an increase in local muscle endurance. It should be noted that local muscular endurance and strength muscular endurance are understood as close phenomena described through their ability to maintain optimal strength performance parameters of movement over extended periods of time.

In parallel with the development of the muscular system using KAATSU Training in combination with aerobic exercises, a significant improvement in the indicators of maximum oxygen consumption and maximum heart rate has been demonstrated. It was also shown that training with blood flow restriction enhances the body's adaptation to aerobic exercises and muscular endurance development exercises by increasing the content of muscle glycogen and improving parameters associated with maximum oxygen consumption [10].

In many publications, authors argue for the use of KAATSU Training to increase strength, local muscle endurance and hypertrophy of muscle fibres [11, 12]. The level of such physical abilities is enhanced by using KAATSU Training in team sports, such as rugby and American football [13, 14]. Despite the fact that the use of KAATSU Training is recommended in sports for the development of athletes' muscular system [15], references to its use in football are extremely rare. Thus, options for the improvement of football players' local muscular endurance through KAATSU Training remain poorly understood.

The purpose of this study is to determine the influence of KAATSU Training on the development of strength endurance in qualified football players

2. Methods

To study the influence of KAATSU Training on local muscular endurance in football players, a pedagogical experiment was conducted over a period of three weeks. The experiment was conducted from July till August of the year 2019, which corresponded to the preparatory period of training cycle of football players. We studied changes in the strength endurance of the QF as one of the busiest muscle groups of football players [16]. The criterion for the level of development of this physical ability was the number of barbell squats that an athlete could perform to muscular failure with a burden of 40% of the maximum. In addition, DOMS in thigh muscles was evaluated.

Subjects. The study involved two groups of qualified football players (nine athletes in each group) with at least six years of experience and no medical restrictions. The experimental and control groups were uniform in terms of their composition and were consisting of athletes who didn't differ in age and in total body size (Table 1). Before the start of the experiment, all subjects were acquainted with its program and gave their informed written consent to participate in it.

Table 1. *Physical characteristics of subjects*

Group	Age, years	Height, cm	Weight, kg
Experimental, n=9	18.5±0.4	177±1	71.8±2.1
Control, n=9	18.9±0.5	180±2	69.1±2.2
Significance of differences between groups	p>0.05	p>0.05	p>0.05

Values are MEANS±SE

Experimental procedure. In the weekly microcycle of the football team that included the members of the control and experimental groups, two training sessions were aimed at the development of physical abilities, which also included exercises of a technical and tactical nature, and two control games. Exercises aimed at the development of physical abilities were held on Thursdays at 8.00 p.m. and Sundays at 12.00 a.m., which corresponded to the 1st, 5th, 8th, 12th, and 19th days of the experiment. On the 22nd day of the experiment, instead of strength training, all experiment participants were involved in a limited general physical training session. Control games were held on Tuesdays and Fridays at 8.00 p.m. The duration of sessions was 1.5 hours. In training sessions with strength exercises, the participants of the control and experimental groups performed three exercises involving the muscles of the lower extremities, which included barbell squats (Fig. 1), seated leg extensions (Fig. 2), and lying leg curls (Fig. 3). Exercises for the development of the strength endurance of the thigh muscles of football players were performed for 15 minutes in the final part of sessions.

Each week, the same exercises were used with the only difference being that the weight of the barbell used for barbell squats didn't change throughout the duration of the experiment and amounted to 40% of 1RM, while, in the other two exercises, the weight of the weights increased by 2% in each subsequent training session compared to the baseline training session (25% of 1RM) to eliminate adaptation of muscles to the load.

The members of the control and experimental groups performed three sets of each exercise to muscular failure. Squats were performed under the supervision of an assistant, which provided the opportunity to perform the maximum number of repetitions. Rest time between sets was 40 s. The duration of one repetition in the set didn't exceed 3 s. It took no more than 5 minutes to complete one exercise. Rest time between exercises didn't exceed 1 min.

Members of the experimental group made barbell squats using KAATSU Training on the 1st, 5th, 8th, 12th, and 19th days. For this purpose, pneumatic cuffs with the width of 50 mm were put on the upper thigh of their both legs (Fig. 1). The KAATSU NANO method was used [15]. Cuff pressure was constant over the course of all exercises and amounted to 400 SCU (Standard KAATSU Unit), which is equivalent to approximately 400 mmHg or 53.3 kPa. During rest pauses, cuff pressure remained unchanged. Participants of the control group performed regular barbell squats without the use of KAATSU Training. Indicators of local muscular endurance were measured from the 1st through the 40th day of the experiment.

From day 1 through day 25 of the experiment, the degree of muscular pain in the thigh muscles of the football players was evaluated on daily basis on a 10-point visual analogue scale (VAS) [17].

Statistical analysis. Experimental data were processed using the STATGRAPHICS Centurion XVI Version 16.2.04 package. The numerical parameters of the samples were calculated, the statistical law was verified, and the average values for independent and paired samples were compared. Statistical hypotheses were tested using Student's t-test.

Fig. 1. ***Barbell squats***

Fig. 2. Seated leg extensions

Fig. 3. Lying leg curls

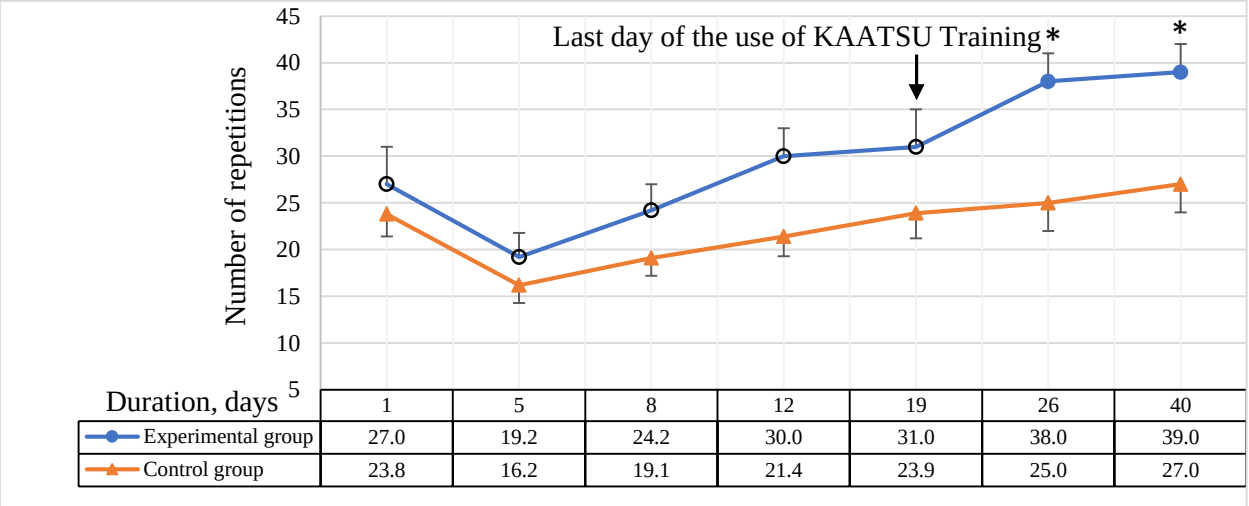
3. Results

3.1. Change in the Level of Strength Endurance

Comparison of Performance metrics in Control and Experimental Groups

Prior to the start of the experiment, the level of strength endurance of the QF, which was determined by the amount of repetitions in a barbell squat with a 40% load, didn't differ significantly among the athletes in the experimental and control groups (Fig. 4). By the end of the application of the KAATSU Training (day

19), this indicator reached a value of 31±4 repetitions in experimental group athletes and 23.9±2.7 in control group athletes. However, differences between the groups weren't significant (p>0.05).



Duration, days	1	5	8	12	19	26	40
Experimental group	27.0	19.2	24.2	30.0	31.0	38.0	39.0
Control group	23.8	16.2	19.1	21.4	23.9	25.0	27.0

Fig. 4. *Changes in the indicators of strength endurance of the QF in experimental and control groups as determined on the basis of the number of squats with a barbell with a weight of 40% of the maximum (* - significant differences between groups at a significance level of 0.05; - days of application of KAATSU Training; average squat numbers are shown in the table below the figure)*

In seven days after the termination of KAATSU Training, the amount of repetitions in squat in experimental group was 38±3 and became significantly higher compared to the results achieved by the control group (25±3), p <0.05. Thus, the influence of KAATSU Training using the muscular failure method on the level of strength endurance of the QF in experimental group was significantly higher as compared to the regular muscular failure method.

It should be noted that the cumulative effect of KAATSU Training continued for subsequent 14 days after the termination of KAATSU Training, until the start of the team's games in the St. Petersburg First League Championship. At the end of this period (on Day 40), the average amount of repetitionss in a squat in experimental group was 39±3, while for control group it was 27±3. Differences between the experimental and control groups were significant (p<0.05).

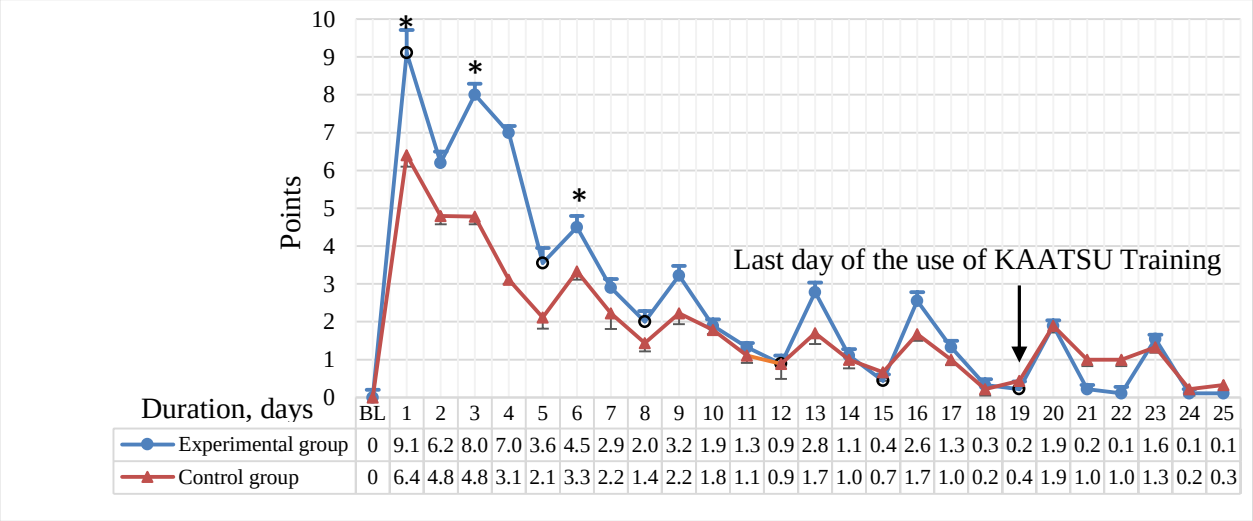
Comparison of Performance by Control and Experimental Group Athletes before and after the Experiment

A significant decrease (p<0.05) in strength endurance indicators in experimental group compared with baseline indicators was noted on the 5th day of the experiment (Fig. 4). For athletes of the experimental group, the results were 19±8. A significant decrease (p<0.05) in strength endurance indicators among control group athletes compared with baseline indicators was noted on the 5th and 8th day of the experiment. In control group, the relevant values were 16±6 and 19±6, respectively.

A significant increase (p<0.01) of strength endurance of the QF in experimental group compared with baseline indicators was noted on the 26th day of the experiment. Before the end of the experiment, control group didn't show any significant changes in terms of the strength endurance of the QF as compared to baseline indicators.

3.2. Changes in the Levels of Acute Pain and DOMS

Prior to the start of the experiment, the athletes of both groups experienced no pain in the anterior and posterior groups of thigh muscles (Fig. 5). However, after performing strength exercises on the first day of the experiment, the athletes of both groups experienced acute pain. Muscular pain levels in experimental group were extremely high and amounted to 9.1±0.2 points, which was significantly higher ($p<0.05$) than the relevant indicators in control group (6.4±0.4 points). On the 8th day of the experiment, DOMS in athletes of both groups significantly decreased: down to 2.0±0.2 points in the experimental group and 1.4±0.4 in the control group. Differences in the level of DOMS between groups became unreliable ($p>0.05$). By the end of the experiment, athletes of both groups experienced a decrease in pain levels virtually to a baseline level. Considering that strength training corresponded to the 1st, 5th, 8th, 12th, 15th, 19th, and 22nd days of the experiment, and it was clearly seen that delayed pain levels increased on the next day after each strength training session.



Duration, days	BL	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Experimental group	0	9.1	6.2	8.0	7.0	3.6	4.5	2.9	2.0	3.2	1.9	1.3	0.9	2.8	1.1	0.4	2.6	1.3	0.3	0.2	1.9	0.2	0.1	1.6	0.1	0.1
Control group	0	6.4	4.8	4.8	3.1	2.1	3.3	2.2	1.4	2.2	1.8	1.1	0.9	1.7	1.0	0.7	1.7	1.0	0.2	0.4	1.9	1.0	1.0	1.3	0.2	0.3

Fig. 5. *Acute pain and DOMS in the thigh muscles in experimental and control group athletes (* - significant differences between groups at a significance level of 0.05; - days of application of KAATSU Training; BL - before physical load; average values of acute and delayed pain levels are shown in the table below the figure)*

4. Discussion

The study has shown that the use of KAATSU Training over a period of three weeks led to an increase in the level of strength endurance of the QF in football players. A significant increase in strength endurance indicators of the anterior thigh muscle group as compared to baseline indicators in experimental group athletes was noted on the 26th day of the experiment, seven days after the last strength training session using KAATSU Training. The growth of local muscular endurance indicators of the thigh muscles in experimental group athletes as compared to the baseline level continued for subsequent 14 days, up to the 40th day of the experiment. Before the end of the experiment, control group athletes didn't display significant changes in terms of the indicators of local muscular endurance of QF as compared to baseline indicators.

Acute pain in athletes of both groups reached a maximum on the first day of the experiment after performing strength exercises. By the 8th day of training, the intensity of delayed DOMS decreased, and its values didn't differ from the baseline level. A slight increase in DOMS was subsequently associated with strength training to muscular failure in the control group and with strength training with the use of KAATSU Training in the experimental group.

The data obtained may be explained as follows. As far as it is known, a high power of muscular activity is associated with the alactate anaerobic mechanism of energy supply, in which adenosine

triphosphate (ATP) is re-synthesised in muscle fibres as a result of the breakdown of creatine phosphate (CP). During intensive continuous strength workout to muscular failure using KAATSU Training, CP contained in muscle fibres is largely depleted. Therefore, to support efforts continuing in excess of 10 s, it is necessary to connect the second ATP re-synthesis route – glycolysis [18]. In this study, rest times between sets of strength exercises were short (40 s), while the duration of all sets of each exercise was about 5 minutes. After 5 minutes of strength training, lactate and hydrogen ions accumulate in muscle fibres [19]. Hydrogen ions cause significant damage to the membranes of muscle fibres and organelles, which contributes to the mechanical damage of muscle fibres. Subsequently, muscle fibres become inflamed. Leukocytes penetrate them from the bloodstream. The process of penetration of leukocytes into muscle fibres is rather extended [20]. Thus, DOMS peaks in three days after the start of strength training, as clearly seen in Fig. 5. It should be noted that the diagram of changes in DOMS corresponds to the results obtained by other authors [21].

Improvement in the performance of the experimental group using KAATSU Training as compared to the group using the muscular failure method over 26 days after the start of the experiment may be explained by the accumulation of energy substrates in muscle fibres (CP and glycogen) and the improvement of muscle fibre capillarisation: an increased number of capillaries per muscle fibre [22], an increase in the diameter of blood capillaries [22], and an increase in the concentration of haemoglobin in blood plasma [9, 22]. Given that such changes require a certain amount of time, the cumulative effect of KAATSU Training on muscle fibres begins to transpire on the 26th day of training (seven days after the termination of KAATSU Training) and continues for 14 days. It should also be noted that the greater cumulative effect of KAATSU Training should affect slow twitch type I muscle fibres, where ATP re-synthesis is based on tissue respiration [22], and, apparently, type IIA muscle fibres, which also adapted to function in conditions of tissue respiration.

5. Conclusions

An influence of KAATSU Training on strength endurance of the QF of football players was reliably established. 26 days after the start of strength training using KAATSU Training, the number of repetitions of barbell squats was 38±3, which represented a significantly higher performance ($p<0.05$) compared to that of control group athletes (25±3).

Significant changes in strength endurance occurred within seven days after the termination of KAATSU Training, which we associate with the accumulation of energy substances in muscle fibres and an improvement in their capillarisation.

Changes in DOMS in muscles clearly correspond to the damage and subsequent regeneration of affected muscles.

References

1. Stolen T, Chamari K, Castagna C, Wisloff U. Physiology of soccer: an update. *Sports Med.* 2005;35(6):501-536.DOI:10.2165/00007256-200535060-00004. https://www.ncbi.nlm.nih.gov/pubmed/?term=Stolen+T%2C+Chamari+K%2C+Castagna+C%2C+Wisloff+U.+Physiology+of+soccer%3A+an+update.
2. Godik MA. *Fizicheskaya podgotovka futbolistov* [Physical training of football players]. Moscow: Terra-sport: Olympia Press; 2006. 271. (in Russian).
3. Bangsbo J The physiology of soccer - with special reference to intense intermittent exercise. Acta Physiol Scand Suppl. 1994; 619: 1-155. https://www.ncbi.nlm.nih.gov/pubmed/8059610
4. Monakov GV. *Podgotovka futbolistov. Teoriya i praktika* [Training of football players. Theory and practice]. Moscow: Sovetsky sport; 2007. 285. (in Russian)
5. Chirva BG. Futbol. Programma 50-dnevnoy zimney predsorevnovatel'noy podgotovki professional'noy komandy [Football. Program of 50-day winter pre-competition training of a professional team]. Moscow: Rus. St. Univ. of Physical Culture, Sports, Youth and Tourism; 2014. 68. (in Russian).

6. Takarada Y, Takazawa H, Sato Y, Takebayashi S, Tanaka Y, Ishii N. Effects of resistance exercise combined with moderate vascular occlusion on muscular function in humans. J Appl Physiol. 2000; 88(6): 2097-2106. DOI: 10.1152/jappl.2000.88.6.2097. https://www.ncbi.nlm.nih.gov/pubmed/10846023
7. Takarada Y, Sato Y, Ishii N. Effects of resistance exercise combined with vascular occlusion on muscle function in athletes. Eur J Appl Physiol. 2002; 86(4): 308-314. DOI: 10.1007/s00421-001-0561-5. https://www.ncbi.nlm.nih.gov/pubmed/11990743
8. Kacin A, Strazar K. Frequent low-load ischemic resistance exercise to failure enhances muscle oxygen delivery and endurance capacity. Scand J Med Sci Sports. 2011; 21(6): 231-241. DOI: 10.1111/j.1600-0838.2010.01260.x. https://www.ncbi.nlm.nih.gov/pubmed/21385216
9. Larkin KA, Macneil RG, Dirain M, Sandesara B, Manini TM, Buford TW. Blood flow restriction enhances post-resistance exercise angiogenic gene expression. *Med Sci Sports Exerc.* 2012; 44(11): 2077-2083. DOI: 10.1249/MSS.0b013e3182625928.https://www.ncbi.nlm.nih.gov/pubmed/22677927
10. Park S, Kim JK, Choi HM, Kim HG, Beekley MD, Nho H. Increase in maximal oxygen uptake following 2-week walk training with blood flow occlusion in athletes. *Eur J Appl Physiol.* 2010; 109(4): 591-600. DOI: 10.1007/s00421-010-1377-y
11. Pope ZK, Willardson JM, Schoenfeld BJ. Exercise and blood flow restriction. *J Strength Cond Res.* 2013; 27(10): 2914-2926. DOI: 10.1519/JSC.0b013e3182874721.https://www.ncbi.nlm.nih.gov/pubmed/23364292
12. Lixandrão ME, Ugrinowitsch C, Berton R, Vechin FC, Conceição MS, Damas F, Libardi CA, Roschel H. Magnitude of muscle strength and mass adaptations between high-load resistance training versus low-load resistance training associated with blood-flow restriction: a systematic review and meta-analysis. Sports Med. 2018; 48(2): 361-378. DOI: 10.1007/s40279-017-0795-y. https://www.ncbi.nlm.nih.gov/pubmed/29043659
13. Cook CJ, Kilduff LP, Beaven CM. Improving strength and power in trained athletes with 3 weeks of occlusion training. Int J Sports Physiol Perform. 2014; 9(1): 166-172. DOI: 10.1123/ijspp.2013-0018.https://www.ncbi.nlm.nih.gov/pubmed/23628627
14. Yamanaka T, Farley RS, Caputo JL. Occlusion training increases muscular strength in division IA football players. J Strength Cond Res. 2012; 26(9): 2523-2529. DOI: 10.1519/JSC.0b013e31823f2b0e.https://www.ncbi.nlm.nih.gov/pubmed/22105051
15. Sato Y. The history and future of KAATSU Training. Int J Kaatsu Training Res. 2005; 1: 1-5. DOI: 10.3806/ijktr.1.1. https://www.kaatsu-global.com/Assets/Files/Presentations/The_history_and_future_of_KAATSU_Training.pdf
16. Hawkins RD, Hulse MA, Wilkinson C, Hodson A, Gibson M. The association football medical research programme: an audit of injuries in professional football. Br J Sports Med. 2001; 35(1): 43-47. DOI: 10.1136/bjsm.35.1.43. https://bjsm.bmj.com/content/bjsports/35/1/43.full.pdf
17. Yasuda T, Brechue WF, Fujita T, Shirakawa J, Sato Y, Abe T. Muscle activation during low-intensity muscle contractions with restricted blood flow. J Sports Sci. 2009; 27(5): 479-89. DOI: 10.1080/02640410802626567. https://www.ncbi.nlm.nih.gov/pubmed/19253083
18. Mikhailov SS. Sportivnaya biokhimiya [Sports biochemistry]. Moscow: Sovetsky sport; 2009. 347. (in Russian). https://uchi-fitness.ru/upload/iblock/2e2/2e2b3a3aff219e1f223f260fece37bca.pdf
19. Robert RA, Ghiasvand F, Parker D. Biochemistry of exercise-induced metabolic acidosis. *Am J Physiol Regul Integr Comp Physiol.* 2004; 287(3): 502-516. https://www.physiology.org/doi/pdf/10.1152/ajpregu.00114.2004
20. McComas AJ. Skeletal muscle: Form and function. Human Kinetics Publ; 1996. 416.
21. Clarkson PM, Tremblay I. Exercise-induced muscle damage, repair, and adaptation in humans. J Appl Physiol. 1988; 65(1):1-6. DOI: 10.1152/jappl.1988.65.1.1. https://www.ncbi.nlm.nih.gov/pubmed/3403453

22. Shmerling MD, Belkin VS, Filyushina EE, Astakhov OB, Busueva II. Struktura skeletnykh myshts i vysokogornaya gipoksiya [Structure of skeletal muscle and high altitude hypoxia]. Novosibirsk: Nauka; 1985. 95. (in Russian).

Effects of Long-Term Intensive Training in Teenage Male Wrestlers Aged between 12 to 14 Years

Mustafa Ertuğrul Çiplak[1], Emre Yamaner[2] , Osman İmamoğlu[3] and Faruk Yamaner[4]
[1]*Assistant Professor, Bülent Ecevit University School of Physical Education and Sports, Zonguldak, Turkey.*
[2]*Lecturer, Hitit University, Sports Science Faculty, Corum, Turkey.*
[3]*Professor, Ondokuz Mayis University, Yasar Doğu Sports Science Faculty, Samsun, Turkey.*
[4]*Professor, Hitit University, Sports Science Faculty, Corum, Turkey.*

Abstract

The aim of the study was to investigate the effects of long-term intensive training on biochemical blood parameters of teenage male wrestlers. Material and Methods: 32 healthy boys (12.93±0.25) were grouped as athletes (A) and control (C). The athlete group joined an intensive training program with a controlled diet for 8 months, whereas control group did not receive any training or diet. Pre- posttest results were analyzed with Paired sample t test and Mann Whitney U test by SPSS 15.0. Development of athletes and control group were alike in terms of height, weight and BMI. Glucose and insulin serum levels decreased in the athlete group, whereas leptin serum levels did not differ among groups in pretest and posttest results. There were no significant differences between pretest and posttest results in terms of cholesterol, triglyceride, creatine and LDL levels, whereas HDL levels ($p \leq 0.05$) were decreased in the athlete group after 8 months training period. Statistically significant increase was observed in uric acid, phosphorus serum levels and platelets ($p < 0.01$) in athlete group. It was concluded that the low-fat diet together with intense training program caused decreased HDL levels and increased uric acid levels in serum which may serve as biomarkers for cardiovascular disease. The intense training program did not cause any muscle damage since creatine levels were not altered but increase in uric acid levels and phosphorus in serum were explained with high oxidative stress as a result of training.

Keywords: Uric Acid, Diet, Intense Training, Leptin, Wrestling.

1. Introduction

Long term adverse effects of intensive training may cause impared physical, physiological and mental health status as a consequence of different metabolism and hormone levels in adolescent wrestlers. As leptin is one of the hormones that is related to the energy systems, the intensity of the exercise regimen may alter leptin levels in young athletes (5,4,17). In order to design appropriate training programs for adolescent wrestlers, hormone level alterations should be monitored regularly during intensive training programs for long term.

2. Literature Review

Wrestling is an acyclic sport performed at different intensities, especially during matches where opponents weight and performance is an important variable. It mostly occurs in the zone of maximal and submaximal load. The energetics of the poly-structural sport wrestling are quite complex since anaerobic alactic and glycolytic pathways together dominates within the matches. While ATP is produced at a very high rate during explosive throws or lifting, aerobic pathways are used during breaks and/or between rounds to maintain effort and accelerates recovery period (1,2).

It requires strength, flexibility, speed, agility, balance, reaction, strategy and control of sporting performance with top-level endurance (3). Although physical performance plays the primary role in the success of the athlete, weight loss is another critical issue in weight category sports. Since wrestling has been performed at several weight categories, it is not unusual that wrestlers lose weight from 3 to 20 % while trying to manage their body especially few days before competitions (4). As a consequence of controlled weight loss, wrestlers become more competitive in a lower weight class. On the other hand, weight cutting (rapid weight loss) among wrestlers is widely experienced through saunas for dehydration, using laxatives,

fasting and over exercising, which in turn causes decline in strength, endurance and even mental alertness. Literature shows that rapid weight loss by these unhealthy methods may have significant adverse consequences not only on physical performance in a short period, but also long-lasting effects on several physiological parameters such as hormones levels responsible for energy balance and metabolic homeostasis (5,6). The risk for facing adverse effects may increase with decreasing age because of impaired normal growth and development (7).

Physical exercise is closely related with energy metabolism where intensity and duration of training highly correlates to plasma leptin levels. Several acute response studies showed that plasma leptin levels were altered after continuous endurance exercise lasting more than half an hour or following intense exercise that requires at least 5500 kcal energy expenditure (8,9). Not only leptin, but also biochemical parameters may vary depending on the type, severity and duration of the exercise (10). It has been shown that regular endurance training has positive effects on blood parameters such as decreased blood viscosity (11,12,13). On the contrary, Haluzik et.al, showed that serum leptin levels correlated positively with blood viscosity only in race walkers, but not in rugby players. Serum leptin levels were correlated with body fat content which was explained by training status of subjects in both groups (11).

With their high relevance in energy metabolism, leptin plays an important role in physical exercise (14,15). The relations between serum leptin concentrations and blood parameters in healthy non-athletic subjects and athletes at several types of training is still unknown, especially during adolescent (16) Turkey wrestling centers undergo intensive training programs to adolescent athletes in order to achieve success during championships in short time. Young athletes need a personalized training program according to the level of maturation and development; however, coaches undergo the standardized training program developed for adult wrestlers. Although nutritional intake is adequate, the intensive training program may have serious detrimental effects on adolescents, but not adult wrestlers. Long term adverse effects of intensive training may cause impared physical, physiological and mental health status as a consequence of different metabolism and hormone levels in adolescent wrestlers. As leptin is one of the hormones that is related to the energy systems, the intensity of the exercise regimen may alter leptin levels in young athletes (5,4,17). In order to design appropriate training programs for adolescent wrestlers, hormone level alterations should be monitored regularly during intensive training programs for long term.

The aim of this study was to investigate the effect of eight-month intensive training program on serum leptin levels and biochemical blood parameters in pre-adolescent beginner wrestlers aged between 12-14 years in Turkey wrestling centers. The development and health status of wrestlers were compared to their non-athlete peers.

3. Method

3.1. Participants

Wrestling Training Center, which was founded and supported by the Turkish Government, aims to train pre-adolescent wrestlers in order to represent Turkey in International Wrestling Games and Olympics Games in future. Students from secondary schools aged between 12-14 years were invited to apply the wrestling centers. Children were evaluated and selected based on motor skills and accepted by the Wrestling Training Center in Corum. Healthy 16 boys accepted in the Wrestling Training Center (WTC) and 16 boys who weren't selected volunteered to the study and were grouped as Athletes (A) and Control (C) groups. Subjects having metabolic, chronic and/or acute infectious disease, or taking any medication were excluded. Child wrestlers who missed two consecutive weeks of training were also excluded from the study.

3.2. Materials

The longituidinal study is a controlled experimental design with a pretest and post test evaluation before and after the eight month intensive training program. The study was approved by the Local Ethics Committee of the Faculty of Medicine, Karaelmas University, Zonguldak. Parents of the young wrestlers and manager of WTC has signed written consent since young wrestlers stay in the dormitories at these centers.

The wrestlers diets, hydration, education and practice period, and sleep schedules were under control and same as their peers before the pretest evaluation. All measurements were performed at the same day by the same expert at the beginning and end of the educational year, in September and May, for pretest and posttest respectively. Blood samples were taken after an overnight fast early in the morning at the same day.

3.3. Procedure

An intensive training program for 90 minutes per day for 6 days per week with a constant intensity of 60% was prepared for the children in group A. The children were trained within aerobic threshold for 8 months and additionally joined local wrestling competitions during this period.

The typical daily training program started with 5 minutes of theoretical preparation session including daily workout explanations. Training session followed by 25 minutes of warm up and stretching, continued with the main part of the training which included a series of exercises prepared by the WTC coaches according to the monthly schedule. The main exercise session lasted for 45 minutes at an intensity of 60% and was followed by a cool down session for 15 minutes in each training session. The daily caloric intakes of the child athletes were calculated from the dietary menu which was prepared by the nutritional specialists working at the WTC. The nutritional intake has started in September with a personalized diet list given to each child wrestler to control daily caloric intake. The specifically designed diet list for calorie intake lasted for 8 months until May when posttest evaluation as performed (Table 1). On the other hand, control group's dietary intake and caloric allowance remained the same as before.

4. Results

Table 1. *General training schedule and daily caloric allowances of the experiment group*

Months	**Training Methods**	**Calories (**kcal/day**)**
Sep **Oct**	Fundamental training/endurance	2500
Nov **Dec**	Fundamentals/strength/ Endurance	2700
Jan **Feb** **Mar**	Fundamentals/technique and tactic / endurance/strength	3000
Apr	Preparatory games for tournaments/tactic	3000
May	Intramural and local wrestling games	not controlled

Anthropometric Measurements

Weight

The children were weighed bare feet on a portable scale with a 125 kg maximum capacity and a +/- 100 g error margin after removing heavy clothes.

Height

A ruler with ±0.1 cm sensitivity was used to measure the height of children on bare feet at standing position with their scapula, buttocks and heels resting against a wall, the neck was held in a natural non stretched position, the heels were touching each other, the toe tips formed a 45° angle and the head was held straight with the inferior orbital border in the same horizontal plane as the external auditive conduct (Frankfort's plane).

BMI

BMI was estimated by dividing weight (kg) by height2 (m2) (21) Individuals were evaluated according to BMI as malnourished if < 18.5, normal from 18.5 to 24.9 and overweight if ≥ 25 (19).

Measurement of Blood Parameters

Blood Sampling

Blood samples were taken after an overnight fast from all children at the same time early in the morning. Blood samples were collected at the beginning of the study in September and at the end of the 8-month training period in may for pretest and posttest evaluation. Blood measurements for hormone and hematological parameters were performed as duplicates by a clinical laboratory (Duzen Laboratory, Ankara, Turkey) which has been regularly participating in external quality control programs and has the accreditation of Turkey's first EN ISO/IEC 17025. All branches in the clinical laboratory have been certified by EN ISO 15189.

Leptin

Blood was collected by a 22-gauge needle directly into EDTA-containing tubes and were centrifuged immediately for plasma collection. 0.5 ml plasma samples were stored at −80 °C until the leptin assay was performed. All participant's plasma was sampled at the same time of day. Serum leptin concentrations were assessed by a commercially available ELISA kit (DIAsource, Belgium: Leptin cat. no.: KAP 2281). Intra-assay precisions (CV %) was 10 and analytical sensitivity was 0.04 ng/ml during the analyses performed at the Duzen Laboratory in Ankara,Turkey.

Biochemical and Hematological Profile

Blood was collected in 8.5-mL plain tubes without any additive (BD Vacutainer; BD, Franklin Lakes, New Jersey, USA) and in 6-mL tubes containing ethylenediamine tetraacetic acid (EDTA) (BD Vacutainer; BD) for serum biochemistry profile and hematological profile, respectively. The EDTA tubes were immediately inverted 5 to 10 times after the sample was collected to mix the anticoagulant with the blood.

For biochemical assessment, blood samples were centrifuged immediately and serum was stored at −20°C until the time of analysis. Serum samples were analyzed at the same day using an automated biochemistry analyzer Roche Integra 800 (Roche Diagnostics USA, Indianapolis, USA) as per standard protocols at Duzen Laboratory for glucose, uric acid, creatinine, insulin, low-density lipoprotein cholesterol (LDL-C), high-density lipoprotein cholesterol (HDL-C), total cholesterol, triglyceride, phosphorus (P) and calcium (Ca).

Standard hematology techniques using the ADVIA 2120/2120i Hematology system (Siemens Healthcare Diagnostics, Deerfield, Illinois, USA) were used to determine the red blood cell (RBC) count, white blood cell (WBC) count, hemoglobin (Hb), hematocrit (Hct) and platelets which were measured photometrically. For further details on the biochemistry & hematological analytical methods and automation procedures, please contact the corresponding author.

Statistical Analysis

Data were recorded, validated and stored using the Statistical Package for the Social Sciences (SPSS) Windows software, version 15.0. The frequency and distribution of the characteristics of were analyzed using Mann-Whitney U test to identify differences between anthropometric measurements, leptin level, biochemical and hematological parameters in experiment and control group and within the whole sample. Paired sample t test was used to evaluate differences between pretest and posttest assessments of the pre-adolescent athletes. The mean and standard deviations (SD) of the data were calculated as descriptive statistics. The significance level was set at $p \leq 0.05$

5. Discussion and Conclusion

At the beginning of the study, both groups were considered as identical in terms of physical, biochemical and hematological parameters. No statistically significant differences were observed in pretest values between the athlete and control groups. After 8 months intensive training, maturation level of both groups was equal, since no differences were observed in anthropometric variables between groups.

Posttest results showed that intensive training affect both hematological and biochemical parameters, such that all hematological parameters showed a statistically significant decrease in the athlete group when compared to the control group, except WBC. Moreover, biochemical parameters showed statistically significant difference between athlete and control groups at the end of intensive training program. Serum glucose and insulin levels were significantly decreased, whereas uric acid levels were significantly increased in the athlete group when compared to control group ($p < .01$). On the other hand, creatine, Ca, P remained same between groups ($p > .05$). Lipid profile did not show a significant change after exercise, except HDL-C levels which were significantly reduced in the athlete group when compared to control group ($p < .01$). When pretest and posttest levels were compared, it was seen that serum phosphorus level showed a significant increase ($p < .01$) whereas serum calcium level showed a significant decrease ($p < .01$) in the athlete group.

Moreoever, glucose, insulin, HDL-C, Hb, Hct, RBC, platelets showed a significant decline whereas uric acid level increased significantly after exercise. Creatine, leptin, TC, TG, LDL-C and WBC remained unchanged in the athlete group.

Table 2. *Comparison of the mean values of athletes and control in terms of anthropometric variables.*

		Athletes				Control			
Variables	Tests	Mean± Sd	Cohen d	%95 CI Lower	%95 CI Upper	Mean± Sd	Cohen d	%95 CI Lower	%95 CI Upper
Age (Year)	Pre- test	12.93±0.25	-1.96	-1.04	-0.44	12.50±0.51	-1.56	-0.98	-0.51
	Post-test	13.68±0.48				13.25±0.45			
	Mean change	0.75±0.57				0.75±0.68			
Height (cm)	Pre- test	147.47±11.39	0.70	-10.84	-6.28	148.25±10.64	-0.65	-9.43	-4.44
	Post-test	155.10±10.29				155.18±10.58			
	Mean change	7.53±5.61				6.81±6.73			
Weight (kg)	Pre- test	41.00±2.93	-2.81	-11.65	-3.96	44.68±11.08	-0.71	-9.93	-5.25
	Post-test	48.81±2.61				52.28±10.21			
	Mean change	7.81±7.21				7.59±6.85			
BMI (kg/m²)	Pre- test	18.71±2.35	-0.40	-1.48	-0.26	20.00±2.14	-0.91	-2.51	-0.63
	Post-test	19.59±2.07				21.57±1.17			
	Mean change	0.88±1.47				1.57±1.76			

Table 3. *Comparison of the mean values of athletes and control groups in terms of hematologic variables*

		Athletes				Control			
Variables	Tests	Mean± Sd	Cohen d	%95 CI Lower	%95 CI Upper	Mean± Sd	Cohen d	%95 CI Lower	%95 CI Upper
RBC (1012/L)	Pre-test	5.18±0.37 [a]	0.68	0.06	0.41	5.04±1.30	0.03	-0.60	0.67
	Post-	4.95±0.30				5.00±1.51			

	test								
	Mean change	-0.23±0.32				-0.04±1.19			
WBC (109/L)	Pre-test	5.28±1.93	0.12	-0.42	0.85	6.07±1.04	-0.06	-0.11	0.00
	Post-test	5.07±1.55				6.13±1.01			
	Mean change	-0.21±1.20				0.06±0.11			
Hb (mmol/L)	Pre-test	8.80±0.50 [a]	1.11	0.25	0.89	8.66±0.44	-0,19	-0.33	0.19
	Post-test	8.23±0.52				8.73±0.28			
	Mean change	-0.57±0.60 [c]				0.07±0.49			
Hct (%)	Pre-test	44.87±0.74 [a]	5.41	3.92	6.90	40.48±2.45	-0.16	-1.72	1.03
	Post-test	39.46±2.62				40.83±1.81			
	Mean change	-4.40±2.79 [c]				0.35±2.57			
Platelets (109/L)	Pre-test	286.38±72.20 [a]	1.10	47.54	101.58	237.25±46.194	-0.09	-37.93	29.24
	Post-test	211.81±62.54				241.59±46.039			
	Mean change	-74.56±44.39 [c]				4.34±63.02			

Table 4. *Comparison of the mean values of athletes and control groups in terms biochemical values*

		Athletes				Control			
Variables	Tests	Mean± Sd	Cohen d	%95 Confidence		Mean± Sd	Cohen d	%95 Confidence	
				Lower	Upper			Lower	Upper
HDL-C (mmol/L)	Pre- test	1.53±0.30 [a]	0.43	0.02	0.03	1.35±0.26	-0.12	-0.14	0.080
	Post-test	1.40±0.31				1.38±0.25			
	Mean change	-0.14±0.23 [c]				0.03±0.20			
LDL-C (mmol/L)	Pre- test	2.06±0.67	0.06	-0.00	0.09	1.72±0.54	-0.07	-0.27	0.19
	Post-test	2.02±0.68				1.76±0.57			
	Mean change	-0.04±0.09				0.04±0.43			
Triglyceride (mmol/L)	Pre- test	0.75±0.15	0.38	-0.07	0.25	0.75±0.15	0.38	-0.10	0.24
	Post-test	0.66±0.26				0.67±0.26			
	Mean change	-0.09±0.29				-0.08±0.32			

Total Cholesterol (mmol/L)	Pre- test	3.81±0.58	0.28	-0.03	0.33	3.28±0.47	-0.09	-0.27	0.20
	Post-test	3.66±0.50				3.32±0.44			
	Mean change	-0.15±0.33				0.04±0.43			
Glucose (mmol/L)	Pre- test	4.76±0.83 [a]	1.73	0.76	1.62	4.64±0.82	0.24	-0.03	0.39
	Post-test	3.57±0.48				4.46±0.68			
	Mean change	-1.19±0.80 [c]				-0.18±0.39			
Insulin (pmol/L)	Pre- test	58.21±20.24 [a]	1.28	9.59	29.21	62.85±16.11	0.05	-2.71	4.31
	Post-test	38.81±6.80				62.05±15.20			
	Mean change	-19.37±18.41 [c]				-0.80±6.59			
Leptin (ng/mL)	Pre- test	0.70±0.65	0.04	-0.31	0.37	0.52±0.34	-0.03	-0.23	0.22
	Post-test	0.67±0.78				0.53±0.43			
	Mean change	-0.03±0.63				0.006±0.42			

* $p \leq 0.05$; ** $p < 0.01$

There were no significant differences between pre- and post-tests results in terms of leptin, cholesterol, WBC, triglyceride, creatinine and LDL-C values of the groups ($p>0.05$). However, significant differences between the groups has been observed in terms of uric acid, glucose, insulin, Ca, P, Hb, Hct, RBC, platelets ($p<0.01$) and HDL-C values ($p \leq 0.05$). There was no significant difference between the blood values obtained in the pre-test and post-tests in the control group ($p> 0.05$). Uuric acid ($p<0.01$) and P ($p \leq 0.05$) levels were increased in athlete group compared to control group. While glucose, insulin, Hb, Hct, platelet ($P<0.01$) and HDL-C ($p \leq 0.05$) values decreased significantly, the decreases in cholesterol, LDL-C, and WBC were not statistically significant ($p>0.05$). There was no statistically significant difference ($p>0.05$) between the pre- and post- test results of the athlete group in terms of leptin levels. Moreover, no significant differences were found between the groups with respect to leptin levels.

Discussion

Maximal strength, power, muscular endurance, maximal aerobic power, and especially anaerobic capability plays important role wrestling and are key elements to be improved for Wrestler's athletic performance (18). Specialists still argue for several unique challenges, such as metabolic and biomechanical demands of wrestling. Most importantly, the weight-class system of the sport imposes restrictions to increase in muscle mass triggering training programs such as resistance training and conditioning. Therefore, specific concerns should be taken before designing the training program and dietary plan of teenage wrestlers so that they can become highly skilled wrestlers in future (19). In this study, planned dietary intake and prolonged high intensity training program was applied for 8 months to 12-14 years aged boys who were selected to be trained and become wrestlers in future representing Turkey in national and international wrestling competitions. Their adaptation to training at the end of 8 months period and their development compared to age matched peers were evaluated.

Athletes in the training group did not show any significant difference with their age-matched peers in the control group in terms of weight, height and BMI. The anthropometric measurements showed that the development of both groups fit well with the maturation curve, which means that 8 months intensive training and restricted calorie intake had no impact on growth and development in the athletes. However, changes in hematological and biochemical parameters were contrary to our expectations. HDL serum levels were decreased whereas the rest of the lipid profile remained unchanged. Furthermore, uric acid levels and phosphate levels were found to be increased in athlete's serum, but creatine remained unaltered during the

study. On the other hand, glucose and insulin serum levels were decreased as a response to exercise whereas leptin resisted to any change in young wrestlers. Moreover, almost all hematological parameters were decreased, except WBC percentage.

The adaptive responses of multiple organ systems to stress are very complex and highly variable. Regular exercise depending on type, intensity, volume and frequency has positive effects on physical and physiological parameters, especially on blood biochemistry by increasing HDL cholesterol levels, while lowering triglycerides, total cholesterol, LDL cholesterol blood lipid levels (20). On the other hand, controversial results have been obtained by several studies which demonstrated no difference in lipid profile or even a decrease in HDL as a response to training protocols. As exercise intensity shifts from moderate to high, carbohydrate metabolism predominates the energy system while increasing glucose uptake and glycogenolysis in both muscle and liver, whereas body lipid oxidation is declined as a result of lowered concentration of free fatty acids in the blood and decreased rate of intramuscular triglyceride oxidation (21). Peak level of lipid oxidation rate has been generally obtained around 65% VO2max, though this value may change by many other factors, such as training status, gender and diet. In this study, we found a significant decrease in plasma glucose and insulin levels after long term intensive training in the athlete group ($p<0.001$), whereas leptin did not change compared to control group. Moreover, plasma HDL-C ($p\leq0.05$) values decreased significantly in the athlete group after 8 months intensive training, whereas total cholesterol and LDL-C were not affected by exercise ($p>0.05$). The results clearly show that HDL is the primary molecule of lipid metabolism that respond to exercise when compared to LDL and total cholesterol. This finding parallels the outcomes of several studies which demonstrated lipid alteration mostly in HDL-C in both men and women (22).

However, the direction of the change in HDL in our results is controversial to the literature stated above, which can be explained by low fat diet. In a review study, authors proposed that acute responses related to lipoprotein metabolism may be caused by diet restrictions and intake periodization of food, because high HDL levels of physically active individuals decreased with reduced or changeably periodized fat intake. The dietary intake of our young wrestlers was rich in proteins and carbohydrates, whereas fat was included only to essential amounts in order to control and restrict excess weight gain during athletic development and improvement. Literature clearly showed that low-fat diet and exercise may reduce HDL serum levels, whereas total cholesterol, LDL and triglyceride levels remain unchanged. Restricted dietary fat consumption influences not only lipid, but also glucose metabolism by altering cell membrane function, enzyme activity, insulin signaling, and gene expression giving rise to dyslipidemia (23).

In a study, lipid profile of trained participants aged between 20-26 years did not change when compared to controls after 12 weeks training according to the protocol that combined 30 min of high intensity aerobic exercise with 30 min of resistance training (23). The resist to any change of the lipid profile was linked to the age of the wrestlers and the authors suggested that the participants were too young to elicit the clinical effects shown by previous research. These findings parallel our results where HDL was found to be lower in the training group not only when pretest was compared to post test, but also when compared to control group in young wrestlers after 8 months of training.

Furthermore, wrestling may generate metabolic changes like circuit-resistance exercise models. Rashidlamir et.al demonstrated decreased serum HDL-C levels which indicates that reverse cholesterol transport (RCT) processes may be temporarily decreased in adult power athletes. Not only decreased HDL, but also increased levels of serum uric acid have been recognized in our study, which together may serve as biomarkers for cardiovascular disease (CVD) morbidity and mortality as stated by literature (24). Uric acid is the end prodct of purine metabolite which is formed by the liver and mainly excreted by the kidneys (65-75%) and intestines (25-35%). Uric acid is recognized as a marker of oxidative stress, but also as a protective factor acting as an antioxidant (25).

Increased serum uric acid level is believed to be an indicator of an extreme training session. Literature committed that high training stimulus and an increase in protein breakdown can favor increased uric acid concentrations (26). Authors in a study suggested that increased levels of uric acid after 6-12 weeks of high

intensity training in young field hockey players may be as a result of reduced excretion rate of urinary uric acid in addition to increased protein intake (27). This may be the case in our study if we had seen increased creatine levels, since it referred as a biomarker for protein breakdown as a result of muscle damage. We expected significant changes plasma creatine levels in athlete group compared to control group and pretest levels as a result of muscle damage caused by prolonged intensive exercise However, plasma creatine levels remained same after 8 months of intensive exercise in young wrestlers. Our findings were similar to Cipryan et.al who demonstrated no difference in creatine and myoglobin level in both endurance and sprint type athletes after high intensity exercise. This result may indicate that our athletes have highly adapted to the training program of wrestling which requires muscular endurance and need high metabolic acidosis tolerance for high performance. It has been shown that lactic acid concentrations (19) in plasma may reach 19 mmol. L-1 which lowers blodd pH drastically during a wrestling match (Therefore, the ability to tolerate metabolic acidosis is imperative for successful wrestling performance.

Another important study suggested that elevated postexercise plasma concentrations of uric acid may be caused as a result of the high energy demand during exercise and increased purine metabolism instead of protein catabolism (28). A net loss of the adenine nucleotide pool via adenosine 5 '-monophosphate (AMP) deamination has been observed as a result of increased energy expenditure during exhaustive exercise (29). During intensive exercise adenylate kinase starts to catalyse the reaction of two adenosine 5- diphosphate (ADP) molecules to form adenosine 5 '-triphosphate (ATP) and adenosine 5 '-monophosphate (AMP) and thereby reduces the accumulation of ADP in tissue when the rate of ATP turnover becomes greater than ADP re-phosphorylation. AMP is converted to Inositol monophosphate (IMP) and urea by the enzyme AMP deaminase in the skeletal muscle, liver and blood (30). In other words, AMP and ADP are lowered by AMP deaminase within muscle in order to sustain sufficient free energy release during ATP hydrolysis to provide adequate energy to fuel muscle contraction by producing IMP and ammonia. Ammonia is toxic to cells and is therefore sent to liver via peripheral circulation and converted to urea before excretion by kidney. Ammonia produced during intense exercise comes mainly from purine deamination, stays elevated in blood and gives rise to fatigue (31). Previous studies also have used evaluated post exercise changes in plasma concentrations of uric acid to evaluate the effect of exercise intensity on adenine nucleotide degradation during a single bout of exercise (32). Increased uric acid and phosphate serum levels, decreased glucose and insulin serum levels together with unchanged plasma creatine levels in our study may refer to increased AMP enzymatic activity in our athletes. We suggest that young wrestlers started to improve muscular endurance as a result of prolonged high intensity exercise training, which gave rise to a shift from CHO oxidation to fat oxidation, thereby decreasing serum glucose levels. This suggestion can be supported by literature which shows that endurance training reduces blood glucose levels by decreasing CHO oxidation and enhancing fat oxidation. The reduced hepatic glycogenolysis and gluconeogenesis are also autoregulated and respond to changes in glucose utilization (33, 3).

Not only exercise intensity, but also diet, especially fructose consumption may be another critical variable in elevated uric acid levels in our athletes. Fructose metabolism differs from other sugars since metabolized fructose causes hepatic adenosine triphosphate depletion, which causes the promotion of uric acid formation as well as the breakdown of nucleotides. Fructose is absorbed in the intestines and metabolized by fructokinase primarily in the liver but also in the kidneys and adipocytes. This enzyme uses ATP to phosphorylate fructose to fructose-1-phosphate. Fructokinase is poorly regulated; therefore, the fructose is rapidly phosphorylated and, in the meantime, causes depletion of ATP (34,35). When ATP is consumed, adenosine monophosphate (AMP) accumulates and stimulates ATP deaminase, which then triggers the production of uric acid (36,37). During strenuous exercise, enough carbohydrate intake is advised for replenishment of muscle and liver glycogen stores. The carbohydrate consumption is preferred as a mixture of glucose and fructose, since only glucose containing oral rehydration solutions used during exercise can increase exogenous carbohydrate oxidation rates, thereby improving exercise performance and endurance capacity (38). On the other hand, fructose together with glucose ingestion increased exogenous carbohydrate oxidation rates by 50% or more compared to only glucose at same total calories (39).

However, recent studies have shown that uric acid levels have risen both in women (>5.5 mg/dL) and men (>6.0 mg/dL) in the last century as a result of added sugars in food in the Western diet, especially fructose (40,41). Increased consumption of fructose-containing sugars, high-fructose corn syrup in soft drinks and fruit juices has been stated in literature. It has been widely studied and accepted that fructose consumed in diet as fruits and vegetables with high Vitamin C and other nutrients did not favor adverse health in athletes for many years. However, recent literature showed that High-fructose corn syrup (HFCS), which is made up of 55% fructose and 45% glucose, has replaced sugar beet because of its inexpensive cost in food industry. Recent study has shown that HFCS consumption has paralleled the increase in obesity, metabolic syndrome, and chronic kidney disease, thus it has been suggested that there is a close relationship between the intake of HFCS and elevated uric acid levels among people (42). HFCS may play an important role in the elevated uric acid level in our adolescent wrestlers since the kids tend to consume sweets throughout the day and consumed fruit juice at breakfast in wrestling center.

Exercise-induced physiological changes may include decrease in hemoglobin, hematocrit, WBC, RBC, and platelets. At the beginning of an exercise regimen, RBC and hemoglobin levels of an athlete decrease. One of the possible reasons for this situation, called sports anemia, is that the plasma volume is increased due to the physical exercise but the increases in Hb and RBC are not enough to have the same Hb and RBC rate in the plasma volume. The other possible reason is that, the blood proteins including RBC is used heavily to increase the myoglobin concentrations, mitochondrial mass and enzymes which are involved in adaptation to exercise and in recovery phase (43). Nemet et al. (2004) have shown that intensive wrestling training sessions in adolescents lead to profound stimulation of the human immune system but the role of these changes in the immune status and the development of the immune systems should be clarified (16). In a study conducted by Cakmakci (2009), no statistically significant difference has been found between the pre- and post-training results of the taekwondo athletes in terms of hemoglobin and RBC levels (44). Pancar et al. (2018) have determined that, the pre- and post-test results have not revealed any significant difference in obese and overweight children (15). The current study did not show any statistically significant differences in RBC and WBC levels ($p<0.05$) but a significant difference was observed in platelet levels ($p<0.01$). Although the results of the studies in literature yield a wide range, it might be said that Hb, Hct, RBC and platelet levels were negatively affected by long-term intensive training, but intensive training had no significant effects on WBC levels of the subjects. The hematological studies have shown that doing sports or sedentary living, short-term and long-term exercise in individuals do not cause significant differences in terms of WBC levels (45).

Leptin is a hormone that is mainly secreted by subcutaneous adipose tissue. It regulates food intake and also promotes energy consumption. It also affects lipid metabolism, activity of the ovary and β-cell function blood cells production and heat production (46). Gutin et al., (1999) have found that the levels of the plasma leptin have decreased in obese children after a 4-month exercise program (47). Leptin levels of adult wrestlers and sedentary subjects did not differ in our previous study (44). Leptin levels remained almost same in pre-adolescent wrestlers in this, suggesting that leptin levels of health individuals resist to any change, whereas leptin levels of only obese individuals may be altered by exercise (44,46).

Conclusion

It can be concluded that prolonged high intensity exercise may shift CHO oxidation toward lipid oxidation to maintain the energy needed during prolonged training. Leptin seems not to take part in this regulation whereas insulin plays a regulatory role during exercise induced alterations in CHO and fat oxidation. As a result of restricted fat intake, HDL levels tend to increase as a response to prolonged high intensity exercise and increases thereby the risk of CVD. Reduces hepatic glycolysis rate and blood glucose levels are compensated by enhanced purine metabolism in order to produce ATP and thereby increases uric acid concentrations in blood. Not only exercise intensity and duration, but also dietary intake, especially processed food and HFCS, play an important role in exercise induced uric acid formation in blood. Thus training intensity and recovery period must be adapted to age specific conditions during preadolescent

period in wrestlers, since decreases in muscle ATP concentration in the cell could increase the production of superoxide radicals which can cause damage to skeletal muscle (48). Although uric acid has excellent antioxidant capacity it may act as a prooxidant if elimination from the blood is delayed (49). Blood uric acid levels can reach a peak. concentration of 0.1 mmol/L during incremental exercise training (50) and elevated uric acid levels in the blood may led to irreversible brain damage (51). Therefore, it is believed that muscle and whole-body purine metabolism and HFCS consumption during exercise in addition to muscle protein balance in athletes will become an important topic within exercise biochemistry in the future.

Practical Applications

Intensive training 6 days a week can be harmful to teenage wrestlers. Therefore, age-related scientific-based training programs, including appropriate load/recovery periods should be planned carefully and the number of intensive training per week should be reduced for pre-adolescent wrestlers. Intensive training can be planned for 4 days per week for these athletes. The recovery periods of pre-adolescent wrestlers should be well adjusted. The athletes should just jog on some days to increase the positive effect on blood values.

References

1. Buchheit M, Laursen PB. High-Itensity Interval Training, Solutions to the Programming Puzzle: Part II: Anaerobic Energy, Neuromuscular Load and Practical Applications. Sports Medicine, 43(10): 927-954, 2013.
2. Garrow JS, Webster J. Quetelet's index (W/H2) as a measure of fatness. International journal of obesity, 9 (2): 147-153, 1985.
3. Chaabene H, Negra Y, Bouguezzi R, Mkaouer B, Franchini E, Julio U, Hachana Y. Physical and physiological profile of wrestler athletes: a short reviewThe Journal of Strength and Conditioning Researc, 31: 1411–1442, 2017.
4. Lamir AR, Goudarzi M, Ravasi A A. The effect of gradual and acute weight loss on strength and endurance of well-trained wrestlers. Word journal of sport sciences, 2(4): 236-240, 2009.
5. Abderrahman AB, Rhibi F, Ouerghi N, Hackney AC, Saeidi A. Effects of Recovery Mode during High Intensity Interval Training on Glucose regulatory Hormones and Glucose Metabolism in Response to Maximal Exercise. Journal of Athletic Enhancement, 7:2, 2018.
6. Ahiante BO, Smith W, Lammertyn L, Schutte A E. Leptin and its Relation to Autonomic Activity, Endothelial Cell Activation and Blood Pressure in a Young Black and White Population: The African-Predıct study. Hormone and Metabolic Research, 50 (3): 257-266, 2018.
7. Koury JC, de Oliveira KDJF, Lopes GC, de Oliveira AV, Portella ES, de Moura EG, Donangelo CM. Plasma zinc, copper, leptin, and body composition are associated in elite female judo athletes. Biological trace element research, 115(1): 23-30, 2007.
8. Voss SC, Nikolovski Z, Bourdon P C, Alsayrafi M, Schumacher Y O. The effect of cumulative endurance exercise on leptin and adiponectin and their role as markers to monitor training load. Biology of sport; 33(1): 23, 2016.
9. Karakukcu C, Polat Y, Torun YA, Aysenur Kisaarslan PAC. The effects of acute and regular exercise on calcium, phosphorus and trace elements in young amateur boxers. Clinical Laboratory, 59: 557-62, 2013.
10. Pancar S,Tokgöz O,Topcu H. The Effect of 8-Week Exercise Program on Some Hematological Parameters in Obese Children, European Journal of Physical Education and Sport Science, 5(4):158-167, 2018.
11. Radka D, Zdena L, Marketa D, et al. Changes of endocrine function of adipose tissue in anorexia nervosa: comparison of circulating levels versus subcutaneous mRNA expression. Clinical Endocrinology, 5:674, 2007.
12. Boamponsem GA, Johnson FS, Mahunu GK, Awiniboya SF. Determination of biochemical composition of Saba senegalensis (Saba fruit). Asian Journal of Plant Science and Research,3: 31-36, 2013.
13. Boudovti L, Cishik M, BarhEkovti M, Brandejskjl P. The influence of physical load on blood viscosity. Sbornik Lekarsky, 96: 11 1-20, 1995.

14. Jurimae J, Maestu J, Jurimae T. Leptin as a marker of training stress in highly trained male rowers? European Journal of Applied Physiologyl, 90(6): 533, 2003.
15. Bouassida A, Chamari K, Zaouali M, Feki Y, Zbidi A, Tabka, Z. Review on leptin and adiponectin responses and adaptations to acute and chronic exercise. British Journal of Sports Medicine, 44(9):620-30, 2010.
16. Nemet D, Mills PJ, Cooper DM. Effect of intense wrestling exercise on leucocytes and adhesion molecules in adolescent boys. British Journal of Sports Medicine, 38: 154-158, 2004.
17. Kayacan Y, Mor A, Ozgocer T, Ucar C, Yildiz S. Psychophysiological stress regulation in football athletes during competition. Sports Medicine, 70(3): 333-43, 2017.
18. Yoon J. Physiological profiles of elite senior wrestlers. Sports Medicine,32: 225–233, 2002.
19. Hasegawa H J, Dziados RU, Newton AC, Fry WJ, Hakkine K. Periodized training programmes for athletes. In: Strength Training for Sport. W.J. Kraemer and K. Hakkinen, eds. Oxford, United Kingdom: Blackwell Science,69–134, 2002.
20. Zierath JR, Wallberg-Henriksson H. Looking Ahead Perspective: Where Will the Future of Exercise Biology Take Us? Cell Metabolism, 22(1): 25-30, 2015.
21. Van Loon LJ, Greenhaff PL, Constantin-Teodosiu D, Saris WH, Wagenmakers AJ. The effects of increasing exercise intensity on muscle fuel utilisation in humans. The Journal of Physiology , 536: 295–304, 2001.
22. Blumenthal J, Emery C, Madden D. Effects of exercise training on cardiorespiratory function in men and women 60 years of age. The American Journal of Cardiology,67:633-639, 1991.
23. Lira FS, Zanchi NE, Lima-Silva AE, et al. Acute high-intensity exercise with low energy expenditure reduced LDL-c and total cholesterol in men. European Journal of Applied Physiology, 107(2): 203, 2009.
24. Stack AG, Hanley A, Casserly LF, Cronin CJ, Abdalla AA, Kiernan TJ, Murthy BV, Hegarty A, Hannigan A, Nguyen HT. Independent and conjoint associations of gout and hyperuricaemia with total and cardiovascular mortality. An International Journal of Medicine,106: 647–658, 2013.
25. Alvarez-Lario B, Macarron-Vicente J: Uric acid and evolution. Rheumatology (Oxford), 49: 2010-2015, 2015.
26. Manna I, Khanna GL. Effect of training on selected biochemical variables of elite male swimmers. American Journal of Sports Science and Medicine, 2: 13-16, 2013.
27. Manna I, Khanna GL, Dhara PC. Training induced changes on physiological and biochemical variables of young Indian field hockey players. Biology of Sport, 26: 33-43, 2009.
28. Balsom PD, Söderlund K, Ekblom B. Creatine in Humans with Special Reference to Creatine Supplementation. *Sports Medicine*. 8(4): 268, 1994.
27. Hellsten-Westing Y, Sollevi A, Sjödin B, Plasma accumulation of hypoxanthine, uric acid and creatine kinase following exhausting runs of different durations in man. European Journal of Applied Physiology, 62:380-384, 1991.
28. Atkinson DE, Cellular Energy Metabolism and Its Regulation, Academic Press, New York, USA, 1st edition, 1977.
29. Bassini-Cameron A, Monteiro A, Gomes A, Werneckde-Castro JPS, Cameron L, Glutamine protects against increases in blood ammonia in football players in an exercise intensity-dependent way, British Journal of Sports Medicine, 42(4): 260–266, 2008.
30. Ketai LH , Simon RH, Kreit JW, Grum CM. Plasma hypoxanthine and exercise. Am Rev Respir Dis, 136: 98-101, 1987.
31. Coggan AR, Kohrt WM, Spina RJ, Bier DM, Holloszy JO. Endurance training decreases plasma glucose turnover and oxidation during moderate-intensity exercise in men. Journal of Applied Physiology, 68(3): 990-996, 1990.
32. Coggan AR, Swanson SC, Mendenhall LA, Habash DL, Kien CL. Effect of endurance training on hepatic glycogenolysis and gluconeogenesis during prolonged exercise in men. American Journal of Physiology-Endocrinology And Metabolism, 268(3): 58-65, 1995.

33. Nair S, Arnold C, Diehl AM. Hepatic ATP reserve and efficiency of replenishing: comparison between obese and nonobese normal individuals. American Journal of Gastroenterology, 98, 2003.
34. Fox IH, Kelley WN. Studies on the mechanism of fructose-induced hyperuricemia in man. Metabolism, 21, 1972.
35. Gersch MS, Mu W, Cirillo P, et al. Fructose, but not dextrose, accelerates the progression of chronic kidney disease. American Journal of Physiology-Renal Physiology, 293, 2007.
36. Jentjens RLPG, Shaw C, Birtles T, Waring RH, Harding LK, Jeukendrup AE. Oxidation of combined ingestion of glucose and sucrose during exercise. Metabolism: Clinical And Experimental, 54(5):610-618, 2005.
37. Rowlands DS, Thorburn MS, Thorp, RM, Boradbent S, Shi X. Effect of graded fructose coingestion with maltodextrin on exogenous 14C-fructose and 13C-glucose oxidation efficiency and high-intensity cycling performance. The Journal of Applied Physiology. 104, 2008.
38. Sui X, Church TS, Meriwether RA, Lobelo F, Blair SN. Uric acid and the development of metabolic syndrome in women and men. Metabolism, 57: 845–852, 2008.
39. Nakagawa T, Hu H, Zharikov S, Tuttle KR, Short RA, Glushakova O, Patel JM. A causal role for uric acid in fructose-induced metabolic syndrome. American Journal of Physiology-Renal Physiology, 290(3): 625-631, 2006.
40. Johnson RJ., Nakagawa T, Sanchez-Lozada LG, Shafiu M, Sundarum ., Le M, Lanaspa MA. Sugar, uric acid, and the etiology of diabetes and obesity. Diabetes, 62: 3307–3315, 2013.
41. Bartsch P, Mairbaurl H, Friedmann B. Pseudo-anemia caused by sports. Ther. Umsch. 55: 251-255, 1998.
42. Cakmakci E. The effects of camping period on some haematological parameters in male Taekwondo players. Nigde University Journal of Physical Education and Sport Sciences, 3: 21-29, 2009.
43. Ergün M, Tengiz I, Türk U, Senısık S, Alioglu E, Yüksel O, Ercan E, Islegen C, et al, The Effect of Long-Term Regular Exercise on Endothelial Functions, Inflammatory and Thrombotic Activity İn Middle Aged, Healthy Men. Journal of Sports Science and Medicine, 266 – 275, 2006.
44. Yamaner F, Bayraktaroglu T, Atmaca H, Ziyagil MA, Tamer K. Serum leptin, lipoprotein levels and glucose homeostasis between national wrestlers and sedentary males. Turkish Journal of Medical Sciences. 40: 471-477, 2010.
45. Gutin B, Ramsey L, Barbeau P, Cannady W, Ferguson M, Litaker M, Owens S. Plasma leptin concentrations in obese children: changes during 4-mo periods with and without physical training. The American Journal of Clinical Nutrition, 69: 388-94, 1999.
46. Sjödin B, Hellsten Westing Y, Apple F. Biochemical mechanisms for oxygen free radical formation during exercise. Sports Medicine,10:236-254, 1990.
47. Sautin YY, Johnson RJ: Uric acid: the oxidant-antioxidant paradox. Nucleosides Nucleotides Nucleic Acids. 27:608-619, 2008.
48. Casas H, Murtra B, Casas M. Increased blood ammonia in hypoxia during exercise in humans, Journal of Physiology and Biochemistry, 57(4): 303–312, 2001.
49. Tschakert G, Hofmann P. High-Intensity Intermittent Exercise: Methodological and Physiological Aspects. International Journal of Sports Physiology and Performance, 8(6), 600-610, 2013.
50. Cakmakci E. The effects of camping period on some haematological parameters in male Taekwondo players. Nigde University Journal of Physical Education and Sport Sciences, 3: 21-29, 2009.
51. Ergün M., Tengiz I., Türk U., Senısık S., Alioglu E., Yüksel O., Ercan E., Islegen C., et al, The Effect of Long-Term Regular Exercise on Endothelial Functions, Inflammatory and Thrombotic Activity İn Middle Aged, Healthy Men. Journal of Sports Science and Medicine, 266 – 275, 2006.

Actual Tasks of Choreographic Training in Gymnatic Sports

Todorova Valentyna Heorhiivna[1], Pogorelova Olena Oleksandrivna[2] and Kashuba Vitalii Oleksandrovich[3]

[1,2] The state institution «South Ukrainian National Pedagogical University named after K. D. Ushynsky», Odesa, Ukraine .

[3]National University of Physical Education and Sport of Ukraine, Kyiv, Ukraine.

Abstract

Introduction: Modern rules of competition place extremely high requirements on the choreographic preparation of athletes in various gymnastic kind of sport. These requirements apply to both the technique and the artistry of the exercises. In gymnastic kind of sport with high requirements for choreographic preparation, two different teams of judges are involved in the evaluation of the "technical" and "artistic" components, the ratings of which equally influence on the result of the athletes' competitive activity. **Objective:** The aim of this work was to identify directions for improving choreographic training in gymnastic sports. Interviews were conducted with 50 experts in rhythmic gymnastics, sport gymnastics, sport acrobatics, bouncing on trampoline, sport aerobics, that certifies the lack of a unified approach to the methodology and organization of choreographic training at different stages of long-term improvement of sportsmen. **Methods:** analysis of special theoretical and science methodological literature, documentary materials, rules of competitions in gymnastic sports that are part of the International Federation of Gymnastics (FIG); sociological methods; including surveys; pedagogical: experiment, conversation, mathematical statistics. **Results:** Unanimously defining the need for quality and effective choreographic training, coaches pay attention to the lack of adapted choreography facilities that meet current trends and requirements of the sport, competition rules and features of the technique of performing choreographic and specific elements of sport. **Conclusion:** According to the coaches, one of the ways of improving the technique of choreographic training in gymnastic sports should be strengthening the work on the technique of performing choreographic exercises and elements inherent in the sport. In order to achieve this, it is necessary to improve the program material on choreographic training, organize it in accordance with current trends of development and features of the sport, introduce the necessary control over the level of choreographic fitness of athletes.

Keywords: gymnastic sports, choreography, choreographic training, competition rules, criteria

1. Introduction

On the eve of each new Olympic cycle, the question is what path will be taken for the further development of gymnastic sports with high requirements for the choreographic fitness of athletes, is most strongly discussed by experts [1, 2, 4, 13]. Along with the traditional questions about the technical difficulties and content of athletic competitions, the subject of discussions in the technical committee of the International Gymnastics Federation is the aesthetic side of performing skills. Competition in the international arena implies that the championship will be maintained by those athletes who can combine multistructural complexity in extraordinary compositions with virtuoso performance and special expressiveness, emotionality, artistry. [11, 12, 14]. There is a general consensus that the choreographic readiness of athletes in gymnastic sports has a significant impact on improving the results of training and competitive activity [7, 8].

Trends in the development of gymnastic sports with high requirements for choreography and rules of competition indicate that one of the most important requirements for competitive activity of athletes is the achievement of high technical skills combined with artistry and expressiveness of performance.

2. Literature Review

The analysis of the rules of competitions in different gymnastic sports made it possible to identify the requirements for the choreographic preparation of athletes and to outline the directions of their choreographic training.

Rhythmic gymnastics. Achievement of high technical skills in rhythmic gymnastics is the result of improving the technique of performing body difficulties (jumps, turns, and equilibria), the difficulty and skill of working with the subject and expressiveness of performance. Judges who evaluate the artistry of the performers are empowered to lower their ratings for lack of choreographic preparation. Thus, the rules of competition prescribe the lower rating for the following: the nature and idea of the exercise (when they are underdeveloped or absent); lack of harmony between movements and musical accents, phrases, tempo; mismatch of gymnast's moves with dynamic changes in music; lack of expression (beauty, elegance, intensity) in the moves of the gymnast's body; lack of balance in the amplitude of the rearrangements or their predominance in one type of pattern; lack of variety of throws; insufficient diversity in the use of directions and types of moves; lack of teamwork in the composition of group exercises.

The analysis of the rules of competitions in rhythmic gymnastics allowed distinguishing the "competitive" criteria of the choreographic readiness of athletes, namely: style and character; rhythm, harmony; energy, power, speed, intensity; expressiveness of the body; "Contrasting" performance (rather - slower; strong, powerful, energetic - smooth, lyrical, etc.); interaction with partners / subjects.

In sports gymnastics, the final grade is formed by the sum of points for the content of the exercise and the amount of rewards for performance and artistry. The choreographic readiness of gymnasts influences both the technique of performance and the evaluation of artistry [6, 7, 13].

Lower points for performance and artistry in sports gymnastics are provided for insufficient tension of the body, legs; the amplitude of element execution, the lack of ease of execution; accuracy of movements; landing balance, uncertainty in the execution of elements and movements; errors in body position.

The rules of the competition stipulate special requirements, both general and for each individual device, which are constantly changing and improving in accordance with the development of the sport itself. The composition must present a balanced division between the technical and choreographic elements, when it consists of original elements and movements, incorporates new ideas, forms, interpretations and originality. The main features of male free exercises are their acrobatic, choreographic and athleticism. Despite the fact that acrobatic content, both for men and women, is of paramount importance, the basic emotional coloring of the whole program is provided by connecting movements that allow to achieve the organic composition and reveal the individual abilities of gymnasts. Judges consider expressiveness of performance - range of emotions (facial expressions and movements during exercise). It also includes the ability to control facial expression while performing complex elements [3, 4, 6]. Gymnasts must "create an image" and show not only technique, but also harmony and grace. During the exercise, the moves should match the music.

Sport acrobatics. The rapid development of sports acrobatics in many countries, as well as the consideration of the current inclusion of acrobatics in the program of the Olympics, are the cause of sharp intensification of competition in international competitions. Competition programs of mixed pairs of the most powerful acrobats of the world have become especially entertaining today, which equate to performances of ballet dancers in terms of skill and virtuosity.

Choreography in sport acrobatics is a structural component of various exercises (gymnastic and artistic) regarding space and time, as well as other partners. It is an aesthetic blend of the elements of difficulty with the help of choreographic steps, jumps and turns, requiring creative use of space and variety of moves, levels, directions, body shapes, rhythm and speed. The choreography must show originality and create an individual uniqueness of the couple or group. Movements should be performed in amplitude, using the maximum possible space, with subtlety and nuance, as defined by music [9, 10].

Judges make the points lower for amplitude, stretching of the body (feet, legs, knees, arms, backs), deviation of move from the correct direction (trajectory), instability of position of the body,

mismatch of movement of the hands in the form of element, lack of accuracy of movements of the legs, instability, failure of element, non-completion of move. In trampoline jumping, athletes should demonstrate an exercise consisting of various elements, with and without rotation. In the exercise, the athlete must show good coordination, technique and keep pace. Body postures, technique, maintaining the height of jumps, opening in all jumps are evaluated to demonstrate excellent body possession in flight [11, 12, 15]. Referees award bonuses for body position while jumping on a trampoline grid.

Sports aerobics. In modern sport, aerobics acts as an independent sport within the International Federation of Gymnastics (FIG) along with such sports as sport and rhythmic gymnastics, trampoline jumping, sport acrobatics. The effectiveness of aerobic athletes is largely determined by their choreographic readiness with a high level of artistry. All moves must be performed with maximum accuracy without errors. The performance judge evaluates the technical skills of all movements, including the elements of complexity, choreography, transitions, connections, partnerships and ups, and synchronization.

The analysis of the competition rules gives an idea of the main tasks and directions of choreographic training in gymnastic sports. Along with other types of sports training, choreographic training should be aimed at achieving a high competitive result, taking into account the individual characteristics of each athlete and the selected type of sports activities. This explains the need to identify areas for improving the choreographic fitness of athletes, taking into account the practical experience of leading coaches in various gymnastic sports.

3. Method

Analysis of special theoretical and science methodological literature, documentary materials, rules of competitions in gymnastic sports that are part of the International Federation of Gymnastics (FIG); sociological methods; including surveys; pedagogical: experiment, conversation, and mathematical statistics.

4. Results

As a result of survey conducted among 50 trainers from different gymnastic sports, namely: rhythmic gymnastics (13 persons), sports gymnastics (7 persons), sports acrobatics (8 persons), trampoline jumping (9 persons), sports aerobics (13 persons), - the data received indicates that there is no unique approach to the method of choreographic training in this sport. Therefore, the general question of the need for choreographic training in gymnastics was appropriate. Coaches unanimously (100%) noted the need to use choreographic training to improve the athletic skills of athletes.

The majority of trainers (60%) consider that the main task of choreographic training is to increase the result of competitive activity, for 22% of those interviewed the more important task is the need to master the correct technique of performing exercises; 18% consider the main task of choreographic preparation a comprehensive effect on the individual (aesthetic education, spiritual and physical development).

The second priority of 32% of coaches named mastering the correct exercise technique, 34% said that it is achieving high results in the sport chosen. Among the main tasks, 24% of trainers also named the ensuring a high level of development of the required motor skills, 6% of respondents responded that due to the choreography of athletes formed the correct posture, which is necessary to perform the elements of groups of complexity and composition, 6% of specialists put the second task of formation special knowledge, skills and abilities required in gymnastic sports. The last place in importance is the task of forming a sustainable interest in systematic lessons, but, in our opinion, the experts underestimate the importance of the motivational aspect of the process of choreographic preparation.

All of the coaches at the stage of initial and preliminary basic training find it appropriate to give choreography lessons of 40-45 minutes. Differences in views regarding the duration of choreography begin at the stage of specialized basic training, where 28% of trainers reduce the time of choreographic preparation to 30-35 minutes. The reduction of the duration of choreography at the stage of preparation for higher achievements up to 20-30 minutes, in the opinion of experts, is advisable, since the main time is devoted to

the improvement of the technique of performing elements and compositions. It should be noted that this divergence of opinion of the coaches is primarily due to the lack of clear regulation of the time of conducting choreography at different stages of sports training in sports training programs.

Regarding the number of classes per week, coaches unanimously recommend that they perform choreography classes at the initial and preliminary basic training stage once per week, at the specialized basic training stage twice per week; at the stage of preparation for higher achievements - once per week. Most of the coaches (92%) consider it unnecessary to adhere to the hours allocated in training programs to different types of training, including choreographic training. 96% of specialists are guided by their own experience of conducting classes, because the list of training material on choreographic training provided in the programs does not meet the needs of athletes and coaches. It should be pointed out that it is practically impossible to achieve an adequate level of choreographic fitness of athletes with one or two sessions per week. The level of development of modern gymnastic sports puts extremely high demands on both the level of choreographic readiness of athletes and the choreography of competitive programs. In this regard, the curricula should provide not only the appropriate number of hours per week, but also the frequency of choreography classes at different stages of sports training.

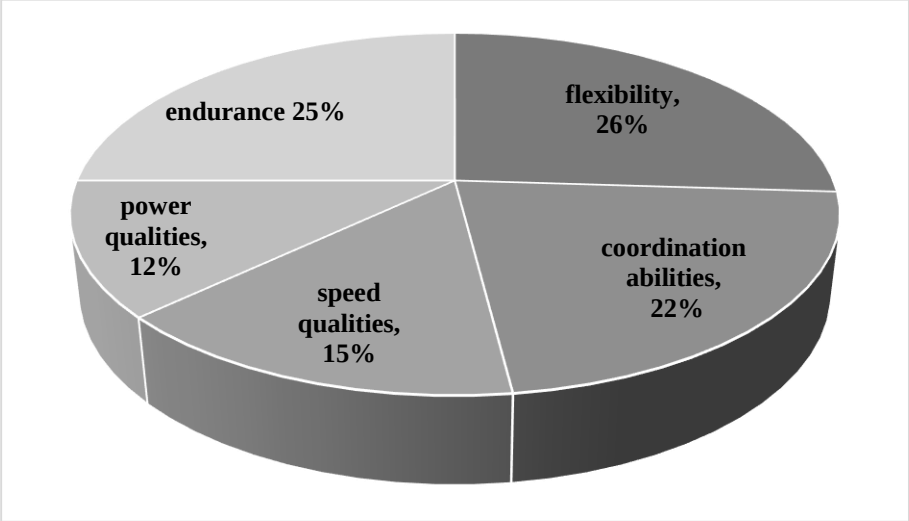
Regarding the structure of a separate training session, most experts conduct choreography in the preparatory part, but 36% of respondents use the means of choreographic training also in the final part.

Among the means of choreographic training, 52% of trainers use mostly modern dance, 28% prefer classical dance, and 20% of experts consider it appropriate to use various means of choreography in a comprehensive manner. It should be noted that classical dance is primarily used by trainers in rhythmic gymnastics, and note the great dependence of its use on the stage of preparation.

The divergence of trainers 'opinions can also be explained by the lack of a clear distribution of the choreography tools that need to be learned at different stages of athletes' training in the training programs.

98% of the coaches surveyed consider it appropriate to combine the means of choreographic training with the elements of gymnastic sports. Of the forms of beginner choreography, 78% of trainers prefer a choreographic warm-up, with qualified athletes, most coaches (86%) use a choreography lesson, and 12% direct classes to practice some elements of choreography.

Among the physical qualities that determine the success of athletes in gymnastics, 26% of the coaches polled put flexibility, 25% - endurance; 22% - coordination qualities; 15% - high quality and 12% - power qualities. It should be noted that systematic choreography lessons, together with special physical training, can ensure a proper level of development of these qualities (Fig. 1).



- endurance
- speed qualities
- speed abilities
- coordination abilities
- power qualities

Figure 1. *Physical qualities that determine the success of athletes in gymnastic sports (according to the results of the coaches' survey, %)*

Experts believe that the system of choreographic training adopted in classical dance should be different from that used in most gymnastic sports, since sports choreography must first meet the specific requirements of the sport. According to 76% of trainers surveyed, the features of choreography training are influenced by the features of choreographic training; the rest of the respondents (24%) did not have a clear answer.

Thus, according to the trainers, one of the ways of improving the technique of choreographic training in gymnastic sports should be to strengthen the work on the technique of performing elements inherent in the sport, as well as choreographic movements. To do this, it is necessary to improve the program material on choreographic training, to organize it in accordance with current trends in the development of the sport, as well as the stages of training athletes, to control the level of choreographic fitness of athletes.

In addition, choreographic training should form the specific knowledge, skills and competencies required in the chosen sport activity.

The analysis of the survey data made it possible to outline the directions of improvement of choreographic training in gymnastic sports: improvement of sportsmanship, work on the technique of performing exercises, dependence of time of choreographic preparation on the stage and level of choreographic readiness of the athlete; the use of choreography in parts of the training session, the mandatory introduction of the choreography lesson in the training process, the focus of the choreography on the education of flexibility, coordination and speed-power.

Conclusions. The analysis of the competition rules revealed the specific features of choreographic training in various gymnastic sports: rhythmic gymnastics - style, character and harmony of movements; energy, power, speed, intensity of movements; expressiveness of body movements; "Contrast" performance; ways to interact with partners and objects; sports gymnastics, sports acrobatics - posture, leg tension, stability, accuracy, completeness and fusion of movements, lightness, musicality, expressiveness, amplitude, rhythm; aerobics - music and musicianship, aerobic and general content, use of space, artistic skill.

The results of the poll indicate that there is no single approach to the methods and organization of choreographic training at different stages of many years of improving athletes. The coaches pay attention to the lack of adapted choreography facilities that meet the current trends and requirements of the sport, the rules of the competition and the peculiarities of the technique of performing choreographic and specific elements of sports. One of the ways to improve the method of choreographic training should be to strengthen the work on the technique of performing choreographic exercises and elements inherent in the sport. To do this, it is necessary to improve the program material on choreographic training, to organize it in accordance with current trends of development and features of the sport, to introduce the necessary control over the level of choreographic fitness of athletes.

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Conflict of interests .The authors declare that there is no conflict of interest.

References

1. Agopyan A. Analysis of Body Movement Difficulties of Individual Elite Rhythmic Gymnasts at London 2012 Olympic Games Finals. Middle-East Journal of Scientific Research. 2014;19(12):1554–1565.
2. Anca I. Comparative study between athletes in rhythmic gymnastics and dance anatomic and physiologic

and development specific force. In: Ovid us University Annals. Series: Physical Education & Sport/Science. Movement & Health; 2016;16(2):477–783.
3. Ávila-Carvalho L, Palomero MdL, Lebre E. Body difficulty score (d1) in group rhythmic gymnastics (portimão 2009 World Cup series). In: Da Prática à Ciência Artigos do 2 e 3 Congresso de FGP. Lisboa; 2011:105–113.
4. Briskin Yu, Todorova V, Perederiy A, Pityn M. Comparative analysis of choreographic training of athletes from foreign and Ukrainian sport aerobics teams. Journal of Physical Education and Sport. 2016;16(4):1352–1356.
5. Chiat LF, Loo FY. Importance of Music Learning and Musicality in Rhythmic Gymnastics. Procedia – Social and Behavioral Sciences. 2012;46:3202 – 3208.
6. Ewalt KL. Athletic training in dance medicine and science. Journal of Dance Medicine & Science. 2010;14(3):79–79.
7. Gautier G, Thouvarecq R, Larue J. Influence of Experience on Postural Control: Effect of Expertise in Gymnastics. Journal of Motor Behavior. 2008;40(5):400–408.
8. Lutsenko LS. Choreographic training in aerobic gymnastics. In: Pedagogy, psychology and biomedical problems of physical education and sport; 2007;10:95–97
9. Lysenko EA. The relationship of special and choreographic training of young acrobats. In: Physical education of students of creative specialties; 2006;2:17– 22
10. Prokopyuk S. Choreographic training of partners in pair-group types of sports acrobatics. Theory and methodology of physical exercise and sport. 2012; 1: 22–26.
11. Roters TT. Physical improvement of students in the process of interaction of physical and aesthetic education. In: Physical Education of Students; 2013;4:73-76
12. Serebryanskaya EA. The influence of choreography on the special physical training of acrobats. In: Ermakov SS, editor. Pedagogy, psychology and biomedical problems of physical education and sport. Scientific monograph Kharkov; 2007; 1, 132–135
13. Sosina VU. Choreography in gymnastics: studies. allowance. Kiev: Olympus. literature; 2009.
14. Syvash IS. The formation of young athletes' specialization on the example of rhythmic gymnastics group exercises. Pedagogic, psychology, medical-biological problems of physical training and sports. 2014;6:63–70.
15. Todorova VH. Peculiarities of Objective Evaluation of Choreographic Preparedness at Different Stages of Long-Term Athletic Performance (Through the Example of Aerobic Gymnastics). In: Science and Education; 2017;2:63–69.

The Relationship between Yo-yo Intermittent Recovery Test Level I and Anaerobic Based Tests in Young Soccer Players

Turgay Ozgur[1], Bahar Odabas Ozgur[2], Mursit Aksoy[3], Gurcan Yazici[4], Sahin Ozen[5], Gokalp Gurel[6] and Deniz Demirci[7]

[1]*Columbia University, Teachers College, North Arlington, New Jersey/USA.*
[2]*Sport Science PHD, North Arlington, New Jersey/USA.*
[3] *Hakkari University, Education Faculty, Department of Physical Education, Hakkari/Turkey.*
[4]*Sports Science Specialist, Kocaeli/Turkey.*
[5]*Marmara University, Faculty of Sport Sciences, Department of Coaching, Istanbul/Turkey.*
[6]*Kocaeli University, Faculty of Sport Sciences, Department of Physical Education, Kocaeli/Turkey.*
[7]*Istanbul Bilgi University, Faculty of Health Sciences, Department of Ergotherapy, Istanbul/Turkey.*

Abstract

The purpose of this study was to invastigate the relationship between Yo-Yo Intermittent Recovery Level I (YYIRI) test and commonly used Anaerobic tests such as; Sargent Jump (SJ), Standing Broad Jump (SBJ) and Hexagon Agility Tests (HAT) also refered as physical ability or athletic ability tests. A total of 20 male young soccer players (ages 14±0.0 years) voluntarily participated in the study. Tests were conducted on two consecutive days. YYIRI test total running distance was averaged at 1454 ± 420 m. Peak Anaerobic Power (PAP) was calculated using SJ scores (2966.83±621.71 watt). Spearman's correlation test revealed that there was a significant negative correlation between HAT and YYIR1 tests (r= -0.742, p=0.000). There was no significant correlation between leg power indicator tests (SJ & SBJ) and YYIR1. In conclusion, YYIR1 test which measures Aerobic Endurance Capacity was correlated only with Hexagon Agility Test.

Keywords: Soccer, Yoyo Test, Hexagon Agility Test, Sargent Jump Test

1. Introduction

Identifiying and tracking physical characteristics of athletes is one of the most important task for coaches and trainers due to its ability of talent identification and future performance predictions. Coaches and trainers also continually search for easier to conduct and execute tests to perform this task.

Yo-yo intermittent recovery level 1 (YYIR1) test has been described as a valid test for evaluating the intermittent endurance capacity of soccer, basketball and rugby players and it`s also been presented that it is reliability in young soccer players (Deprez et al., 2015, Roe and Malone, 2016; Atkins, 2006; Castagna et al., 2008). The test is an aerobic endurance test including runs at gradually increasing speeds and 10 seconds of active recovery times between these, which athletes continue to voluntary fatigue (Bangsbo et al., 2008).

YYIR1 test evaluates the maximal aerobic performance of athletes by creating stress in their anaerobic energy systems and in these terms it creates similar physiological responses to the match environment (Atkins 2006; Bangsbo, 2008; Castagna, 2010). Additionally, the test is used for talent identification among young soccer players (Markovic G, 2010; Deprez D, 2012; Atkinson G, 1998).

Soccer is one of the most popular sport games and characterized with the combination of physical, technical and tactical factors (Giovani dos Santos Cunha, 2016). During a soccer match, young soccer players run a distance of around 4-8 km and therefore aerobic endurance is acknowledged as the most important performance indicator (Buchheit M et al., 2010). It was reported that 10% increase in aerobic performance can provide 20% increase in the distance run during a match and 100% increase in the number of sprints (Helgerud J, 2001).

There are several factors defining success in a soccer match. Soccer as a game of intermittent loads, requires intense aerobic and anaerobic training and physical preparation (Henrique Borges, 2017). Additionally, strength, vertical jump and agility are factors providing important contribution (Manouras et al., 2016). Jumps, sprints, turns and agile moves form the 11% of the moves soccer players do during a game

and Volpi Braz et al. (2017) mentioned that many previous studies have reported linear correlations between vertical jump, sprint and agility.

Despite the popularity of the YYIR1 test is pretty high, its correlation between anaerobic performance tests has not been documented well (Souhail Hermassi et al., 2014). In that sense it is important to investigate if YYIR1 test poseses any correlation to SJ (leg power) SBJ (leg power) and HAT (foot quickness). I could be useful for athletic community if there is such a correlation. The purpose of this study was to investigate the correlation between YYIR1 and selected anaerobic tests (Sargent jump (SJ), standing long jump (SLJ), hexagon agility test (HAT).

2. Method

The purpose of the present study was to investigate the correlation between YYIR1 test and SJ, SBJ, and HAT. All participants were subjected to familirization sessions and adviced to follow their regular diets. Subjects took the day off on the day before the testing procedures and informed not to consume caffeine on the testing day and they had their last meals at least 2 hours prior to tests. The experiment consisted of 20 athletes (age 14±0.0 years) from Gölcük Sport in U-15 league in Kocaeli.

All tests were conducted on the same time of the day. Tests were given during the competition season and on 2 consecutive days.

On the first day, body weights (kg) were measures with a Tanita brand scale and the heights (cm) were measured with a metal measure. Yo-Yo Intermittent Recovery 1 Test was applied as suggested in the protocol defined by Castagna (2009). MaxVO2 was calculated using MaxVO2=YYIR1(m) x 0.0084+36.4 formula developed by Bangsbo et al. in 2008.

On the second day, Sargent vertical jump, standing long jump, hexagon agility test measures were taken.

Sargent Vertical Jump: Test requires expolosive leg power. The standing vertical reach was determined with the dominant arm. The athlete stands side onto the wall of measurement, raises their hands on the wall side, and the highest point their tips of hands can reach is marked standing reach height. Then their wall side hand fingertips were marked with colored chalk. Subjects were allowed to swing their arms freely (countermovement) but were not allowed any preparatory step before jumping. Subjects attempted to touch the wall at the highest point of the jump. The difference in distance between the standing reach height and the jump height is the score. The best of three attempts is recorded. The best score is recorded after three jumps (Brian Mackenzie, 2005). Vertical Jump Anaerobic Power Calculation: Anaerobic power was calculated using Sayers Peak Anaerobic Power (PAP) Formula (W= 60.7 x SJ (cm) + 45.3 x mass (kg)–2055), which involves the height, body weight and vertical jump scores of the subject (Sayers et al., 1999).

Standing Long Jump: The athlete stands behind a line marked on the ground, the tips of their feet lined with the line. Then they jump forward swinging their arms freely on two feet. On the point where the athlete lands, the distance between the starting line and the heel of the athlete's foot closer to the line is measured and recorded (Mackenzie, 2005).

Hexagon Agility Test: The test measures foot quickness. A 120° Hexagon was constructed each side measuring 66 cm. The athlete jumps from the middle point of the hexagon towards the B edge first to the out of line with both feet and turns back to the middle point and repeats this move clockwise until they reach the A line, always facing one direction. Test is completed after the cycle is completed twice, and the time is recorded (Mackenzie, 2005).

The data was analyzed using Spearman's correlation test.

3. Results

The data obtained after measurements are shown in the tables below.

Table 1. *Descriptive statistics of selected variables*

	N	Min	Max	Mean	Sd
Height (cm)	20	151,00	185,00	170,60	8,33
Weight (kg)	20	34,70	74,70	57,12	10,66
YYIR1 (m)	20	680,00	2040,00	1454,00	420,58
SJ (cm)	20	32,00	50,00	40,10	4,86
SLJ (cm)	20	139,00	217,60	184,63	18,35
MaxVO2 (ml/kg/min)	20	42,11	53,54	48,61	3,53
HAT (s)	20	10,00	13,44	11,53	0,943
PAP (w)	20	1762,81	4181,81	2966,83	621,71

It was found that there was a significant negative strong correlation between YYIR1 and HAT results (Table 2).

Table 2. *Spearman's correlation table of YYIR1 and selected variables*

		SJ	SLJ	HAT	PAP
YYIR1	r	0,048	0,032	-0,742*	0,145
	p	0,841149	0,167392	0,00048Ω	0,540503
	n	20	20	20	20

Ω p<0,01

4. Discussion and Conclusion

YYIR1 test evaluates the maximal aerobic performance of athletes by creating stress in their anaerobic energy system and in these terms it creates similar physiological responses to the match environment (Atkins 2006; Bangsbo et al., 2008; Castagna et al., 2010). Recently, Roe et al. (2016) reported similar findings on their study on amateur Gaelic soccer players' YYIR1 running distances.

Roe et al.'s (2016) findings that states the distances covered in YYIR1 increases significantly with age and maturation are very important. The findings of the present study on the calculated average maxVO2 48.61±3.53 ml/kg/min for U15 participants were in agreement with the findings presented in the related literature (Vanderford et al., 2004; Stolen et al., 2005; Póvoas et al., 2016; Bangsbo et al., 2008; Young & Pryor, 2007).

In terms of its physiological bases, the game of soccer is mostly aerobic and additionally lactic and a-lactic energy ways are also important. Muscle strength is mostly coordinated with movements with ball such as dribbling, passing and ball control which requires dynamic, explosive strength and agility (Portes et al., 2015).

YYIR1 test is used for talent selection among young soccer players and considered successful in providing aerobic endurance indicator in the related literature (1454±420 m), yet the findings of the present research showed no correlation with lower extremity anaerobic power (leg power) variable probably due to its predominant aerobic nature.

Speed and agility are reported as vital variables in soccer (Stolen et al., 2005; Svensson & Drust, 2005; Wisloff et al., 2004). Vanderford et al. (2004) reported that agility changes among young soccer players especially with age. Portes et al. (2015) reported a weak correlation between agility and strength but found a moderate correlation between agility and muscle strength. They used Stafetten run test for agility and vertical jump test for muscle strength. The present study used Hexagon test for agility. The differences in test protocols may have caused the differences in findings, since acceleration is also important in addition to start

strength in Stafetten run while acceleration is irrelevant in Hexagon test.

An avarage soccer match is played at around 70-75% of maxVO2 capacity (Bangsbo, Iaia & Krustrup, 2008). These rates are equal to anaerobic range intensities (Stolen et al., 2015). Accordingly, YYIR1 test, which evaluates the maximal aerobic performance of athletes, is highly successful in predicting physiological features. However, the fact that movements such as jumps, sprints and agile multidirectional movements form the 11% of the all movements in a soccer match (Volpi Braz et al., 2017) the present study found correlation only between YYIR1 and HAT which measures agility in terms of foot quickness. There was no correlation between YYIR1 and leg power (SJ & SBJ) tests probably because leg power test are performed in mili-seconds and the main energy source is stored ATP in contrast to aerobic dependant YYIR1. In this context future studies can be focused on Yo-Yo Intermittent Recovery Level 2 which predominantly tests anaerobic features, (Póvoas et al., 2016) and its correlation between anaerobic based ability tests.

References

1. Atkins, S. J. (2006). Performance of the yo-yo intermittent recovery test by elite professional and semiprofessional rugby league players. Journal of Strength and Conditioning Research, 20(1), 222.
2. Atkinson, G., & Nevill, A. M. (1998). Statistical methods for assessing measurement error (reliability) in variables relevant to sports medicine. Sports medicine, 26(4), 217-238.
3. Bangsbo, J., Iaia, F. M., & Krustrup, P. (2008). The Yo-Yo intermittent recovery test. Sports medicine, 38(1), 37-51.
4. Bangsbo, J., Mohr, M., & Krustrup, P. (2006). Physical and metabolic demands of training and match-play in the elite football player. Journal of sports sciences, 24(07), 665-674.
5. Buchheit, M., Mendez-Villanueva, A., Simpson, B. M., & Bourdon, P. C. (2010). Match running performance and fitness in youth soccer. International journal of sports medicine, 31(11), 818-825.
6. Castagna, C., Impellizzeri, F. M., Rampinini, E., D'Ottavio, S., & Manzi, V. (2008). The Yo–Yo intermittent recovery test in basketball players. Journal of Science and Medicine in Sport, 11(2), 202-208.
7. Castagna, C., Manzi, V., Impellizzeri, F., Weston, M., & Alvarez, J. C. B. (2010). Relationship between endurance field tests and match performance in young soccer players. The Journal of Strength & Conditioning Research, 24(12), 3227-3233.
8. Cunha, G. D. S., Lopes, A. L., Geremia, J. M., Leites, G. T., Baroni, B. M., Voser, R. D. C., ... & Reischak-Oliveira, Á. (2016). Aerobic fitness profile of youth soccer players: effects of chronological age and playing position. Revista Brasileira de Cineantropometria & Desempenho Humano, 18(6), 700-712.
9. Deprez, D., Vaeyens, R., Coutts, A. J., Lenoir, M., & Philippaerts, R. (2012). Relative age effect and Yo-Yo IR1 in youth soccer. International journal of sports medicine, 33(12), 987.
10. Ekblom, B. (1986). Applied physiology of soccer. Sports medicine, 3(1), 50-60.
11. Eurofit, C. O. E. (1993). handbook for the Eurofit test on physical fitness. Strasbourg: Council of Europe.
12. Helgerud, J., Engen, L. C., Wisløff, U., & Hoff, J. (2001). Aerobic endurance training improves soccer performance. Medicine & Science in Sports & Exercise, 33(11), 1925-1931.
13. Henrique Borges, P., Rechenchosky, L., Paulo Deprá, P., Vaz Ronque, E. R., Juan Greco, P., Menezes Menegassi, V., & Rinaldi, W. (2017). Impact of Aerobic Power, Strength of Lower Limbs and Speed on Technical Skills in Young Soccer Players. Journal of Exercise Physiology online, 20(1).
14. Hermassi, S., Aouadi, R., Khalifa, R., van den Tillaar, R., Shephard, R. J., & Chelly, M. S. (2015). Relationships between the Yo-Yo intermittent recovery test and anaerobic performance tests in adolescent handball players. Journal of human kinetics, 45(1), 197-205.
15. Mackenzie, B. (2005). Performance evaluation tests. London: Electric World plc. ISSN 1-905096-18-6
16. Manouras, N., Papanikolaou, Z., Karatrantou, K., Kouvarakis, P., & Gerodimos, V. (2016). The efficacy of vertical vs. horizontal plyometric training on speed, jumping performance and agility in soccer players. International Journal of Sports Science & Coaching, 11(5), 702-709.
17. Markovic, G., & Mikulic, P. (2011). Discriminative ability of the yo-yo intermittent recovery test (level 1) in prospective young soccer players. The Journal of Strength & Conditioning Research, 25(10), 2931-2934.

18. Portes, L. A., Canhadas, I. L., Silva, R. L. P., & de Oliveira, N. C. (2015). Anthropometry and fitness of young elite soccer players by field position. Sport Sciences for Health, 11(3), 321-328.
19. Roe, M., & Malone, S. (2016). Yo-yo intermittent recovery test performance in subelite gaelic soccer players from under thirteen to senior age groups. Journal of strength and conditioning research, 30(11), 3187-3193.
20. Sayers, Stephen P.; Harackiewicz, David V.; Harman, Everett A.; Frykman, Peter N.; Rosenstein, Michael T., (1999) Cross-validation of three jump power equations. Med Sci Sports Exerc, 31, p. 572
21. Stolen T, Chamari K, Castagna C, Wisloff U (2005) Physiology of soccer: an update. Sports Med 35(6):501–536
22. Póvoas, S. C., Castagna, C., Soares, J. M., Silva, P. M., Lopes, M. V., & Krustrup, P. (2016). Reliability and validity of Yo-Yo tests in 9-to 16-year-old football players and matched non-sports active schoolboys. European journal of sport science, 16(7), 755-763
23. Svensson, M., & Drust, B. (2005). Testing soccer players. Journal of sports sciences, 23(6), 601-618.
24. Vanderford, M. L., Meyers, M. C., Skelly, W. A., Stewart, C. C., & Hamilton, K. L. (2004). Physiological and sport-specific skill response of olympic youth soccer athletes. Journal of Strength and Conditioning Research, 18(2), 334-342.
25. Volpi Braz, T., José Nogueira, W., de Assis Cruz, W., Borsetti Businari, G., de Ornelas, F., Alves Brigatto, F., ... & Ricardo Lopes, C. (2017). Relation between Different Variables of Vertical Jumps and Sprints in Brazilian Professional Soccer Players. Journal of Exercise Physiology Online, 20(1)
26. Wisløff, U., Castagna, C., Helgerud, J., Jones, R., & Hoff, J. (2004). Strong correlation of maximal squat strength with sprint performance and vertical jump height in elite soccer players. British journal of sports medicine, 38(3), 285-288.
27. Young W. B., Pryor L., (2006), Relationship between pre-season anthropometric and fitness measures and indicators of playing performance in elite junior Australian Rules soccer, Journal of Science and Medicine in Sport (2007) 10, 110—118.

Influence of Eight Week Core Strength Training on Respiratory Muscle Strength in Young Soccer Players

Özgür Bostanci[1], Menderes Kabadayi[1], Ali Kerim Yilmaz[1], Muhammet Hakan Mayda[1], Çoşkun Yilmaz[1], Serhat Erail[1] and Emre Karaduman[1]

[1]Ondokuz Mayıs University, Yaşar Doğu Sport Science Faculty, 55100, Samsun, Turkey.

Abstract

Purpose : Core Strength Training (CST) has become a well-known training method in sport sciences and medicine. The aim of the present study was to examine the effects of CST program on the respiratory functions and muscle strength in young soccer player.

Materials and methods: Thirty one male soccer players participated in this study. The subjects were divided into two groups as experimental group (EG, n=11) and control group (CG, n=11). An eight-week CST program was implemented in the EG. The CG subjects participated in their respective sport training routine. The samples' pulmonary function tests were administered with spirometry, while their respiratory muscle strength tests were administered by using intraoral barometer. All tests were measured both pre-test and post-test for all groups.

Results: There were significant improvements in FVC, MIP and MEP between pre-test and post-test in EG ($p<0.05$). There were statistically differences in FEV1 and SVC between EG and CG in post-test ($p<0.05$). Difference was found in MEP between EG and CG in post-test ($p<0.05$.(

Conclusion: CST was found to increase both some pulmonary functions and respiratory muscle strength. These results clearly indicate that CST positively affects pulmonary functions and especially respiratory muscles strength in young soccer player.

Keywords: Core Strength, Respiratory Muscles Strength, Soccer, Exercise

1. Introduction

The core has been described as a muscular corset with the abdominals in the front, erector spinae and gluteals in the back, the diaphragm as the roof, and the pelvic floor and hip girdle musculature in the bottom [1] and core stabilization has been defined as the stabilization of the body centre against the dynamic movements of limbs and the absorption of the pressures on core of the body [8]. The term of CST has become a universal definition for any exercise that covers some areas of "Lumbo-pelvic" stability.'Lumbo-pelvic stabilite; involves different functional components: deep muscles which stabilize the lumbar spine, abdominal muscles, lower back, and middle back muscles, and hip muscles that help sustain and stabilize the pelvis [10, 22]. Core strength training (CST) has surpassed the world of sports medicine and became a well-known training method [1]. In addition the well-trained core is essential for optimal performance and injury prevention in sports activities [21].

A significant part of core area muscles (paraspinals, gluteals, obliques, pelvic/hip girdle musculatera and especially diaphragm) are directly associated with respiration and it is known that respiration both coordinates postural control and athletic performance [17, 12]. Besides inspiratory muscle fatigue is associated with impairment of postural stability in healthy people [15]. Diaphragm which is one of the most important components of core stability; plays an important role in controlling intra-abdominal pressure with respiratory and trunk stabilization [14, 22]. Correct breathing is vital for the core region, because the respiratory muscles, especially the diaphragm is directly active during CST [4, 39].

Today, respiratory muscle strength, especially the diaphragm, is directly trained with special equipment, researchers aim to increase the overall core stabilization of the athletes and increase the respiratory muscle strength by adding CST-containing components to their training routine. [3, 7, 12], CST is generally used to improve the core strength, conditioning, health, fitness and athletic performance fields, to stabilize postural control by sport scientists [5, 6, 9, 13, 18, 28, 34, 35, 40, 42], It is also used to improve

performance and reduce disability risks [24, 25]. Especially in soccer, it has been used in training programs, because the core acts as an anatomical base for motion of the distal segments and this can be considered 'proximal stability for distal mobility' for throwing, kicking or running activities.

Recently researches have investigated the effect of CST on respiratory parameters, muscle strength, physical fitness, athletic performance and sports conditioning [4, 9, 10, 32], but no studies have been found on the effect of CST on both pulmonary functions and respiratory muscles strength in soccer players. The present study aimed to investigate the effects of eight week CST program on the pulmonary functions and respiratory muscle strength in young soccer players. The study was hypothesized that the eight-week core exercise would have a positive effect on respiratory functions and muscle strength.

2. Method

2.1. Experimental design and Subjects

The present study is comprised of eight weeks of CST. A test-retest design with a control group (CG) was used to identify the effects of the CST. The subjects for this study consisted of twenty two young soccer players who were separated into two groups randomly. The first group was the Experimental Group (EG) (n:11, age 16.00±1.34) and the second group was the Control Group (CG) (n:11, age 15.54± 0.52). A total of three meetings were made with subjects. In the first meeting, all of the subjects were informed about the measurements to be performed and in addition CST exercise program to be conducted was introduced to the (EG). The second and the third meetings included pre-test and post- test measurements for both CG and EG. In these meetings, pulmonary functions and respiratory muscle strength tests were conducted at the same time on each day (between 14:00 and 16:00). Exercise and high-intensity physical activity were not allowed before meetings. Between the pre-test and post-test, the eight-week CST program was implemented in the EG, while they continued in their usual training routine. CG were instructed to only participate in their usual training. The present study was designed and implemented in accordance with the Declaration of Helsinki [41]. The study protocol was approved by the local ethics committee.

***Table 1**. Descriptive information of subjects (EG: n=11, CG: n=11)*

	Group	Mean	SD	t	p
Age (year)	EG	16.00	1.34	1.047	0.308
	CG	15.54	0.52		
Height (cm)	EG	181.18	2.75	2.522	**0,020***
	CG	176.82	5.03		
Weight (kg)	EG	71.55	7.94	2.405	**0.026***
	CG	62.73	9.21		
Training age (years)	EG	6.72	1.19	1.438	0.166
	CG	6.18	0.40		
BMI (kg/m²)	EG	21.76	1.93	1.999	0,059
	CG	19.99	2.21		

*p<0.05

2.2. Measurements

SPIROLAB III (Medical International Research, Rome, Italy) was used to find out the pulmonary function tests of the subjects. Forced vital capacity (FVC), forced expiration volume in 1 second (FEV1), slow vital capacity (SVC) values of the samples were measured respectively.

AMicroRPM (CareFusion Micro Medical, Kent, UK) intraoral barometer was used for MIP and MEP. For MIP measurement, after suitable filter and holders were fixed, the nose air way was closed with a clip. The test was completed when the subject was standing with residual volume, the holder was taken into the mouth, and maximal inspiration was made at maximal speed for 1-3 seconds.For MEP measurement, the

same method was applied as in MIP. However, unlike residual volume, the test was started at total lung capacity. During the test, the subjects' MIP and MEP were encouraged to achieve the highest results. While MIP measurement started with residual volume, MEP started with total lung capacity. The measurements were repeated until a 5% difference appeared and the mean was recorded as cmH_2O.

2.3. CST Program

The EG subjects received a CST program that consisted of ten core-related exercises performed two times per week for eight weeks, while they continued in their usual sport training routine. CST program was not applied incrementally and it continued with the same layout for 8 weeks. Ten core-related exercises implemented within the CST program were as follows: (1) push up, (2) abdominal crunch, (3) vertical leg crunch, (4) jack knife, (5) supine knee drop side-to-side, (6) reverse crunch, (7) superman, (8) plank with alternating arm and leg raise, (9) cat-camel stretch, (10) plank jack [38]. All of the moves were made in two sets and the rests were 15 seconds between moves and 60 seconds between sets as applied by Özdal [27]. Before CST, five minutes of walking or jogging and five minutes of static stretching for major muscles were practiced to warm-up. All EG subjects received a hard copy that included instructions, pictures, and key points of the exercises.

2.4. Statistical analyses

SPSS 22.0 program was used for statistical analyses. The data were presented as mean and standard deviation. Shapiro–Wilk test was used for normality. 2*2 One Way ANOVA were used to compare pre and post-test for each groups. In addition, in the comparison of paired groups, effect sizes were found according to Cohen's d effect size. The statistical results were assessed within significance level of $p<0.05$.

3. Results

Table 2. *Differences inpulmonary functions between EG and CG*

		EG (n: 11)			CG (n: 11)		
		Mean±SD	**PC(%)**	**e.s**	**Mean±SD**	**PC(%)**	**e.s**
FVC (lt)	Pre-test	4.70±0.72	4.89	0.33	4.68±0.76	-0.04	-
	Post-test	4.94±0.70†			4.68±0.72		
FEV1 (lt)	Pre-test	4.32±0.58**	1.13	0.12	3.88±0.64	0.25	0.02
	Post-test	4.39±0.58			3.89±0.59		
SVC	Pre-test	4.42±0.60**	3.08	0.22	4.13±0.65	0.24	0.01
	Post-test	4.58±0.81			4.14±0.71		

† significant difference between pre-test and post-test;* significant difference in pre-test between EG and CG;**significant difference in post-test between EG and CG; SD standard deviation; e.scohen'd effect size; PC percentage change between pre-test and post-test.

There were significant improvements in FVC between pre-test and post-test in EG ($p<0.05$). There were statistically differences in FEV1 and SVC between EG and CG in post-test ($p<0.05$). These results showed that CST improved respiratory functions and especially FVC.

Table 3. Differences in respiratory muscle strengths between EG and CG

		EG (n: 11)			CG (n: 11)		
		Mean±SD	PC	e.s	Mean±SD	PC	e.s
MIP (cmH_2O)	Pre-test	84.64±29.26	25.22	0.64	105.55±19.59	4,06	0.18
	Post-test	102.45±25.41†			109.00±16.61†		
MEP (cmH_2O)	Pre-test	127.73±17.45	11.95	0.40	121.09±15.17	1,26	0.08
	Post-test	142.64±20.65†			122.36±13.68**		

† significant difference between pre-test and post-test;* significant difference in pre-test between EG and CG;**significant difference in post-test between EG and CG; SD standard deviation; e.scohen'd effect size; PC percentage change between pre-test and post-test;

There were significant improvements in MIP and MEP between pre-test and post-test in EG ($p<0.05$). Difference was found in MEP between EG and CG in post-test ($p<0.05$)

4. Discussion and Conclusion

When literature invastigated literature, only one study in which athletes examined the effect of CST on respiratory functions was found [26], and there was no study on soccer players that examined the effect of CST on respiratory functions and muscle strength. This study is the first study to investigate the effect of CST on respiratory functions in soccer players in terms of scope and content. Two major findings emerged from this study, first one is that eight week CST program improved respiratory muscle strengths ($p<0.05$), second one is that FVC increased after eight week CST ($p<0.05$). Especially MIP (25.22%) and MEP (11.95%) had important increase in EG, but in CG improved MIP just 4.06% ($p<0.05$).

CST emphasizes strength, conditioning and postural control of muscles of trunk. In addition, trunk muscles are responsible for sustaining demands of breathing [20], at the same time they have responsibility to respiration for stabilization of the rib [2]. Diaphragm which is important muscle of core area serves as the roof of the coreand most important for respiratory, especially muscle of inspiration [2, 30, 33, 36]. In the light of this information, it could be believed that CST program may positively affect pulmonary functions and respiratory muscles strength in the present study.

Studies have been found which showed that CST training has positive effects on core strength, and stabilization, trunk muscle strength, strength development and athletic performance [5, 6, 9, 13, 19, 34, 35, 40]. However there is only one study investigating the relationship between CST and pulmonary functions and respiratory muscle strength in sport sciences. In a study conducted on 24 well-trained subjects, Özdal [26] found that 10-week CST increased MIP (6.13%), while 8-week CST applied on competitive volleyball players decreased respiratory muscle fatigue level [27]. According to another study on healthy individuals who participated in the 6-week CST program, there was a statistically significant improvement in the parameters of FVC, FEV1 and PEF, 12% in FVC, and in FEV1; 11.5% improvement was observed [4]. In addition, It has been reported that CST program applied in paralyzed patients has significantly improved FVC, FEV1, FEV1 / FVC and PEF parameters compared to a normal physiotherapy group [24]. Mustafaoglu et al. [22] reported that the 6-week CST on substance addicts showed a statistically significant improvement in the FVC, FEV1, PEF and FEF parameters between 25% and 75%, and these developments were higher in the exercise group than in the control group. Kim and Lee [18] obtained statistically significant effects of strength exercise applied to abdominal muscle area on both FVC and FEV1 values. In addition to these studies, it is known that CST contributes to strength formation by increasing hypertrophy in core area muscles and also contributes to movement and thus performance by improving muscle rigidity and tissue mobilization [2]. Also researchers found a great number of neural adaptations that occurred following CST.

These were more efficient neural recruitment patterns, faster nervous system activation, improved synchronization of motor units and a lowering of neural inhibitory reflexes [37]. The results of our study are similar to the studies investigating the effect of CST on respiratory functions. To improve lung function, increase intra-abdominal pressure and reduce intra-thoracic pressure through the contraction of the abdominal wall, core stabilization exercises that stimulate the core region muscles and help increase air flow are the most ideal method [16, 22]. In other words, PEF in lung function depends on the strength - speed relationship and length - tension relationship of the abdominal muscles [22, 29]. This information revealed by the researchers supports the results of our current study.

As a conclusion, enhanced diaphragmatic function achieved via CST not only increased respiratory volume but also played a role in stabilizing the lumbar spine through the co-contraction of the transversus abdominis. When these effects of CST are taken into consideration, it is thought that soccer players can more successfully perform throwing, kicking or running etc. activities in the field thanks to pulmonary function and respiratory strength. In addition, it is thought that diaphragm muscle which is important during inspiration develops with CST and thus a high percentage of improvement occurs in MIP values. Since CST is a safe and easily applicable training choice, it can be easily applied in other sports branches and it can be added training routine by trainers. Also, as a result of this study, it has been shown that the effect of CST on respiratory functions and muscle strentgth should be examined in different branches.

References

1. Akuthota V, Ferreiro A, Moore T, Fredericson M. Corestability exercise principles. Curr Sports Med. 2008; 7(1): 39-44.
2. Akuthota V, Nadler SF .Core strengthening. Arch Phys Med Rehab. 2004; 85:86-92.
3. Al-Bilbeisi F, McCool FD. Diaphragm recruitment during nonrespiratory activities. Am J Respir Crit Care Med. 2000; 162:456–459.
4. Cavaggioni L, Ongaro L, Zannin E, Iaia FM, Alberti G. Effects of different core exercises on respiratory parameters and abdominal strength. Journal Of Physical Therapy Science. 2015; 27(10): 3249-3253.
5. Cholewicki J, McGill SM. Mechanical stability of the in vivo lumbar spine: implications for injury and chronic low back pain. Clinical Bio mechanics. 1996; 11(1):1-15.
6. Cosio-Lima LM, Reynolds KL, Winter C, Paolone V, Jones MT. Effects of physio balland conventional flor exercises on early phase adaptations in back and abdominal core stability and balance in women. J Strength Cond Res. 2003; 17(4): 721-725.
7. DePalo VA, Parker AL, Al-Bilbeisi F, et al. Respiratory muscle strength training with nonrespiratory maneuvers. J Appl Physiol 1985. 2004; 96:731–734.
8. Ezechieli M, Siebert CH, Ettinger M, Kieffer O, Weikopf M, Miltner O. Muscle strength of the lumbarspine in different sports. Technol Heal Care. 2013; 21(4): 379–86.
9. Faries MD, Greenwood M. Core Training: Stabilizing the Confusion. Strength Cond J. 2007; 29(2): 10-25.
10. Gamble P. An integrated approach to training core stability. Strength Cond J. 2007; 29(1):58-68
11. Gandevia SC, Butler JE, Hodges PW, et al. Balancing acts: respiratory sensations, motor control and human posture. Clin Exp Pharmacol Physiol. 2002; 29:118–121
12. Gandevia SC, Refshauge KM, Collins DF. Proprioception: Peripheral input sand perceptual interactions. Adv Exp Med Biol. 2002; 508:61–88.
13. Granacher U, Schellbach J, Klein K, Prieske O, Baeyens JP, Muehlbauer T. Effects of core strength training using stable versus unstable surfaces on physical fitness in adolescents: a randomized controlled trial. BMC Sports Science, Medicine and Rehabilitation. 2014; 6(1): 40.
14. Hodges PW, Eriksson AM, Shirley D, Gandevia SC. Intra- abdominal pressure increases stiffness of the lumbar spine. J Biomech. 2005; 38(9):1873-1880.
15. Janssens L, Brumagne S, Polspoel K, Troosters T, McConnell A. The effect of inspiratory musclesf atigue on postural control in people with and without recurrent low back pain. Spine (PhilaPa 1976). 2010; 35:1088–1094.

16. Key J. 'The core': understanding it, and retraining its dysfunction. J Bodyw Mov Ther. 2013;17(4):541-559.
17. Kibler WB, Press J, Sciascia A. The role of corestability in athletic function. Sports Med. 2006; 36: 189–198.
18. Kim E, Lee H. The effects of deep abdominal muscle strengthening exercises on respiratory function and lumbar stability. Journal Of Physical Therapy Science. 2013; 25(6):663-665.
19. Kim KJ. Effects of core muscle strengthening training on flexibility, muscular strength and driver shot performance in female Professional golfers. Int J Appl Sports Sci. 2010; 22(1):111-127.
20. Lomax M, Tasker L, Bostanci O. Inspiratory muscle fatigue affects latissimus dorsi but not pectoralis major activity during arm sonly front crawl sprinting. J Strength Cond Res. 2014; 28(8): 2262-2269.
21. McGill S. Core training: Evidence translating to beter performance and injury prevention. Strength & Conditioning J. 2010; 32(3): 33-46.
22. Mustafaoglu R., Demir R., Demirci AC, Yigit Z. Effects of core stabilization exercises on pulmonary function, respiratory muscle strength, and functional capacity in adolescents with substance use disorder: Randomized controlled trial. Pediatric pulmonology. 2019; *54*(7):1002-1011.
23. Nesser TW, Huxel KC, Tincher JL, Okada T. The relationship between corestability and performance in division I football players. J Strength Cond Res. 2008; 22(6):1750–1754.
24. Oh DS, Park SE. The effect of lumbar stabilization exercise on the pulmonary function of stroke patients. J Phys Ther Sci. 2016; 28(6):1896-1900.
25. Olmsted LC, Carcia CR, Hertel J, Shultz SJ. Efficacy of the Star Excursion Balance Tests in detecting reach deficits in subjects with chronic ankle instability. J Athl Train. 2002; 37:501–506.
26. Özdal M. Effect of core training on inspiratory muscle strength in well-trained. Men Biology of Exercise. 2016; 12(1).
27. Özdal M. Influence of an eight-week core strength training program on respiratory muscle fatigue following incremental exercise. Isokinetic sand. Exercise Sci. 2016; 24(3):225-230.
28. Putnam CA. Sequentialmotions of body segments in striking and throwing skills. J Biomech. 1993; 26:125-35.
29. Quanjer PH, Lebowitz MD, Gregg I, Miller MR, Pedersen OF. Peak expiratory flow: conclusions and recommendations of a Working Party of the European Respiratory Society. Eur Respir J Suppl. 1997; 24:2-8.
30. Ramírez-Sarmiento A, Orozco-Levi M, Güell R, Barreiro E, Hernandez N, Mota S, Sangenis M, Broquetas JM, Casan P, Gea J. Inspiratory muscle training in patients with chronic obstructive pulmonary disease: structural adaptation and physiologic outcomes. Am J Respir Crit Care Med. 2002; 166(11):1491-1497.
31. Sato K, Mokha M. Does core strength training influence running kinetics, lower-extremity stability, and 5000-M performance in runners?. The Journal of Strength & Conditioning Research. 2009; 23(1):133-140.
32. Schilling JF, Murphy JC, Bonney JR, Thich JL. Effect of core strength and endurance training on performance in college students: randomized pilot study. J Bodyw Mov Ther. 2013; 17(3):278-290.
33. Sekendiz B, Cug M, Korkusuz F. Effects of Swiss-ball corestrength training on strength, endurance, flexibility, and balance in sedentary women. The Journal of Strength & Conditioning Research. 2010; 24(11):3032-3040.
34. Sever O, Zorba E. Comparison of static and dynamic core exercises effects on speed and agility performance in soccer players. Isokinetics and Exercise Sci. 2016; 26:29-36.
35. Sharma A, Geovinson SG, Singh SJ. Effects of a nine-week core strengthening exercise program on vertical jump performances and static balance in volleyball players with trunk instability. J Sports Med Phys Fitness. 2012; 52(6):606-615.
36. Shinkle J, Nesser TW, Demchak TJ, McMannus DM. Effect of core strength on the measure of power in the extremities. J Strength Cond Res. 2012; 26(2):373-380.
37. Staron RS, Karapondo DL, Kraemer WJ, Fry AC, Gordon SE, Falkel JE, Hikida FC, Hikida RS. Skeletal muscle adaptations during early phase of heavy resistance training in men and women. J Appl Physiol. 1994; 76(3):1247-1255.
38. Stephenson J, Swank AM. Core training: Designing a program for anyone. S trength Cond J. 2004;

26(6):34-37.
39. Strongoli LM, Gomez CL, Coast JR: The effect of core exercises on transdiaphragmatic pressure. J Sports Sci Med, 2010; 9:270–274.
40. Subramanian A. Investigation of core strength training ınduced adaptations on selected physical and physiological parameters of cricket players. International Journal of Physical Education Fitnessand Sports. 2014; 3(1):65-70.
41. World Medical Association. World Medical Association Declaration of Helsinki: ethical principles for medical research involving human subjects. Jama 2013; 310(20): 2191.
42. Zattara M, Bouisset S. Posturo-kinetic organization during the early phase of voluntary limb movement. J Neurol Neurosurg Psychiatry. 1988; 51:956-65

Investigation of Stay-at-Home-Related Metaphors and in-Home Activities: A Research on Academicians

Mustafa Can Koç[1] and Meliha Uzun Dönmez[2]
[1]*Faculty of Sport Sciences, Mersin University, Mersin, Turkey.*
[2]*School of Physical Education and Sports, Şırnak University, Şırnak, Turkey.*

Abstract

This study has been designed to determine the positive/negative opinions of the academicians staying at home due to COVID-19 and their in-home activities. The study consists of 20 academicians (f:5, m:15) working in universities in various provinces of Turkey. In the research, the data collection process was provided with a semi-structured interview form. The form consists of two parts. The first part includes a personal information form consisting of six questions, while the second part includes open-ended questions to reveal the perceptions of academicians. The content analysis method was used to evaluate the data. The data collected from the content analysis were coded and classified. These codes were collected under certain categories and themes were created (Figure 3). According to the result of the research, among the activities that contribute to the standards of academicians during COVID-19 are activities such as spending time with the family, conducting academic studies, resting, renewing, following the agenda and among the frequent activities are reading a book, spending time with children, watching television, and giving courses.
Keywords: Core Strength, Respiratory Muscles Strength, Soccer, Exercise

Introduction

The new type Corona virus (COVID-19), which has influenced the whole world in recent days and which humanity recognizes as the 'pandemic', is frequently mentioned in many countries based on the number of deaths. All governments have taken serious measures against this global virus declared as a worldwide pandemic, which has been affecting the whole world with its spread especially on the European continent, causing increased numbers of deaths (1). In addition, organizations and activities in many fields such as sports, religion, and education, including international giant sports organizations, are delayed or cancelled (2). As in the whole world, it has had serious consequences in Turkey as well. In the face of this situation, as a result of both prohibitions and suggestions, individuals understood that staying at home is the safest method. Theatres, cinemas, show centres, concert halls, engagement/wedding halls, restaurants/music halls, casinos, pubs, taverns, coffee shops, cafés, cafeterias, country gardens, hookah lounges, hookah cafes, internet lounges, internet cafes, the activities of all kinds of game halls, all kinds of indoor playgrounds (including shopping malls and restaurants), tea garden, clubhouses, amusement park, swimming pool, Turkish bath, sauna, hot spring, massage parlour, SPA and sports centres were temporarily suspended in accordance with the Circular of the Turkish Ministry of Internal Affairs (16.03.2020), (2). Mankind, who is not accustomed to living without immobility and social-human relations and staying at home for a long time, may have some difficulty in this process. People provide their free time remaining out of their daily needs by taking part in some activities, having a mental rest and attempting to remain physically good. Among these activities are reading books, drawing, sports activities, etc. Also, in this process, people can continue their scientific studies academically. In this case, they continue their academic progress during their stay at home due to the COVID-19 and turn this process into an advantage. It is extremely important for human beings to engage with vital factors and enjoyable activities that keep them away from stress (3). They can support themselves physically and spiritually with the activities they love, especially when those people are staying at home. This is what has shaped the subject of this study. In light of all this information, this study aims to determine the positive/negative opinions of the academicians staying at home due to the COVID-19 and their activities.

Method

This section includes information about the research model, research group, data collection tool and statistical analysis of the data obtained.

Research Model

The research is based on a phenomenological model, which is one of the qualitative research methods. Phenomena occur in the form of events, perceptions, experiences, trends, etc. in the world we live in. Within the scope of the research, the model was used to express the positive/negative feelings of academics in their homes due to the COVID-19 and their activities during their stay at home. In this context, their perceptions about the situation of staying at home were examined by applying the metaphor technique.

Research Group

The sample of the research consists of academicians. The sample of the study consists of 20 academicians, (f:5; m:15), working in universities in various provinces (Çanakkale, Samsun, Şırnak, Artvin, Bursa, Ağrı, Nevşehir, Manisa, Hatay, Ankara and Gümüşhane), who were accessed via the convenience sampling method. Convenience sampling is a sampling method where the sample is taken from a group of people easy to contact or to reach (4). Due to the COVID-19 outbreak, it is unlikely to be generalized to academicians in all universities during these difficult days, which is a limitation of our research.

Table 1: *Demographic characteristics of the academicians participating in the study*

Participants	Age	Gender	Marital Status	Occupation	Level of Education	City
K1	40	Male	Single	Lecturer	Doctorate	Çanakkale
K2	44	Female	Married	Instructor	Master's Degree	Samsun
K3	29	Male	Single	Instructor	Master's Degree	Şırnak
K4	34	Male	Married	Instructor	Master's Degree	Artvin
K5	35	Male	Married	Instructor	Master's Degree	Bursa
K6	37	Male	Married	Instructor	Master's Degree	Ağrı
K7	36	Female	Single	Instructor	Doctorate	Nevşehir
K8	37	Female	Married	Lecturer	Doctorate	Şırnak
K9	38	Male	Single	Lecturer	Doctorate	Şırnak
K10	40	Male	Married	Lecturer	Doctorate	Manisa
K11	35	Male	Single	Lecturer	Doctorate	Hatay
K12	43	Male	Married	Instructor	Master's Degree	Şırnak
K13	39	Male	Married	Lecturer	Doctorate	Ankara
K14	43	Male	Single	Lecturer	Doctorate	Gümüşhane
K15	33	Male	Single	Lecturer	Doctorate	Şırnak
K16	40	Male	Married	Lecturer	Doctorate	Şırnak
K17	40	Female	Single	Lecturer	Doctorate	Şırnak

K18	41	Male	Married	Lecturer	Doctorate	Şırnak
K19	36	Male	Married	Instructor	Master's Degree	Artvin
K20	35	Female	Married	Lecturer	Doctorate	Şırnak

Table 1 demonstrates the demographic characteristics of academicians participating in the study. A total of 20 academicians participated in the study and interviews were held with them.

Data Collection Tool

A semi-structured interview form was used to reveal the perceptions of academicians participating in the study about their stay at home. The form consists of two parts. In the first part, there are six questions asked to determine the demographic characteristics of the participants, and in the second part, open-ended questions are asked to reveal the perceptions of the academicians. In this context, each of them was given the following sentences with blanks to fill in:

- "Staying at home is like……; for,……"
- "Best activity to do at home is……; for,……."

Metaphors answered by academicians were collected and evaluated.

Data Analysis

In the study, the content analysis method was used to evaluate the data. The data collected via the content analysis was coded and classified. These codes were then collected under certain categories and themes were created. These themes and codings were exemplified by some statements of academicians given below.

Results

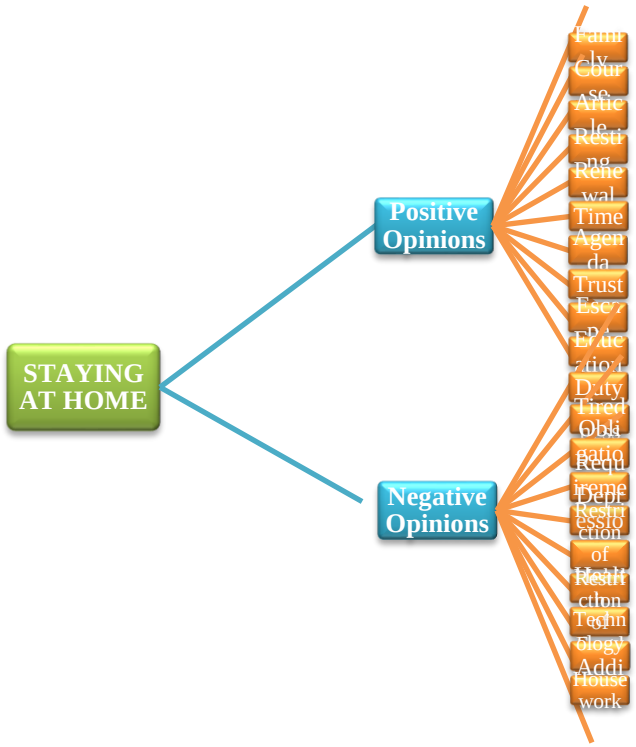

Figure 1. *Positive and negative opinions of academicians about their stay at home (spending time)*

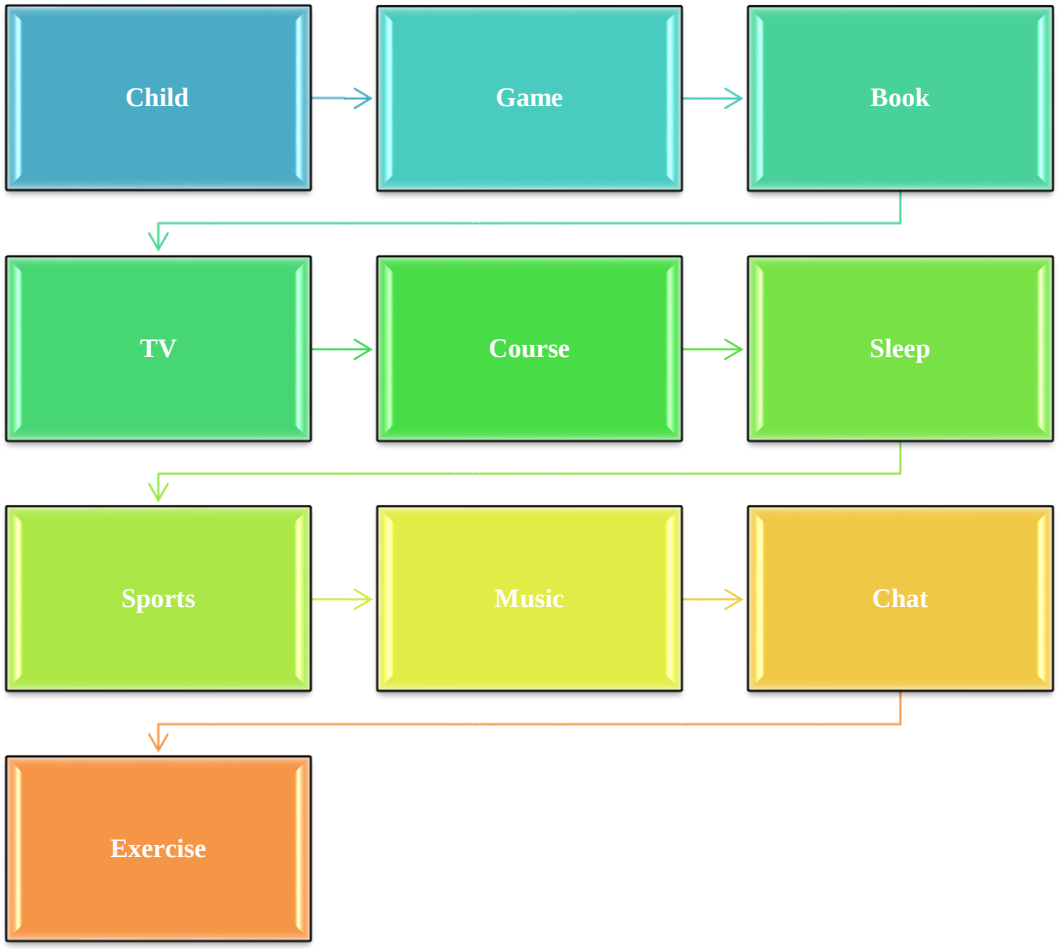

Figure 2. *Activities done frequently by academicians during their stay at home*

Figures 1 and 2 include the positive and negative opinions of the academicians about their stay at home. Positive opinions are indicated with the concepts of "family, lesson, article, rest, renewal, time, agenda, trust, escape and education" while negative opinions are indicated with concepts of "duty, tiredness, obligation, requirement, depression, mobility restriction, health, restriction of freedom, technology addiction, and housework". The study shows that particularly married individuals generally stay at home due to cases such as duty, responsibility, etc. In addition, academicians express that staying at home restricts mobility, increases depression, prevents freedom, and causes technology addiction while particularly female academicians name the situation as tiredness. On the other hand, they state that they are unable to leave the house because of coronavirus (COVID-19) and that it is safer for them to stay at home. In addition to these, academicians report that this situation is positive for spending time with the family, and it has various contributions such as conducting academic studies, resting, renewing, following the agenda. Finally, among the activities that academicians frequently carry out at home are reading a book, spending time with children, watching television, and giving courses.

In the figure below, 6 categories were created within the framework of the answers given by academicians. In addition, some statements obtained as a result of the interview were included.

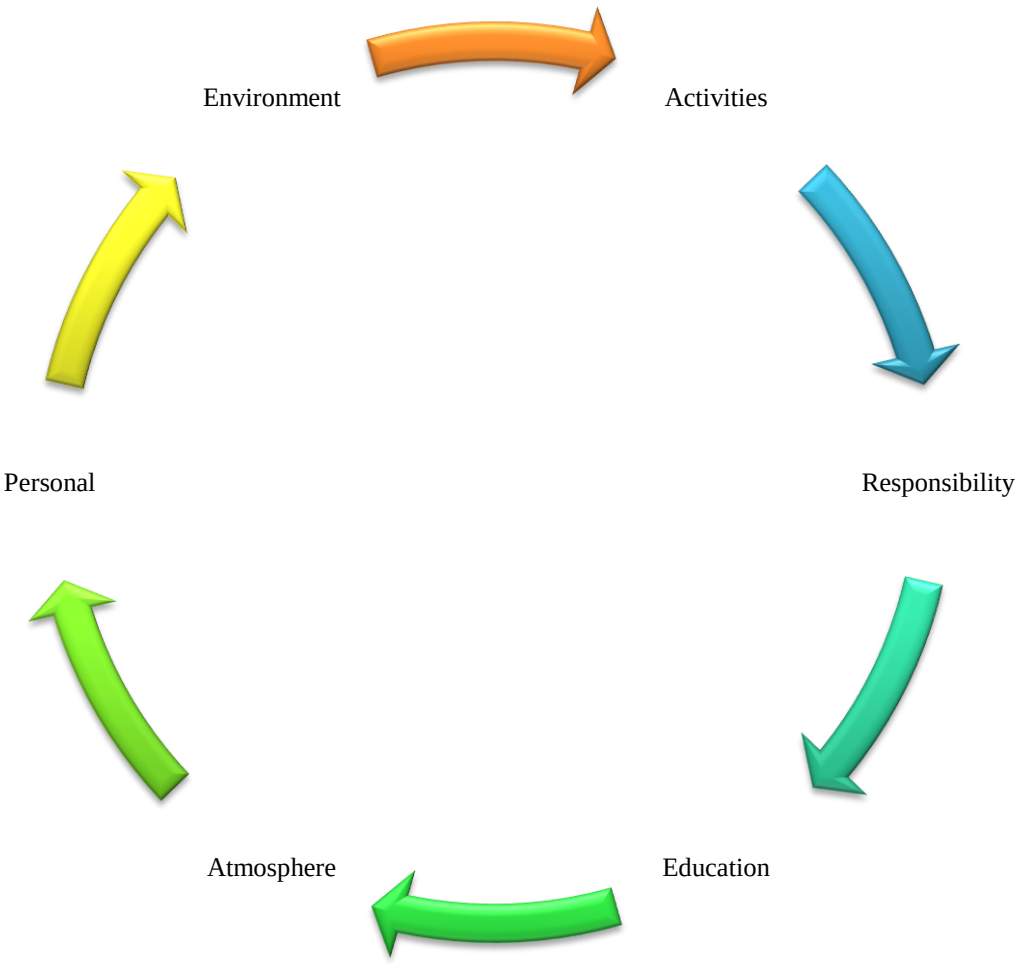

Figure 3. *Categories for staying at home (spending time)*

What does it mean for you to stay at home?
K10: "Peace"
"Staying at home is peaceful as I spend time with my family."
K19: "Restriction of Freedom"
"Not being able to leave the house freely is frustrating. It is good for you to go out and breathe and socialize. Mobility is limited when you stay at home. You are taken captive by mobile devices.

What do you think is the best activity to do at home?
K7: "Playing sports"
"When I can't find anything else to do at home, both due to my job and the coronavirus, I do sports to make good use of my time. I think the best activity is to do sports. "
K13: "Studying"
"I prefer to study in this process to improve in my field and improve myself."
K19: "Watching TV"
"It is necessary to learn firsthand what is happening because of the agenda. Also, the series

and documentaries can be attractive. ”

5. Discussion and Conclusion

This study has been designed to investigate the activities done by academicians working in some provinces of Turkey during the stay as well as their positive/negative opinions about staying at home due to COVID-19. In this context, in light of the findings obtained in the research, the following interpretations were included. The academicians were asked to complete sentences such as “what it means to stay at home and what is the best activity to do at home. Participants have some positive and negative opinions about staying at home. Accordingly, among the contributions of this case based on positive opinions are “to have a good time with the family, to study, to carry out academic studies, to have a rest and renewal, to use the time well and efficiently, to follow the agenda, to feel the confidence and escape at home as part of the prevention from the disease, and to carry out educational activities.” Negative emotions are indicated with statements such as “considering the stay at home for a healthy life as a duty, obligation, and requirement, depression, restriction of mobility, restriction of freedom, technology addiction and being more active in the housework, and tiredness particularly for female academicians” (Figure 1). Frequent activities of academicians who stay at home due to COVID-19 were observed to be spending time with children, playing games, reading books, watching TV, studying, sleeping, playing sports, listening to music, chatting with the family and exercising” (Figure 2). The metaphors, which were formed as a result of the research, regarding the stay at home, were gathered under 6 conceptual categories. These are “activities, responsibility, education, environment, personal and atmosphere” (Figure 3). Indoor recreation activities include recreational activities carried out in all kinds of indoor and outdoor spaces reserved for the use of the society in which they live (5). Indoor recreation activities are not affected by nature and weather conditions as much as outdoor activities. For, such activities can be performed at any time and place (6). Among the indoor and at-home activities are watching TV, exercising, playing computer games, needlework, embroidery, reading books and newspapers, watching videos, listening to music, gardening, one's own hobbies, football, volleyball, basketball, playing tennis, etc. (7; 5; 8; 9). In a study, it was stated that individuals prefer engaging with gardening, watching TV, or listening to the radio as a leisure activity (10). In another study, it was determined that individuals mostly spend their leisure (78%) with passive recreational activities such as watching television, listening to the radio, and chatting (11). In another study, it was stated that individuals tend to watch activities such as watching television, listening to music, and arranging a garden during their stay at home (12). In their study, Guatam et al. (2007) found that men watching television, listening to the radio and physical activity, and women watching television and listening to the radio had a low level of depression (13). In addition, in a study conducted by Dodge et al. (2008), a significant relationship was found between depression and participation in activities (14). Tessier et al.(2007), they state that the physical activity, mental health, vitality and social mobility values of those exercising in their free time are increased (15). Also there are also many studies showing that exercise improves mentally and is effective on anxiety and stress parameters (16). As an inevitable result of the conditions we are in, immobility has become a threatening and risking factor for life (17). Sullivan and Chang (2011) stated that mental fatigue occurs in people due to the conditions of modern life, the requirements of settled life, daily life process, traffic, internet addiction, stress, future anxiety, and so on adding that these conditions cause inattention, depression, and exhaustion in individuals (18). The primary obligations of women at home lead to an unequal position and thus become an important obstacle in breaking the routine of everyday life (19). Back, neck, arm and low back pains are the main work-related musculoskeletal disorders at home (20). The qualities of motherhood and housewife and responsibilities towards their spouses and children limit the time women to spend for themselves (21). Consequently, among the activities that contribute to the standards of academicians during COVID-19 are activities such as spending time with the family, conducting academic studies, resting, renewing, following the agenda and among the frequent activities are reading a book, spending time with children, watching television, and giving courses.

References

1. Karcıoğlu, Ö. What is Corona viruses, and how can we protect ourselves?. Anka Tıp Dergisi, 2020; 2(1), 66-71.
2. Gümüşgül, O. & Aydoğan, R. Yeni Tip Koronavirüs-COVID 19 Kaynaklı Evde Geçirilen Boş Zamanların Ev İçi Rekreatif Oyunlar ile Değerlendirilmesi. Spor Eğitim Dergisi, 2020; 4(1), 107-114.
3. Kalaycı, M. C., Gönültaş, B., Akyol, B. Yaşlı Erkeklerde Fiziksel Aktivite Düzeyine Göre Yorgunluk ve Ağrı Düzeyinin İncelenmesi, Conference: Uluslararası Bilimler Kongresi.2020
4. Gegez, A. E. Pazarlama Araştırmaları, İstanbul: Beta Basım. 2007
5. Argan, M., Yüncü, D., Coşkun., O., Sevil, T., Özel, Ç. H., Yüncü, H. R. & Şimşek, K. Y. Rekreasyon Yönetimi. Eskişehir: Anadolu Üniversitesi Yayınları. 2013
6. Kocaeski, S., Sevil, T., Şimşek, K. Y., Katırcı, H., Çelik, O. & Çeliksoy, M. A. Boş Zaman ve Rekreasyon. Eskişehir: Anadolu Üniversitesi Yayınları. 2012
7. Karaküçük, S. Boş Zaman ve Rekreasyon. Ankara: Gazi Kitabevi. 2008
8. Baud-Bovy, M. and Lawson, F. Tourism and Recreation: Handbook of Planning and Design. Jordan Hill: Architectual Press. 2002
9. Tribe, J. The economics of leisure and tourism:[environments, markets and impacts]. Butterworth Heinemann Ltd, Oxford. 1995
10. Softa, H. Evde ve huzurevinde kalan yaşlıların fizyolojik, psikolojik ve sosyal yönden incelenmesi. Yaşlı Sorunları Araştırma Dergisi, 2015; 8(2), 63-76.
11. Kerem, M., Meriç, A., Kırdı, N., Cavlak, U. Ev Ortamında ve Huzurevinde Yaşayan Yaşlıların Değişik Yönlerden Değerlendirilmesi. Geriatri, 2001; 4(3): 106-112.
12. Şimşek, T. T., Yümin, E.T., Sertel, M., Öztürk, A., Yümin, M. Kadın ve Erkek Yaşlı Bireylerde Depresyonun Sağlıkla İlgili Yaşam Kalitesi ve Yaşam Memnuniyeti Üzerine Etkisi. Fırat Üni. Sağlık Bilimleri Tıp Dergisi,2010; 24(3):147-153.
13. Gautam, R., Saito, T., Kai, I. Leisure and Religious Activity Participation and Mental Health: Gender Analysis of Older Adults in Nepal. BMC Public Health, 2007; 7: 299.
14. Dodge, H. H., Kita, Y., Takechi H., Hayakawa T., Ganguli M., and Ueshima H. Healthy Cognitive Aging and Leisure Activities Among the Oldest Old in Japan: Takashima Study J. Geron. A Biol. Sci. Med. Sci.2008; 63(11): 1193–1200.
15. Tessier, S., Vuillemin, A., Bertrais, S., Boini, S., Le Bihan, E., Oppert, J., et al. Association between leisure-time physical activity and health-related quality of life changes over time. Preventive Medicine, 2007; 44, 202-208.
16. Yargıcı, S. Kadınlarda farklı egzersiz yöntemlerinin seçilmiş fiziksel, fizyolojik uygunluk ve psikolojik parametreler üzerine etkilerinin karsılaştırılması. Yüksek Lisans Tezi, Ankara Üniversitesi, Sağlık Bilimleri Enstitüsü, Beden Eğitimi ve Spor Anabilim Dalı, Ankara. 2007
17. Zorba, E. Herkes İçin Yaşam Boyu Spor, 4. baskı. Ankara: Türkiye Herkes İçin Spor Federasyonu Yayınları, Canset Form Matbaacılık 2014
18. Sullivan, W.C., Chang, C. Mental Health and the Built Environment. Mental Health And The Built Environment For Health, Well-Being, And Sustainability 2011; (s. 106-116) Island Press.
19. Bulgu, N., Arıtan, C. K., & Aşçı, F. H. Gündelik Yaşam, Kadın ve Fiziksel Aktivite. Spor Bilimleri Dergisi, 2007; 18(4), 167-181.
20. Öztepe, N. D. Ev Eksenli Çalişanlarin Karşilaştiği Kazalar Hastaliklar ve Tehlikeler. Mesleki Sağlık ve Güvenlik Dergisi (MSG), 2015; 12(44), 26-31.
21. Yılmaz, A., & Ulaş, M. Kadınların rekreatif alanlarda fiziksel aktivite yapma amaçları ve karşılaştıkları sorunlar. Spor Bilimleri Dergisi, 2016; 27(3), 101-117.

Effects of Adding Cognitive Motor Coordination Exercise to Soccer Training vs. Soccer Training Alone on Physical Fitness of Prepubescent Boys

Bahar Ates Cakir[1], Mehmet Turkkan[1] and Ozgur Ozer[1]
[1]Faculty of Sport, Usak University, Usak, Turkey.

Abstract

The aim of this study was to investigate and compare the effects of 6-week Life Kinetik exercises combined with soccer training vs. soccer training alone on the physical fitness in prepubescent boys. A total of 30 untrained prepubescent boys were randomly assigned to either Life Kinetik-Soccer (LK-S) (n= 15) or soccer training (S) (n= 15) to train 2 times/week for 6 weeks. In the LK-S, subjects performed a total of four to five cognitive, coordination and visual Life Kinetik exercises at the beginning of the soccer training, while the S executed soccer training alone. The Y-balance test (Y-BT), T agility (T-test), 20-m sprint, Standing Long Jump (SLJ), and sit-and reach (S&R) test were applied before and after 6-week training. Our results revealed that LK-S and the S group significantly improved their PM%, PL%, and COMP% ($p<0.05$). In the ANT%, LK-S significantly increased their performance, however, the S showed no significant improvement. While both group showed significant enhancements in the T-test time trial, S&R, there were no significant enhancement in 20-m sprint time trial for LK-S and S groups ($p >0.05$). In the SLJ performance, boys who performed soccer training alone showed a significant increase of 7.3%. With regard to the LK-S group, no improvement was detected from pre- to post-training. A 2-way analysis of repeated-measures analysis revealed that there were no pre- and post-intervention improvements between the groups regarding all parameters ($p>0.05$). In conclusion, adding cognitive motor coordination exercise to regular soccer training, might be effective in improving anterior dynamic postural control ability, whereas soccer training alone, might be more appropriate for lower extremity power in untrained prepubescent boys.

Keywords: Dual-tasking, Life Kinetik, Postural control, Physical activity

1. Introduction

It is well-known that regular and greater participation in physical activity is associate with enhanced physical fitness parameters such as cardiorespiratory endurance, balance, power, speed, agility, flexibility, muscular strength and endurance (1,2). Physical fitness is often defined as a good measure of the body's ability to perform physical activity and exercise (3). Many studies have increasingly recognized the physical fitness as a key for an important indicator of health lifestyles based on general health and motor performance of children (3,4,5). While balance, coordination, speed, agility and power are grouped as performance-related fitness parameters; body composition, cardiorespiratory endurance, muscular strength, and flexibility are indicated the important determinants of health-related fitness (1). Physical activity and fitness are both known to contribute greatly to high performance in team sports as well as being indicated as one of the components of physical well-being, which is effective in preventing or controlling non-communicable diseases as obesity, musculoskeletal and cardiovascular disease among all age groups (6,7,8). In the literature, there are some studies that examine the relationship between childhood and adolescent activity and physical fitness and corresponding indicators in adulthood (9,10). These studies have reported that regular physical activity and enhanced physical fitness executed during childhood and adolescence may prevent these degenerative conditions and improve the quality of life which is also related to physical well-being in adulthood. Although a growing body of the literature provides evidence on the benefits and lifestyle-related diseases of physical activity and purposed programs, the inactivity among children is still increasing substantially.

Children face new tasks and challenges during their daily lives (11). Daily activities often require simultaneous dual-tasking (12). Various cognitive and motor abilities contribute to find proper solutions by

flexibly reacting to these changing conditions (11). Cognitive-motor coordination exercises are defined as performing a combination of physical and cognitive skills. While most cognitive-motor coordination studies have targeted on cognitive skills in general, (11,13,14,15) the implications of exercises and cognitive interventions on physical function as postural control or gait are also investigated (16,17). Their findings concluded that the training of dual-tasking exercises might be able to enhance postural control or gait. Morover, Jak (18) stated that observed improvements both in mental abilities and physical abilities related trainings. Lauenroth (12) has found that simultaneous movement and cognitive activity have been shown to induce improvements both in cognitive and motor functions than single physical or single cognitive exercise when it meets specific criteria. However, despite the positive changes in physical performance studied in older adults or people with neurological impairments, the effects in healthy people after cognitive-motor interventions have so far received less scientific attention.

As stated above, like daily activities, sport practices often require simultaneous performance of physical and/or cognitive skills as well. Soccer is one of the most popular team sports in the world participated by women and men with different age and physical capacity, especially among children and teenagers. The physiological capacities such as muscular strength, speed, rapid change of direction, power, and maximal aerobic capacity represent the important components of performance (19). In addition, soccer is actually a cognitive activity in which there is an interaction between perceptual, memory, decisional and motor systems (20). Since in a soccer match, players are confronted with many challenges such as dynamic or stable teammates, opponent players and the ball, they are often required to make appropriate decisions to these stimuli during the game (21). There have been studies suggest that game-based training may bring improvements related to physical fitness and athletic performance in team-sport athletes (22,23).

Earlier studies suggest that activities for children must be organized to be effective on physical well-being (6, 24) and athletic performance (25). In this study, we used the Life Kinetik exercises (26) which is one of the most common training that is used to train motor coordination performance in association with cognitive challenges, combined with soccer training. The existing literature shows that there are only a few studies examining the effects of adding to motor cognitive exercises to sport activities on physical fitness performance among children. Therefore, the aim of the present study was (i) to test the 6-week effects of Life Kinetik training program combined with soccer training vs. 6-week soccer training alone on dynamic postural control, agility, running speed, lower extremity power, and flexibility in untrained prepubescent boys and (ii) to reveal whether prepubescent boys practicing Life Kinetik training program incorporated with regular soccer training had additional physical performance outcomes compared to soccer training alone. We expected that prepubescent boys practicing combined Life Kinetik exercises with soccer training would have greater enhancement in dynamic postural control ability without any negative effects on other physical performance than those attending soccer training alone.

Materials and Methods

Subjects

The study was carried out in accordance with the principles of the Declaration of Helsinki. Ethical approval for this study was obtained from Health Sciences Research Ethics Committee of Uşak University (2019-47). All subjects and their parents were informed about the benefits and risks before participation, and they were requested to sign volunteer consent form. Thirty untrained prepubescent boys selected within a special skill screening project were participated in this study. They involved in no regular physical activity except attending normal physical education classes (2 h. wk-1). None of the subjects were skilled or had any extensive experience in soccer. The inclusion criteria were; (i) having no history of injury in the past 6 months, (ii) having no health problem that would prohibit participation, (iii) having no physical activity habits. The groups did not significantly differ in any anthropometric characteristics in the pre-test (Table 1). After baseline measurements, the boys were assigned to two groups: Life Kinetik exercises combined with soccer training (LK-S) (n= 15) or soccer training alone (S) (n= 15). In this study, the S was determined as the control group. Since two subjects in LK-S group did not complete all post-test procedures, they were

dismissed from the study.

Procedures

Pre- and Post-testing Sessions. In this current study, the pre-and-post test designed was used to determine the efficacy of a Life Kinetik program combined with soccer training and soccer training alone. Baseline anthropometric and physical measurements were conducted one week before the first training session and one week after the last training session. Verbal encouragement ensured maximal effort throughout all tests. One familiarization sessions were held two weeks before definitive testing. Prior to the performance test, the subjects performed the warm-up (jogging, lateral displacement, dynamic stretching, jumping) that lasted 8-10 minutes. To avoid of confounding effects of weather, all tests were performed in an indoor sports hall. All subjects were tested on the same day, and the tests were performed in the same order. The participants were allowed to complete 3 trials (interspersed with 45 seconds of rest), requiring at least one successful trial.

For anthropometric measurements, subjects' standing height measurements in meters were recorded using a Mesitas portable height gauge (Germany) and body weights were measured without shoes, in their shorts and t-shirt using a scale (Tanita) with an accuracy of ± 0.01 kg. Body Mass Index (BMI) was calculated using the formula BMI= weight/height squared (kg/m2).

According to modified Pubertal Maturational Observational Scale (PMOS), the boys were classified as prepubertal stage (equivalent to Tanner Stage I) and the chronological age was calculated based on the difference between the date of birth and date on which the first testing session was carried out.

The Y-Balance Test (Y-BT) Kit was used to measure dynamic postural control ability of the subjects. The measurements were performed on a hard surface in 3 directions; anterior (ANT), posteromedial (PM) and posterolateral (PL) while standing on one leg (barefoot) in a central location on the Y-BT platform. ANT was tested from the toe aligned to the origin while PM and PL were based on the distance between heel and farthest possible point to reach with the contralateral leg to the support leg. Participants were asked to perform fingertip light touch with their reach foot as keeping their hands on the iliac and heels on the ground during the trial. All Y-BT attempts were performed in the same order, always started with dominant leg. It was considered as a failed attempt to transfer the body weight through the reach foot, ground the heel of the stance foot or remove hands from the hips; and the measurement was repeated after the participant was verbally informed. Training attempts were performed in accordance with the Robinson and Gribble protocol (27) the best 3 reaches were recorded in all directions after the participants were allowed to try at least 4 times practical trail. Each participant was given a 2-minute resting time and then was asked to perform 5 test trials in each direction. The result of each attempt was recorded only when the participant could return to the starting position by having full control over the movement. All reach distances were recorded in centimeters. After the data were collected, obtained scores were normalized using the formula: "Maximal Reach Distance/Limb Length) x 100 = Largest Reach Distance %" for each direction in order to eliminate the advantage of the limb length. The limb length of each participants was recorded in centimeters in the supine position, measured from the anterior superior iliac spine to the distal portion of the medial malleolus using a tape measure. The total score (COMP) was calculated by averaging the normalized ANT, PL and PM scores.

Sprint speed (20-m) was measured with photocells in a closed area. The first and second timers were placed respectively as 0 m, 20 m apart from the starting line.

Standing long jump test was used to determine lower extremity power of the subjects. The distance between the last mark of the participant and scratch line after the completion of the long jump with a two-food take off was calculated as centimeters.

The agility performances of the subjects were evaluated using agility (T-Test) with photocells system. Three cones were placed on a line 4.57 m apart from each other. They were placed in the shape of a "T" in 9.14 m distance. The test was applied as shuffling to the left, right and backwards running. Subjects had a straight body position and placed one leg behind the starting line (0 meter). They were also asked to make a

minimum 3-second slight forward lean before the start. The results were recorded in seconds.

In the last test, a sit-and-reach box was used to measure the flexibility of the lower back and hamstring muscles. The subjects were asked to sit with legs together and extended to provide that the soles of the feet (shoes removed) were reaching the surface. They also locked both knees and pressed flat to the floor in order to ensure full extension. They were then asked to place hands on top of each other, palms facing downwards, and move their fingers as far as possible to reach forward along the measuring line. The position was held for 2 seconds without stretching forward or backward to measure the distance properly.

Training Interventions

During the study, each group performed two 80-min training sessions per week for 6 consecutive weeks. The S group participated in a soccer training program alone. Prior to each soccer training the S group performed a standardized warm-up with low-to-moderate intensity exercises including jogging, lateral displacements, dynamic stretching, and jumping. After the warm-up session, the S was submitted to soccer training program lasting 60-min each, focusing on basic motor skills and technical skills such as dribbling, dribbling in different direction, passing drills, coordinative exercises with ball or without ball, receiving, shooting, and heading skills. In addition, one of the sessions included a half-field game lasting 30 minutes at the end of the training. At the end of the soccer training, subjects performed of standardized 10-min static stretching exercises. As the skills and motivation of the subjects develop, intensity and difficulties of exercises were increased.

In the LK-S, each session composed of 3 phases: Life Kinetik exercises, soccer training and cool-down session. The LK-S group participated in soccer training sessions, which were similar as the S group did lasting 45-min. Life Kinetik exercises were applied 30-min before soccer-specific training. One week before the study, the LK-S completed two life Kinetik orientation sessions to familiarize to the equipment, and the procedures for the minimizing the learning effects. Training in LK-S was modified by Lutz (26) to train motor coordination in association with cognitive tasks. A total of four to five cognitive, coordination and visual exercises were executed each of which was organized and changed in a methodical way. Each task lasted at least between 3 and 5-min. In this respect, each task was organized in levels in which the exercise intensity increased. A higher level started if the participant could perform the task at a sufficient level. The exercises used during intervention in following: line jump, ball dancing, parallel ball, passing ball, eye skills, cone jumping, change of direction go and throw, dancing with a scarf (Table 2).

Statistical Analyses

The results of the tests were analyzed using the SPSS Statistics 23.0 (IBM, 2015), and data were shown as mean ± SD. The normality distribution was tested with skewness and kurtosis, and Shapiro-Wilk tests. The sphericity measurement was performed using the Mauchly test, and the significance of F-ratios was adjusted when it was not met according to the Greenhouse-Geisser or the Huynh-Feldt procedure. The effects of the training intervention differences were assessed using a 2-way analysis of repeated-measures analysis, with factors: (group: LK-S vs. S) x (time: pre vs. post). Paired sample t-tests were applied to analysis within-group differences in all selected parameters. In addition, effect sizes (Cohen's d) were calculated by converting partial eta-squared values to Cohen's d with the Excel. The effect size thresholds were as follows: small ($0.00 < d < 0.49$), medium ($0.50 < d < 0.79$), or large ($d > 0.80$). The statistical significance level was set at $p < 0.05$.

Results

Descriptive values of pre- to post-test and the percentage of change for each group for Y-BT, S&R, T-Test, 20-m sprint, and SLJ were given in Table 3 and 4. Paired t test revealed significant increases in the ANT% for the LK-S ($\Delta = 8.9\%$; $p<0.05$; $d= 1.34$ [large effect]), however, the S showed no significant improvement ($\Delta = 4.66\%$; $p >0.05$; $d= 0.43$ [small effect]). Significant increases ($\Delta = 12.6\%$; $p<0.05$; $d= 1.01$ [large effect]) and ($\Delta = 9.17\%$; $p<0.05$; $d= 0.62$ [medium effect]) were also observed for the LK-S and S in the

PM%, respectively. For PL%, paired t-test demonstrated significant enhance both for the LK-S and S (Δ= 12.6%; p<0.05; d= 1.27 [large effect]) and (Δ= 9.17%; p<0.05; d= 0.81 [large effect]), respectively. In addition, there were significant improvements in COMP% (Δ= 12.4%; p<0.05; d= 1.09 [large effect]) for the LK-S and (Δ= 9.6%; p<0.05; d= 0.74 [medium effect]) for the S (Table 3).

After 6-week of intervention, agility T-test time trial performance significantly enhanced (Δ= -14.3%; p<0.05; d= 2.12 [large effect]) and (Δ= -10.6%; p<0.05; d= 1.69 [large effect]), and sit and reach test performance (Δ= 11.9%; p<0.05; d= 0.86 [large effect]) and (Δ= 7.8%; p<0.05; d= 1.11 [large effect]) in the LK-S and S, respectively. For SLJ, paired t-test demonstrated significant progress for S (Δ= 7.3%; p<0.05; d= 0.69 [medium effect]), while no significant progress was observed for LK-S (Δ= 3.79%; p >0.05; d= 0.49). However, no significant improvements were found for 20-m sprint time trial performance (LK-S: Δ= -0.2%; p >0.05; d= 0.06; S: Δ= 0.29%; p >0.05; d= 0.05) (Table 4).

Further analysis (ANOVA) revealed that there were no significant differences between the groups in the ANT%, PM%, PL% and COMP%, T-test, 20-m sprint, SLJ, and S&R performance (p >0.05) (Table 3 and 4).

Table 1. *Subjects' characteristics.*

	LK-S (n=13)		**S (n=15)**	
	Pre	**Post**	**Pre**	**Post**
Height (m)	1.37 ± 0.25	1.37 ± 0.02*	1.38 ± 0.05	1.39 ± 0.05*
Body mass (kg)	29.7 ± 2.25	30.6 ± 4.02	30 ± 4.22	29.9 ± 2.58
BMI (kg/m²)	15.9 ± 0.97	16.2 ± 2.02	15.8 ± 1.98	15.6 ± 1.97
Leg length (cm)	70.7 ± 2.84		71.3 ± 2.82	

BMI: Body Mass Index
**p< 0.05.*
** Significant difference from pre-training*

Table 2. *Life Kinetik exercises used during intervention.*

Ball dancing	Throwing the ball by specifying the hand to catch -Specification of hand to keep by numbers (double numbers = right, single numbers = left) -By adding variations through the colors of the balls etc.
Line jumps	-jumping with left leg- right leg - both leg- etc. -jumping with left leg - right leg- both leg – etc. (to the front and back) -with simple counting system -by collecting the alphabet etc.
Parallel ball	Throwing two balls upwards, cross the arms and catch the balls
Passing ball	A trainer gives commands for throw the small ball to another while pass to each other
Eye skills	A trainer gives commands for moving eyes in different directions -Up, down, to the right and to the left
Cone jumping	Jumping through a cones with cognitive perturbation -Recite the alphabet, phone number, etc.
Change of Direction	A trainer gives commands for moving different directions and perform tasks -Number 1: to the right, remove tongue and bounce a ball at the same time -Number 2: to the left, move nose and bounce a ball at the same time etc.

Table 3. *Dynamic postural control (Y-BT) before and after the 6-week training program.*

Group	Pre-test	Post-test	Δ%	Paired t test		
				p value	Cohens *d*	Magnitude
Measures	**M±SD**	**M±SD**				
LK-S (n=13)						
ANT%	59.7 ± 6.96	64.9 ± 8.1	8.9	0.00*	1.34	Large
PM %	87.5 ± 11.2	103.8 ± 17	12.6	0.00*	1.01	Large
PL%	88.7 ± 9.2	99.6 ± 10.8	12.6	0.00*	1.27	Large
COMP%	78.6 ± 8.24	88.9 ± 3.31	12.4	0.00*	1.09	Large
S (n=15)						
ANT%	60.2 ± 4.22	62.9 ± 6.77	4.66	0.12	0.43	-
PM %	92.3 ± 14	102.7 ± 13	9.17	0.03*	0.62	Medium
PL%	92 ± 13.8	99.2 ± 9.85	9.17	0.01*	0.81	Large
COMP%	81.5 ± 10.8	88.3 ± 8.8	9.6	0.01*	0.74	Medium

Sd; Standard deviation; ANT%: Normalized Anterior; PM%: Normalized Posteromedial; PL%: Normalized Posterolateral
**p< 0.05.*
** Significant difference from pre-training.*

Table 4. *Physical fitness performance before and after 6-week training program.*

Group	Pre-test	Post-test	Δ%	Paired t test		
				p value	Cohens d	Magnitude
Measures	**M±SD**	**M±SD**				
LK-S (n=13)						
S&R (cm)	25.2±5.2	26.9±5.01	11.9	0.00*	0.86	Large
T test (sec)	14.3± 0.92	12.2±0.42	-14.3	0.00*	2.12	Large
20-m (sec)	4.140.19	4.13±0.2	-0.2	0.82	0.06	-
SLJ (cm)	1.61±0.95	1.67±0.12	3.79	0.10	0.49	-
S (n=15)						
S&R (cm)	28.1±3.35	30.1±2.45	7.8	0.00*	1.11	Large
T test (sec)	13.5±0.9	12±1.06	-10.6	0.00*	1.69	Large
20-m (sec)	3.97±0.25	3.98±0.21	0.29	0.84	0.05	-
SLJ (cm)	1.66±0.12	1.8±0.14	7.03	0.01*	0.69	Medium

S&R: Sit and Reach Test; T test: Agility T test; SLJ: Standing Long Jump.
**p< 0.05.*
** Significant difference from pre-training.*

Discussion and Conclusion

The aim of this study was to investigate the effects of 6-week Life Kinetik exercises program incorporated with soccer training vs. 6-week regular soccer training on physical fitness parameters and to determine the Life Kinetik training program incorporated with regular soccer training had additional dynamic postural control performance outcomes compared to soccer training alone in prepubescent boys. Our priori hypothesis is consequently falsified. The results of our study showed that both the two training methods are effective to improve composite postural balance score, flexibility and agility performance and ineffective to improve 20-m sprint time trial performance after 6-week intervention. In addition, soccer training alone might be more suitable for lower extremity power in prepubescent boys.

First, our results revealed that the LK-S group significantly improved their normalized Y-Balance score in the all direction, whereas the S group showed significant improvements in the PM%, PL% and COMP% scores after 6-week of training. In the ANT%, LK-S significantly increased their performance by 8.9%, whereas S showed no significant improvement. Our results are inconsistent with previous study of Neiderer et al. (15) examined the well-trained young healthy participants and reported that Life Kinetik training had no effects on dynamic postural control. However, the differences observed may be because the protocols administered in the 2 studies were not identical. In another study, similar our results, the lateral, posterolateral, posterior, posteromedial, and medial direction score of male soccer players increased after acute effects of cognitive based neuromuscular training which based on Life Kinetik exercises, whereas no significant enhancement in anterior, anterolateral and anteromedial occurred (28). In this current study, the improvements in all reach direction score in LK-S may be associated with the applied 6-week of Life Kinetik exercises involving such as line jump, course run and march to different direction to soccer training. Regarding soccer training results, it has been well documented that soccer players have better dynamic postural control performance than untrained subjects (29,30). These findings indicated that some components of soccer such as to maintain unipedal posture to perform lower extremity shooting, dribbling, and passing skills, which are typical of this discipline and repeated many times during both training and competitions (31), which are favorable to improve postural control. However, they addressed experienced adult athletes in these studies. Despite the popularity of postural balance measurement in soccer players such as different age, competition level and compare other sports and related with lower-extremity injury, only few studies examined the dynamic postural control in untrained children. A study comparing soccer players and non-athlete boys, found that there were greater differences in the medial-lateral plane than anterior-posterior plane stability (32). According to Dichgans et al, (33) and Paillard et al. (34) the contribution of afferent information (somatosensory, vestibular, and visual) is less important to regulate mediolateral balance for experienced soccer players. In another study, it was reported that 8-week of soccer-based training twice a week revealed higher improvement in postural balance in soccer players than untrained subjects (35). Moreover, Bieć and Kuczyński, (32) stated the improvement in mediolateral stability might be caused more by the faster matures in the anteroposterior plane in children. In order to improve balance ability, previous studies suggested long-term physical training (34,35) and a specific training program (36). When performing the Life Kinetik exercises involving complex movements, subjects need extra information which promotes them to consider, and the perception of each subject regarding his/her body and the kinaesthetic and vestibular system are trained as well. Our results extended these arguments from different competition levels to beginners demonstrating the effects of adding cognitive motor coordination exercise to soccer training in improving the anterior plane balance performance as well.

In performance-related physical fitness indicators, such as agility, sprint and lower extremity power, both LK-S and S significantly decreased the agility time trial performance, while no positive effects were observed on 20-m sprint performance in both groups. Furthermore, lower extremity power was significantly affected in the S, contrary to the LK-S. Van Praagh (37) suggested certain methods for neural/neuromuscular system of the athletes to improve coordination, movement efficacy, speed of movement or stride frequency, which are considered essential to optimize the efficacy of training during the specific period (5-9 years of age). Regard with agility performance, other studies supports our results in the literature (4,8,38). Consistent with the result from Alesi et al (39). who provided evidence for improvements in agility performance of untrained boys, aged 8.8, decreased of 28% from pretest to post-test after 6-months of soccer training. Sekulic, et al. (40) has stated that the influence of speed and power on agility performances is less. Studies by Ateş 4 and Serbescu et al. (41) showed that SLJ values of prepubescent soccer players were significantly higher than untrained peers. In another study by Hammami et al. (25) the values of 20-m sprint and SLJ were higher in trained adolescent soccer players than untrained age-matched group. We evaluated 20-m sprint time trial performance in the current study. These results may be associated with training sessions not being included in adequate sprints distance. In addition, Stolen et al. (19) recommended using 10-m time-trial performance evaluation in modern soccer.

The last finding of this study was that positive effects were observed in the LK-S and S regarding flexibility. The LK-S and S increased their flexibility by 11.9% and 7.8%, respectively from pre- to post-test. These results are similar to those described by Christou et al. (42) in their study conducted on eighteen soccer players aged 12-15 years. In another study, conversely, Hammami et al. (25) found that there were no significant differences in flexibility between the trained adolescent soccer players and untrained adolescent subjects. In another study supporting ours, the flexibility values were similar in active and non-active boys age between 7 and 12 years (43). They also reported that flexibility is not adversely affected by the participation in soccer training and development when stretching exercises are properly included in the program. In addition, based on Junge and Dvorak (44) results, it is suggested that the general injury prevention program should involve appropriate warm-up for improving flexibility due to the incidence of injuries which seem to increase with age in soccer players. It also has been concluded that dynamic and static stretching exercises performed during warm-up and cool-down significantly affect the flexibility of the LK-S and S.

In conclusion, adding to Life Kinetik exercises lasting 30-min to regular soccer training led to significant improvements in anterior reach distance of Y-BT and no significant effects on SLJ. Additionally, we showed that both training methods (LK-S and S) resulted in improved dynamic postural balance, agility, and flexibility, while no differences were observed in 20-m sprint time trial performance after 6-week intervention. Furthermore, the limitation of the study should also be noted. There were no separate groups not included in a training program or performed only the Life Kinetik exercises, and untrained control group in order to compare the exercise groups. In addition, another major limitation is related to the absence of physical activity enjoyment test, since it was observed by the researchers that children in the LK-S group enjoyed the training more. Further studies conducted with different number of groups and appropriated frequency, length and duration of the combined training will increase the external validity of this research. Consequently, our findings suggested that combining Life Kinetik exercises with soccer training sessions was effective in improving physical fitness performance in preadolescent soccer players.

References

1. Howley ET. Type of activity: resistance, aerobic and leisure versus occupational physical activity. Med Sci Sport Exer 2001; 33: 364-369.
2. Ruiz JR, Rizzo NS, Hurtig-Wennlöf A, Ortega FB, Wàrnberg J, Sjöström M. Relations of total physical activity and intensity to fitness and fatness in children: The European Youth Heart Study. Am J Clin Nutr 2006; 84: 299-303.
3. Ortega FB, Ruiz JR, Castillo M J, Sjöström M. Physical fitness in childhood and adolescence: a powerful marker of health. Int J Obes 2008; 32: 1-11.
4. Ateş B. Enhanced Body Composition and Physical Fitness in Prepubescent Soccer Players. Pedagogical Research 2018; 3: 10.
5. Lopes VP, Rodrigues LP, Maia JA, Malina RM. Motor coordination as predictor of physical activity in childhood. Scand. J. Med. Sci. Sports 2011; 21: 663-669.
6. Bovet P, Auguste R, Burdette H. Strong inverse association between physical fitness and overweight in adolescents: a large school-based survey. Int J Behav Nutr Phy 2007; 4: 24.
7. Jonker JT, De Laet C, Franco OH, Peeters A, Mackenbach J, Nusselder W J. Physical activity and life expectancy with and without diabetes: life table analysis of the Framingham Heart Study. Diabetes care 2006;29;38-43.
8. Yasumitsu T, Nogawa H. Effects of a short-term coordination exercise program during school recess: agility of seven-to eight-year-old elementary school children. Percept Mot Skills 2013; 116: 598-610.
9. Malina RM. Physical activity and fitness: pathways from childhood to adulthood. Am J Hum Biol 2001; 13: 162–172.
10. Malina RM. Physical fitness of children and adolescents in the United States: status and secular change. In Pediatr Fitness 2007; 50: 67-90.

11. Pietsch S, Böttcher C, Jansen P. Cognitive motor coordination training improves mental rotation performance in primary school-aged children. Mind, Brain, and Edu 2017;11:176-180.
12. Lauenroth A, Ioannidis AE, Teichmann B. Influence of combined physical and cognitive training on cognition: a systematic review. BMC geriatrics 2016; 16: 141.
13. Blüchel M, Lehmann J, Kellner J, Jansen P. The improvement in mental rotation performance in primary school-aged children after a two-week motor-training. Edu Psychol 2013; 33: 75-86.
14. Jansen P, Fraunhofer L, Pietsch S. Cognitive motor coordination training and the improvement of visual-spatial cognition in office work. Int J Train Develop 2018;22: 233-238.
15. Niederer D, Plaumann U, Seitz T, Wallner F, Wilke J, Engeroff T, Giesche, F, Vogt L and Banzer W. How does a 4-week motor–cognitive training affect choice reaction, dynamic balance and cognitive performance ability? A randomized controlled trial in well-trained, young, healthy participants. SAGE Open Med 2019;7;1-8.
16. Pichierri G, Wolf P, Murer K, de Bruin ED. Cognitive and cognitive-motor interventions affecting physical functioning: a systematic review. BMC geriatrics 2011;11: 29.
17. Silsupadol P, Shumway-Cook A, Lugade V, van Donkelaar P, Chou LS, Mayr U, Woollacott MH. Effects of single-task versus dual-task training on balance performance in older adults: a double-blind, randomized controlled trial. Arch. Phys. Med. Rehabil 2009;90;381-387.
18. Jak AJ. The impact of physical and mental activity on cognitive aging. CurrTop Behav Neurosci 2012; 10: 273–91.
19. Stolen T, Castagna C, Wisløff U. Physiology of Soccer. Sports Med 2005;35: 501-36.
20. Hicheur H, Chauvin A, Chassot S, Chenevière X, Taube. Effects of age on the soccer-specific cognitive-motor performance of elite young soccer players: Comparison between objective measurements and coaches' evaluation. PloS one 2017; 12: 1-20.
21. Williams AM. Perceptual skill in soccer: implications for talent identification and development. J Sports Sci 2000; 18: 737–50.
22. Gabbett T, Jenkins D, Abernethy B. Game-based training for improving skill and physical fitness in team sport athletes. Int J Sports Sci Coa 2009; 4: 273-283.
23. Impellizzeri FM, Marcora SM, Castagna C, Reilly T, Sassi A, Iaia FM, Rampinini E. Physiological and Performance Effects of Generic Versus Specific Aerobic Training in Soccer Players, Int J Sports Med 2006;27:483-492.
24. Starc G, Strel J. Influence of the quality implementation of a physical education curriculum on the physical development and physical fitness of children. BMC Public Health 2012; 12: 61.
25. Hammami A, Randers MB, Kasmi S, Razgallah M, Tabka Z, Chamari K, Bouhlel E. Effects of soccer training on health-related physical fitness measures in male adolescents. J Sport Health Sci 2018; 7: 169-175.
26. Lutz H. Life Kinetik. Gehirntraining durch Bewegung. München, Germany: BLV 2014.
27. Robinson RH, Gribble PA. Support for a reduction in the number of trials needed for the star excursion balance test. Arch. Phys. Med. Rehabil 2008; 89: 364-370.
28. Emirzeoğlu M. Acute Effects of Cognitive Based Neuromuscular Education and Game Based Education on the Balance and Performance of Healthy Young Football Players, Hacettepe University Institute of Health Sciences Program of Physical Therapy and Rehabilitation Master Thesis, Ankara, 2018 (In Turkish).
29. Davlin CD. Dynamic balance in high level athletes. Percept Mot Skills 2004; 98: 1171-6.
30. Baghbani F, Woodhouse LJ, Gaeini AA. Dynamic postural control in female athletes and non-athletes after a whole-body fatigue protocol. J Strength Cond Res 2016;30: 1942–1947.
31. Ramírez-Campillo R, Gallardo F, Henriquez-Olguín C, Meylan CM, Martínez C, Álvarez C, Izquierdo M. Effect of vertical, horizontal, and combined plyometric training on explosive, balance, and endurance performance of young soccer players. J Strength Cond Res 2015 ;29: 1784-1795.
32. Bieć E, Kuczyński M. Postural control in 13-year-old soccer players. Eur. J. Appl 2010; 110: 703-708.

33. Dichgans J. Postural sway in normals and atactic patients: analysis of the stabilizing and destabilizing effects of vision. Agressologie 1976;17;15-24.
34. Paillard T, Noe F, Riviere T, Marion V, Montoya R, Dupui P. Postural performance and strategy in the unipedal stance of soccer players at different levels of competition. J Athl Train 2006; 41: 172–176.
35. Jadczak L, Grygorowicz M, Dzudzinski W, Sliwowski R. Comparison of static and dynamic balance at different levels of sport competition in professional and junior elite soccer players. J Strength Cond Res 2019; 33: 3384-3391.
36. Jlid MC, Racil G, Coquart J, Paillard T, Bisciotti GN, Chamari K. Multidirectional Plyometric Training: Very Efficient Way to Improve Vertical Jump Performance, Change of Direction Performance and Dynamic Postural Control in Young Soccer Players. Frontiers Physio 2019;10.
37. Van Praagh E. Pediatric Anaerobic Performance. Champaign, IL: Human Kinetics Publisher, Inc 1998.
38. Yasumitsu T, Nogawa H, Hatano Y. Effects of the Coordination Exercise Program on School Children's Agility: Short-Time Program during School Recess. ICHPER-SD J Res 2011; 6: 10-13.
39. Alesi M, Bianco A, Luppina G, Palma A, Pepi A. Improving children's coordinative skills and executive functions: the effects of a football exercise program. Percept Mot Skills 2016;122: 27-46.
40. Sekulic D, Spasic M, Mirkov D, Cavar M, Sattler T. Gender-specific influences of balance, speed, and power on agility performance. J Strength Cond Res 2013; 27: 802-811.
41. Serbescu C, Flora D, Hantiu I, Greene D, Benhamou CL, Courteix D. Effect of a six-month training programme on the physical capacities of Romanian schoolchildren. Acta Paediat 2006; 95: 1258-1265.
42. Christou M, Smilios I, Sotiropoulos K, Volaklis K, Pilianidis T, Tokmakidis SP. Effects of resistance training on the physical capacities of adolescent soccer players. J Strength Cond Res 2006; 20: 783-791.
43. Ara I, Moren LA, Leiva MT, Gutin B, Casajús JA. Adiposity, physical activity, and physical fitness among children from Aragon, Spain. Obesity 2007; 15: 1918-1924.
44. Junge A, Dvorak J. Soccer injuries. Sports Med 2004; 34: 929-938.

Plyometric Training Improves Some Physical and Biomotoric Parameters of Young Male Basketball Players

Ali Erdem Cigerci[1] and Harun Genc[2]
[1]*Assistant Professor, Kastamonu University, Kastamonu, Turkey.*
[2]*Assistant Professor, Bingol University, Bingol, Turkey.*

Abstract

Plyometric training is essential for basketball players as well as for every athlete. Although the effect of plyometric training on players is very well researched, some deficiencies especially about anaerobic power parameter are noticeable. The target of current study was to demonstrate the effect of 8-week plyometric training applied to male basketball players aged 15-16 on some anthropometric and performance-based parameters. Volunteers were seperated two groups as plyometric training group (PTG) and control group (CG). PTG was applied plyometric training during 8 weeks and 3 days per week additionally basketball training. CG just continued basketball training. The effect of plyometric training was compared after eight weeks with repeated measures MANOVA for the tests. While there was a significant difference in height and body weight on behalf of PTG, a statistically significant improvement was found in all performance measurements except star excursion balance test (SEBT), running-based anaerobic sprint test (RAST) minimum power and fatigue index parameters of PTG. The results indicate that plyometric training is very effective in terms of physical and biomotoric features of young basketball players.

Keywords: Anaerobic Power, Performance Enhancement, Plyometric Training, Youth

1. Introduction

Basketball is considered as a team sport which includes repetitive transitions between offense and defense and frequent movement changes that require rapid changes in direction, [1,2] is intermittent [3] and anaerobic-based [4,5]. In basketball, the better the player can dribble, score a point or pass, the greater chance of success. However, for an athlete, being healthy and fit and reaching a physical capacity beyond the required basic standards are prerequisites to achieve a long-term and high level of sporting efficiency [6].

In addition to technical, tactical and mental development in basketball, while it is reported that strength is one of the most important characteristics [7], it is also declared that jumping faster and higher is one of the most important biomotoric feature for great performance [8]. In literature, it is easily understood that anaerobic-based parameters of basketball players such as explosive power [9,10], anaerobic power [10,11] and agility [10,12,13] should be improved in the best manner to compete at the highest level. The ability to produce maximum power in the shortest time is considered necessary to achieve a high level of success in sportive performance [14-16]. Therefore, highly enhanced explosive strength and power features are considered to be so noteworthy for a basketball player. However, when it comes to the ability of basketball players to apply maximal force in the shortest time and to train the agility and speed parameters, plyometric training is seen as a good way to do this.

Plyometric training is considered as a popular training method for athletes and has a lot of place in basketball strength and fitness programs [17,18]. It is also understood that plyometric training is accepted worldwide by scientific research and gained reliability [19]. Plyometric exercises often include exercises such as standing jumps, multiple jumps, forward or side to side jumps, box exercises, depth jumps, throws, catches, and various types of push-ups. In addition, explosion and short amortization are seen as very important in the implementation of all these movements [20,21]. In particular, human movement is enhanced by jumping, bouncing and other opposite activities, defined as stretch-shortening cycle, which means a combination of eccentric and concentric contractions that form a muscle function [22,23]. In anaerobic-based sports such as basketball, players need to improve their explosive strength features by applying such movements. In consideration of above information, we hypothesize that plyometric training performed for 8

weeks can especially improve the anaerobic-based features of young basketball players

Therefore, the aim of current study was to evaluate the effect of 8-week plyometric training applied to male basketball players aged 15-16 on some physical and biomotoric performance parameters and to make suggestions to coaches and athletes on training and training planning.

2. Method

2.1. Subjects

20 male basketball players participated in the study. After the pre-test period, in order to ensure that there was no difference between the groups physically and physiologically, the groups were formed as follows: 10 players (age=15,85+0,37 years, height=178,21+10,14 cm, weight=69,49+8,48 kg) for plyometric training group (PTG) and 10 players (age=15,42+0,53 years, height=173,57+11,09 cm, weight=64,98+12,25 kg) for control group (CG). Besides, the parents of each player were informed about the procedure and the parental signed consent form was obtained.

2.2. Procedures

At the application stage of the study, an 8-week plyometric training program was applied to PTG three days a week (Monday, Wednesday, Friday). During the training period, CG did not participate in any training programs except for technical and tactical training programs of their team while PTG participated in the basketball and plyometric training for approximately 90 minutes.

2.3. Training Plan

The basketball players were divided into two groups as PTG and CG according to pre-test data. The training program was planned to be 12 repetitions and 2 sets for each movement and the subjects were given 1 minute between repetitions and 3 minutes between sets in order to provide full recovery. Participants were warned not to perform any challenging exercise except basketball and plyometric training during the study.

Table 1. *8-week plyometric training program [24]*

Movements	1st Week	2nd Week	3th Week	4th Week	5th Week	6th Week	7th Week	8th Week
Calf Raise	2X12	2X12	2X12	2X12	2X12	2X12	2X12	2X12
Forward and Back Ankle Hops	2X12	2X12	2X12	2X12	2X12	2X12	2X12	2X12
Standing Jump and Reach	2X12	2X12	2X12	2X12	2X12	2X12	2X12	2X12
Side to Side Ankle Hops	2X12	2X12	2X12	2X12	2X12	2X12	2X12	2X12
Knee Tuck Jump					2X12	2X12	2X12	2X12
Squat Jump						2X12	2X12	2X12
Step-Close Jump and Reach							2X12	2X12
Split Squat Jump								2X12
VOLUME	96	96	96	96	120	144	168	192
WEEKLY VOLUME	288	288	288	288	360	432	504	576

2.4. Physical Measurements

In this section, the information about height, body weight (BW), body mass index (BMI), body fat percentage (BFP), skeleton muscle mass (SMM) parameters of subjects will be explained.

The height of the subjects was measured by a stadiometer (Holtain, UK) with 1 mm accuracy and body weight (BW) was determined with a sensitivity of 1 gr in anatomical position (Medisana, Germany). BMI values of basketball players were evaluated by "BMI = weight (kg) / (height)^2" formula.

2.5. Motoric Performance Measurements

In this section, vertical jump (VJ), standing long jump (SLJ), running-based anaerobic sprint test

(RAST), 10-20m sprint, Lane agility test (LAT), star excursion balance test (SEBT) will be explained as part of motoric performance measurements.

2.5.1. Jump Tests

In VJ test, the height that the subject could reach was taken as the starting point while the feet were on the ground. The difference between the point that the subject jumped and touched and the starting point was calculated. In SLJ test, the participant jumped from the back of the starting line to the furthest possible point and the distance between the back of the heel at the point where the subject landed and the starting line was measured. Better than two trials were recorded as "cm" for both tests [25].

2.5.2. Running-based anaerobic sprint test (RAST)

Peak power (PP), minimum power (MinP), average power (AveP) and fatigue index (FI) values were obtained as a result of the test consisting of six 35-meter sprints with a 10-second rest between each sprint [26].

2.5.3. 10m-20m speed and acceleration tests

The subjects started the test from the starting line located 1 meter behind the starting photocell (Newtest 2000; Newtest Oy, Oulu, Finland). Acceleration and speed values of the subjects were recorded through the photocells placed at 10^{th} and 20^{th} meter. Each participant repeated the test twice, and the best one was recorded as "seconds".

2.5.4. Lane agility test (LAT)

Cones were placed at the 4 corners of the key on a basketball court. Standing at the left side corner of the free throw line facing the baseline, the subjects ran to the bottom line, sided step right to the second cone at the baseline, ran backward to the foul line and came back to the place where the test started with the sliding step. Afterwards, they made the same running and side step movements in a counterclockwise direction. Average of two trials was recorded as agility score [27].

2.5.5. Star excursion balance test (SEBT)

The participants were asked to touch the furthest point they could reach in eight directions with an angle of 45 degrees. The test was performed three times for both feet. Balance score was calculated by "sum of eight directions / leg length x 100" [28].

2.6. Statistics

The sample's homogenity test between the groups and the Chi square test was applied to understand whether the distribution obtained from the sample fits the desired theoretical distribution or not. For physical and performance tests, the pre and post-test distributions of the variables by groups were analyzed, the normality of the distributions and the homogeneity of the variances were determined by Mauchly's Test of Sphericity. Inter-group, intra-group and training-related analyzes were performed with multivariate analysis of variance (MANOVA) in repeated measurements. In significant relationships, Post Hoc comparisons continued with Bonferroni Test and significance level was set as 0.05.

3. Results

Table 2. *Descriptive statistics of players and comparison of physical measurements between groups*

Group	N	Variables	Average+S.D	Min.	Max.
PTG	10	Age (year)	15.85±0.37	15	16
CG	10		15.42±0.53	15	16
PTG	10	Height (cm)	178.21±10.14	160.00	192.00
CG	10		173.57±11.09	159.00	188.00

PTG	10	BW (kg)	69.49±8.48	55.70	81.80		
CG	10		64.98±12.25	49.00	86.10		
PTG	10	BMI(kg/m²)	18.52±4.32	14.10	26.90		
CG	10		19.47±3.85	15.00	25.50		
						Chi Square (X^2)	**p**
Total 20		Age (year)	15.64±0.49	15	16	0.192	0.661
		Height (cm)	176±10.55	159.00	192.00	0.690	0.406
		BW (kg)	67.23±3.49	49.00	86.10	0.920	0.337
		BMI(kg/m²)	19.00±3.97	14.10	26.90	0.262	0.609

Body Mass Index: BMI, Body Weight: BW
***p< 0.05**

For all descriptive variables, no significant difference was observed between the groups before the training process.

Table 3. *Comparison of pre and post-test changes of physical features of groups*

Variables	n	Group	Pre-Test X ±SS	Post-Test X±SS	In-group Change(%)	Test*Group F	p
Height (cm)	10	PTG	178.21±10.14	179.71±9.96	**1.50 (% 0.84)***	**16.615**	**0.002***
	10	CG	173.57±11.09	174.21±11.09	**0.64 (% 0.37)***		
BW (kg)	10	PTG	69.48±8.49	69.84±9.52	0.36 (% 0.52)	**5.560**	**0.036***
	10	CG	64.98±12.25	66.43±12.15	**1.45 (% 2.23)***		
BMI (kg/m²)	10	PTG	18.53±4.32	17.82±4.09	-0.71 (% -3.83)	0.124	0.731
	10	CG	19.47±3.85	18.94±3.39	-0.53 (% -2.72)		

Body Weight: BW, Body Mass Index: BMI
***p< 0.05**

In Table 3, it was seen that there was a test*group interaction in height and BW. While the interaction in the height parameter was caused by the positive increase in PTG, it was determined that the interaction in the BW feature was due to the increase in the value of CG. There was no statistically significant difference in BMI parameter.

Table 4. *Comparison of pre and post-test changes of RAST between groups*

Variables	n	Group	Pre-Test X ±SS	Post-Test X±SS	In-group Change(%)	Test*Group F	p
PP (Watt)	10	PTG	292.57±57.42	371.42±118.05	**78.85 (% 26.95)***	**19.289**	**0.001***
	10	CG	246.29±92.95	295.86±96.29	**48.95 (% 19.82)***		
AveP (Watt)	10	PTG	224.57±44.65	269.85±70.44	**45.25 (% 20.16)***	**7.607**	**0.017***

MinP (Watt)	10	CG	197.43±48.22	220.57±70.50	23.14 (% 11.72)	0.007	0.937
	10	PTG	177.28±43.45	203.43±66.23	26.15 (% 14.75)		
FI (%)	10	CG	148.14±20.66	175.86±33.58	27.72 (% 18.71)	1.913	0.192
	10	PTG	3.41±1.46	5.27±3.65	1.86 (% 54.54)		
	10	CG	3.27±2.45	3.67±3.18	0.4 (% 12.23)		

Peak Power: PP, Average Power: AveP, Minimum Power: MinP, Fatigue Index: FI
***p< 0.05**

In Table 4, it was understood that there was no test*group interaction in MinP and FI and the test*group interaction was found in PP and AveP. While the significance was due to the improvement of both groups in PP, the interaction was caused by a significant increase of PTG in AveP post-test measurements.

Table 5. *Comparison of pre and post-test changes of performance measurements between groups*

Variables	n	Group	Pre-Test X ±SS	Post-Test X±SS	In-group Change(%)	Test*Group F	p
10 m (sec)	10	PTG	1.94±0.26	1.72±0.20	**-0.22 (% -11.34)***	**19.003**	**0.001***
	10	CG	1.99±0.26	2.00±0.24	0.01 (% 0.50)		
20 m (sec)	10	PTG	3.31±0.16	3.18±0.14	**-0.13 (% -3.92)***	**21.051**	**0.001***
	10	CG	3.55±0.34	3.54±0.33	-0.01 (% -0.28)		
SLJ (cm)	10	PTG	194.14±27.787	209.43±29.27	**15.29 (% 7.88)***	**14.612**	**0.002***
	10	CG	183.86±26.02	186.29±25.3	**2.43 (% 1.32)***		
VJ (cm)	10	PTG	45.14±6.41	51.29±8.06	**6.15 (% 13.62)***	**6.490**	**0.026***
	10	CG	39.93±5.54	41.28±5.28	**1.35 (% 3.38)***		
LAT (cm)	10	PTG	6.21±0.26	5.89±0.35	**0.32 (% 5.15)***	**5.222**	**0.041***
	10	CG	6.35±0.38	6.31±0.37	0.04 (% 0.63)		
SEBT(R)	10	PTG	619.19±48.61	645.95±75.11	26.76 (% 4.32)	1.071	0.321
	10	CG	651.42±40.19	657.56±74.18	6.14 (% 0.94)		
SEBT(L)	10	PTG	609.77±60.21	651.84±67.17	42.07 (% 6.90)	2.594	0.133
	10	CG	643.84±42.06	654.37±51.29	10.53 (% 1.63)		

Standing Long Jump: LJ, Vertical Jump: VJ, Lane Agility Test: LAT, Star Excursion Balance Test: SEBT, Right: R, Left: L
***p< 0.05**

When the data of sprint, SLJ, VJ and LAT tests of the groups showing inter-group, intra-group and test*group relationships were analyzed, it was seen that there was a statistically significant difference in these parameters and this difference was due to the development in PTG. In addition, although the improvement of PTG in balance parameter was noteworthy, it was not considered as statistically significant.

4. Discussion

In the study, measurements of the physical and motoric performance features of 20 male basketball players (PTG=10, CG=10) were evaluated. In the discussion section of the study, first of all, the physical measurements of groups and then the motoric performance features will be evaluated.

When the descriptive statistics of groups such as age, height, BW and BMI were examined, there was no difference between the groups before the training process. In addition, there was no difference between the groups in terms of motoric performance features before the training period. It is concluded that the distribution between groups is homogeneous and that there is no statistically significant difference between groups before plyometric training period.

The pre and post-test measurements of the subjects' physical characteristics such as height, BW and BMI are compared in terms of intergroup, intragroup and group*test interaction. While there was a significant increase in the height parameter between the two measurements as a result of explosive strength exercises applied to basketball players [29], it was observed that combining specially arranged plyometric training with sports training resulted in a significant difference in BW [30]. It was observed that moderate intensity training programs in sports branches such as swimming, basketball, volleyball and athletics had a positive effect on the growth and development of children [31]. The significant difference in BW and height parameters between pre and post-test can be explained by the rapid increase in height with the onset of puberty, as well as the positive effect of sports on bone development of children in adolescence. On the other hand, the decrease in BW detected in PTG is thought to cause weight loss as plyometric training brings an increase in extra intensity and volume on the athletes in PTG, and the increase in BW in CG is also thought to be due to the effects of factors such as physical environment, nutrition and genetics.

When the RAST measurements of the subjects were examined, it was seen that there was a significant increase in post-test measurements in PP parameter in both groups, a significant increase in the AveP value in PTG and after MinP and FI values were examined, it was found that the test*group interaction was not significant. It was reported that RAST values showed improvement as a result of plyometric training in basketball [24,32] as well as different sports branches [33-35]. The reason why there is no significant difference in minimum power and fatigue index parameters can be explained as the tolerance of the players to the progressing high intensity exercises is not fully developed and they should add exercises that enhancing anaerobic power to their training programs. Besides, to the best of our knowledge, studies that investigated RAST results as a result of plyometric training on basketball are very limited. Therefore, it is thought that current study will contribute to the literature in this regard.

When VJ and SLJ tests of the groups were examined, it was seen that there was a statistically significant difference in both parameters and this difference was due to the development in PTG. It was reported by some researches that plyometric training improved jumping ability of athletes [36-39]. Jumping, cutting and pivoting activities occur in almost all sports which have plyometric demands, thus the concept of power development is the key for many activities of daily life as well as competitive sports. Plyometric exercises should play a critical role to develop power for performance [40]. Based on this information, it can be said that the plyometric training program in current study makes a very positive contribution to VJ and SLJ features of athletes compared to basketball training.

When the sprint and LAT results of the groups were examined, it was seen that there was a statistically significant difference in both parameters and that this difference resulted from the development of PTG. Many studies in the literature have reported that plyometric training improves the sprint [41,42]and agility features[43,44] of athletes. Agility and speed are thought to be an integral part of approximately every defense and offensive movement of basketball players in training and competitions [45]. Therefore, it is understood that the results of this study are similar to those of other studies in the literature on the effects of plyometric training on speed and agility values. According to this information, it can be said that increased muscle strength and explosiveness as a result of plyometric training applied in the study had a positive effect on speed and agility characteristics.

When SEBT results of the groups were examined, it was observed that the intergroup, intragroup and test*group relationship was not statistically significant. However, it was observed that there is more improvement (SEBT R: %4.32, %0.94; SEBT L: %6.90, %1.63) in PTG than in CG. According to the results of the studies using SEBT to measure dynamic balance parameter in the literature, plyometric training has improved the balance feature [46-49], but these studies are very limited. Therefore, it is thought that the

reason for the significant difference seen in different studies may be due to the characteristics such as duration, volume, type of plyometric training.

5. Conclusions

Briefly, while there was no statistically significant difference in pre-test results between PTG and CG in the physical and performance tests in our study, after 8-week plyometric training, positive increase in height parameter of PTG was seen in the post-test results. On the other hand, a statistically significant improvement was found in all performance measurements except SEBT, RAST MinP and FI parameters of PTG. As a result, it is understood that plyometric training has a positive effect on basketball players in terms of both physically and performance development. In addition, it is seen as a result of current study that all trainers and strength-condition coaches should definitely add plyometric training to the training programs of basketball players.

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References

1. Ben Abdelkrim N, El Fazaa S, El Ati J. Time–motion analysis and physiological data of elite under-19-year-old basketball players during competition. Br J Sports Med 2007;41:69–75
2. McInnes SE, Carlson JS, Jones CJ, McKenna MJ. The physiological load imposed on basketball players during competition. J Sport Sci 1995;13(5):387-97.
3. Hoffman J. Physiology of basketball. In: McKeag DB, editor. (2008). Handbook of sports medicine and science: Basketball. Malden: Blackwell Science Ltd; 2008. p. 12–24.
4. Delextrat A, Cohen D. Strength, power, speed, and agility of women basketball players according to playing position. J Strength Cond Res 2009;23(7)1974-81.
5. Meckel Y, Casorla T, Eliakim A. The influence of basketball dribbling on repeated sprints. Int J Coach Sci 2009;3(2):43-56.
6. Dundar U. Conditioning in basketball (Basketbolda kondisyon). Ankara: Bagirgan Publishing House; 1999.
7. Erol AE, Sevim Y. Cabuk kuvvet calismalarinin 16-18 yas grubu basketbolcuların motorsal ozellikleri uzerine etkisinin incelenmesi. Spor Bilimleri Dergisi 1993;4(3):25-37.
8. Muratli S, Kalyoncu O, Sahin G. Training and competition (Antrenman ve müsabaka). İstanbul: Kalyoncu Sports Consultancy; 2011.
9. Štrumbelj E, Erčulj F. Analysis of experts' quantitative assessment of adolescent basketball players and the role of anthropometric and physiological attributes. J Hum Kinet 2014;42(1):267-76.
10. Struzik A, Pietraszewski B, Zawadzki J. Biomechanical analysis of the jump shot in basketball. J Hum Kinet 2014;42(1):73-9.
11. Delextrat A, Cohen D. Physiological testing of basketball players: toward a standard evaluation of anaerobic fitness. J Strength Cond Res 2008;22(4):1066-72.
12. Ben Abdelkrim N, Chaouachi A, Chamari K, Chtara M, Castagna C. Positional role and competitive-level differences in elite-level men's basketball players. J Strength Cond Res 2010;24(5):1346-55.
13. Arazi H, Coetzee B, Asadi A. Comparative effect of land and aquatic based plyometric training on the jumping ability and agility of young basketball players. S Afr J Res Sport Phys Edu Rec 2012;34(2):1–14.
14. Brittenham G. Complete conditioning for basketball. Champaign, IL: Human Kinetics; 1997.
15. Hedrick A. Sports-specıfıc: Strength and power training for basketball. Strength Cond J 1993;15(4), 31-6.
16. Klinzing JE. Training for improved jumping ability of basketball players. Strength Cond J 1991;13(3):27–32.
17. King JA, Cipriani DJ. Comparing preseason frontal and sagittal plane plyometric programs on vertical jump height in high-school basketball players. J Strength Cond Res 2010;24(8):2109-14.

18. Simenz CJ, Dugan CA, Ebben WP. Strength and conditioning practices of National Basketball Association strength and conditioning coaches. J Strength Cond Res 2005;19(3):495-504.
19. Jose SA, Khan DJAA, Saran KS. Effect of plyometrics on the vertical jumping ability on basketball players. Int J Physiol Nutr Phys Educ 2018;3(1):1363-66.
20. Radcliffe J, Farentinos R. High powered plyometrics. Champaign, IL: Human Kinetics; 1999.
21. Ratamess N. ACSM's foundations of strength training and conditioning. Chine: Lippincott Williams &Wilkins; 2012.
22. Komi PV. Stretch-shortening cycle: a powerful model to study normal and fatigued muscle. J Biomech 2000;33(10):1197-206.
23. Harrison AJ, Gaffney S. Motor development and gender effects on stretch-shortening cycle performance. J Sci Med Sport 2001;4(4):406-15.
24. Cigerci AE. The effects of aquatic and land plyometric trainings with additional load on some physical and physiological features of 15-17 age group basketball players. Doctoral dissertation, Gazi University Institute of Health Sciences; 2017.
25. Castro-Pinero J, Gonzalez-Montesinos JL, Mora J, Keating XD, Girela-Rejon MJ, Sjostrom M, et al. Percentile values for muscular strength field tests in children aged 6 to 17 years: influence of weight status. J Strength Cond Res 2009;23(8):2295-310.
26. Balčiūnas M, Stonkus S, Abrantes C, Sampaio J. Long term effects of different training modalities on power, speed, skill and anaerobic capacity in young male basketball players. J Sport Sci Med 2006;5(1):163-70.
27. McGill SM, Andersen JT, Horne AD. Predicting performance and injury resilience from movement quality and fitness scores in a basketball team over 2 years. J Strength Cond Res 2012;26(7):1731-9.
28. Gribble PA, Hertel J. Considerations for normalizing measures of the Star Excursion Balance Test. Meas Phys Educ Exerc Sci 2003;7(2):89-100.
29. Sen A. The effects of explosive strength trainings, applied among the basketball players aged between 12 and 14 on jumping capability. Master Thesis, Sakarya University Institute of Social Sciences; 2003.
30. Gur E. Effects of regular specific plyometric training on anaerobic power of young soccer players. Master Thesis, Firat University Institute of Health Sciences; 2001.
31. Zorba E, Saygin O. Physical activity and physical fitness (Fiziksel aktivite ve fiziksel uygunluk). 3rd ed. Ankara: Inceler Printing; 2009.
32. Shirali S, Daneghian S, Barari A, Masoumi H, Rezaee H, Rahimi R. The effects of six weeks plyometric training and mistletoe supplementation on changes of cytokines levels and performance in basketball players. The Ayer 2015;1:267-76.
33. Khodajo AR, Nikseresht A, Khoshnam E. The effect of strength and plyometric training on anaerobic power, explosive power and strength quadriceps femoris muscle in soccer players. Eur J Exp Biol 2014;4(1):448-51.
34. Sarapardeh AH, Gholami M, Ebrahim K. The effect of plyometric training on lower limb and aerobic power in adolescent handball player. Int J Basic Sci Appl Res 2014;3(4):241-4.
35. Shiran MY, Kordi MR, Ziaee V, Ravasi AA, Mansournia MA. The effect of aquatic and land plyometric training on physical performance and muscular enzymes in male wrestlers. Res J Biol Sci 2008;3(5):457-61.
36. Asadi A, Ramírez-Campillo R. Effects of cluster vs. traditional plyometric training sets on maximal-intensity exercise performance. Medicina 2016;52(1):41-5.
37. Markovic G, Mikulic P. Neuro-musculoskeletal and performance adaptations to lower-extremity plyometric training. Sports Med 2010;40(10):859-95.
38. Mazurek K, Zmijewski P, Makaruk H, Mróz A, Czajkowska A, Witek K, et al. Effects of short-term plyometric training on physical performance in male handball players. J Hum Kinet 2018;63(1):137-48.
39. Stojanović T, Kostić RM. The effects of the plyometric sport training model on the development of the vertical jump of volleyball players. FU Phys Ed Sport 2002;1(9):11-25.
40. Davies G, Riemann BL, Manske R. Current concepts of plyometric exercise. Int J Sports Phys

Ther 2015;10(6):760-86.
41. Chelly MS, Ghenem MA, Abid K, Hermassi S, Tabka Z, Shephard RJ. Effects of in-season short-term plyometric training program on leg power, jump-and sprint performance of soccer players. J Strength Cond Res 2010 24(10):2670-6.
42. Kotzamanidis C. Effect of plyometric training on running performance and vertical jumping in prepubertal boys. J Strength Cond Res 2006;20(2):441-5.
43. Aalizadeh A, Daneshi A, Shirkhani S, Borazjani AF, Ashtiyani SC, Mobaseri N. The effect of short-term plyometric training program on sprint, strength, power and agility performance in non-athletic men. Biosci Biotech Res Asia 2015;12(2):1389-95.
44. Lehnert M, Hůlka K, Malý T, Fohler J, Zahálka F. The effects of a 6 week plyometric training programme on explosive strength and agility in professional basketball players. Acta Gymn 2013;43(4):7-15.
45. Ziv G, Lidor R. Physical attributes, physiological characteristics, on-court performances and nutritional strategies of female and male basketball players. Sports Med 2009;39(7):547-68.
46. Asadi A, de Villarreal ES, Arazi H. The effects of plyometric type neuromuscular training on postural control performance of male team basketball players. J Strength Cond Res 2015;29(7):1870-5.
47. Granacher U, Prieske O, Majewski M, Büsch D, Muehlbauer T. The role of instability with plyometric training in sub-elite adolescent soccer players. Int J Sports Med 2015;36(05):386-94.
48. Sedaghati P. The effect of selective plyometric exercises using an unstable surface on the movement performance of basketball players. Ann Appl Sport 2018;6(3):15-22.
49. Turgut E, Colakoglu FF, Serbes P, Akarcesme C, Baltaci G. Effects of 12-week in-season low-intensity plyometric training on dynamic balance of pre-pubertal female volleyball players. Turkish Journal of Sport and Exercise. 2017;19(1):24-30.

The Level of Sports Career Predicts Mental Training Levels of Student Athletes

Alkan Uğurlu[1]
[1]*Assistant Professor, Faculty of Sport Sciences, Turkey.*

Abstract

Previous researches showed that mental training is helpful to enhance performance. This study aimed to investigate mental training levels of student athletes according to their level of sports career. The study was conducted at Akdeniz University. A total number of 206 sport science student athletes, 102 (49.5) female and 104 (50,5) male, participated in the study voluntarily. Considering the athletes' level of sports, there are 76 professionals and 130 amateur athletes. As a data collection instrument Turkish version of the sport mental training questionnaire was used. ANOVA was used in the data analysis. The collected data were analyzed with SPSS 25.0 package program. For the distribution of the data, the skewness and kurtosis values were examined with a range of +2 and -2, and regression analysis was carried out to determine the power of the independent variable in predicting the dependent variable for the purpose of the research. As a result of the current research, level of sport career positively predicts sport mental training level of student athletes, and the current study is determined that professional athletes have higher mental training skills than amateur athletes.

Keywords: Mental Training , Sports career, Student-athlete, Sport, Performance, Psychological skill

1. Introduction

It has been revealed by researches that only physical exercises including motoric abilities such as strength, strength, quickness, endurance are not enough to improve the performance of athletes. As a result of the need for how to improve performance in general, mental training practices have started to emerge in the field of sports psychology (4). A lot of research has been conducted on both recreational and competition athletes. All these studies have demonstrated that there is a relationship between mental training (psychological techniques) and performance development, and they emphasize that the mental (Psychological) training methods, as well as the physical characteristics of the athletes, play an important role on performance (1, 6, 4, 3, 2, 7, 13, 21, 22).

In the literature on mental training many different definitions have been noted such as; according to Unestahl, the whole of psychological techniques aimed at controlling and changing an individual's internal and external, mental and physical behavior and experiences (as cited in, 8), reviving the movement in the mind without actually being done (9), systematic improvement of the management of psychological processes such as perception, attention, learning, motivation, stress that affect the person engaged in before, after or during a sport activity (11), passive learning process without physical activity (12), intensively imaginary of the planed movement in the mind against positive or negative situations that may be encountered during training or competition without practice (10).

When mental training practices first appeared, the main purpose was to improve the performance of adult competition athletes. This aim has changed / transformed over time and aims to enhance both athletes and young athletes with lower performance (4).

To minimize the negative effects of psychological factors such as self-confidence, self-efficiacy, arousal, anxiety, attention and stress on performance of athletes before, during or after training or competition, some mental training methods such as goal setting, imagerey, relaxation and self-talk are used (17, 18, 19, 20, 16, 15, 14, 23, 24).

In elite level competitions where performances are very close to each other, athletes with good psychological performance as well as physical performance differ from others and increase their chances of success. As demonstrated by the aforementioned research, a relationship has been shown to exist between using mental

skills during competition and objective success in competition. Also, the studies that have compared elite/successful athletes with non-elite/unsuccessful athletes claim that the elite/successful population uses mental skills more consistently and on daily basis, suggesting possible benefits from incorporating the use of mental skills into physical practice (26, 27, 28, 29).
From this perspectives, the aim of this study was to determine the levels of student athletes' mental training according to their levels of sports career.

2. Method

2.1. Participants

A total number of 206 sport science students, 102 (49.5) female and 104 (50,5) male, participated in this study voluntarily. Considering the students' levels of sports career, there are 76 professional and 130 amateur athletes.

2.2. Materials

To determine the mental training levels of Sport Science Faculty students regarding their level of sports careers, the sport mental training questionnaire (SMTQ) which was used. The SMTQ was developed by Behnke et al. (2017) and adapted to Turkish culture by Yarayan and İlhan (2018), and has 20 items and 5 subdimensions. Internal consistency was examined using Cronbach's alpha for the SMTQ and Cronbach's alpha coefficient was .89 .

23. Statistical Analyses

For the distribution of the data, the skewness and kurtosis values were examined with a range of +2 and -2 (35). Regression analysis was carried out to determine the power of the independent variable in predicting the dependent variable for the purpose of the research. SPSS 25.0 package program was used for statistical analyses.

3. Results

According to analyses, the data were determined to be normally distributed. As shown in Table 1, it was found that the level of sport career predicted mental training skills significantly (p =, 000) and explained 10% of the variance (R = 307, R2 =, 095). The standardized regression coefficient was found as (β) -, 307. When the average between groups was examined, it was found that professional (82,28) athletes had higher mental training skills than amateur (75,68) athletes.

Table1. *An example of a table.*

Variable	B	Beta	t	R	R^2	Adjusted R^2	F	P
Constant	82,22		72,150					
Level of Sport Career	-6,605	-,307	-4,600	-307	,095	,090	21,164	,000*

Durbin-Watson=1,600

Regression analysis assumptions; It was determined that there was a moderate significant correlation between the two variables, the variance increase factor (VIF) was below 10 and the tolerance value was above 0.2, and there was no multiple connection problem (36).

4. Discussion and Conclusion

The purpose of the present study was to determine the levels of mental training in sports according to the level sports career of sports science students. The results demonstrated that level of sports career

positively predicts sport mental training levels of student athletes. It works to explain 10% of the variance where the level of sports career predicts mental training skills significantly (p =, 000). (R = 307, R^2 =, 095). The standardized regression coefficient is applied as (β) -, 307. The current study suggests that professional athletes have higher mental training skills than amateur athletes. The reason for this is that athletes with high level of athletics have more detailed information about mental training methods and some of them use these methods for that reason.

In the previous research, mental training programs were conducted on student-athletes which lead to the performance enhancements (33, 4). Ungerleider and Golding (1991) research on elite athletes showed that 97% of athletes had knowledge on imagery, visualization or mental practice, 93,6% of them understood the concept and 84.7% of them practiced some forms of it. Additionally, 41.8% of athletes reported that they practice some forms of mental trainings from two to six times in a week and 16.3% practice it seven times or more in a week. Previous researchers have reported that skilled golfers have higher mean scores on mental preparation, concentration, automaticity and commitment then less skilled golfer (29, 25, 32, 30, 31). Also Güler and Erhan (2017) has found significant differences among the responses by amateur and professional athletes in terms of their levels of sport in total.

In conclusion, the level of sports career is suggested to predict sport mental training levels of student athletes positively. However, there are certain limitations of this study. Further research on this subject should be conducted to point out and understand underpinning mechanisms on mental training levels of student athletes and its relationship with the level of sports career. Further research with more participants with different backgrounds can be conducted. Moreover, experimental or qualitative research may be helpful to enhance the knowledge on mental training and the level of sports career relationship.

References

1. Weinberg, RS, Gould D. Foundations of sport and exercise psychology. 6th ed. Champaign, IL, Human Kinetics; 2015
2. Bakker FC. and Kayser CS. Effect of a self-help mental training programme. International J of Sport Psychology, 1994; 25:158–175.
3. Patrick TD, Hrycaiko DW. Effects of a mental training package on an endurance performance. Sport Psychologist 1998; 12:283–299.
4. Mamassis G, Doganis G. The effects of a mental training program on juniors' precompetitive anxiety, self-confidence, and tennis performance. J of Applied Sport Psychology 2004;16:118–137.
5. Vealey RS. Mental skills training in sport. In: Tenenbaum G, Eklund RC. Handbook of Sport Psychology. 3th ed. Hoboken, New Jersey: John Wiley & Sons, Inc.; 2007. p. 287-309
6. Lutz A, Slagter HA, Rawlings NB, Francis AD, Greischar LL, Davidson RJ, Mental training enhances attentional stability: neural and behavioral evidence. J of Neuroscience. 2009; 29: 13418–13427.
7. Efran J, Lesser G, Spiller M. Enhancing tennis coaching with youths using a metaphor model. The Sport Psychologist. 1994; 8:349–359.
8. Uneståhl LE. Sport Psychology in Theory and Practice, Örebro: VEJE Int. Publ. 1985.
9. Hecker JE, Kaczor LM. Application of imagery theory to sport psychology. J of Sport and Exercise Psychology, 1988;10:363–373.
10. Koruç Z, Bayar P. Kitle sporu ve spor psikolojisi. Spor ahlaki ve spor felsefesine yeni yaklaşımlar sempozyumu, İstanbul Universitesi. 1990.
11. İkizler C, Karagozoğlu C. Sporda başarının psikolojisi, İstanbul: Alfa Basım Yayın Dağıtım. 1997.
12. Altıntaş A, Akalan C. Zihinsel antrenman ve yuksek performans. Spormetre Beden Eğitimi ve Spor Bilimleri Dergisi. 2008:6;39–43
13. Güler MŞ, Erhan SE. The evaluation of mental abilities of athletes in diferent branches. European J of Phy. Edu. and Sport Science. 2017:3(10); 311-331
14. Thelwell RC, Greenlees IA. The effects of a mental skills training package on gymnasium triathlon performance. The Sports Psychologist. 2001:15; 127-141.

15. Kingston KM, Hardy L. Effects of different types of goals on processes that support performance. The Sports Psychologist. 1997:11;277-293.
16. Gould D, Eklund RC, Jackson SA. 1988 U.S. Olympic wrestling excellence: I. Mental preparation, precompetitive cognition, and effect. The Sports Psychologist. 1992:6;358-382.
17. Gill D. Psychological dynamics of sport and exercise. 2nd edition. Champaign, IL: Human Kinetics. 2000.
18. Silva JM, Stevens DE. Psychological foundations of sport. Boston; USA: Allyn & Bacon; 2002.
19. Horn TS. Advances in sports psychology. Champaign, IL: Human Kinetics; 2002. 459-493
20. Jones MV. Controlling emotions in sport. The Sports Psychologist. 2001:17;471-486.
21. Gülşen DBA, Yıldız AB, Bayköse N, Eryücel ME. Bireysel ve takım sporu yapan spor bilimleri fakültesi öğrencilerinin kendinle konuşma düzeylerinin çeşitli değişkenlere göre incelenmesi, Akdeniz Spor Bilimleri Dergisi. 2018;1:58-66
22. Yarayan YE, Yıldız AB, Gülşen DBA. Elit düzeyde bireysel ve takım sporu yapan sporcularının zihinsel dayanıklılık düzeylerinin çeşitli değişkenlere göre incelenmesi, J of Inter. Social Research. 2018;11: 992-999
23. Orhan İ, Aktop A, Pekaydin Y. An investigation of hand-eye coordination, attention, balance and motor skill in school children. The European Proceedings of Social & Behavioural Sciences. 2018;42: 11-18
24. Turgut M, Yaşar OM. Mental training of college student elite athletes, J of Edu. and Learning. 2020;9(1):51-59
25. Hayslip B. Jr., Petrie TA, MacIntire MM, Jones GM. The influences of skill level, anxiety, and psychological skills use on amateur golfers' performances, J of App Sport Psych. 2010;22(2);123-133, DOI: 10.1080/10413200903554281
26. Frey M, Ravissa K. Collegiate athletes' mental skill use and perceptions of success: An exploration of the practice and competition settings. J of App. Sport Psych. 2003;15:115–128.
27. Gould D, Weiss M, Weinberg R. Psychological characteristics of successful and nonsuccessful big ten wrestlers. J of Sport Psychology. 1981;3(1):69-81. doi:10.1123/jsp.3.1.69
28. Ungerleider S, Golding JM. Mental practice among olympic athletes. Perceptual and Motor Skills. 1991;72(3):1007-1017. doi:10.2466/pms.1991.72.3.1007
29. Thomas PR, Over R. Psychological and psychomotor skills associated with performance in golf. The sport psychologist. 1994;8(1):73–86. doi:10.1123/tsp.8.1.73
30. Cohn PJ. An exploratory study on peak performance in golf. The Sport Psychologist. 1991;5:1–14.
31. Catley D, Duda JL. Psychological antecedents of the frequency and intensity of flow in golfers. Int. J of Sport Psychology. 1997;28(4):309–322
32. Lee BY. An overview of psychological techniques used for performance enhancement in golf. In Science and golf III: proceedings of the World Scientific Congress of Golf. Champaign, IL: Human Kinetics. 1999: 138-144.
33. Glass CR, Spears CA, Perskaudas R, and Kaufman KA. Mindful sport performance enhancement: randomized controlled trial of a mental training program with collegiate athletes, J of Clinical Sport Psychology. 2018;13(4):609 – 628
34. Yarayan YE, İlhan EL. Sporda Zihinsel Antrenman Envanteri'nin
(SZAE) Uyarlama Çalışması. Gazi Beden Eğitimi ve Spor Bilimleri Dergisi. 2018;23(4):205-218
35. Kline RB. Principles and practice of structural equation modeling. 3rd ed. New York , NY : Guilford. 2011.
36. Tabachnick BG, Fidell L. Using multivariate statistics. Sixth edition. Boston: Allyn ve Bacon. 2013.

State and Trait Anxiety Levels of Adolescent Wrestlers

İlkay Orhan[1] and Alkan Uğurlu[2]
[1]Lecturer, PhD, Faculty of Sport Sciences, Turkey.
[2]Assistant Professor, Faculty of Sport Sciences, Turkey.

Abstract

Wrestling is a complex sports requiring several high level motoric performance demands such as strength, endurance, flexibility, speed, balance. As mentioned performance demands, psychological state is a strong determinant of success in wrestling as in many other sports. Thus, this study aimed to investigate the state and trait anxiety levels of adolescent wrestlers according to several variables like region, housing, doing traditional oil wrestling and achievement to reach the podium. A total of 101 competitive adolescent wrestlers aged 12 to 18 participated in this study. State and trait anxiety levels of participants were determined using The State-Trait Anxiety Inventory (STAI), and personal information form prepared by researchers was used to collect demographic information. As a result, statistical significance was noted in state anxiety levels of adolescent wrestlers according to region. Wrestlers from Elmalı were determined to have higher level of state anxiety compared to wrestlers from Antalya city center and Korkuteli regions. No further statistical significance was determined. In conclusion, region can be stated as a moderator of state anxiety level and the need for further research should be considered from different perspectives to get underpinning mechanisms of psychological performance parameters.

Keywords: State anxiety, Trait anxiety, Adolescence, Wrestling, Oil wrestling

1. Introduction

The sport of wrestling has a long history starting from ancient Olympic Games in a sporting context. Along with continuation of life, being superior than others and establishing dominance have always been a passion for humankind which has made them offensive and forced them to take up the challenges (1, 2). Wrestling is not only a sport comprising of several games to defeat an opponent, but requires several high-level performance demands like endurance (aerobic, anaerobic, respiratory functions), strength, flexibility, speed, velocity, balance, reaction and strategy (3) and technical-tactical training and mental abilities (2). Wrestling is a close combative sport requiring strength and complex working patterns of body. It takes place between two people with certain rules on a certain place without using any equipment and relies on defeating the opponent through using psychological strength and technical and tactical skills (4). Similarly, Başer (1986) explained wrestling as a sport challenging organism and functional systems, enhancing developmental process during the period of human development and several positive traits such as courage, will to win, self-confidence (5).

Different styles of wrestling have emerged in different societies. Some have gained remarkable popularity and been included in the Olympic Games, while others have the characteristics of that region. From this perspective, it is possible to categories them into two as Olympic and traditional wrestling (6). Specifically, Freestyle and Greco-Roman wrestling are included in national and international competitions like Olympic Games, and as in many other sports, weight categories are used to create a fairer environment for each wrestler (7).

Anxiety is defined as a negative emotional state which is in relation to worry, nervousness and apprehension and mostly accompanied by rather high arousal level in the organism. Most research has noted that anxiety is best understood by conceptually and empirically distinguishing its trait and state facets (8, 9, 10, 11, 12) defines state anxiety as a transient response to stress that consists of subjective feelings of tension, apprehension, nervousness, worry, and arousal of the autonomic nervous system (13). Thus, anxiety can be specified in two ways; cognitive and somatic anxiety. Cognitive anxiety is more thought-oriented while somatic anxiety is described as physical/body-oriented. In other words, physical activation level is the key concern in somatic anxiety (14). Arousal, anxiety and fear are phenomena mis conceptualized and used

for each other by mistake, yet the distinctions should be highlighted. According to Köknel (1989), people experience anxiety as a state of feeling as if something bad will happen in the future (15).

In addition to somatic and cognitive anxiety distinction, anxiety should be explained through state and trait anxiety as well (14, 10, 16, 12, 13). Specifically, state anxiety is refers to temporary and ever-changing mood. Spielberger (1966) defined state anxiety as an emotional state "characterized by subjective, consciously perceived feelings of apprehension and tension, accompanied by or associated with activation or arousal of the autonomic nervous system" (17). For instance, anxiety just before taking an exam or an important competition is a good example of state anxiety. Sweating, pale face, blush, shaking, tension and discomfort are indicators of anxiety as a result of the activation in autonomic nervous system (18).

Secondly, trait anxiety is more of personality related phenomenon influencing behaviors. Spielberger (1966) explained that individuals having high trait anxiety perceive situations as threatening although it may actually not (17). Moreover, people having high trait anxiety experience higher state anxiety in competitive or evaluative conditions compared to people having lower trait anxiety (19, 14). Stressful life conditions create tendency to high trait anxiety which leads to perceiving every condition as stressful and threatening (20).

Anxiety strongly affect adaptability, attention and concentration, coordination, decision making, evaluation, self-confidence, motivation and actions in sporting context to a significant context (21). Anxiety and athletic performance relationship is studied in several research in the relevant literature. Research highlights the importance of optimal anxiety level for optimal performance (22). For instance, Singer (1975) investigated athletes in four situations; a) low anxiety, b) high anxiety, c) looking for success, d) disregarding success. As a result, athletes with high achievement need and low anxiety presented more successful skills contrary to athletes with high anxiety and low achievement needs (23).

According to Kara (2016), anxiety before and during a competition may differ and this may be caused by many reasons. If the underpinning mechanism regarding the reasons of anxiety is not determined and they are not controlled, negative effects may be experienced by athletes which may cause to failure. Thus, certain measures should be taken for optimal and successful performance (24).

Feeling insufficient compared to their opponents may lead to anxiety and cause to several negativities (25). Furthermore, experienced athletes focus on anxiety less to achievements. So, in the relevant literature, many researches were conducted to examine anxiety before and after competitions, and determined some athletes control it effectively for success. Using mental and behavioral strategies efficiently to control anxiety may differ between more and less experienced athletes (26). Thus, the purpose of this study was to investigate trait and state anxiety levels of adolescent wrestlers.

2. Method

2.1. Participants

A total of 101 competitive adolescent wrestlers (10-18 years of age) participated in this study from 3 regions of Antalya (62 wrestlers from Antalya city center, 21 wrestlers from Elmalı, 18 wrestlers from Korkuteli).

2.2. Materials

Personal information form comprising of 11 items was prepared by researchers to collect demographic data. Spielberger's The State-Trait Anxiety Inventory (STAI) was used to determine state and trait anxiety levels of wrestlers. It comprised of 40 items (20 for state anxiety and 20 for trait anxiety) (27).

2.3. Procedure

Survey research was applied in this research to examine state and trait anxiety levels of adolescent wrestlers in Antalya. Frequencies and percentages were determined and One-way ANOVA was used to determine differences between regions. Then, Tukey post hoc test was applied. Independent samples t-test was used for state and trait anxiety levels regarding housing, oil wrestling experience and placement in podium. SPSS 23 was used for analyses. %5 was used for statistical significance.

3. Results

Table 1 shows demographic variables and within group differences among adolescent wrestlers in the study.

Table 1. *Demographic variables and within group differences*

		N	Mean	SD	F	p	Tukey
Age (years)	Korkuteli	18	14,84	0,64	0,246	0,78	
	Antalya	61	15,09	2,08			
	Elmalı	21	15,29	1,06			
	Total	100	15,00	1,73			
Weight (kg)	Korkuteli	18	61,00	13,95	1,693	0,05	2 > 3
	Antalya	62	67,33	20,29			
	Elmalı	20	56,47	14,34			
	Total	100	63,51	18,56			
Height (m)	Korkuteli	18	1,66	0,08	3,142	0,19	
	Antalya	59	1,69	0,12			
	Elmalı	19	1,65	0,09			
	Total	96	1,68	0,11			
BMI	Korkuteli	18	21,92	3,88	2,661	0,08	
	Antalya	59	23,11	4,76			
	Elmalı	19	20,57	3,36			
	Total	96	22,40	4,42			

*p>0,05

According to ANOVA results, wrestlers in Antalya were determined to be significantly heavier. According to regions, no further statistical significance was noted regarding age, height and BMI (p>0,05).

Of wrestlers participated in this study, 62 (61,4%) were from Antalya, 21 (20,8%) from Elmalı and 18 (17,8%) from Korkuteli. Regarding family support, 99 (98%) of wrestler stated that their families supported them to do wrestling while 2 (2,0%) mentioned the opposite. While 39 wrestlers (38,6%) were staying at dormitory, 62 (61,4%) stated that they lived with their families.

Of wrestlers participated in this study, 94 (93,1%) were competing at free-style wrestling while 4 (4%) were competing at Greco-Roman style. Regarding traditional oil wrestling, 70 (69,3%) stated that they were doing oil-wrestling, while 28 (27,7%) were not. Of wrestlers having experience in oil wrestling, 61 wrestlers (60.4%) did not reach the podium while 39 wrestlers (38.6%) reached.

Table 2 shows state and trait anxiety levels of adolescent wrestlers in this study.

Table 2. *State and trait anxiety differences acording to region*

				Mean	SD		F	p	Tukey
State Anxiety	Kocaeli	Kork	8	29,00	6,35	39	5,1*	0,01	3 > 1
	Antalya	Anta	2	31,15	9,17				
	Elmalı	Elma	1	37,67	10,45				3 > 2
		Total	01	32,12	9,42				
Trait Anxiety	Kocaeli	Kork	8	35,61	6,47	53	2,9	0,01	3 > 2
	Antalya	Anta	2	36,53	8,02				
	Elmalı	Elma	1	40,71	9,45				
		Total	01	37,24	8,22				

*P<0,05

One way ANOVA was used to determine state and trait anxiety levels of adolescent wrestlers according to their regions. As a result, statistical significance was determined in state anxiety levels (F(2,98)=5,391, p=.006, ŋ2=0,9) Tukey post hoc test revealed this significance in favor of wrestlers from Elmalı. Eta-square was calculated to evaluate the effect of this result and moderate effect was reported according to Alpar (2016), (28). On the other hand, no significance was determined in trait anxiety levels of adolescent wrestlers.

Table 3 presents state and trait anxiety levels of adolescent wrestlers according to housing variable.

Table 3. *State and trait anxiety levels of wrestlers according to housing*

			N	Mean	SD		p
State Anxiety	Dormitory	Dormitory	39	33,67	9,73	,314	0,19
	Family house	Family	62	31,15	9,17		
Trait Anxiety	Dormitory	Dormitory	39	38,36	8,51	,088	0,28
	Family house	Family	62	36,53	8,02		

p>0,05

Regarding state anxiety levels, wrestlers staying at dormitory had 33,67±9,74 and wrestlers staying with their families had 31,15±9,73. No statistically significant difference was determined in state anxiety levels (p>0,05). Similarly, wrestlers staying at dormitory had 38,36±8,51 and wrestlers staying with their families had 36,53±8,024 regarding trait anxiety. No statistically significant difference was determined in trait anxiety levels of adolescent wrestlers (p>0,05).

Table 4 shows state and trait anxiety levels of wrestlers according to oil wrestling variable.

Table 4. *State and trait anxiety levels of wrestlers according to oil wrestling.*

	Oil wrestling	N	Mean	SD	t	p
State Anxiety	Yes	70	30,03	10,00	,260	0,21
	No	28	30,36	7,98		
Trait Anxiety	Yes	70	36,93	7,98	,572	0,57
	No	28	38,00	9,31		

p>0,05

Both in state and trait anxiety levels, no statistically significant difference were determined according to oil wrestling variable (p>0,05).

Table 5 shows state and trait anxiety levels of adolescent wrestlers according to their achievements to reach the podium.

Table 5. *State and trait anxiety levels of wrestlers according to achievement to reach the podium.*

	Oil wrestling achievement	N	Mean	SD		p
State Anxiety	No	61	31,00	7,89	,435	0,513
	Yes	39	33,94	11,39		
Trait Anxiety	No	61	36,05	7,81	,068	0,788
	Yes	39	37,31	8,91		

p>0,05

Both in state and trait anxiety levels, no statistically significant difference was determined according to participants' achievements to reach the podium (p>0,05).

4. Discussion and Conclusion

The purpose of this study was to investigate state and trait anxiety levels of adolescent wrestlers according to regions, family support, housing, oil wrestling experience and place in the podium.

No statistically significant difference was determined between wrestlers' regions, age, weight and body mass index. This result is supported by the findings of many other researchers such as (29, 30, 2). With regard to family support, 99 (98%) of wrestlers stated that their family supported their career in wrestling while 2 (2%) wrestlers stated exactly the opposite of that. Regarding housing, 39 wrestlers (38.6%) were determined to accommodate in a dormitory while 62 wrestlers (61.4%) stated to stay with their families. State anxiety mean of the participants was determined 32.12 while trait anxiety mean was 37.24. Başaran et al. (2009) determined state anxiety mean as 39.43 and trait anxiety mean as 39.84 in athletes doing different sports (31). Compared to this study, anxiety levels of participants in our study were rather lower. Moreover, Engür (2002) examined 279 athletes' state anxiety levels with regard to experience. As a result, experience was suggested as not a moderator of state anxiety (32). Similarly, Erbaş (2005) investigated athletes

regarding their training experience and determined no statistically significant difference between groups (33). Regarding age, Yücel (2003) investigated state and trait anxiety levels of taekwondo athletes and noted that age was not a moderator (34).

In this study, style of wrestling, more participants were doing freestyle compared to Greco-Roman wresting. Also, as a traditional wrestling in Turkey, oil wresting participation was determined high in this study. Of wrestlers having experience in oil wrestling, 61 wrestlers (60.4%) did not reach the podium while 39 wrestlers (38.6%) reached.

Wrestlers from Elmalı region were determined to have statistically significant higher In conclusion, no statistically significant differences in state and trait anxiety levels of adolescent wrestlers were determined regarding housing, oil wrestling experience and reaching to the podium in an oil wrestling competition. Thus, these are suggested as parameters which do not moderate state and trait anxiety levels of adolescent wrestlers.

References

1. Eroğlu Ş. Elit Güreşçiler ile Farklı Branşlardaki Sporcuların Başarı Motivasyonunun İncelenmesi. Yüksek Lisans Tezi, T.C. Kahramanmaraş Sütçü İmam Üniversitesi Sağlık Bilimleri Enstitüsü Beden Eğitimi ve Spor Ana Bilim Dalı, 2018.
2. Khan KS, Ali D. Comparison between Male and Female Elite Wrestlers: A Psychological Study. J of Education and Practice 2011;2(4):105-110
3. Yoon JS. Teacher characteristics as predictors of teacher–student relationships: Stress, negative affect, and self-efficacy. Social Behavior and Personality: An international journal, 2002;30(5):485-494. https://doi.org/10.2224/sbp.2002.30.5.485
4. Arslan C. Güreşçinin Rehberi -1 – Güreş ve Metodik Bilgiler. I Baskı. İzmir: Uğur Yayınları; 1984.
5. Başer E. Uygulamalı Spor Psikolojisi, Performans Sporunda Psikolojinin Rolü. I. Baskı, Ankara: MEGSB Yayınları; 1986.
6. Şahin H. Gelişim Çağındaki Güreşçilerin Akut Kilo Kaybının Performansa Etkisi. Yüksek Lisans Tezi, T.C Erciyes Üniversitesi Sağlık Bilimleri Enstitüsü, 2011.
7. TGF Official Website: https://www.tgf.gov.tr/tr/index.php/2017/ Access: 23.05.2020.
8. Ree MJ, French D, MacLeod C, Locke V. Distinguishing Cognitive and Somatic Dimensions of State and Trait Anxiety: Development and Validation of the State-Trait Inventory for Cognitive and Somatic Anxiety (STICSA)
9. Kocovski NL, Endler NS, Cox BJ, Swinson RP. The differential assessment of state-trait anxiety and depression in a clinically anxious sample. Journal of Psychopathology and Behavioral Assessment 2004;26: 165-172
10. Endler NS, Kocovski NL.State and trait anxiety revisited. Journal of Anxiety Disorders 2001;15:231–345
11. Rapee RM, Medro L. Fear of physical sensations and trait anxiety as mediators of the response to hyperventilation in nonclinical subjects. Journal of Abnormal Psychology 1994;103: 693–699.
12. Reiss S. Trait anxiety: it's not what you think it is. J of Anxiety Disorders 1997;11:201–214.
13. Spielberger CD, Reheiser EC, Owen AE, Sydeman SJ. Measuring the Psychological Vital Signs of Anxiety, Anger, Depression, and Curiosity in Treatment Planning and Outcomes Assessment. In Maruish ME, editor. The Use of Psychological Testing for Treatment Planning and Outcome Assessment. 3rd ed. Hillsdale, NJ: Lawrence Erlbaum; 2004. P.421–447.
14. Weinberg RS, Gould D. Foundations of Sport and Exercise Psychology. Champaign, IL: Human Kinetics, 1995.
15. Köknel Ö. Psikiyatri (Genel ve Klinik). İstanbul: Nobel Tıp Yay; 1989.
16. Kocovski NL, Endler NS, Cox BJ, Swinson RP. The differential assessment of state-trait anxiety and depression in a clinically anxious sample. Journal of Psychopathology and Behavioral Assessment 2004;26(3):165-172
17. Spielberger CD. (Ed.). Anxiety and behavior. Academic Press; 1966.

18. Öner N., Le Compte A. Durumluk ve Sürekli Kaygı Envanteri El Kitabı, İstanbul: Boğaziçi Üniversitesi Yayınları, 1983.
19. Öner N. Durumluk ve Sürekli Kaygı Envanterinin Türk Toplumundaki Geçerliliği, Yayınlanmış Doktora Tezi, Ankara, 1977.
20. Özçelik B. Belediyelerde Çalışan İş görenlerin Durumluluk Kaygı, İş Doyumu ve Tükenmişlik Düzeylerinin Çeşitli Değişkenler Açısından İncelenmesi. Yüksek Lisans Tezi, T.C. Maltepe Üniversitesi Sosyal Bilimler Enstitüsü Psikoloji Bölümü, 2009.
21. Koç H. Profesyonel futbolcularda durumluk kaygı düzeylerini etkileyen faktörlerin değerlendirilmesi. Yayımlanmamış Yüksek Lisans Tezi. Dumlupınar Üniversitesi Sosyal Bilimler Enstitüsü. Kütahya, 2004.
22. Ak E. Determination of İzmir 1.amat is struggling football team continuity and set the players in the state anxiety, Dumlupınar University, Ph.D. Thesis, 2015.
23. Singer RN. Motor learning and human performance. NewYork: Macmillan. 1975.
24. Kara E. Üst seviye atış sporcularının müsabaka öncesi kaygı düzeyi ile performansları arasındaki ilişki. Gazi Üniversitesi, Sağlık Bilimleri Enstitüsü, Yüksek Lisans Tezi, Ankara, 2016.
25. Ford JL, Ildefonso K, Jones ML, Arvinen-Barrow M. Sport-related anxiety: current insights. Open access journal of sports medicine, 2017; 8:205–212. https://doi.org/10.2147/OAJSM.S125845
26. Navruz A. Seçili takım sporlarında mücadele eden lise öğrencilerinin müsabaka öncesi durumluk ve sürekli kaygı düzeylerinin motivasyon düzeylerine olan etkisinin incelenmesi (Ankara İli Ölçekli). Yüksek Lisans Tezi. Süleyman Demirel Üniversitesi. Isparta, 2018.
27. Spielberger CD, Gorsuch RL, Lushene PR, Vagg PR, Jacobs AG. Manual for the State-Trait Anxiety Inventory (Form Y).Consulting Psychologists Press, Inc.: Palo Alto. 1983.
28. Alpar R. Spor, Sağlık ve Eğitim Bilimlerinden Örneklerle Uygulamalı İstatistik ve Geçerlik-Güvenirlik. Detay Yayıncılık, Dördüncü Baskı, Ankara. 2016.
29. Matheson H, Mathes S. Influence of performance setting, experience and difficulty of routine on pre-competition anxiety and self-confidence of high school female gymnasts. Perceptual and Motor Skills 1991;72:1099-1105.
30. Hammermeister J, Burton D. Stress, appraisal, and coping revisited: Examining the antecedents of competitive state anxiety with endurance athletes. The Sport Psychologist 2001;15:66-90.
31. Başaran MH, Taşğın Ö, Sanioğlu A, Taşkın AK. Sporcularda Durumluk ve Sürekli Kaygı Düzeylerinin Bazı Değişkenlere Göre İncelenmesi. Selçuk Üniversitesi Sosyal Bilimler Enstitüsü Dergisi.2009;21:533-542.
32. Engür M. Elit sporcularda başarı motivasyonun, durumluk kaygı düzeyleri üzerine etkisi. Yüksek Lisans Tezi. İzmir: Ege Üniversitesi. Sağlık Bilimleri Enstitüsü. İzmir, 2002.
33. Erbaş MK. Üst Düzey Basketbolcularda Durumluk Kaygı Düzeyler ve Performans, Dumlupınar Üniversitesi, Yüksek Lisans Tezi, Kütahya, 2005.
34. Yücel EO. Taekwandocuların Durumluk ve Sürekli Kaygı Düzeyleri Ve Müsabaka Başarılarına Etkisi. Gazi Üniversitesi, Sağlık Bilimleri Enstitüsü, Yüksek Lisans Tezi, Ankara 2003.

Sinking or Swimming: The Need for Water Safety and Swimming Education in the 21st Century

İlkay Orhan[1]
[1]*Lecturer, PhD, Faculty of Sport Sciences, Turkey.*

Abstract

Swimming lessons are received by few students as a course in the educational curriculum in Turkey. However, aquatic environment activities are carried out as a recreation activity by many individuals of all ages, which cause water safety problems and drowning. Water environment activities require individuals to receive proper water safety education. In this research, to highlight the importance of swimming and water safety education, picnic activity was selected as to reveal drownings in water. The water environment creates many opportunities for people Having a picnic near the water environment is one of these facilities. The aim of the study was to investigate drowning cases that took place during a picnic in Turkey. The cases of drowning in water during the recreational picnic activity in Turkey between the years 2011 and 2016 were examined in terms of distribution by years, months and provinces, some demographic features of drowned individuals, patterns of drowning, and the water environment in which they occurred. The data obtained were evaluated as frequency and percentage in SPSS 23 packaged software. As a result of the study, it was determined that a total of 236 people including 200 males (84.7%) and 36 females (15.3%) lost their lives by drowning during the recreational picnic activity in Turkey between the years 2011 and 2016. Drowned people are mostly under 20 years of age. The highest number of cases of drowning in water occurred in summer months. Specifically, 132 people drowned while swimming (55.9%), 43 people drowned as a result of falling into water (18.2%), and 26 people drowned while trying to rescue people (11%). Providing swimming, water safety, lifesaving in the water and first aid education in educational institutions is suggested to contribute to decrease drowning rates to a significant extent.

Keywords: Swimming education, Water safety, Drowning, Picnic, Recreation

1. Introduction

The water environment creates many opportunities that people can use for different reasons such as sports and recreational activities. These activities include recreational water sports, water gymnastics, water fitness, water exercises, and cheerful activities such as picnic on the waterfront, swimming, fishing.. In this respect, the water environment provides many opportunities for individuals. One of the risks that individuals face when performing these activities is drowning.

Many individuals in the community are involved in the water environment activities. These activities may differ depending on rural or urban life, but they are all water environment activities. Rural water environment activities include swimming in streams, dam lakes, irrigation ponds, canals, river, lake and sea and several other recreational activities like picnic near those areas. . . In the urban life, swimming pools, park pools, canals, lake and sea areas constitute water environment activity areas. This is an important condition that pointing the need for individuals of all ages to receive swimming and water safety education. When education programs and curricula in Turkey are examined, there is no specific course related to water sports and swimming in the primary school curriculum (1). However, such lessons are included in the programs of private schools. When secondary education programs are examined, although water sports and swimming are mentioned in physical education curriculum as options, they are not preferred by many teachers/educators due to the lack of a swimming pool (2).

In Turkey, swimming lessons are received by few individuals who can afford and have facilities near. However, water environment activities are carried out as a recreation activity by many individuals of all ages regardless of enough educational background on swimming which cause many water safety problems and drownings. Thus, water environment activities require individuals to receive water safety education.

It is possible to define the recreation as activities that individuals participate in voluntarily to learn, to relax, to maintain their health and to have fun, outside the time they allocate to their basic needs. At this point, individuals' understanding of the concept of time that draws attention should be evaluated. Some individuals decide how to relax by themselves as they see relaxation among their basic needs. Some prefer to sleep in their leisure time, while others use their leisure time by having fun or participating in any recreational activity. In this way, since the individual focuses on the activity mentally, relaxation takes place.

People visit the outdoors to learn, discover, examine and explore. In short, recreation is an opportunity to learn. Therefore, recreation and education should not be separated from each other in this context(3).

Several studies indicate that participation in outdoor activities increases self-confidence and self-respect of the individual besides their positive effects on physical, mental and social health, and leads to positive changes in personal skills, social behaviors, body and personality development and general behavior (4).

Particular attention should be paid to domestic education in this regard since relationships with parents and other adults during childhood are key in the development of leisure time habits of individuals (5). Picnic activity, which has an important place in Turkish culture, is a popular outdoor recreational activity that Turkish people meet at a very young age and experience with thir parents. Regardless of whether settlements are small or large, it can be considered as an activity that can be done without a leader when a suitable environment is found. The choice of a suitable environment is usually areas by water during spring and especially summer times, with the end of winter in certain areas. These environments also give rise to risk factors for everyone, especially for young children. In Turkey, between the years 2007 and 2011 3216 people drowned in water, specifically 507 people in 2007, 588 people in 2008, 703 people in 2009, 730 people in 2010, and 688 people in 2011 (6). Turgut and Akdağ (2017), in their study on the cases of drowning in water, found out that 15.5% of the 97 drowned people were present in that environment to have a picnic (7). Between the years 2005 and 2011, 236 people lost their lives as a result of drowning in water who went to the water environment to have a picnic (8).

In the general definition, drowning in water is a series of processes that progress with breathing disruption caused by submersion in a liquid environment (9). Drowning is the third leading cause of unintentional injury death worldwide and accounts for 7% of injury-related deaths. As stated in the global report on drowning prepared by the World Health Organization, 372000 people lose their lives by drowning every year in the world. More than 90% of these deaths occur in low- and middle-income countries. More than half of those drowned are under 25 years of age, and around 42 people lose their lives each hour by drowning. Drowning is among the ten leading causes of death for people between 1 and 24 years of age in every region of the world (10).

Australia is a country of water enthusiasts. Many visitors coming to NSW (New South Wales) to live near the beautiful coastline or visit it. For those who do not go to the coastline, trips to the local pool or river as a favorite recreational destination. The love for water environment recreational activity, combined with alcohol use, leads to an increased risk of drowning and the decreased ability to respond to hazards associated with it. In the case study presented by Chellew, Julie (35 age), her sister and her children were enjoying a picnic by the river when her son who was swimming called for help. Julie dived into the river to rescue him, but could not return to the surface. Julie had a Blood Alcohol Concentration (BAC) of 0.07 g/100 ml (11).

In the light of this information, the examination of the cases of drowning in water during a picnic, which is a popular recreational activity in Turkey will provide focus on an important problem and effort to find solutions.

The aim of this study was to investigate the drowning cases that took place during a picnic Turkey between the years 2011 and 2016.

2. Method

2.1. Procedure

The cases of drowning in water during the recreational picnic activity in Turkey between the years 2011 and 2016 was examined in terms of distribution by years, months and provinces, some demographic features of drowned individuals, patterns of drowning, and the water environment in which they occurred. To investigate the cases of drowning in water, news on drowning in water between 01 January 2011 and 31 December 2016 was collected on a daily basis with the help of online search engines. The data were recorded in the form of the personal information of drowned individuals, the place of drowning, why they were there, the water environment, etc. The data were analyzed using SPSS 23 packaged software. The data obtained were evaluated as frequency and percentage.

3. Results

As shown Table 1 shows the numbers and gender distributions of individuals who drowned in water by years. Between the years 2011 and 2016, 200 of the individuals who drowned in water were male (84.7%) and 68 were female (15.3%). The number of drowning cases by years was 27 (23 males, 4 females) in 2011, 8 (6 males, 2 females) in 2012, 57 (52 males, 5 females) in 2013, 49 (35 males, 14 females) in 2014, 52 (44 males, 8 females) in 2015, and 43 (40 males, 3 females) in 2016.

Table 1. *Distribution of individuals who drowned in water during a picnic by years and genders.*

Year	Male (%)	Female (%)	Total (%)
2011	23 (9.7)	4 (1.7)	27 (11.4)
2012	6 (2.5)	2 (0.8)	8 (3.4)
2013	52 (22.0)	5 (2.1)	57 (24.2)
2014	35 (14.8)	14 (5.9)	49 (20.8)
2015	44 (18.6)	8 (3.4)	52 (22.0)
2016	40 (16.9)	3 (1.3)	43 (18.2)
Total	200 (84.7)	36 (15.3)	236 (100)

Table 2 shows the age range of individuals who drowned in water during the recreational picnic activity between the years 2011-2016. The age range with the maximum number of people who drowned in water was 10-19 years with 101 people (42.8%). A total of 50 people in between 20-29 years (21.2%), 32 people between 30-39 years (13.6%), 23 people between 0-9 years (9.7%), 18 people between 40-49 years (7.6%), 6 people in the age range of 50-59 years (2.5%) and 3 people over 60 years of age (1.3%) with the lowest number, drowned in water. There are 3 people (1.3%) whose age is unknown but who are all known to be adults. The distribution of individuals who drowned in water by months was 71 (30.1%) in August, 50 (21.2%) in June and 43 (18.2%) in July, 33 (14.0%) in May, 15 (6.4%) in September, 13 (5.5%) in April and 5 (2.1%) in March, 4 (1.7%) in February and 2 (0.8%) in October. The distribution of the patterns of drowning in water by the number of drowning cases was 132 people (55.9%) while swimming, 43 people (18.2%) by falling into water, 26 people (11%) who drowned without saving life, 14 people (5.9%) while recovering items, 9 people (3.8%) who drowned after saving life, 6 people (2.6%) due to sudden flooding, 3 people (1.3%) by falling from the boat/vessel, 1 person (0.4%) due to a vehicle accident, 1 person (0.4%) by trying to save an animal, and 1 person (0.4%) while jumping into water, respectively. When the water environment in which drowning cases occurred is examined, it is observed that 102 people (43.2%) lost their lives by drowning in the creek-stream-river, 51 people (21.6%) in the lake/pond, 43 people (18.2%) in the dam, 32 people (13.6%) in the coast/sea, 4 people (1.7%) in the irrigation canal, 1 person (0.4%) in the fire pool, 1

person (0.4%) in the ornamental pool, 1 person (0.4%) in the irrigation well, and 1 person (0.4%) in the irrigation pit.

Table 2. *Distribution of Individuals Who Drowned in Water During a Picnic by Ages, Months, Patterns of Drowning, and the Water Environment in Which They Occurred*

		f	%
Age Range	0 – 9	23	9.7
	10 – 19	101	42.8
	20 – 29	50	21.2
	30 – 39	32	13.6
	40 - 49	18	7.6
	50 – 59	6	2.5
	60 +	3	1.3
	Unkonwn[(a)]	3	1.3
	Total	236	100
Months	February	4	1.7
	March	5	2.1
	April	13	5.5
	May	33	14.0
	June	50	21.2
	July	43	18.2
	August	71	30.1
	September	15	6.4
	October	2	0.8
	Total	236	100
Patterns of Drowning in Water	While Swimming	132	55.9
	Vehicle Accident (b)	1	0.4
	Falling into Water	43	18.2
	Falling from the Boat/Vessel	3	1.3
	Drowned After Saving Life	9	3.9
	Drowned Without Saving Life	26	11.0
	While Recovering Items (c)	14	5.9
	Drowned Without Saving His/Her Dog	1	0.4
	While Jumping into Water	1	0.4
	Sudden Flooding (d)	6	2.6
	Total	236	100
Water Environment in Which Drowning Occurred	Creek-Stream-River	102	43.2
	Lake/Pond	51	21.6
	Coast/Sea	32	13.6
	Fire Pool	1	0.4
	Ornamental Pool	1	0.4
	Irrigation Canal	4	1.7
	Dam	43	18.2
	Irrigation Well	1	0.4
	Irrigation Pit	1	0.4
	Total	236	100

(a) An individual is known to be an adult.
(b) The accident occurred by being trapped inside the vehicle falling into water.
(c) They drowned when they went into water to get the ball and slipper.
(d) As a result of the unannounced opening of the dam hatches, the people who were having a picnic by the water got caught in the water and drowned.

In Table 3, it is observed that 1 person in 160 cases, 2 people in 27 cases, 3 people in 4 cases, 4 people in 1 case, and 6 people in 1 case lost their lives by drowning in water.

Table 3. *Number of drownings in the same case*

Number of People Drowned in the Same Case	Number of Cases	f	%
1	160	160	67.8
2	27	54	22.9
3	4	12	5.1
4	1	4	1.7
6	1	6	2.5
Total	193	236	100

4. Discussion and Conclusion

In this research, which was carried out to reveal the importance of water sports, swimming and water safety education, picnic activity was chosen as a case. There are very few studies on cases of drowning while having a picnic in areas close to the water environment among studies conducted on fatal accidents during recreational activities. In this study, it was determined that a total of 236 people lost their lives by drowning during the outdoor recreational picnic activity in Turkey between the years 2011 and 2016. For this reason, picnic areas should be arranged together with safety measures. It is a fact that it is important to take measures to ensure water safety in picnic areas close to the water environment. In a study conducted on the cases of drowning in water in Gaziantep province of Turkey, it was found out that 15 out of 97 (15.5%) who drowned in 12 years were having a picnic in that environment (7).

In our study, it was found out that 200 (84.7%) males and 36 females (15.3%) drowned in water between the years 2011 and 2016. The number of drowning cases by years was 57 (52 males, 5 females) in 2013, 52 (44 males, 8 females) in 2015, 49 (35 males, 14 females) in 2014, 43 (40 males, 3 females) in 2016, 27 (23 males, 4 females) in 2011, and 8 (6 males, 2 females) in 2012, respectively. In the study conducted by Turgut et al. in 2018, it was determined that a total of 236 people, 168 males (71.2%) and 68 females (28.8%), lost their lives by drowning in water in 6 years, and these results are similar to our findings (8). This situation shows that the safety measures taken in picnic areas that are close to the water environment are not sufficient and people do not have proper educational background. Thus, it becomes more important to take necessary measures in a short time.

In our study, the number of males who drowned in water was higher than that of females. In a study by Harries et al., the number of drowning cases was reported to be three times higher in males than in females (12). As the World Health Organization stated in its global report on the prevention of drowning, males are particularly at the risk of drowning and have twice the total mortality rate of females. The studies have shown that higher drowning rates among males are caused by riskier behaviors such as increased exposure to water and swimming alone, drinking alcohol before swimming alone, and drinking alcohol on the boat (10). For our study, this may be explained by the fact that the rate of male participation in such

recreational activities is higher or individuals who intervene in drowning cases are mostly males.In our study, the number of people under 20 years of age who participated in the recreational picnic activity and lost their lives by drowning is 124 (52.5%). In a study conducted on drowning in water during picnic, the number of drowned people under 20 years of age is 140 (8).

When the distribution of individuals who drowned in water by months was examined, it was observed that 71 people (30.1%) lost their lives by drowning in water in August, 50 people (21.2%) in June and 43 people (18.2%) in July, 33 people (14%) in May, 15 people (6.4%) in September, 13 people (5.5%) in April, 5 people (2.1%) in March, 4 (1.7%) in February and 2 people (0.8%) lost their lives by drowning in water in October. According to these data, the highest number of people who drowned in water during the picnic activity is observed in summer months with 164 (69.5%) people. It is thought that public education and public warnings with public service announcements and different communication tools, especially between the beginning of spring and the end of winter, may contribute to decrease the number of drowning cases.

When the patterns of drowning in water were examined, it was determined that 132 people (55.9%) drowned while swimming, 43 people (18.2%) by falling into water, 26 people (11%) drowned without saving life, 14 people (5.9%) while recovering items, 9 people (3.8%) drowned after saving life, 6 people (2.6%) drowned due to sudden flooding, 3 people (1.3%) by falling from the boat/vessel, 1 person (0.4%) due to a vehicle accident, 1 person (0.4%) drowned while trying to save his/her dog, and 1 person (0.4%) drowned while jumping into water. In their study, Turgut et al. (2018) reported that the cases of drowning in water during the picnic activity included 125 people (53%) while swimming, 39 people (16.5%) by falling into water, 37 people (15.7%) who drowned without saving life, 15 people (6.4%) who drowned after saving life, 7 people (3%) by falling from the boat/vessel, 5 people (2.1%) while taking/recovering items, 3 people (1.3%) while fishing, and 2 people (0.8%) due to a vehicle accident (8). When the studies are examined, it is observed that the highest number of drowning cases occur while swimming. When these results are evaluated, giving proper education on swimming and lifesaving in water with starting from a young age is extremely vital. Furthermore, drowning in water can be prevented if there is a system to warn individuals on the waterfront to prevent drowning from sudden flooding caused by the opening of the dam hatches.

In this study, when the number of drownings in the same cases is examined, it is observed that 1 person in 160 cases, 2 people in 27 cases, 3 people in 4 cases, 4 people in 1 case, and 6 people in 1 case lost their lives by drowning in water. In the study by Turgut et al. (2018), when multiple drowning cases are examined, it is observed that 1 person in 133 cases, 2 people in 32 cases, 3 people in 9 cases and 4 people in 3 cases lost their lives by drowning in water. Orhan and Turgut (2018) reported that in 2011, 29 multiple drowning cases occurred in Turkey. In these cases, 50 people (4 females, 46 males) lost their lives and the number of people who intervened in the drowning case was 34 in total, including 2 females and 32 males (13). Multiple drowning cases are almost half of all drowning cases. According to the study by Turgut and Akdağ (2017), 1 person in 67 cases drowned in water, while 2 people in 12 cases and 3 people in 2 cases lost their lives by drowning (5). In the United States of America, the National Drowning Prevention Alliance reported that 88% of child drowning cases occurred when at least one adult was present (14). The reason for the increasing number of deaths in the same case is thought to be the drowning of the relatives or other people who jump into water in order to save the drowning person.

In our study, when the water environment in which drowning cases occurred is examined, it is observed that 102 people (43.2%) lost their lives by drowning in the creek-stream-river, 51 people (21.6%) in the lake/pond, 43 people (18.2%) in the dam, 32 people (13.6%) in the coast/sea, 4 people (1.7%) in the irrigation canal, 2 people (0.8%) in the pool, 1 person (0.4%) in the irrigation well, and 1 person (0.4%) in the irrigation pit. Similarly, in the study conducted by Turgut et al. (2018), it was determined that 100 people (42.4%) lost their lives by drowning in the creek-stream-river, 66 people (27.9%) in the lake/pond, 33 people (14%) in the dam, 26 people (11%) in the coast/sea, and 6 people (2.5%) in the irrigation canal. In another study by Turgut and Akdağ (2017), the water environment in which most of the drowning cases occurred

was found to be creek-stream-river (37.1%) (7). The water environment in which drowning cases take place varies depending on the geographical structure of the picnic area.

When the results of our study are examined, it is understood that it is important to make the necessary arrangements regarding in educational curricula, picnic areas, especially those close to the water environment. It is thought that providing proper trainings to individuals on lifesaving in water and water safety and disseminate this to their families seems quite important to save lives.

References

1. T.C. Milli Eğitim Bakanlığı Beden Eğitimi ve Spor Dersi Öğretim Programı Ankara, 2018
2. T.C. Milli Eğitim Bakanlığı Ortaöğretim Beden Eğitimi ve Spor Dersi Öğretim Programı. Ankara, 2018.
3. Wells, Marcella, Merriman, Tim (2002). Parks & Recreation. Buyer's Guide, Vol. 37 Issue 3, p94 5p.
4. Mc Avoy, L. (2001). Outdoors for Everyone: Opportunities that include people with disabilities. Parks and Recreation, Vol. 36, Issue.8, p. 24-36.
5. Elke Zeijl, Yolanda te Poel, Manuela Du Bois-Reymond, Janita Ravesloot & Jacqueline J. Meulman (2000) The Role of Parents and Peers in the Leisure Activities of Young Adolescents, Journal of Leisure Research, 32:3, 281-302, DOI: 10.1080/00222216.2000.11949918
6. Turgut A. & Turgut T. (2014). A population-based study on deaths by drowning incidents in Turkey. International Journal of Injury Control and Safety Promotion, Vol. 21, No. 1, 61–67.
7. Turgut A. & Akdağ E. (2017). Investigation of the Cases of Drowning in Water in Gaziantep Province. Mediterranean Journal of Humanities VII/2, 437-444.
8. Turgut, A., Orhan, İ., Uğurlu, A. (2018). Picnicking as a Recreational Activity: Investigation of Drowning Cases. Spor Eğitim Dergisi, 2 (2), 01-11.
9. ILS (2007). World Drowning Report 2007 Edition. https://www.ilsf.org/sites/ilsf.org/files/filefield/world-drowning-report-final-sept-27-2007.pdf. Date Accessed: 27.03.2019.
10. World Health Organization. (2014) World Drowning Report 2014 Edition. http://www.who.int/violence_injury_prevention/global_report_drowning/Final_report_full_web.pdf Date Accessed: 27.03.2019.
11. Chellew, C., Franklin, R.C, and Simmonds, E. (2009). Swim Safe, Swim Sober: A study examining drowning in NSW and the influence of alcohol. Sydney: The Royal Life Saving Society Australia, NSW Branch.
12. Harrıes M. G. Mb Mrcp. (1981). Critical Care Medicine: Volume 9 - Issue 5 - ppg 407-408.
13. Orhan İ, Turgut A. (2018). The Investigation of Multiple Drowning Cases Mediterranean Journal of Humanities, VIII/1 (2018) 275-283.
14. http://ndpa.org/ Date Accessed: 27.03.2019