ISSN: 2148-1148

IntJSCS

International Journal of Science Culture and Sport (IntJSCS)

International Refereed Scientific Journal

ICV Score: 73,50

Volume 5 - Issue 4
December 2017

www.iscsjournal.com

International Journal of Science Culture and Sport
December 2017 : 5(4)
ISSN : 2148-1148
Doi : 10.14486/IntJSCS

IntJSCS

INTERNATIONAL SCIENCE CULTURE AND SPORT ASSOCIATION

www.iscs-a.org

IntJSCS is an International Refereed Scientific Journal published quarterly by ISCSA.

IntJSCS is indexed/included in Index Copernicus (ICV 73,35), CrossRef, DOAJ, Google Scholar, Cite Factor, Research Bible, Mendeley, Open Access Journals, Academic Keys, Scientific Indexing Services, DRJI, Journal Index, ASOS, İSAM, Dergipark, Arastirmax; and it is also under evaluation by many other primary indexing services.

Message from the editorial board

We invite high quality articles, review papers, case studies of theoretical, and empirical, conceptual, and experimental researches on social sciences, humanities, and sport sciences in a properly formatted file as per the author guidelines. We assure all the submissions to be evaluated through fast double blind review process by our international scientific board and published in the following issue. Articles submitted in IntJSCS for consideration should not have been published elsewhere and should not be submitted for review elsewhere during the duration of evaluation. We promote researchers to use our open access articles in their researches and to contribute to the development of our journal through their citations.

International Journal of Science Culture and Sport
December 2017 : 5(4)
ISSN : 2148-1148
Doi : 10.14486/IntJSCS

TABLE OF CONTENTS

REFEREES OF THIS ISSUE

Dr. Adela BADAU
Dr. Ali AĞILÖNÜ
Dr. Ali ÖZKAN
Dr. Ahmed BENREDJEM
Dr. Ahmed BOUSAKRA
Dr. Atahan ALTINTAŞ
Dr. Benkazdali Hadj MOHAMED
Dr. Burhanettin HACICAFEROĞLU
Dr. Eren ULUÖZ
Dr. Ercan ZORBA
Dr. Erdal ZORBA
Dr. Halil SAROL
Dr. Iffet MAHMUTOVIC
Dr. Mehmet DEMİREL
Dr. Mehmet GÜÇLÜ
Dr. Metin YAMAN
Dr. Murat AKYÜZ
Dr. Murat KUL
Dr. Murat SARIKABAK
Dr. Nadim ALWATTAR
Dr. Necati CERRAHOĞLU
Dr. Recep SOSLU
Dr. Recep GÜRSOY
Dr. Sibel ARSLAN
Dr. S. Rana VAROL
Dr. Saadullah Abas RASHID
Dr. Saffet KAPO
Dr. Selçuk GENÇAY
Dr. Selma CİVAR YAVUZ
Dr. Sinan AYAN
Dr. Taner BOZKUŞ
Dr. Teodora Mihaela ICONOMESCU
Dr. Yücel OCAK
Dr. Zaid Kazi GASIM

International Journal of Science Culture and Sport
December 2017 : 5(4)
ISSN : 2148-1148
Doi : 10.14486/IntJSCS676

Field *: Coaching*
Type *: Research Article*
Received: *29.08.2017* ***- Corrected:*** *17.10.2017* ***- Accepted:*** *20.10.2017*

Effects of Some Active and Passive Recovery Techniques on Strength Parameters[1]

Ahmet MOR, Gökhan İPEKOĞLU, Cansel ARSLANOĞLU, Kürşat ACAR, Erkal ARSLANOĞLU
Sinop University, Faculty of Sports Sciences, Sinop, TURKEY
Email: erkaloglu@sinop.edu.tr

Abstract
Aim: The purpose of this study was to determine the acute effect of short term active and passive recovery methods on strength after high intensity interval training (HIIT). Method: Twelve trained male bodybuilders (18–30 years of age) voluntary participated in the study, on a voluntary basis. The criteria for the athletes were being healthy, not having any chronic or acute disorders, and not having restrictions on movement due to injuries.Subjects applied randomly active and passive recovery techniques (Electrostimulation, core training, control) after each HIIT on three different days. Performance tests were conducted on athletes before (Pre-T) and after HIIT (Post-T). The data collected were analysed with dependent two sample t test and independent samples t test. Results: Although there was an increase in the anaerobic strength, vertical jump, and back strength levels, no statistically significant difference was found in between groups ($p>0,01$). Similarly, a decrease was found in the levels of leg strength and right-left handgrip strength in three groups. Although the difference in the control group was not meaningful in terms of these values, there was a significant difference in the right-left hand grip strength levels in the core training and stimulation groups ($p<0,01$). Pre-T the values of right-left handgrip strength in the core training group decreased from 48,46±5,06 to 46,16±5,84, from 47,95±5,44, to 46,50±5,43 respectively compared to Post-T ($p<0,01$). In the electrostimulation group, on the other hand, Pre-T the right handgrip strength decreased from 47,36±4,48 to 45,72±5,31 while Pre-T the left handgrip strength decreased from 46,45±4,27 to 44,13±5,05, compared to Post-T ($p<0,01$). Additionally, the comparison between the groups Pre-T and Post-T showed no statistically significant difference ($p>0,01$).Conclusion: The active and passive recovery methots, did not have any effect on strength parameters in bodybuilders and does not provide any acute effect in the recovery period after high intensity training.

Keywords: Strength, recovery, electrostimulation, core training, HIIT

[*] *This study was presented in International Conference on Humanities and Educational Research, March 23-26, 2017, Houston, Texas, USA.*

Introduction

High intensity interval training is a frequently used exercise in training programs that aims to develop maximum oxygen consumption (MaxVO2) and the anaerobic capacity (Tabata et al., 1996:1327) (Gorostiaga et al., 1991:101). Performance and physiological adaptations related to these exercises vary depending on the intensity of the exercise, recovery methods and periods. Active or passive recovery methods are a few examples (Dupont., 2004:302). The effects of active and passive recovery methods on rapid recovery process has been an actively researched topic. It's shown that the active recovery method in interval exercises decreases the blood lactate level and shortens the tiredness period compared to the passive recovery methods (Ahmaidi et al,. 1996:450) (Billat, 2001:13). Electrostimulation which is also used as an active resting technique is a widely used technique for helping the muscle's voluntary contraction without activating the central nervous system. Electrostimulation has gained popularity in recent years among amateur and professional athletes and started to be used as a recovery technique along with strength training method. With this electrical stimulation method, it's thought that the local blood flow is increased and the skeleton muscle deformation which occurs during exercise is corrected rapidly (Miller et al, 2000: 53) (Cramp et al, 2002: 5) (Lattier et al, 2004:509). This is a clinical method used for increasing the technical muscle performance (Delitto and Snyder, 1990:158). There's literature on the fact that this method which affects the fiber length, shape and strength, may also lead to a decrease in muscle damage and tiredness levels over time (Rosemffet et al, 2004:246) (Delitto et al, 1998:187).

Another active resting technique used in the study is core exercises. Core exercise is an important element in preventing injuries by aiming to improve local strength and balance. Additionally, these exercises that increase the strength, balance, and the control of movement of upper and lower extremities, are the center of all kinetic chains in all fields of sports (Kibler et al, 2006): 189). Although core exercises are a frequently used training method in all fields of sports, it is of interest to find out how it affects strength after exercise and recovery as an active resting method.

The aim of this study was to determine the effects of electrostimulation and core training techniques on some strength parameters after intensity training, during recovery phase. The results of this study will help trainers and athletes to decide which resting method they should prefer during the recovery phase.

Method

Sample Group

The samples of this study consists of trained bodybuilding athletes between the ages of 18-30. High intensity interval training protocol was applied three times with different recovery techniques to 12 voluntary male athletes. The criteria for the athletes were being healthy, not having any chronic or acute disorders, and not having restrictions on movement due to injuries. This study was approved by the Clinical Research Ethics Committee in Ondokuz Mayıs University (Number: B.30,2.ODM.0.20.08/1533).

Research Design

The study was conducted in Sinop and the participants of the study were recruited in the city of Sinop. Performance tests conducted and recovery methods were applied to the participants

for 5 days without disrupting their daily and training routines. Athletes were asked to do high intensity exercises every other day and recovery methods were applied to them and the performance levels were checked. All athletes were subject to the same protocol three times. The athletes were asked to not do intensity training during the last 24 hours prior to the exercises for the performance tests and they were asked to eat as if preparing for competition before exercise. Also, athletes were warned against consumption of alcohol and stimulate substances, and advised to pay attention to their diet and resting. In the study, first the height and body mass measurements were taken and the BMI for athletes were determined. Then, the same protocol, training program and performance tests were conducted on the 1st, 3rd, and 5th days of the study.

The performance levels of athletes were measured and than high intensity interval training protocol was applied. Before the training (Pre-T), first the athletes were asked to warm up in order to get ready physically and mentally for the load and they were given 5 minutes. Afterwards, the moves consisting of 8 repetitions in 4 minutes were applied in 4 sets with the method of training for 20 seconds, resting for 10 seconds under the observation of the researcher. Two minute resting breaks were taken between the sets. Immediately after the training (Post-T), strength measurements were taken for performance levels again and the handgrip strength of athletes with a hand-dynamometer. The leg and back strengths were measured with a back/leg-dynamometer. And lastly, a jump test was conducted to determine the vertical jump level and the anaerobic strength.

The same training program and performance tests were conducted three times on the athletes but at the end of the tests, various recovery methods were applied for ten minutes. In the first day, no active recovery methods were applied during the recovery phase but only performance levels were measured. On the third day, an active resting method, core training was applied after the performance tests. The researchers showed the moves to the athletes before the training and tests. On the fifth day, athletes were connected to electrostimulation (muscle development and rehabilitation device) for active recovery after the training and performance tests, and the effects of the methods on strength parameters were identified and compared.

Handgrip Strength

The measurement was taken with a Takei brand hand dynamometer (Handgrip). The measurement was taken after the warm up while the participant is standing up without bending the arm that is being measured and with an angle of 450 without touching the body. This was repeated for right and left hands three times and the highest values were used (İbiş vd, 2004:285).

Leg Strength

The measurement was performed with a Takei brand back and leg dynamometer. After the warm up, the participants placed their feet on the dynamometer base while knees are bent and pulled up the dynamometer that they gripped with their hands while back is straight and body is slighlty bent forward, with their legs. This step was repeated three times and the best value for each participant was recorded (Saygın vd, 2005:205).

Squat Jump Test

The anaerobic strength and vertical jump of athletes in the study were identified with a jumping platform and a jumpmeter, that is connected to the platform in accordance with standards. After the identification of the anaerobic strength level, the calculation of the height

was done with the formula based on the jump test. Afterwards, the anaerobic strength was calculated. (Özkan vd, 2010:33).

Measurement of Heights and Body Weight; Calculation of Body Mass Index

The heights of the athletes were measured with a Charder brand height measurement device in centimeters. The bodyweights of athletes were measured with a Tanita BC418 segmental body analysis device in kilograms. The body mass indexes of the athletes were calculated by the division of the bodyweight value by the height's square in meters (kg/m2).

Recovery Programs

Passive Resting

High intensity and interval training method was applied to the athletes. After the training, athletes rested for 10 minutes without any cool down exercises or any method that would speed up the recovery. At the end of the 10 min rest, performance tests were conducted.

Core Training

All the movements were conducted with the athlete's own bodyweight and continued based on the order of the moves during the 10 minutes at the end of the high intensity interval training.

Electrostimulation

This study was conducted with a Norotrac brand, mobile muscle development and rehabilitation device. Surface electrodes were placed on skin and electrical current was applied through the electrodes to the locations where the working muscles were. When the electrodes are conntected, as the muscle group that is working continued contracting, the energy to be applied was adjusted automatically towards big and small muscle groups by the device. The recovery phase continued for 10 minutes after the high intensity interval training.

Statistical Analysis

The data obtained are presented as arithmetical mean and standard deviation. The parameters showing normal distribution were analysed with dependent paired-samples t test within the group and the comparison between groups were analysed with an independent t test. The statistical significance was accepted as $p<0.01$. SPSS v.22 packet program was used in the statistical analysis of the data obtained and in the comparison of results.

Results

Table 1. The means and standard deviations of the athletes' age, height, bodweight, and body mass index

CHARACTERISTICS OF ATHLETES					
	n	**Minimum**	**Maximum**	**Mean**	**Standard Deviation**
Age (years)	12	18,00	30,00	21,33	4,51
Athlete Age	12	6,00	15,00	9,33	3,23
Height (cm)	12	182,00	198,00	184,66	6,13
Bodyweight (kg)	12	66,00	82,00	72,66	5,78
Body-Mass Index (kg/m2)	12	19,90	23,50	21,26	1,17

The mean of age of athletes is 21,33±4,51 years, the mean of the years of being an athlete is 9,33±3,23 years, the average of height 184,66±6,13 cm, the mean bodyweight is 72,66±5,78 kg, and the mean BMI is 21,26±1,17 kg/m2 (Table 1).

Table 2. The changes in the performance levels before and after the load in the control group

PERFORMANCE VALUES OF THE CONTROL GROUP								
					%95 Confidence Interval			
Measurement Type	Phase	n	Mean	Std. Dev.	Lowest	Highest	t	p
Anaerobic Strength	Pre-T	12	336,50	52,51	-151,30	77,96835	-,822	,448
	Post-T	12	373,16	83,81				
Vertical Jump	Pre-T	12	44,00	5,01	-4,29718	3,63052	-,216	,837
	Post-T	12	44,33	4,58				
Back Strength	Pre-T	12	130,41	12,67	-21,9722	17,13896	-,318	,764
	Post-T	12	132,83	13,56				
Leg Strength	Pre-T	12	154,41	21,22	-13,5494	31,54944	1,026	,352
	Post-T	12	148,36	22,43				
Handgrip Strength (Right)	Pre-T	12	47,86	4,52	-3,60932	4,64265	,322	,761
	Post-T	12	47,35	5,60				
Handgrip Strength (Left)	Pre-T	12	46,21	3,10	,12272	4,14395	2,727	,051
	Post-T	12	45,08	4,61				

Table 2 shows the changes in the performance measurement levels in the control group Pre-T and Post-T. The results shows that anaerobic strength is 336,50±52,51 in Pre-T while 373,16±83,81 afterwards; Pre-T the vertical jump was 44,00±5,01 while it increased to 44,33±4,58 after HIIT; back strength increased from 130,41±12,67 to 132,83±13,56 in Post-

T. Pre-T the leg strength was 154,41±21,22 while it decreased to 148,36±22,43 after HIIT; Pre-T the right handgrip strength was 47,86±4,52 while it decreased to 47,35±5,60 after HIIT; Pre-T the left handgrip strength was 46,21±3,10 while it decreased to 45,08±4,61 after HIIT, however there was no statistically significant difference found in these results (p>0,01).

Table 3. The changes in performance levels before and after the load in the core training group

PERFORMANCE LEVELS OF CORE TRAINING GROUP								
					%95 Confidence Interval			
Measurement Type	**Phase**	**n**	**Mean**	**Std. Dev.**	**Lowest**	**Highest**	**t**	**p**
Anaerobic Strength	Pre-T	12	326,16	44,96	-84,3029	45,30297	-,774	,474
	Post-T	12	345,66	82,39				
Vertical Jump	Pre-T	12	43,33	4,45	-5,43810	3,10476	-,702	,514
	Post-T	12	44,50	7,03				
Back Strength	Pre-T	12	138,41	14,12	-13,5734	11,24007	-,242	,819
	Post-T	12	139,58	6,71				
Leg Strength	Pre-T	12	155,41	26,58	-8,88372	20,05039	,992	,367
	Post-T	12	149,83	27,46				
Handgrip Strength (Right)	Pre-T	12	48,46	5,06	1,38995	3,21005	6,497	,001★
	Post-T	12	46,16	5,84				
Handgrip Strength (Left)	Pre-T	12	47,95	5,44	,81425	2,08575	5,863	,002 ★
	Post-T	12	46,50	5,43				

p<0,01 ★

Table 3 shows the changes in the performance measurement levels before and after the high intensity interval training in the core training group. The data showed that Pre-T the anaerobic strength was 326,16±44,96 while it increased to 345,66±82,39 afterwards; Pre-T the vertical jump was 43,33±4,45 and increased to 44,50±7,03 after HIIT; and Pre-T the back strength was 138,41±14,12 while it increased to 139,58±6,71 afterwards. There was no statistically significant difference (p>0,01). Pre-T the leg strength was 155,41±26,58 while it decreased to 149,83±27,46 after HIIT but there was no statistically significant difference (p>0,01). Pre-T the right handgrip strength was 48,46±5,06 while it decreased to 46,16±5,84 after HIIT, Pre-T the left handgrip strength was 47,95±5,44 and it decreased to 46,50±5,43 afterwards (p<0,01).

Table 4. The changes in performance levels before and after the load in the electrostimulation group

PERFORMANCE LEVELS OF THE ELECTROSTIMULATION GROUP								
					%95 Confidence Interval			
Measurement Type	**Phase**	**n**	**Mean**	**Std. Dev.**	**Lowest**	**Highest**	**t**	**p**
Anaerobic Strength	Pre-T	12	332,16	46,31	-53,2803	19,83590	-,965	,348
	Post-T	12	348,88	77,15				
Vertical Jump	Pre-T	12	43,72	4,49	-2,02188	1,35521	-,416	,682
	Post-T	12	44,05	5,64				
Back Strength	Pre-T	12	135,33	12,41	-7,97093	4,35982	-,618	,545
	Post-T	12	137,13	9,76				
Leg Strength	Pre-T	12	160,25	16,94	-1,72038	8,88705	1,737	,143
	Post-T	12	156,66	19,34				
Handgrip Strength (Right)	Pre-T	12	47,36	4,48	,44721	2,83057	2,902	,010★
	Post-T	12	45,72	5,31				
Handgrip Strength (Left)	Pre-T	12	46,45	4,27	1,50873	3,11349	6,077	,000★
	Post-T	12	44,13	5,05				

p<0,01 ★

Table 4 shows the changes in performance measurement levels before and after the high intensity interval training in the electrostimulation group. According to the results, Pre-T the anaerobic strength was 332,16±46,31 while it increased to 348,88±77,15 after HIIT, Pre-T the vertical jump strength was 43,72±4,49 while it increased to 44,05±5,64 after HIIT, and Pre-T the back strength was 135,33±12,41 while it increased to 137,13±9,76 after HIIT. No statistically significant difference was found (p>0,01). Pre-T the leg strength was 160,25±16,94 while it decreased to 156,66±19,34 after HIIT, however no statistically significant difference was found (p>0,01). Pre-T the right handgrip strength was 47,36±4,48 while it decreased to 45,72±5,31, and Pre-T the left handgrip strength was 46,45±4,27 and it decreased to 44,13±5,05 after HIIT. (p<0,01).

Table 5. The comparison of performance levels of athletes before and after the load in between the groups

Measurement Type	**Phase**	**Control & Core Training**		**Control & Electrostimulation**		**Core Training & Electrostimulation**	
		t	p	t	p	t	p
Anaerobic Strength	Pre-T	,366	,722	,091	,930	-,281	,784
	Post-T	,573	,579	1,005	,338	,399	,698
Vertical Jump	Pre-T	,243	,813	,059	,954	-,186	,856
	Post-T	-,049	,962	,322	,754	,308	,765
Back Strength	Pre-T	,840	,326	-,987	,347	,171	,867
	Post-T	,107	,300	-,964	,358	,138	,893
Leg Strength	Pre-T	,983	,583	-1,151	,276	-,375	,715
	Post-T	,366	,433	-1,610	,138	-,478	,629
Handgrip Strength (Right)	Pre-T	-,217	,833	,836	,423	1,008	,337
	Post-T	,358	,728	1,235	,245	,818	,432
Handgrip Strength (Left)	Pre-T	-,677	,514	,481	,641	,981	,350
	Post-T	-,831	,426	,828	,427	1,578	,146

Table 5 shows the comparison of strength parameters before and after the load for the three groups. The results show no statistically significant difference between the groups (p>0,01).

Discussion and Conclusion

Training is loads that create functional and morphological change in the organism and are applied in certain intervals with the purpose of increasing exercise efficiency. Athletes can tolerate high intensity and low intensity loads only for short periods of time. These sorts of trainings are used in sports fields where anaerobic capacity is in the foreground to improve resistance and speed (Aslankeser, 2010). Athletes can use various applications to ease or speed up the recovery after a tiring training or tiredness after a high load. Using these recovery techniques are as important as completing an efficient training. Body builders use anaerobic system frequently as well. Strength and anaerobic strength are two of the most important elements of sportive performance. Therefore, changes in the strength performance level affect athletes directly.

Selkowitz (1985) determined that electrostimulation method increases the leg strength (Selkowitz, 1985:186). There are other studies that show that the electrostimulation method has positive effects on performance (Kale et al., 2014: 142). When the effects of core training on performance are examined; Dedecan et al. (2016:131) showed that core training has positive effects on some physical and physiological characteristics; Karacaoglu & Kayapinar (2015:221) showed that it has positive contribution on volleyball players' postures; Taskin (2016:115) showed that it improves the speed, acceleration, vertical jump and long jump; Dogan et al. (2016:1) showed that athletes had significant recovery on several performance parameters of athletes in addition to leg and back strength; Atici and Afyon (2016:542) found that it increases some physical and motor skills of swimmers.

Schilling et al. (2013:278) examined the effect of core training of 6 weeks on athletic performance by identifying the athletes' performances in the beginning and performing performance tests again on the 3rd and 6th weeks. As a result, athough regular core training has significantly positive effects on some performance levels such as squat strength, bench press strength, no significant difference was found in the vertical jump test. Weston et al. (2015:204) conducted a study on swimmers at the national team level where he examined some performance parameters of swimmers that had done core training for 12 weeks. When he compared the core training group with the control group, he found that the core training has positive effects on the 50 meter swim time, prone-bridge test, and straight-arm pull down test performance levels. Zanotti et al. (2003:292) conducted a study where they examined the effects of electrostimulation on muscle strength during a 30 min period a day for 4 weeks on patients who are confined to bed and found significant improvement on the muscle strength. Miller et al. (2000), Cramp et al. (2002), Delitto & Snyder-Mackler (1990) and Delitto et al. (1989) stated that electrostimulation method affects muscle strength.

In this study, an increase was found on performance parameters such as anaerobic strength, vertical jump, and back strength, but no significant difference was found. These parameters show similarities and differences with several studies. The other results show that there's a decrease in leg strength and right/left hand grip strength in all three groups and this decrease created a significant difference between core training and electrostimulation groups on right/left hand grip strength. These results can be evaluated as a situation emerging due to the tiredness after a high intensity interval training.

According to the results of the study, active recovery methods don't have any positive effect on strength and anaerobic strength levels after high intensity interval training. Although the study provides an important result in terms of strength which is one of the most important performance elements in athletes, more research on the subject matter might reveal different results.

Acknowledgement

This study was supported by Sinop University Scientific Research Projects. We would like to thank Sinop University Scientific Research Projects Coordinationatorship for the support they provided.

Conflicts of Interest

The authors have no conflicts of interest to acknowledge.

REFERENCES

Ahmadi S, Granier P, Taoutaou Z, Mercier J, Dubouchaud H, Prefaut C (1996). Effects of active recovery on plasma lactate and anaerobic power following repeated intensive exercise. Medicine and Science in Sports and Exercise, 28(4): 450-456.

Aslankeser Z (2010). The effects of anaerobic trainings on central-peripheral fatigue and recovery periods. PhD Thesis, Çukurova University Institute of Health Sciences, Adana.

Atıcı M, Afyon YA (2016). The Effects of Core Training on Swimming in Sedentary Women. Anthropologist, 23(3): 542-549.

Billat LV (2001). Interval training for performance: a scientific and empirical practice. Sports Medicine, 31(1): 13-31.

Cramp FL, Mccullough GR, Lowe AS, Walsh DM (2002). Transcutaneous electric nerve stimulation: the effect of intensity on local and distal cutaneous blood flow and skin temperature in healthy subjects. Archives of Physical Medicine and Rehabilitation, 83(1): 5-9.

Dedecan H, Çakmakçı E, Biçer M, Akcan F (2016). The Effects of Core Training on Some Physical and Physiologıcal Features of Male Adolescent Students. European Journal of Physical Education and Sport Science, 2(4): 131-144.

Delitto A, Brown M, Strube MJ, Rose SJ, Lehman RC (1989). Electrical stimulation of quadriceps femoris in an elite weight lifter: a single subject experiment. International Journal of Sports Medicine, 10(03): 187-191.

Delitto A, Snyder-Mackler L (1990). Two theories of muscle strength augmentation using percutaneous electrical stimulation. Phys Ther, 70(3):158-164.

Doğan G, Mendeş B, Akcan F, Tepe A (2016). The Effects of Eight-week Core Training on Some Physical and Physiological Parameters of Football Players. Niğde University Journal of Physical Education And Sport Sciences, 10(1): 1-12.

Dupont G, Moalla W, Guinhouya C, Ahmaidi S, Berthoin S (2004) Passive versus active recovery during high-intensity intermittent exercises. Medicine and Science in Sports and Exercise, 36(2): 302-308.

Gorostiaga EM, Walter CB, Foster C, Hickson RC (1991). Uniqueness of interval and continuous training at the same maintained exercise intensity. European Journal of Applied Physiology and Occupational Physiology, 63(2): 101-107.

Ibiş S, Gökdemir K, Iri R (2004). The analysis of some the physical and physiological parameters of the 12-14 years old male football players attending and not attending to football schools. Kastamonu Education Journal, 12(1): 285-292.

Kale M, Kaçoğlu C, Gürol B (2014). The Effects of Electromyostimulation Training on Neural Adaptation and Sports Performance. Hacettepe University Journal of Sport Sciences, 25 (3): 142–158.

Karacaoğlu S, Kayapınar FÇ (2015). The Effect of Core Training on Posture. Academic Journal of Interdisciplinary Studies, 4(1): 221-226.

Kibler WB, Press J, Sciascia A (2006). The role of core stability in athletic function. Sports Medicine, 36(3): 189-198.

Lattier G, Millet GY, Martin A, Martin V (2004). Fatigue and recovery after high-intensity exercise Part II: recovery interventions. International Journal of Sports Medicine, 25(07): 509-515.

Miller BF, Gruben KG, Morgan BJ (2000). Circulatory responses to voluntary and electrically induced muscle contractions in humans. Physical Therapy, 80(1): 53-60.

Ozkan A, Köklü Y, Ersöz G (2010) Anaerobik Performans ve Ölçüm Yöntemleri. Ankara, Türkiye: Gazi Kitabevi.

Rosemffet MG, Schneeberger EE, Citera G, Sgobba ME, Laiz C, Schmulevich H, Cocco JAM (2004). Effects of functional electrostimulation on pain, muscular strength, and functional capacity in patients with osteoarthritis of the knee. JCR: Journal of Clinical Rheumatology, 10(5): 246-249.

Saygın Ö, Polat Y, Karacabey K (2005). The effects of movement training, applied to children on their physical fitness parameters. Fırat University Medical Journal of Health Sciences, 19(3): 205-212.

Schilling JF, Murphy JC, Bonney JR, Thich JL (2013). Effect of core strength and endurance training on performance in college students: Randomized pilot study. Journal of Bodywork & Movement Therapies, 17: 278-290.

Selkowitz DM (1985). Improvement in Isometric Strength of the Quadriceps Femoris Muscle After Training with Electrical Stimulation. Phys Ther, 65: 186-196.

Tabata I, Nishimura K, Kouzaki M, Hirai Y, Ogita F, Miyachi M, Yamamoto K (1996). Effects of moderate-intensity endurance and high-intensity intermittent training on anaerobic capacity and VO2max. Medicine and Science in Sports and Exercise, 28(10): 1327-1330.

Taşkın C (2016). Effect of Core Training Program on Physical Functional Performance in Female Soccer Players. International Education Studies, 9(5): 115-123.

Westan M, Hibbs AE, Thompson KG, Spears IR (2015). Isolated core training improves sprint performance in national-level junior swimmers. International Journal of Sports Physiology and Performance,10(2): 204-210.

Zanotti E, Felicetti G, Maini M, Fracchia C (2003). Peripheral Muscle Strength Training in Bed-Bound Patients with COPD Receiving Mechanical Ventilation: Effect of Electrical Stimulation. Chest, 124(1): 292-296.

International Journal of Science Culture and Sport
December 2017 : 5(4)
ISSN : 2148-1148
Doi : 10.14486/IntJSCS677

Field *: Physical Education*
Type *: Research Article*
Received: *07.09.2017* ***- Corrected:*** *12.10.2017* ***- Accepted:*** *20.10.2017*

Secondary School Students' Opinions about Physical Education Course

Mustafa Aydın BAŞAR[1], Ali COŞKUN[2]
[1] Çanakkale Onsekiz Mart University, Faculty of Education Instructor, Canakkale/17100, TURKEY
[2] Çanakkale Onsekiz Mart University, Bayramiç Vocational School Canakkale/17100, TURKEY
Email: alicoskun@comu.edu.tr

Abstract

Physical education and sports lessons, as well as all the courses in the curriculum, should be accepted as equally important. This course has an important place in the development of cognitive, emotional and social skills as psychomotor in the second childhood and adolescence period which corresponds to secondary school level. Students who take the course will make the best assessments about the quality of the course applications.

In this study, it was tried to reveal the views of secondary school students about the applications of physical education and sports lessons. For this purpose, the interest and love of female and male students to physical education; views which report via drawing and slogan expressions about the lesson applications have been examined. The study is a semi-qualitative research based on drawing and slogan analysis. The findings show that students' love and interest in physical education classes is high; their lessons are mainly taught playing football. Playing volleyball and basketball follows this.

Keywords: Physical education, course activities, sports at school

Introduction

Programs such as the curriculum of the national education system are also applied to implement the aims of the physical education system. Positive or negative attitudes may noticed in students depending on the level of effectiveness of the training in the process of obtaining advantage. Studies in physical education and sport (PES) courses should be based on physical activity, versatile development of learners' knowledge, attitudes, motor and behavioral skills. This will also positively affect students' interest and attitudes towards the course. The positive attitude of the students to the physical education lesson can facilitate the efficient processing of the lesson activities and facilitate the achievement of the lesson's private and general goals or provide the voluntary participation of the students in various future physical activities (Silverman ve Scrabis, 2004). Because people do not have attitudes when they are born. Attitudes are learned later by the influence of family, environment, school and direct personal experiences (Kağıtçıbaşı, 2005 ve Sakallı, 2001). Schools that are a formal educational environment, with appropriate physical education and sporting activities, are important institutions that will mediate these attitudes in a positive way.

Individual training begins with play. The orientation and target of individuals to the sport will be an important support for living a healthy life and for living in harmony with society. So, Physical education is an important educational process that leads to the acquisition of basic knowledge, attitudes and habits that enable the development and strengthening of all the organs and systems of the individual and their effective use in life. Physical education studies consist of activity chains that can improve the individual as well as the psychomotor area, from affective and cognitive aspects (Gilliver, 2003; Yenal, Çamlıyer, & Saracaloğlu, 1999).

Teachers will also be able to participate in their lessons in an entertaining environment, actively participate, and adopt an active lifestyle that includes their physical continuity (Pate ve ark., 1998). As soon as the person begins to use his / her mobility skills to explain himself / herself, he / she continues to increase his / her lifetime through physical education and similar movements when he / she finds suitable environments and opportunities (Yang, 2005). Physical education and sport activities at schools are also important in helping individuals improve their skills, gain positive behaviors, maintain sporting habits and be healthy (Çamlıyer & Çamlıyer, 2001).

The secondary school Physical Education and Sports curriculum has a characteristic that can attain the above mentioned development competence and positive attitudes. In the program, the aims of the physical education course are explained as follows: *Students are to prepare themselves for the next level of education by developing their self-management skills, social skills and thinking skills along with their mobility skills, active and healthy living skills, concepts and strategies that they will use throughout their lifetime. From the beginning of school to the end of secondary education, physical education and participation in the sport; has an important role in improving the physical, emotional, social and mental characteristics of students. In these processes, firstly expected from the Physical Education and Sports Course; students should be able to improve their self-management, social and thinking skills through physical education and sports. At the same time, students should be able to improve their social and thinking skills by improving their physical competence and attaining active and healthy lifestyle habits* (MEB, 2013).

Although the educational programs provide important opportunities for schools and teachers, the areas that will be used in the course applications are different from each other in terms of teacher-student communication and interaction, such as sports halls, sports grounds, school

halls, and these differences are accompanied by more physical, emotional, cognitive task and responsibility (Taşmektepligil, Yılmaz, İmamoğlu & Kılcıgil, 2006). In fact, physical education and sports activities are provided in schools as complementary to general education in the classroom and extra curricular times, and the individual is treated as a whole in these activities (Koçyiğit, & Öztürk, 1991).

Generally, the improvement to be achieved at these targets seems to be directly related to the weekly number and duration of the applications, the facility used, the area, and a sufficient number of qualified physical education teachers. Although the physical education courses require high cost buildings and tools, their creative features can be processed efficiently by limited space and tools by advanced teachers. In this course, different and creative methods and approaches can be used to contribute to the overall development of the students. In studies related to education, teachers play the most important role in the success of students. When teachers believe that students have an important role in learning, the success of students is increasing (Bandura, 1994; Tschannen – Moran, Woolfk Hoy & Hoy, 1998)..

The use of two or more methods and tools instead of the use of a single method or tool in the classroom environment will provide a significant enrichment for the lesson of physical education teachers. In education, multi-media organization that will address multiple sensory organs will also increase the quality and value of teaching (Dwyer, 1998; Harmandar, (2004). However, when we look at the practices in schools, it seems that they cannot be passed beyond traditional understandings (Yılmaz, Ulucan & Pehlivan, 2010). In this respect, the students who take advantage of the course of the practices; It is also important to think about where and how the physical education courses are conducted, whether they are satisfied with their course practice, and how they are related to the lesson.

Aim of the study

The aim of this study is to reveal the views of secondary school students about their interest in physical education and their practice. For this purpose, the following sub-questions are included:

1. Is the interest of secondary school students in the Physical education course different according to their gender?

2. Are the views of girls and boys visually differentiated by drawing about practices that stand out in the Physical Education class?

Method

The study carried out is semi-qualitative research based on the examination of drawing documents, "Interest Circle to the courses", which is prepared by the students to reflect their relevance and application to the Physical Education lesson. In Çanakkale province, a branch was selected from 7th grade students in three different secondary schools. The number of students entering the sample group is 83 in total; with 43 females and 40 males.

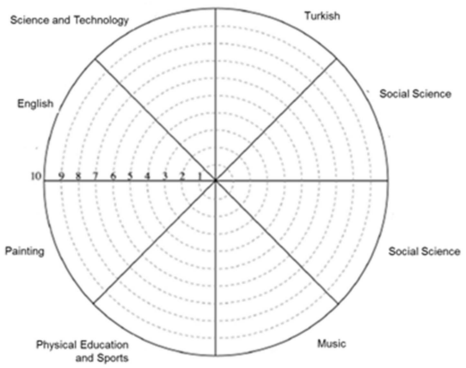


Figure 1. Interest Circle to the courses

These students were first given a "Interest circle to the course " to express their views on physical education and sports lessons and were asked to rate their lessons with their painting work. students that have " Interest circle to the course" was divided into eight lessons and each piece was graded out of ten. Students are asked to paint these graded areas so that they reflect the interest and love of the classes. Painted areas for each course are scored and evaluated.

Then, in this lesson, the pictures that will express the most applied practices are drawn. Visual text analysis of the data processed on the picture papers was done. The analysis of the pictures was done by an education specialist and two sports education specialists. Frequency, percentage, -t test and chi-square test statistical procedures were used in the analysis of collected data.

Findings

Findings and interpretations reached in the direction of sub-aims of the work are as follows:

Findings related to students' interests to the courses

The students reflected their interest and affection for the lessons they had attended in secondary school by painting them in a segmented and graded circle of interest. The lesson that the students have showed the most interest and love was "Physical Education and Sports" course with an average of 9, 61. This course is followed by Turkish, Art, Music, English and mathematics lessons. The lessons they have expressed their interest and love levels with the lowest averages are Social Studies and Science and Technology lessons.

Table 1. Distribution of the level of interest and importance of the students to the classes by gender

COURSE NAME	Gender	N	$\overline{X}$		Sd	$t_{.05}$
Physical education	Female	43	9,42	9,61	0,88	-2,14*
	Male	40	9,83			
Turkish	Female	43	8,60	8,41	1,94	0,84
	Male	40	8,20			
Painting	Female	43	8,09	8,13	2,23	-0,16
	Male	40	8,18			
Music	Female	43	8,21	8,06	2,52	0,55
	Male	40	7,90			
English	Female	43	7,95	7,84	2,23	0,46
	Male	40	7,73			
Mathematics	Female	43	7,65	7,54	2,49	0,42
	Male	40	7,43			
Social Science	Female	43	7,09	7,08	2,82	0,03
	Male	40	7,08			
Science and Technology	Female	43	7,21	6,78	2,64	1,53
	Male	40	6,33			

The students' interest and love for the lessons differs significantly only in Physical Education and Sports lessons according to gender [t(82)= -2,14, p<.05]. There is no significant difference between the student views on the other lessons.

Findings about the opinions of the students about the practices of Physical Education and Sports lesson

Football has become prominent in Physical Education and Sports lessons. More than three-quarters of the students (34.8%) included Football in their drawings. While about two thirds of the male students (72.5%) included Football in their drawings, only nine of the female students (20.9%) included Football in their drawings. 21,1% of the students have been reflected volleyball and 19,2% of the students have reflected basketball practices in their drawings. One of the students put paintings on garbage collection, contest, dodgeball, badminton and playground plays.

Table 2. Opinions of male and female students about physical education and sports lesson applications

PES activities	Gender		TOTAL	
	Female	Male		
	f	f	f	%
Football	9	29	38	34,8
Volleyball	21	2	23	21,1
Basketball	10	11	21	19,2
Jump rope	8	2	10	9,2
Tennis	7	-	7	6,4
Hide and seek	2	1	3	2,7
Exercise	1	1	2	1,8
Environmental Cleaning the garden	-	1	1	0,9
Competition	-	1	1	0,9
Badminton	1	-	1	0,9
Burning ball	1	-	1	0,9
Playground	1	-	1	0,9
TOTAL	61	48	109	100

Student paintings show that physical education lessons are limited to sporting activities in the popular feature that attracts the attention of students rather than course gains. Although in this lesson's purpose, "movement competence" learning field holds an important place, it is an interesting finding that there is no reflection on student drawings in this direction. The topics that girl students handle are mostly volleyball, basketball and skipping rope and male students are interested in football and basketball. One of the most notable applications in classroom practice is cultural physics events, where only one girl and one male student take part in their paintings.

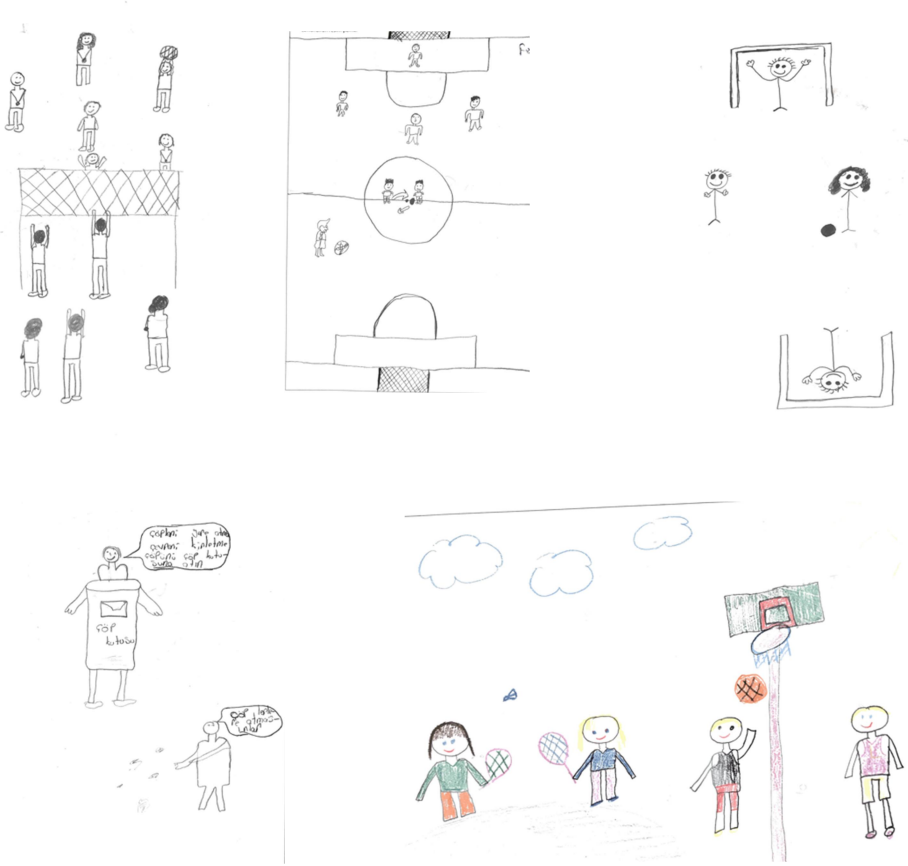
Table 3. Sexual differences in the subjects students handle

	Value	df	P
Pearson Chi-Square	42,047[a]	12	,000*
Likelihood Ratio	50,037	12	,000*
N of Valid Cases	249		

The topics covered in the drawings related to Physical education and ssports lesson applications differ significantly according to student genders [χ^2 (12)= 42,047, p<.05]. It can be said that girls and boys are directed to different activities in their Physical education and sports courses or they are directed by different teachers.

During the painting work done by the students, the lessons were also interviewed. Students expressed that they like physical education and sports lessons, but often they work on other lessons (especially for preparing for the test). One student replied, "Let's rejoice in that, too. We may have little or no chance of dealing with physical education and sports next year. " and other students have also supported him. In both of the schools that the study is carried on, an area within the building is used for these course activities. When weather is convenient, lessons are generally taught in the garden. In a school, there is a very unsuitable and unhealthy dirt surface area. Here, mostly male students play soccer. All other areas are covered with asphalt or concrete. However, students do not seem to have much complaints about these areas. By their own words, it seems enough for them to be satisfied even with this lesson.

Some examples of the student drawings;



Conclusions

In view of the students' views on physical education and sports lessons, the following conclusions are reached:

1. Physical education and sports lessons come out as the lessons that middle school students reflect the most interest and affection. The attitudes of students towards this course differ significantly from other courses. In most of the similar studies, the attitudes of the students to physical education courses were found high (Türkmen & Varol, 2017; Güllü et al., 2016; Kannan, 2015; Aras, 2013; Mohammed & Mohammed, 2012; Aybek et al., 2011; Philips, 2011; Kangalgil et al., 2006; Erhan & Tamer, 2009; Hünük & Demirhan, 2003; Şişko & Demirhan, 2002). There are few studies in which the attitudes of students towards physical education and sport are at a low level (Jaureguy 2013; Gurbuz & Özkan 2012; Ramsey 2012; Balyan 2009).

2. Male students are more interested in Physical Education and Sports lessons than girls. According to the researches, male students have higher attitudes and attitudes towards physical education and sports lessons (Keskin et al., 2016, Aybek et al., 2011, Kamtsios 2010, Akandere et al. 2010, Taşgın Ö & Tekin M 2009 There are no significant differences between the two groups' opinions (Korkalgil et al., 2006; Yinuk 2006; Tekin et al 2005, Koca et al 2005, Chung & Phillips 2002, Arslan and Mendes 2002, Smoll and Schutz 1980) Güllü et al 2016; Uluışık et al. 2016; Göksel et al. 2016, Diaz 2015, Lazarevic et al 2015, Chatterjee 2013, Siegel 2013, Gürbüz & Özkan 2012, Phillips 2011, Alpenlan 2008, Alenezi 2005, Keskin et al 2016 ; Koca and Cook 2002; Şişko & Demirhan 2002).

3. The outstanding practices of the students in the course activities; football and basketball in male students, and volleyball, basketball and rope in female students. The views of the students reflected in the course drawings are different meaningly. Almost all of the activities that are drawn are examples of activities done in the school garden. This can be seen as a sign of the school's inadequate space and equipment for sporting events. This finding overlaps with some research results (Orhun & Özşaker 2001).

4. There are not many activities for students' drawings, for the achievement of physical education and sports lessons in secondary schools. This is also limited to some popular and competitor sporting events. In the study, the activity examples drawn by male and female students are similar to those of a study on "Metaphor for the Production of Secondary School Students' Physical Education Course" (Namli et al., 2017).

Based on the findings and conclusions of the research, the suggestions for the problem addressed can be summarized as follows:

1. Practices related to the practice of the course should be diversified and enriched, Physical education and sports lessons should be adapted to the curriculum. Such an arrangement will make the students who know how to be happy even in the present situation more relevant to the lesson. Thus, the lessons will gain more effectively and it will also be reflected in the general objectives of education.

2. Schools should provide space and equipment that will facilitate the processing of the lesson and allow diversification. School administrations should also be informed and influenced by physical education and sports teachers.

3.Pphysical education and sports lessons should not be reserved for the processing of other courses. The thought that this course is as important as other courses; should be given to students, other branch teachers, school administrations and parents.

4. In-service training programs should be organized to develop competencies in physical education and sport teachers' teaching methods and techniques, classroom management and organization.

5. Researchers who are interested in studying the subject;

a) effective use of spaces in physical education and sports lessons,

b) they can work on parent awareness issues related to physical education and sports lessons.

Conflicts of Interest

The authors have no conflicts of interest to acknowledge.

REFERENCES

Akandere M, Özyalvaç N T, Duman S (2010). Ortaöğretim öğrencilerinin beden eğitimi dersine yönelik tutumları ile akademik başarı motivasyonlarının incelenmesi (Konya Anadolu Lisesi Örneği), Selçuk Üniversitesi Sosyal Bilimler Enstitüsü Dergisi, 24

Alenezi MA (2005). Attitudes of secondary students toward physical education classes in Kuwait. Unpublished doctoral dissertation, The Pennsylvania State University, Pennsylvania

Alparslan S (2008). Ortaöğretim öğrencilerinin beden eğitimi öğretmenlerinin sergilediği öğretim davranışlarına ilişkin algıları ve öğrencilerin bu derse karşı geliştirdikleri tutumları, Unpublished master's thesis. Abant İzzet Baysal Üniversitesi Sosyal Bilimler Enstitüsü, Bolu

Arabacı R (2009). Attitudes toward physical education and class preferences of Turkish secondary and high school students. Elementary Education Online, 8: 1, 2-8

Aras Ö (2013). İlköğretim kurumları ikinci kademede öğrenim gören öğrenci ve görev yapan beden eğitimi öğretmenlerinin beden eğitimi dersine yönelik görüş ve tutumlarının incelenmesi (Kars ili örneği). Unpublished master's thesis, Gazi Üniversitesi, Ankara

Arslan C, Mendeş B (2002). Orta dereceli okullarda beden eğitimi dersine yönelik öğrencilerin ilgi ve tutumlarının araştırılması (Elazığ Örneği). Ege Üniversitesi Performans Dergisi; 8: 1-2, 30-47

Aybek A, İmamoğlu O, Taşmektepligil MY (2011). Öğrencilerin beden eğitimi dersi ve ders dışı etkinliklerine yönelik tutumlarının değerlendirilmesi. Spor ve Performans Araştırmaları Dergisi, 2: 2, 51-60

Balyan M (2009). İlköğretim 2. kademe ve ortaöğretim kurumlarındaki öğrencilerin beden eğitimi dersine yönelik tutumları, sosyal beceri ve özyeterlik düzeylerinin karşılaştırılması, Unpublished PhD thesis, Ege Üniversitesi, İzmir

Bandura A (1995). Self-efficacy. In A. S. R. Manstead & M. Hewstone (Eds.), Blackwell encyclopedia of social psychology, (pp. 453-454), Oxford: Blackwell

Chatterjee S (2013). Attitudes toward physical education of school going adolescents in West Bengal. International Journal of Innovative Research in Science, Engineering and Technology, 2: 11, 6068-6073

Chung M, Phillips DA (2002). The relationship between attitude toward physical education and leisure time exercise in high school students. Physical Educator, 59: 3, 126-139

Çamlıyer H, Çamlıyer H (2001). Eğitim bütünlüğü içinde çocuk hareket eğitimi ve oyun, Manisa

Diaz G A (2015). Attitudes of Latino students toward high school physical education, Unpublisahed doctoral dissertation, Columbia University, New York

Dwyer C (1998). "Eğitimde çoklu ortam" Eğitim ve Bilim, 22, 3-8

Erhan S E, Tamer K (2009). Doğu Anadolu Bölgesi ilköğretim ve ortaöğretim okullarında beden eğitimi dersi için gereken tesis araç-gereç durumları ile öğrencilerin beden eğitimi dersine ilişkin tutumları arasındaki ilişkiler, Atatürk Üniversitesi Beden Eğitimi ve Spor Bilimleri Dergisi, 11: 3, 57-66

Gilliver, K. (2003). 'Quality physical education', British journal of teaching physical education, 34 (1) pp. 6-8

Gosset ME (2015). Comparison of attitude toward physical education of upper elementary school in skill themes and multi-activity classes. Unpublished doctoral dissertation, Columbia University, New York

Göksel AG, Caz Ç (2016). Anadolu lisesi öğrencilerinin beden eğitimi dersine yönelik tutumlarının incelenmesi, Marmara University Journal of Sport Science, 1: 1

Güllü M, Cengiz Ş Ş, Öztaşyonar Y, Kaplan B (2016). Ortaokul öğrencilerin beden eğitimi ve spor dersine ilişkin tutumlarının bazı değişkenlere göre incelenmesi (Şanlıurfa İli Örneği), Gaziantep Üniversitesi Spor Bilimleri Dergisi, 1: 2

Gürbüz A, Özkan H (2012). Determining the attudie of secondary school students toward physcal education of sport lesson (Muğla sample), Pamukkale Journal of Sport Science, 3: 2, 78-89

Harmandar, İH (2004). Beden eğitimi ve spor'da özel öğretim yöntemleri, Ankara: Nobel Yayın Dağıtım

Hoy A W, Spero R B (2005). Changes in teacher efficacy during the early years of teaching: a comparison of four measures. Teaching and teacher education, 21, pp. 343–356

Hünük D (2006). Ankara ili merkez ilçelerindeki ilköğretim ikinci kademe öğrencilerinin beden eğitimi dersine ilişkin tutumlarının sınıf düzeyi, öğrenci cinsiyeti, öğretmen cinsiyeti ve spora aktif katılımları açısından karşılaştırılması. Unpublished master's thesis, Hacettepe Üniversitesi, Ankara

Hünük D, Demirhan G (2003). İlköğretim sekizinci sınıf, lise birinci sınıf ve üniversite öğrencilerinin beden eğitimi ve spora ilişkin tutumlarının karşılaştırılması. Spor Bilimleri Dergisi, 14: 4, 175-184

Jaureguy CD (2013). 6th grade elementary student's attitudes towards running activities in physical education: a preliminary study, Unpublished master's dissertation, California State University, Sacramento

Kağıtçıbaşı Ç (2005). Yeni insan ve insanlar, (Onuncu Basım), İstanbul: Evrim Yayınevi

Kamtsios S (2010). Gender differences in elementary school children in perceived athletic competence, body attractiveness, attitudes towards exercise and participation in physical activity. International Quarterly of Science, 2, 10-18

Kangalgil M, Hünük D, Demirhan G (2006). İlköğretim, lise ve üniversite öğrencilerinin beden eğitimi ve spora ilişkin tutumlarının karşılaştırılması, Spor Bilimleri Dergisi, Hacettepe J. of Sport Sciences, 17 (2): 48-57

Kannan B (2015). Attitude of higher secondary students towards physical education, International Journal of Teacher Educational, Research, 4: 1, 19-25

Keskin N, Öncü E, Kılıç KS (2016). Ortaokul öğrencilerinin beden eğitimi dersine yönelik tutum ve öz-yeterlikleri, Ankara Üniversitesi Spor Bil Fakültesi Dergisi, 14: 1, 93-107

Koca C, Aşçı FH (2002). Lise birinci sınıf öğrencilerinin beden eğitimine yönelik tutumları ve atletik yeterlik düzeyleri, 7. Uluslararası Spor Bilimleri Kongresi: 27-29 Ekim Antalya

Koca C, Aşçı F H, Demirhan G (2005). Attitudes toward physical education and class preferences of Turkish adolescents in terms of school gender composition. Adolescence, 40: 158, 365-375

Koçyiğit F, Öztürk F (1991). İlkokul ve ilköğretim okullarında beden eğitimi dersi uygulama sorunu, I. Eğitim kurumlarında beden eğitimi ve spor sempozyumu. Ankara: Milli Eğitim Basımevi

Lazarevic D, Orlic A, Lazarevic B, et al (2015). Attitudes of early adolescent age students towards physical education. Physical Culture, 69: 2, 88-98

MEB. (2013). Beden eğitimi ve spor dersi öğretim programı (Ortaokul 5-8. Sınıflar). Ankara: MEB Yayınları

Mohammed HR, Mohammad MA (2012). Students' opinions attitudes towards physical education classes in Kuwait public schools, College Student Journal, 46: 3, 551-566

Namlı A, Temel C, Güllü M (2017). Ortaokul Öğrencilerinin Beden Eğitimi Dersine İlişkin Ürettikleri Metaforlar, Kastamonu Eğitim Dergisi, 25: 2, 479-496

Orhun A, Özşaker M (2001). İlköğretim okullarında beden eğitimi dersinin amaç ve içeriğine ilişkin sorunlar, http://acikerisim.ege.edu.tr:8081/jspui/handle/11454/641

Pate R, Corbin C, Pangrazi B (1998). Physical activity for young people. president's council on physical fitness and sports. Research digest, 3: 3, 1–6

Phillips SR (2011). Upper elementary school students' attitudes and perceptions toward physical education. Unpublished doctoral dissertation, Columbia University, New York

Ramsey V (2012). Urban middle school African American girls' attitudes toward physical education and out-of-school physical levels. Unpublished doctoral dissertation, Columbia University, New York

Sakallı N (2001). Sosyal etkiler. Ankara: İmge Kitabevi.

Sılverman S, Scrabis KA (2004). A review of research on ınstructional theory in physical education 2002-2003, International journal of physical education, 41: 1, 4-12

Smoll FL, Schutz RV (1980). Children's attitudes towards physical activity: a longitudial analysis. J Sport Psychol, 2: 137-147

Şişko M, Demirhan G (2002). İlköğretim okulları ve liselerde öğrenim gören kız ve erkek öğrencilerin beden eğitimi ve spor dersine ilişkin tutumları, Hacettepe Üniversitesi Eğitim Fakültesi Dergisi, 23: 205-210.

Taşğın Ö, Tekin M (2009). Çeşitli Değişkenlere göre ilköğretim ve orta öğretim kurumlarında öğrenim gören öğrencilerin beden eğitimi ve spor dersine ilişkin tutum ve görüşleri, Kastamonu Eğitim Dergisi, 17: 2, 457-466

Tekin M, Demir B, Taşğın Ö (2005). Beden Eğitimi ve spor öğretmenlerinin çeşitli değişkenler açısından lise öğrencilerinin beden eğitimi ve spor dersine karşı göstermiş oldukları tutum ve görüşlere etkisi, IV. Ulusal Beden Eğitimi Ve Spor Öğretmenliği Sempozyumu, Uludağ Üniversitesi, Bursa

Taşmektepligil Y, Yılmaz Ç, İmamoğlu O, Kılcıgil E (2006). İlköğretim okullarında beden eğitimi ders hedeflerinin gerçekleşme düzeyi Spormetre Beden Eğitimi ve Spor Bilimleri Dergisi, IV: 4, 139-147

Tschannen–Moran M, Hoy AW, Hoy WK (1998). Teacher efficacy: It's meaning and measure. Review of Educational Research, 68 (2), 202-248

Türkmen M, Varol R (2017). İmam Hatip Ortaokullarındaki Öğrencilerin Beden Eğitimi ve Spor Dersine İlişkin Tutumlarının Araştırılması (Bartın İli Örneği), Turkish Studies, 12(25), 749-762

Uluışık V, Beyleroğlu M, Suna G, Yalçın S (2016). Ortaöğretim öğrencilerinin beden eğitimi dersine yönelik tutumlarının sınıf ve cinsiyet değişkenlerine göre incelenmesi, Journal of Human Sciences, 13: 3, 5093-5106

Yang DJ. Physical education and globalization: A new paradigm for the revitalization of holistic education through the globalization process. The 46'th ICHPER*SD Anniversary World Congress. 14-15, November, İstanbul

Yenal T, Çamlıyer H, Saracaloğlu A S (1999). İlköğretim ikinci devre çocuklarında beden eğitimi ve spor etkinliklerinin motor beceri ve yetenekler üzerine etkisi, Gazi Beden Eğitimi ve Spor Bilimleri Dergisi. IV: 3, 15-16

Yılmaz İ, Ulucan H, Pehlivan S (2010). Beden eğitimi öğretmenliği programında öğrenim gören öğrencilerin eğitimde teknoloji kullanımına ilişkin tutum ve düşünceleri, Ahi Evran Üniversitesi Eğitim Fakültesi Dergisi, 11: 1, 105-118

International Journal of Science Culture and Sport
December 2017 : 5(4)
ISSN : 2148-1148
Doi : 10.14486/IntJSCS681

Field *: Coaching*
Type *: Research Article*
Received: *25.09.2017* ***- Corrected:*** *19.10.2017* ***- Accepted:*** *26.10.2017*

Investigating the Anthropometric Variables and Bio-Motoric Properties in Male and Female Swimmers

Bircan DOKUMACI[1], Cihan AYGÜN[1], Demet DEMIR DOĞAN[2], Hayriye ÇAKIR ATABEK[1]
[1]Department of Coach Training in Sports, Faculty of Sports Science, Anadolu University, TURKEY
[2]Department of Physical Education and Sports, Faculty of Sports Science, Anadolu University, TURKEY
Email: bircanakdogan@gmail.com

Abstract

The purpose of this study was to investigate the anthropometric features, and some bio-motoric properties in young male and female swimmers. Furthermore, this study aimed to investigate the relationship between anthropometric and bio-motoric variables considering the gender differences. Eighteen male and seventeen female amateur swimmers (mean age = 13.4 ± 2.9 and 12.7 ± 2.2 years respectively) volunteered to participate in this study. All swimmers were member of the same team who had trained at least for 3 days in a week. The anthropometric features were evaluated by height, weight, skinfold thicknesses (triceps, biceps, pectoral chest, midaxillary, abdominal, subscapular, midthigh, suprailium, supraspinale, and calf skinfold thicknesses), breadth, and girth measurements, and body fat. The bio-motoric variables were limited with flexibility, squat jump (SJ), counter movement jump (CMJ), and handgrip strength. The results showed that there was no significant differences between groups for age, height, weight, skinfold thicknesses and ∑8 skinfolds ($p>0.05$). However, there was a significant difference between groups for body fat ($p<0.01$), humerus and femur breadth values ($p<0.01$), and for waist girth values ($p<0.05$). There was significant differences between male and female swimmers for investigated bio-motoric properties. The results showed that the SJ and CMJ values were significantly related with height, weight, breadth, and girth measurements ($p<0.01$) in male swimmers. On the other hand, no such relationship was found in female swimmers. In conclusion, present study indicated that there were significant differences between genders, with favor results for male swimmers. The determination of anthropometric properties may help the trainers to predict and follow the swimmers' performance.

Keywords: Swimming, amateur athletes, gender, anthropometry, strength

Introduction

Swimming is all the purposeful movements that an individual makes in order to cover a certain distance in the water (Çelebi, 2008). As athletes compete in a fluid environment, they have to push a liquid substance instead of a solid to push their bodies forward (Maglischo, 2003). Water is not a natural environment for humans. For this reason, in order to pass through the water, it is essential to learn to be comfortable and to support natural floating ability. Additionally, it is essential to bring the body to its maximum swimming position with minimum effort, faster than the face (Guzman, 2007).

Fast swimming is built on efficiency and effect. Efficiency means faster swimming with less effort, and consuming less energy. On the other side, effect means a force produced to move the body from one side of the pool to another side; in other words, the force that was being used effectively. Both concepts are based on the ability to create the force The technique of the style, force, power, and flexibility of the swimmer, a hydrodynamic body position in the water, form level, body type and shape of the swimmer are the factors that affect these skills (Salo and Riewald, 2008). On the other hand, but similar to the other sports, aerobic and anaerobic endurance, strength, speed, rhythm, coordination, and technical skills play important roles for high performance. Addition to these mentioned determinants; anthropometry is another factor that influence the swimming performance. Certain parameters, such as size of the hands, long arms, large feet, and a wide shoulder diameter are features that must exist in the swimmers (Cicchella et al., 2009; Ayan and Kavi, 2016).

By determining these qualities with certain measures and directing them to swim at the appropriate age, the coach will prevent time loss by developing appropriate training and they will produce successful elite swimmers (Ayan and Kavi, 2016). Hence, the purpose of this study was to investigate the anthropometric features, and some bio-motoric properties such as isometric handgrip strength, explosive leg strength, and flexibility in young swimmers. Furthermore, this study aimed to investigate the relationship between anthropometric and bio-motoric variables considering the gender differences.

Materials and Methods

Participants

Eighteen male and seventeen female amateur swimmers (mean age = 13.4 ± 2.9 and 12.7 ± 2.2 years respectively) volunteered to participate in this study. All swimmers were member of the same team who had trained at least for 3 days in a week. None of the swimmers had medical history, leg or arm injury, cardiovascular and pulmonary diseases. At the beginning of the study all participants and their parents were informed about possible risks and benefits of the study and written consents were obtained. The study was approved by the local ethical committee and was conducted in accordance with the Helsinki Declaration for experiments involving humans.

Anthropometric data collection

Participants' heights were measured with a stadiometer (Seca, 767) to the nearest 0.1 cm and their weights were measured with an electronic scale (Seca, 767) to the nearest 0.1kg.

Skinfold thicknesses (triceps, biceps, pectoral chest, midaxillary, abdominal, subscapular, midthigh, suprailium, supraspinale, and calf skinfold thicknesses) were measured using a skinfold caliper (Holtain, ltd, England) to the nearest 0.2 mm. The average of the three values

was used for data analysis. Sum of eight skinfold thicknesses (∑8 skinfolds; triceps, biceps, suprailium, supraspinale, abdominal, subscapular, thigh, and calf skinfolds) was calculated. Body density (BD) of males was predicted using the equation of Jackson and Pollock (1978), additionally, BD of females was predicted using the equation of Jackson and Pollock (1980) (Formula 1 and Formula 2, respectively), whereas the body fat (BF) was estimated using the equation of Siri (Siri, 1956) (Formula 3) (Eston and Reilly, 2009).

$$\text{BD of males} = 1.112 - 0.00043499(\Sigma 7) + 0.00000055(\Sigma 7)^2 - 0.00028826(X2) \quad \text{Formula 1}$$

$$\text{BD of females} = 1.097 - 0.00046971(\Sigma 7) + 0.00000056(\Sigma 7)^2 - 0.00012828(X2) \quad \text{Formula 2}$$

Σ7 = Sum of 7 skinfolds as specified (mm) [pectoral chest + midaxillary + abdominal + suprailium + subscapular + triceps + midthight]

X2 = age (years)

$$\text{BF \%} = ((4.95/\text{body density}) - 4.5) \times 100 \quad \text{Formula 3}$$

Additionally to the mentioned anthropometric measurements, breadth of the distal extremity of the humerus and femur was measured based on standardized procedures (Eston and Reilly, 2009) Furthermore, girth of the hip, waist, and arm (biceps relaxed, and biceps flexed (tensed)) were measured based on standardized procedures (Eston and Reilly, 2009). All anthropometric measurements were taken by one professional who was assisted by a recorder, additionally all measurements were obtained from the left side of the body.

Flexibility

The sit-and-reach test was applied according to the explained method before (Fagnani et al., 2006).This test involves sitting on the floor with legs out straight ahead. Feet (shoes off) are placed flat against the box. Both knees are held flat against the floor by the researcher. The swimmer lean forward slowly as far as possible toward a graduated ruler held on the box from -25 to +25, holding the greatest stretch for 2 sec. The researcher had to be sure that there were no jerky movements on the part of the subject and that her/his fingertips remain at the level and the legs flat. The score was recorded as the distance before (negative) or beyond (positive) the toes. The test was repeated twice, and the best score was recorded. This test measures only the flexibility of the lower back and extensibility of hamstring muscles.

Squat jump and Counter movement jump tests

All participants started with a standardized warm-up of 5-7 minute of cycling at 55-60 rpm against no load (894 Ea, Peak Bike by Monark AB, Sweden) and 5-7 minute of stretching. Following the warm-up, subjects rested for 5-min. After a familiarization session (learning the proper techniques of the jump condition) each participant performed three maximal voluntary vertical jumps at each of two testing conditions – Squat Jump (SJ) and Counter Movement Jump (CMJ); and the best value of the three trials was used for further analysis. The SJ was performed from a starting position with the subjects' knees flexed to 90^0, hands fixed on the hips and with no allowance for preparatory counter-movement. The CMJ was performed from an upright standing position, with the hands fixed on the hips and with a counter movement preparatory phase ended at a position corresponded to the starting position in SJ. Sufficient recovery time was given among trials (more than 2 minutes). The jump heights were measured using a dedicated force platform (Fusion Sport, Old, Australia). For the SJ and CMJ, three parameters were estimated: (1) the maximum jumping height (SJh and CMJh), (2) the difference between CMJh and SJh as explosive strength and (3) the power output

(SJpower and CMJpower) value which was determined using the following formula (Rogers, 1990).

SJpower and CMJpower (kg.m/s) = √4.9 x body weight (kg) x √jump height (m) Formula 4

Handgrip strength

Each participant was given a brief demonstration and verbal instructions for the hand-grip test using the Takei T.K.K.5101 digital hand-grip dynamometer (Takei Scientific Instruments Co. Ltd, Tokyo, Japan). If necessary, the grip opening was adjusted according to the subject's hand size. The test was conducted for both the dominant and non-dominant hand, in standing, with shoulder adducted and neutrally rotated, the wrist, and the elbow in full extension. The dynamometer was held freely without support, not touching the subject's trunk (Koley et al., 2011). Three trials were allowed with sufficient recovery period and the highest score was recorded in kilograms (kg) as peak grip strength. The body mass was used to determine relative strength expressed in kg/kg (weight).

Statistical analyses

Descriptive statistics were compute for each group and all values were presented as mean ± standard deviation (SD). The normality of distribution of the data was assessed with Kolmogorow-Simirnov test; as final the median values of age and ten skinfold thicknesses were compared between groups using the "Man Whitney U" test. Additionally, the mean values of height, weight, breadth, and girth measurements, ∑8 skinfold thicknesses, BF, jump heights, anaerobic power, flexibility, and handgrip strength were compared between groups using the "independent student t-test". The correlations between anthropometric variables (age, height, body mass, sum of 8 skinfold and body fat percentage) and bio-motoric properties (jump heights, handgrip strength, flexibility, and anaerobic power) was evaluated using the Pearson Product Moment Correlation analysis. All analyses were executed using the SPSS for windows version 18.0 and statistical significance was set at $p < 0.05$.

Results

The values of physical properties and anthropometric variables of swimmers who participated in the current study are presented in Table 1. The results indicated that there was no significant differences between groups for age, height, weight, measured ten skinfold thicknesses and ∑8 skinfolds ($p>0.05$). There was a significant difference between groups for body fat values ($p<0.01$), with significant higher body fat value in female swimmers. Furthermore, there was a significant difference between groups for breadth values of humerus and femur ($p<0.01$), additionally, there was a significant difference for girth value of waist ($p<0.05$).

The mean values of investigated bio-motoric properties (jump heights, the difference between CMJh and SJh, anaerobic power, handgrip strength) are presented in Table 2. There was a significant difference between groups for SJh and CMJh values ($p<0.05$ and $p<0.01$), furthermore there was a significant difference between groups for anaerobic power values calculated by SJ and CMJ values ($p<0.05$). It has been observed that the values of jump height and anaerobic power were higher in male swimmers. Similar to these findings there were significant differences between groups based on handgrip strength values (absolute and relative strength values) with higher values in male swimmers ($p<0.05$), except right handgrip strength normalized to the body weight ($p>0.05$).

Table 1. The physical properties and anthropometric variables of swimmers.

Variables	Males (n=18)	Females (n=17)
Age (years)	13.44 ± 2.97	12.75 ± 2.26
Height (cm)	161.71 ± 13.54	157.10 ± 9.25
Weight (kg)	54.97 ± 15.68	48.00 ± 9.77
Body fat (%)	11.36 ± 4.43	19.01 ± 4.78 **
Skinfold thicknesses		
Triceps (mm)	12.22 ± 3.12	13.05 ± 4.28
Biceps (mm)	6.45 ± 2.50	8.10 ± 4.47
Subscapular (mm)	10.22 ± 3.63	11.12 ± 4.17
Pectoral chest (mm)	9.52 ± 3.89	10.22 ± 3.93
Midaxillary (mm)	11.49 ± 6.00	11.48 ± 4.37
Suprailium (mm)	11.23 ± 5.30	11.58 ± 5.21
Supraspinale (mm)	7.35 ± 3.35	7.98 ± 1.77
Abdominal (mm)	20.25 ± 8.01	21.34 ± 6.19
Midthight (mm)	17.91 ± 5.47	20.28 ± 6.83
Proximal Calf (mm)	12.32 ± 3.98	13.33 ± 5.32
∑8 skinfolds (mm)	97.98 ± 30.92	104.86 ± 32.97
Breadth and girth measurements		
Humerus (cm)	6.52 ± 0.64	5.83 ± 0.37 **
Femur (cm)	9.51 ± 0.66	8.76 ± 0.47 **
Waist (cm)	75.03 ± 8.19	69.18 ± 5.15 *
Hip (cm)	85.05 ± 8.55	85.45 ± 8.34
Biceps relaxed (cm)	25.99 ± 4.30	23.53 ± 2.88
Biceps flexed (cm)	26.66 ± 5.05	24.75 ± 2.83

* $p<0.05$; ** $p<0.01$; ∑8 skinfolds = triceps + biceps + suprailium + supraspinale + abdominal + subscapular + thigh + calf

Table 2. The bio-motoric properties' values of swimmers

Variables	Males (n=18)	Females (n=17)
SJh (cm)	28.15 ± 5.23	24.33 ± 2.93 *
CMJh (cm)	30.47 ± 5.85	25.84 ± 3.23 **
The difference between CMJh and SJh	2.31 ± 1.29	1.60 ± 1.92
SJ-Anaerobic power	65.52 ± 24.16	52.29 ± 10.95 *
CMJ-Anaerobic power	68.15 ± 25.21	53.92 ± 11.66 *
Flexibility (cm)	28.18 ± 5.48	32.91 ± 8.01*
Handgrip strength – right (kg)	28.77 ± 13.22	21.51 ± 6.25 *
Normalized handgrip strength – right	0.50 ± 0.11	0.44 ± 0.07
Handgrip strength – left (kg)	27.68 ± 13.03	19.70 ± 5.35 *
Normalized handgrip strength – left	0.48 ± 0.12	0.41 ± 0.07 *

* $p<0.05$; ** $p<0.01$; SJh = squat jump height; CMJh = counter movement jump height

Table 3 and 4 present the correlation coefficients among measured variables in male and female swimmers. The results showed that the SJh and CMJh values were significantly related with some anthropometric variables such as height and weight, also significantly related with breadth and girth measurements ($p<0.01$) in male swimmers. On the other hand, it has been observed that the SJh and CMJh values were not significantly related with anthropometric variables (height, weight, breadth, and girth measurements) in female swimmers ($p>0.05$). There was no significant relationship between jump height values (SJh and CMJh), ∑8 skinfolds, and BF values in both groups ($p>0.05$), except the significant relationship between SJh and ∑8 skinfolds in female swimmers ($p<0.05$).

As seen in Table 3, there was a significant relationship between handgrip strength – both absolute and relative strength - values and other investigated variables in male swimmers ($p>0.05$ and $p<0.01$). On the other hand, only the absolute handgrip strength values were significantly related with other investigated variables (except jump height values) in female swimmers ($p<0.05$), and the relative handgrip strength values were not related with them ($p<0.05$; Table 4).

Table 3. Correlation between anthropometric variables and bio-motoric variables in male swimmers

	Height	Weight	Hum	Fem	Waist	Hip	Biceps Rel.	Biceps Con.	SJh	CMJh	SJ An.P	CMJ An. P	HG-R	N-HG-R	HG-L	N-HG-L	∑8 Skinfolds	BF
Age	0.962**	0.882**	0.783**	0.614**	0.708**	0.805**	0.806**	0.554*	0.884**	0.845**	0.923**	0.919**	0.950**	0.783**	0.944**	0.766**	NS	NS
Height		0.923**	0.865**	0.680**	0.725**	0.852**	0.839**	0.662**	0.823**	0.781**	0.935**	0.929**	0.923**	0.693**	0.916**	0.680**	NS	NS
Weight			0.928**	0.808**	0.874**	0.924**	0.967**	0.682**	0.772**	0.749**	0.985**	0.983**	0.915**	0.558*	0.898**	0.534*	NS	NS
Hum				0.860**	0.727**	0.809**	0.925**	0.664**	0.664**	0.643**	0.902**	0.898**	0.848**	0.527*	0.847**	0.522*	NS	NS
Fem					0.685**	0.820**	0.834**	0.501*	0.561*	0.564*	0.770**	0.776**	0.733**	NS	0.732**	NS	NS	NS
Waist						0.886**	0.858**	0.503*	0.610**	0.591**	0.842**	0.842**	0.722**	NS	0.688**	NS	0.479*	0.638**
Hip							0.871**	0.541*	0.665**	0.650**	0.889**	0.891**	0.840**	0.517*	0.823**	0.482*	NS	0.522*
Biceps Rel.								0.675**	0.704**	0.673**	0.944**	0.940**	0.860**	0.469*	0.851**	NS	NS	NS
Biceps Con.									NS	NS	0.629**	0.619**	0.480*	NS	0.471*	NS	NS	NS
SJh										0.979**	0.868**	0.869**	0.909**	0.806**	0.900**	0.787**	NS	NS
CMJh											0.845**	0.856**	0.884**	0.789**	0.882**	0.780**	NS	NS
SJ An.P												0.998**	0.955**	0.646**	0.939**	0.622**	NS	NS
CMJ An.P													0.954**	0.646**	0.940**	0.625**	NS	NS
HG-R														0.836**	0.993**	0.812**	NS	NS
N-HG-R															0.841**	0.976**	NS	NS
HG-L																0.841**	NS	NS
N-HG-L																	NS	NS
∑8 Skinfolds																		0.970**

* $p<0.05$; ** $p<0.01$; Hum = Humerus; Fem = Femur; Biceps Rel. = Biceps relaxed; Biceps Con. = Biceps contraction; SJh = Squat jump height; CMJh = Counter movement jump height; HG-R = Handgrip right; N-HG-R = Normalized handgrip right; HG-L = Handgrip left; N-HG-L = Normalized handgrip left; ∑8 skinfolds = sum of eight skinfold thicknesses; BF = Body fat.

Table 4. Correlation between anthropometric variables and bio-motoric variables in female swimmers.

	Height	Weight	Hum	Fem	Waist	Hip	Biceps Rel.	Biceps Con.	SJh	CMJh	SJ An.P	CMJ An. P	HG-R	N-HG-R	HG-L	N-HG-L	∑8 Skinfolds	BF
Age	0.592*	0.626**	0.684**	0.536*	NS	0.668**	0.483*	0.495*	NS	NS	0.619**	0.627**	0.528*	NS	NS	NS	NS	NS
Height		0.859**	0.579*	0.734**	0.736**	0.755**	0.586*	0.635**	NS	NS	0.914**	0.895**	0.626**	NS	0.550*	NS	NS	NS
Weight			0.712**	0.852**	0.933**	0.952**	0.889**	0.912**	NS	NS	0.951**	0.946**	0.795**	NS	0.727**	NS	0.610**	0.642**
Hum				0.848**	0.509*	0.672**	0.708**	0.727**	NS	NS	0.675**	0.671**	0.832**	0.528*	0.717**	NS	NS	NS
Fem					0.760**	0.749**	0.782**	0.799**	NS	NS	0.828**	0.830**	0.809**	NS	0.749**	NS	NS	0.510*
Waist						0.870**	0.863**	0.884**	NS	NS	0.876**	0.879**	0.614**	NS	0.567*	NS	0.710**	0.762**
Hip							0.910**	0.905**	NS	NS	0.852**	0.846**	0.722**	NS	0.668**	NS	0.656**	0.650**
Biceps Rel.								0.988**	NS	NS	0.760**	0.753**	0.742**	NS	0.727**	NS	0.749**	0.740**
Biceps Con.									NS	NS	0.818**	0.809**	0.777**	NS	0.746**	NS	0.716**	0.727**
SJh										0.813**	NS	NS	NS	NS	NS	NS	-0.550*	NS
CMJh											NS	NS	NS	NS	NS	NS	NS	NS
SJ An.P												0.990**	0.768**	NS	0.706**	NS	NS	NS
CMJ An.P													0.770**	NS	0.703**	NS	NS	0.484*
HG-R														0.711**	0.935**	NS	NS	NS
N-HG-R															0.690**	0.833**	NS	NS
HG-L																0.658**	NS	NS
N-HG-L																	NS	NS
∑8 Skinfolds																		0.975**

* p<0.05; ** p<0.01; Hum = Humerus; Fem = Femur; Biceps Rel. = Biceps relaxed; Biceps Con. = Biceps contraction; SJh = Squat jump height; CMJh = Counter movement jump height; HG-R = Handgrip right; N-HG-R = Normalized handgrip right; HG-L = Handgrip left; N-HG-L = Normalized handgrip left; ∑8 skinfolds = sum of eight skinfold thicknesses; BF = Body fat.

Discussion and Conclusion

The first objective of this study was to compare anthropometric measurements (skinfold thicknesses, height, weight, BF, breadth, and girth) and bio-motoric properties (jump heights, anaerobic power, flexibility and handgrip strength) of male and female swimmers. The second objective of this study was to examine the correlation of bio-motoric properties (jump heights, handgrip strength, flexibility, and anaerobic power) with anthropometrics variables (age, height, body mass, sum of 8 skinfold and body fat percentage). Finally, the findings of the current study were tried to be evaluated with the related literature.

In swimming, physical characteristics, such as body size, structure and composition contribute to a good performance in the water (Mameletzi et al., 2003). General hypotheses were that swimmers with a higher percentage of body fat would have a better performance than swimmers with lower percentage (Knechtle et al., 2010). On the other hand, Zampagni et al. (2008) reported that there was an inverse significant relationship between body weight, height, and freestyle swimming time obtained in 50-,100-,200-,400-,and 800-m. In addition, compared to other sports that are characterized by great power production, such as gymnastics, ballet, skating running, and cycling BF levels of swimmers are significantly higher (Mameletzi et al., 2003). Among swimmers fat provides buoyancy by reducing the energy required to stay on the surface of the water. However, extreme excesses of fat mass will alter the body's contour, mass, and increase the water resistance (Mameletzi et al., 2003). For this reason, it can be said that anthropometric variables are important for swimming performance. The results of this study showed that there was a significant difference between

the groups for BF values ($p < 0.01$), with significant higher body fat level in female swimmers. There was also a statistically significant difference between the groups for breadth values of humerus and femur ($p < 0.01$), and there was also a significant difference for girth value of waist ($p < 0.05$). Knechtle et al. (2010) reported significant differences between anthropometric variables (body height, body mass, length of arm and length of leg percent body fat (%)) between male and female athletes. McLean et al. (1998) indicated that females were found to have significantly higher body fat quantity than males. In addition, males' height and weight values were significantly higher than females. These results are consistent with the results of the current study.

Handgrip is a physiological variant influenced by a number of factors such as age, sex and body size (Koley et al., 2011). Handgrip strength was significantly higher in the elite swimmers than in controls for 50- and 100-m Freestyle events, thereby, suggesting that a better ability to perform short races is an important parameter to determine (Geladas et al., 2005). The current study demonstrated that there were significant differences between groups based on handgrip strength values (absolute and relative strength values) with higher values in male swimmers ($p<0.05$), except right handgrip strength normalized to the body weight ($p>0.05$). On the other hand, only the absolute handgrip strength values were significantly related with other investigated variables (except jump height values) in female swimmers ($p<0.05$), and the relative handgrip strength values were not related with them ($p<0.05$).

SJ and CMJ are widely used tests to measure an athlete's ability to jump. While SJ is used to measure lower body concentric strength, CMJ is used to measure lower body reactive strength (Newton et al., 2006). The SJ can be used as the most basic functional expression of explosive muscle strength as it requires only concentric activation, while, the CMJ requires moderate eccentric activation followed by high concentric activation, and therefore requires a more complex timing and graduation of the motor units. Thus the SJ can serve as a baseline for the potential of explosive muscle strength and CMJ may indicate development of this potential (Bencke et al., 2002). Lower limb strength and power is considered an important factor for a successful start in swimming (Benjanuvatra et al., 2007). As indicated by Bosco et al. (2002) there was a statistically significant gender difference in CMJ and SJ (19% and 25%, respectively). Patterson et al. (2009) concluded that male displayed significantly higher values for relative average power and jump height in SJ than female. Buśko and Gajewski (2011) reported that the male subjects had much better performance than the female subjects of comparable physical conditions did. When consider other sport such as volleyball, Riggs and Sheppard (2009) suggested that there is a significant difference between the male and female beach volleyball athletes for the SJ and CMJ variables, which show that the male volleyball players had a better jumping ability. The findings of the current study are consistent with the literature. Komi and Karlsson (1978) has calculated the total leg force per unit of body weight, and they observed very similar values for males and females. It has been observed that the male swimmers has much better performance than female swimmers of comparable physical conditions, on the other hand, the gender difference in some of the values were insignificant when the results were calculated per body mass (Busko and Gajewski, 2011). Thus, it can be said that when the gender differences are considered the major contributing factor in force production is greater muscle mass in males. Additionally, Perez-Gomez et al. (2008) indicated that the difference in sprint running performance between sexes may be due to the ability of greater ground reaction forces produced by men, and this may explain the findings of the present study, why the male swimmers can jump higher than female swimmers.

When anthropometric measurements and jump performance were examined, Sheppard et al., (2008) reported that skinfold ratio was moderately correlated to spike jumps and its contribution in volleyball athletes, additionally, the height ratio was correlated to CMJ ($r = 0.77$; $p \leq 0.01$) and spike jump ($r = 0.51$; $p \leq 0.05$). On the other hand, there was no correlation between skinfold values and CMJ ($p > 0.05$). Mayhew and Salm (1990) reported that the anthropometric factors have been shown to effect power production during the Margaria-Kalamen, vertical jump, and standing long jump tests, which are used to evaluate anaerobic power in untrained male and female individuals (mean age = 19.44 ±1.63 and 18.84 ± 0.89 years, respectively). The findings of the current study demonstrated that the SJh and CMJh values were significantly related with some anthropometric variables such as height and weight, also significantly related with breadth and girth measurements ($p < 0.01$) in male swimmers. In addition, there was a significant relationship between SJh and ∑8 skinfold values in female swimmers ($p < 0.05$). For these reasons, an important factor affecting the difference in jump heights in male and female swimming can be based on differences between somatotypes, body composition, and ground reaction force abilities.

In conclusion, the findings of the present study indicated that there were significant differences between genders, with favor results for male swimmers. The determination of anthropometric properties may help the trainers to predict and follow the swimmers' performance.

Acknowledgements

The authors would like to thank to swimmers for their willingness to participate in this study.

Conflicts of Interest

The authors have no conflicts of interest to acknowledge.

Corresponding author:

Bircan DOKUMACI
Faculty of Sports Science, Anadolu University, 26555 Eskisehir, Turkey
Tel: +902223213550/6792 Fax: +902223213564
Email: bircanakdogan@anadolu.edu.tr; bircanakdogan@gmail.com

REFERENCES

Ayan V, Kavi N (2016). "The study of the somatotypes and the horizontal jump performance characteristics of the female swimmers aged between 8 and 14." International Journal of Science Culture and Sport (IntJSCS), 4(special issue 1): 23-30.

Bencke J, Damsgaard R, Saekmose A, Jørgensen P, Jørgensen K, Klausen K (2002). "Anaerobic power and muscle strength characteristics of 11 years old elite and non-elite boys and girls from gymnastics, team handball, tennis and swimming." Scandinavian Journal of Medicine and Science in Sports, 12(3):171-178.

Benjanuvatra N, Edmunds K, Blanksby B (2007). "Jumping abilities and swimming grab-start performances in elite and recreational swimmers." International Journal of Aquatic Research and Education, 1(3): 231-241.

Bosco C, Tsarpela O, Foti C, Cardinale M, Tihanyi J, Bonifazi M, Viru M, Viru, A. (2002). "Mechanical behaviour of leg extensor muscles in male and female sprinters." Biology of Sport, 19(3): 189-202.

Busko K, Gajewski J (2011). "Muscle strength and power of elite female and male swimmers." Baltic Journal of Health and Physical Activity, 3(1): 13-18

Cicchella A, Jidong L, Jürimäe T, Zini M, Passariello C, Rizzo L, Stefanelli C (2009). "Anthropometric comparison between young Estonian and Chinese swimmers." Journal of Human Sport and Exercise online, 4(2): 154-160.

Çelebi Ş (2008). "We investigate body structural and functional properties in 9-13 year children who takes swimming training [Yüzme antrenmanı yaptırılan 9-13 yaş grubu ilköğretim öğrencilerinde vücut yapısal ve fonksiyonel özelliklerinin incelenmesi]" Master Thesis, Health Sciences Institute, Physical Education and Sports Department, Erciyes University, Kayseri.

Eston R, Reilly T (Eds.) (2009). "Kinanthropometry and exercise physiology laboratory manual: tests, procedures and data." Volume 1: Anthropometry, USA and Canada, Routledge.

Fagnani F, Giombini A, Di Cesare A, Pigozzi F, Di Salvo V (2006). "The effects of a whole-body vibration program on muscle performance and flexibility in female athletes." American Journal of Physical Medicine and Rehabilitation, 85(12): 956-962.

Geladas ND, Nassis GP, Pavlicevic S (2005). "Somatic and physical traits affecting sprint swimming performance in young swimmers." International Journal of Sports Medicine, 26(2): 139-144.

Guzman RJ (2007). The Swimming Drill Book, Human Kinetics.

Knechtle B, Baumann B, Knechtle P, Rosemann T (2010). "Speed during training and anthropometric measures in relation to race performance by male and female open-water ultra-endurance swimmers." Perceptual and Motor Skills, 111(2): 463-474

Koley S, Kaur SP, Sandhu JS (2011). "Correlations of handgrip strength and some anthropometric variables in Indian inter-university female handball players." Sport Science Review, 20(3-4): 57-68.

Komi PV, Karlsson J (1978). "Skeletal muscle fibre types, enzyme activities and physical performance in young males and females." Acta Physiologica, 103(2): 210-218.

Maglischo EW (2003). Swimming fastest: The essential reference on technique, training, and program design. Human Kinetics.

Mameletzi D, Siatras T, Tsalis G, Kellis S (2003). "The relationship between lean body mass and isokinetic peak torque of knee extensors and flexors in young male and female swimmers." Isokinetics and Exercise Science, 11(3): 159-163.

Mayhew JL, Salm PC (1990). "Gender differences in anaerobic power tests." European Journal of Applied Physiology and Occupational Physiology, 60(2): 133-138.

McLean SP, Hinrichs RN (1998). "Sex differences in the centre of buoyancy location of competitive swimmers." Journal of Sports Sciences, 16(4): 373-383.

Newton RU, Rogers RA, Volek JS, Häkkinen K, Kraemer, WJ (2006). "Four weeks of optimal load ballistic resistance training at the end of season attenuates declining jump performance of women volleyball players." Journal of Strength and Conditioning Research, 20(4): 955-961.

Patterson C, Raschner C, Platzer HP (2009). "Power variables and bilateral force differences during unloaded and loaded squat jumps in high performance alpine ski racers". Journal of Strength and Conditioning Research, 23(3): 779-787.

Perez-Gomez J, Rodriguez GV, Ara I, Olmedillas H, Chavarren J, González-Henriquez JJ, Calbet JA (2008). "Role of muscle mass on sprint performance: gender differences?" European Journal of Applied Physiology, 102(6): 685-694.

Riggs MP, Sheppard JM (2009). "The relative importance of strength and power qualities to vertical jump height of elite beach volleyball players during the counter-movement and squat jump." Journal of Human Sport and Exercise online, 4(3): 221-236.

Rogers C (1990). "Exercise physiology laboratory manual." Dubuque: Wm C Brown Publishers.

Salo D, Riewald SA (2008). Complete conditioning for swimming. Human kinetics

Sheppard JM, Cronin JB, Gabbett TJ, McGuigan MR, Etxebarria N, Newton RU (2008). "Relative importance of strength, power, and anthropometric measures to jump performance of elite volleyball players." Journal of Strength and Conditioning Research, 22(3): 758-765.

Siri WE (1956). The gross composition of the body. Adv Biol Med Phys, 4(239-279): 513

Zampagni ML, Casino D, Benelli P, Visani A, Marcacci M, De Vito G (2008). "Anthropometric and strength variables to predict freestyle performance times in elite master swimmers." Journal of Strength and Conditioning Research, 22(4): 1298-1307

International Journal of Science Culture and Sport
December 2017 : 5(4)
ISSN : 2148-1148
Doi : 10.14486/IntJSCS685

Field *: Coaching*
Type *: Research Article*
Received: *11.10.2017* ***- Corrected:*** *04.11.2017* ***- Accepted:*** *16.11.2017*

The Relationship between Anthropometric Properties and Physical Performance Levels of 9-12 Years Old Taekwondoists[1]

Duygu SEVİNÇ, Vedat YILMAZ
Erzincan University Physical Education and Sports School, Erzincan, TÜRKİYE
Email: 24duygusevinc24@gmail.com

Abstract

The aim of this study was to investigate the relationship between physical fitness levels of performance and anthropometric characteristics of male athletes aged 9-12 years who regularly participate in taekwondo. Sixty licensed taekwondoist volunteers participated in the study. The average age, height, and weight of the athletes participating in the study were 10.41±1.16 years, 144.16±15.19 cm and 39.66±12.27 kg, respectively. The participants in the study practiced taekwondo two hours twice a week for 2.5 years. Physical fitness levels of the taekwondoists were measured using the Eurofit Physical Fitness Test Battery protocol. Measurements taken include height, weight, skin fold thickness, and body height and circumference. The Durning-Womersley formula was used to calculate body mass and the Siri formula was used to calculate body fat percentage. The measurements were evaluated using the SPSS statistical program and Pearson correlation analysis was performed to investigate the relationship between the variables. The results demonstrated a significant negative correlation between 10x5m push up run, balance, disc hitting and flexibility parameters and anthropometric characteristics. Long jump, right and left grip force, 30 sec sit-up test, Bent arm pull-up test hanging values and the anthropometric properties were found to be positively correlated. In conclusion, anthropometric characteristics of 9-12 year old male taekwondoists were found to have positive and negative effects on performance related physical fitness levels.

Keywords: Taekwondo, Physical fitness, Anthropometric characteristics

[1] *This research was presented as a poster presentation at ERPA International Congresses on Education 2015, ERPA Congresses 2015, 4-7 June 2015.*

Introduction

Studies show sporting activities should be started in early in order for children to be successful in sports. Consequently, developed countries focus on childhood sporting activities. Furthermore, children's workouts have their own unique characteristics. Therefore, pre-school and primary school age children should undergo a number of tests to obtain necessary information about motor skills, general physical parameters and physical development (Güler & Ark., 2008). Although there are some unique features in each age group, very different features are depicted between the ages of 8-11. In this age group, development and personality formation can be positively affected by sports. The use of Eurofit Tests in children of different age groups is essential in determining general health and nutritional status and understanding exercise and sporting habits. This provides physical education teachers and coaches with information about the structural and functional characteristics of children, as well as developing national norms and defining national policies on children in Physical Education and Sports (Akgün, 1989, Çelebi, 2000, Uzuncan, 1991, Loğoğlu, 2002, Zorba et al, 1995, Demir, 2001, Prime Ministry, 1989, Ministry of National Education, 1997). Physical and physiological tests of children are used to evaluate the effects of regular physical activity on growth, development and health, and to examine the trainability of children during adolescence. The long-term trends of children in growth, maturation and physical fitness models and their acute responses to exercise of varying degrees can also be determined through these tests (Docherty, 1996). The impact of regular exercise on the development of children and young people has been the subject of research for many years (Baltacı, 1998). Taekwondo, a fighting sport, which is popular and widely accepted by the youth in Turkey, is of importance in terms of its effect on the motor skill development of children (Şahin et al., 2012). Moreover, previous experimental studies in Turkey provided evidence of the educational benefits of taekwondo practices in multiple intelligence development of the students (Türkmen, 2013).

The aim of this study was to investigate the relationship between physical fitness levels of performance and anthropometric characteristics of male athletes aged 9-12 years who regularly participate in taekwondo.

Material and Methods

Sixty licensed male athletes age 9-12, active in Taekwondo, volunteered to participate in the study. This group practiced taekwondo regularly for two hours a twice a week for 2.5 years. Measuring forms were prepared and the measurement values were recorded. Body length was measured with a height scale of 0.01 kg in Taekwondo outfits and bare feet, while the ages of the individuals forming the sample were determined as years. The body mass index (BMI) was determined by body weight (kg) / height2 (m) (Zorba and Ziyagil, 1995). Eurofit Physical Fitness Test Battery protocol utilized the following tests: Flamingo Balance Test, Disks Touch Test, Flexibility test, 30 sec sit-up test, Hand Grip Strength Test, Long jump test,Bent arm pull-up test, 10x5m push up run Test and 20 m shuttle run . For anthropometric measurements, biceps, calf, and thigh circumferences were recorded in centimeters (cm) as well as, femur, bust, full arm, and hand length. Body densities were calculated using skin fold thicknesses (biceps, triceps, suprailiac, subscapula) and the Durning-Wormersley formula. Body fat percentage was calculated according to the Siri formula. Calculation of body mass required for the Siri formula was calculated using the Durning-Womersley formula.

Durning -Womersley Body Density (BD) formula:

BD = 1.1553 - 0.0643 x X (Male Child)

BD = Body Density Log X = (bi + tr + ss + si)

Siri Formula: % Fat= (4.95 / BD - 4.50) x 100

(bi = biceps skin fold thickness, tr = triceps skin fold thickness, sc = subscapular skin fold thickness, si = suprailiac skin fold thickness.)

SPSS 21.0 software program was used in the analysis of the data. Pearson correlation analysis was used to determine the relationship between descriptive statistics, physical fitness levels and anthropometric characteristics in the distribution of data and the level of significance was determined as p <0.05

Findings

Table 1. The Relationship between Motor Performance and Anthropometric Properties

Variables		Biceps circumference in flexion	Calf circumference	Femur circumference	Arm span length	Bust Length	Arm length	Hand length	Leg Length
10x5m push up run	r	-,432**	-,291*	-,284*	-,362**	-,499**	-,372**	-,340**	-,357**
Balance test	r	-,235	-,064	-,144	-,273*	-,283*	-,313*	-,238	-,328*
Disk touching test	r	-,372**	-,197	-,257*	-,313*	-,344**	-,330*	-,259*	-,340**
Flexibility test	r	-,083	-,131	-,167	-,215	-,005	-,212	-,256*	-,110
Long jump test	r	,423**	,224	,263*	,400**	,536**	,390**	,378**	,432**
Hand grip strength - Right	r	,650**	,470**	,623**	,672**	,669**	,678**	,684**	,642**
Hand grip strength- Left	r	,664**	,545**	,660**	,630**	,650**	,618**	,609**	,577**
30 sec sit-up test	r	,470**	,221	,331**	,524**	,652**	,530**	,482**	,589**
Bent arm pull-up test	r	,542**	,305*	,409**	,603**	,673**	,649**	,645**	,629**
20 m shuttle run	r	,140	,091	,021	,140	,253	,156	,164	,196

***P<0,01* ** P<0,05*

Table 1 illustrates a negative correlation between anthropometric values and long jump, right-left hand gripping force, 30 sec sit-up testes, Bent arm pull-up test hanging performance and negative correlation between 10x5m push up run , balance, disk touching performance and anthropometric values. It was determined that there was no significant relationship between 20 m crunches test and other variables.

Table 2. Correlation of Body Composition with Motor Performance

Variables		Fat Percentage	Weight	Fat Mass	Fat free mass	Body mass index
10x5m push up run	r	,060	-,374**	-,187	-,428**	-,061
Balance test	r	,112	-,303*	-,119	-,361**	-,113
Disk touching test	r	,059	-,300*	-,137	-,350**	-,042
Flexibility test	r	-,194	-,154	-,229	-,107	-,156
Long jump test	r	-,182	,395**	,099	,497**	,002
Hand grip strength - Right	r	,192	,699**	,490**	,734**	,299*
Hand grip strength- Left	r	,212	,712**	,512**	,742**	,382**
30 sec sit-up test	r	-,038	,358**	,180	,409**	,024
Bent arm pull-up test	r	-,024	,594**	,339**	,660**	,095
20 m shuttle run	r	-,097	-,073	-,080	-,063	-,173

***P<0.01* **P<0.05*

Table 2, shows a negative correlation between 10x5m push up run, balance, disk touching performance and body weight and lean body mass. Conversely, there was a positive correlation between long jump and 30 sec sit-up test performance and body weight and fat free mass. In addition, a positive correlation was found in other measured values except for the percentage of fat in the right and left hand grip strength. A significant relationship was found between body weight, body fat mass and body fat free mass in the Bent arm pull-up test hang test.

Discussion and Conclusion

In this study, the physical fitness levels of 9-12 age group Taekwondoists living in Erzincan were correlated with their anthropometric characteristics. Results showed a significant negative correlation between 10x5m push up run, balance, disc hitting and flexibility

parameters and anthropometric characteristics. Long jump, right and left grip force, 30 sec sit-up test and the Bent arm pull-up test hang test were found to be positively correlated with the anthropometric features. The relationship between anthropometric features and 20 m crunches running test results was not statistically significant.

Changes in body structures and performance during growth and maturation in children and young people have been studied. It has been noted that growth can lead to different developments in levels of performance. (Bale et al. 1992, Malina and Bouchard 1991, Pekel et al 2006)

The relationship between development and motor performance is generally dependent on anthropometric factors and performance is considered as an important factor (Özer K. 1993, Pekel et al., 2006).

Performance and strength are directly related to height, weight, arm and leg length, and other body members, flexibility and joint mobility and reaction time (Bostanci et al., 2004). In speed and coordination tests, 10x5m push up run tests and in all anthropometric parameters, a negative correlation was found in weight and lean mass values, which are body composition parameters. In a study on rugby players, researchers found a weak relationship between body fat and non-directional running speed (r = 0.21) (Sheppard and Young, 2006). From these results, it can be said that the anthropometric measurements on the negative side may adversely affect the speed and coordination test. The relationship between development and motor performance is generally dependent on anthropometric factors and it is considered to be an important factor in performance (Özer, 1993). In this study, right-handed grip force, 30 sec sit-up test and Bent arm pull-up test, as well as the increase in anthropometric and body composition measurement values in the positive direction explains the increase in motor skills in the positive direction. When the correlations between right and left hand grip strength and anthropometric features were examined in children, positive correlations were found in all parameters of length measurement values. In the body composition measurement values, a significant correlation was found in the positive direction in all but the fat percentage parameter. As the measurement levels increase, the performance of hand grip strength right-left also increases. Examining the relationship between the results of the 30 sec sit-up test carried out to determine abdominal force, endurance results anthropometric features and body composition values, positive values were found in other parameters except calf value, fat percentage, fat mass, body mass index values. In the Bent arm pull-up test , a positive correlation was found at $p < 0.001$ for all anthropometric values whereas, for body composition values, a significant correlation was found in weight, fat mass and fat free mass values.

Ostojic et al. (2006) found a strong correlation between body composition and explosive power. Tharp et al. (1984) have stated that anaerobic power is related to age, body weight and most importantly fat free mass. In this study, it was determined that there was a positive correlation between weight and fat body mass values between standing long jump (explosive-anaerobic power) test and body composition values. When the correlations between anthropometric characteristics were examined, positive relationships were found especially between bust length, leg length and arm span length values. This length measurement value increases while the long jump performance is also increasing.

Polat and Saygın (2003) in adolescent athletes, and Berg et al. (1995) in advanced adolescent athletes, reported that flexibility significantly decreased with increasing age. In this study, it

was determined that there is a decrease in the negative direction in the measurements of length and body composition. These studies in literature support our findings.

The flamingo balance test suggests that the relationship between flare length, bust length, full limb length, and leg length is negative and that anthropometric measurements in aging does not protect body balance because it makes it difficult for children to control their limbs. In the disc touch test, all anthropometric values except calf value were determined to have a negative correlation. While these length measurement values are increasing, disk touch performance is also adversely affected. There was no statistically significant difference in the 20 m shuttle run test results.

This study conveys that anthropometric and body composition measurements in this study group affected their performance in a negative and positive direction. These results are consistent with other studies. Comparatively, strong correlations were observed between anthropometric values and body composition values during the growth and development period. This supports establishing norms for future studies in other sports, resulting in discussion and conclusions that will enrich physical development in children.

Acknowledgements

The authors would like to thank to the athletes who participated voluntarily in this study.

Conflicts of Interest

The authors have no conflicts of interest to acknowledge.

REFERENCES

Akgün N (1989). Egzersiz Fizyolojisi, 3. baskı, cilt 1, Gökçe Mat.

Başbakanlık Gençlik ve Spor Genel Müdürlüğü Dışilişkiler Daire BaşkanlığI (1989). Eurofit Ankara, (Çev: ŞİPAL, C.).

Baltacı G (1998). Yüzme Sporu Yapan Çocuklarda Kardiyorespiratuar Özelliklerinin Performansa Etkisinin Kontrol Grubu ile Karşılaştırılması. Doktora Tezi, Gazi Üniversitesi Sağlık Bilimleri Enstitüsü.

Bostancı Ö, Uzun A, Emirzeoğlu M, Kabadayı M, Şahin B, Bilgiç S (2004). Beden Eğitimi Ve Spor Yüksekokulunda Öğrenci Olan Futbolcularin Bazi Antropometrik Ölçümleriyle Boy-Beden Ilişkilerinin Incelenmesi. Journal of Physical Education and Sport Sciences, 6(2).

Bale P, Mayhew JL, Piper FC, Ball TE, Willman MK (1992). Biological and performance variables in relation to age in male and female adolescent athletes, J Sports Med Phys Fitness, 32(2):142-8.

Berg KE, LaVoie JC, Latin RW (1995). Physiological Training Effect Of Youht Soccer. Med. Sci. Sports Exerc. Dec; 17 (6) : 656-60.

Çelebi F (2000). 12-14 Yaş Grubu Puberte Dönemi Spor Yapan ve Sedanter Öğrencilerin Posturel ve Biyomotor Özelliklerinin Karşılaştırılması. (Yüksek Lisans Tezi), Muğla, Muğla Üniversitesi, Sosyal Bilimler Enstitüsü.

Demir İ (2001). Beden Eğitimi ve Sporun Beceri, Yetenek Gelişimlerine Etkisi (11-13 yaş grubunda Eurofit test değerlendirmesi) (Yüksek Lisans Tezi), Sakarya, Sakarya Üniversitesi, Sosyal Bilimler Enstitüsü, Beden Eğitimi ve Spor Öğretmenliği Anabilim Dalı.

Docherty D (1996). Measurement in Pediatric Exercise Science, Human Kinetics, USA.

Durning JVGA, Womersley J (1974). Body fat assessed from total body density and its estimation from skinfold thickness-measurements on 481 men and women aged from 16 to 72 years, British Journal of Nutrition, 32 (1),77-97

Güler D, Çelik FK, Pepe K, Yalçıner M (2008). The Physical, Physiological and Tecnical Characteristics of Football Players Who Took Place in Football Championship at The Primary Schools in Burdur, 10.International Sport Sciences Congress, October, 23-25, Proceedıngs ıı, pp:256, Bolu-Turkey

Loğoğlu M (2002). 12 Yaş Grubundaki Okullu Çocukların Eurofit T est Bataryası ile Fiziksel Uygunluklarının Değerlendirilmesi (Yüksek Lisans Tezi). Konya:, Selçuk Üniversitesi Sağlık Bilimleri Enstitüsü, Beden Eğitimi ve Spor Anabilim Dalı.

Malina RM, Bouchard C (1991). Growth, Maturation and Physical Actıvıty, Human Kinetics Publishers Inc, Illinoiss.

MEB Müdürlüğü (1997). Beden Eğitimi Öğretmen Kılavuzu İlköğretim I. Kademe, İstanbul, 8-9.

Ostojic S.M, Majic S, Dikic N (2006). Profiling basketball: physical and physiological characteristics of elite players. Journal of Strength and Conditioning Reseach, Vol:20, No:4, pp:740-744.

Özer K (1993). Antropometri Sporda Morfolojik Planlama, Kazancı Matbaacılık, İstanbul

Pekel HA, Bağcı E, Güzel NA, Onay M, Balcı ŞS, Pepe H (2006). Spor yapan çocuklarda performansla ilgili fiziksel uygunluk test sonuçlarıyla antropometrik özellikler arasındaki ilişkilerin değerlendirilmesi. Kastamonu Eğitim Dergisi, 299--308 Cilt:14 No:1

Polat Y, Saygın Ö (2003). 12-14 Yaş Grubu Futbolcu Çocukların Sağlığa İlişkin Bazı Fiziksel Uygunluk Parametrelerinin Yaş'a Bağlı Gelişimlerinin İncelenmesi. IX. Ulusal Spor Hek Kong. Kit. S: 401, Nevşehir.

Sheppard JM, Young WB (2006). Agility literature review: Classifications, training and testing. Journal of Sports Sciences, 24(9), 919 – 932.

Siri WE (1956). The gross composition of the body. In C.A. ToBİAs & J.H. Law- rence (Eds.), Advances in biological and medical physics, New York, Academic

Şahin M, Saraç H, Çoban O, Coşkuner Z (2012). Taekwondo antrenmanlarinin çocuklarin motor gelişim düzeylerine etkisinin incelenmesi. Spor ve Performans Araştırmaları Dergisi, 3(1).

Tharp GD, Johnson GO, Thorland WG (1984). Measurement of anaerobic power and capacity in elite young track athletes using the wingate test. The Journal of Sports Medicine and Physical Fitness, Vol:24, No:2, pp:100-106.

Türkmen M (2013). The effects of taekwondo courses on multiple intelligence development – a case study on the 9th grade students, Arch Budo Sci Martial Art Extreme Sport, 9, 55-60

Uzuncan H (1991) Eurofit Testleri ile 10-12 Yaşları Arasındaki Erkek Öğrencilerin Aerobik Güç ve Fiziksel Uygunluklarının Ölçülmesi (Yüksek Lisans Tezi), Konya, Selçuk Üniversitesi, Sağlık Bilimleri Enstitüsü, Beden Eğitimi ve Spor Anabilim Dalı.

Zorba E, Ziyagil MA, Çolak H, Kalkavan A, Kolukısa Ş, Torun K, Özdağ S (1995). 12-15 yaş grubu futbolcuların antropometrik ve fiziksel uygunluk değerlerinin sedanter grupla karşılaştırılması. Futbol Bilim ve Teknoloji Dergisi, 3, 17-22.

International Journal of Science Culture and Sport
December 2017 : 5(4)
ISSN : 2148-1148
Doi : 10.14486/IntJSCS688

Field ***:*** *Coaching, Sports Psychology*
Type ***:*** *Research Article*
Received: *26.10.2017* ***- Corrected:*** *22.11.2017* ***- Accepted:*** *26.11.2017*

Technical Skills According to Playing Position of Male and Female Soccer Players

Aristotelis GIOLDASIS, Athanasios SOUGLIS, Orestis CHRISTOFILAKIS
Department of Physical Education and Sport Science, National and Kapodistrian University of Athens, GREECE
Email: giold_telis@yahoo.gr

Abstract

The aim of this study was to assess the technical skills of both male and female players according to their position. Twenty seven female (M= 12.52 ± .51) and thirty seven male soccer players (M= 12.46 ± .51) who were members of amateur youth leagues participated in the study. Players were classified according to their playing position into the following groups: central defenders (CD), fullbacks (FB), midfielders (M), wingers (W), forwards (F). Shooting, short and long passing, dribbling, and dribbling after passing abilities were assessed. Although there were not significant differences between players of various positions the central defenders as well as the female players performed significantly lower scores in most of the technical skills.

Keywords: soccer, technical tests, playing position

Introduction

Soccer is not just who runs the fastest, who is the strongest or who is the most aggressive. Physical, technical, tactical and mental skills discriminate soccer players by competitive level (Hoare & Warr, 2000; Martindale, Collins, & Daubney, 2005; Reilly, Williams, Nevill, & Franks, 2000). Therefore, to be able to play soccer and produce optimal performance the players should be able to master the basic techniques of the game (Menichelli, 2012). Technical skills of players are considered as a main component in talent identification and development systems (Malina et al., 2005; Reilly, Bangsbo, & Franks, 2000; Vaeyens, Lenoir, Williams, & Philippaerts, 2008) and a discriminator variable for the players who move to elite level and players who drop out of soccer (e Silva et al., 2010). Indeed, many findings conclude that successful performance in technical skills is an important determinant of success in soccer (Rebelo et al., 2013; Vaeyens et al., 2006). The aim of training soccer techniques is to improve players' ability to control the ball on the ground or in the air so as to gain possession and overcome the opponents (Menichelli, 2012). The players are also able to support the movements and the actions of their teammates. Technical abilities are not a way to show off but they serve the team targets (Menichelli, 2012). Players also need a different combination of skills and sub-skills such as control, contact, pass, and kick, fact that might lead them to a higher competitive level (Vaeyens et al., 2008; Vaeyens et al., 2006). For the assessment of these skills a variety of technical tests has been used (Ali, 2011; BenOunis et al., 2013; Malina et al., 2005; Rösch et al., 2000; Rebelo et al., 2013).

Past research has already examined technical skills by dividing players according to their playing position that demand a different combination of skills. Specifically Hughes and colleagues (2012) concluded that central defenders should perform high in passing and running with the ball, fullbacks in dribbling and running with the ball, midfielders and wingers in passing, dribbling and running with the ball, and forwards in shooting (Hughes et al., 2012). Midfielders indicated higher juggling ability than all the other positions as well as higher dribbling performance than the full backs. They also performed greater percentage of successful passes (Dellal, Wong, Moalla, & Chamari, 2010) and they covered longer distances than players of other positions (Mohr, Krustrup, & Bangsbo, 2005). Di Salvo and colleagues (2007) study showed that external midfielders covered significantly greater distance with the ball than players of any other position, while central defenders covered the shortest distance (Di Salvo et al., 2007). However, Vale and colleagues (2009) concluded that there were no significant differences in passing skill of players aged 17-18 years old according to their playing position (Vale et al., 2009). On the other hand, studies showed that neither players aged 13-15 years old (Malina et al., 2005; Wong, Chamari, Dellal, & Wisløff (2009) nor players aged 17-18 years old (Reilly, Bangsbo, & Franks, 2000) differed significantly in technical skills according to their playing position. Differences between these conclusions are probably explained by the various position classifications and technical tests that were used. Specifically, Malina and colleagues (2005), as well as Wong and colleagues (2009) classified players in defenders, midfielders and strikers, Di Salvo and colleagues (2007) as well as Dellal and colleagues (2010) classified them in central defenders, external defenders, central midfielders, external midfielders and strikers, Vale and colleagues (2009) classified them in full backs, central defenders, midfielders and strikes (Dellal et al., 2010; Di Salvo et al., 2007; Malina et al., 2005; Vale et al., 2009; Wong et al., 2009). Similarly, Gioldasis, Bekris, and Gissis (2014) who examined the anthropometric and fitness characteristics of players according to their playing position divided them in goalkeepers, central defenders, fullbacks, midfielders, wingers, and forwards.

It is obvious that, although the fundamental value of the positional requirements of each playing position, sport researchers have not taken it into deep consideration. Furthermore, in our knowledge, there is also a lack of research concerning female soccer players. Therefore, the aim of the current study was to examine the technical differences of both male and female players according to their position.

Methods

Participants

In the current study participated twenty seven female (M= 12.52 ± .51 years old) and thirty seven male soccer players (M= 12.46 ± .51 years old) from amateur leagues. All players participated in 2 training sessions per week with their clubs, 75 minutes each session. The club participated in a 9 month national amateur league and a cup organized by the Hellenic football federation. The parents or the guardians of the participants were informed about the ethics, the risks, the benefits, and the aims of the study before giving them a written informed consent. All the procedures were approved by the Peloponnese University Committee. Two researchers specialized in sport ergophysiology and sport psychology assessed the technical skills of the players in the end of the season. Coaches of the players recorded their field position in which they were placed in most league and cup games.

Skill testing

Five valid and reliable tests were administered to assess the technical skills of the players. The first test was a modified version of the shooting test of Vale and colleagues (2009) according to which the players had to kick the ball from 16.5 meter inside a standard official goal divided by ropes in six marked sections. The researchers placed an horizontally rope between the posts 1.5 meter from the ground, and they dropped two ropes from the crossbar 0.5 meter away of each post. They evaluated the upper right and left sections for 5 points, the lower right and left for 3 points and the upper and lower middle sections for 2 and 1 point respectively. The players had three trials before the ten recorded kicks. The second test was a modified version of Rösch and colleagues' (2000) test for assessing short and long passing ability. For short passing assessment the players had to dribble the ball within a four meter marked rectangle up to a line and then pass the ball into a hockey goal 11 meter away. The players had ten trials of which only the ones that did not hit the ground before the 8 meter distance were rated by the researchers. Initially the players had three more trials so as to familiarize themselves with the test. The researchers recorded 1 point when the ball hit the crossbar or the goalpost and 3 points when the ball was inside the hockey goal. The researchers assessed the long passing accuracy by a test that the players had to pass a no moving ball into a 20 meter distance from the center of three concentric circles with a two meter radius. The radius of the circles were 0.5, 1.5 and 3.5 while a 12X12 square distance was 6 meter from the circle center for each side. The players had one trial before performing the 10 main trials. They achieved 5 points if the ball landed inside the 1 meter circle or its circumference, 3 points if the ball landed inside the 3 meter circle, 2 points if the ball landed inside the 7 meter circle and 1 point if the ball landed inside the marked square or its circumference. Then the researchers examined dribbling ability with BenOunis and colleagues' (2013) test. Players had to dribble the ball straight for 3 meters before the timer starting up. Then they had to dribble for three meters, zig zag for three meters, pass the ball under a hurdle while the player had to jump above it and dribble the ball through one of the

two 1-meter finish lines which were placed seven meter away the hurdle. Initially the players had three trials so as to familiarize themselves with the test. Then the researchers recorded the main three trials. Finally, they assessed dribbling-passing ability by Vänttinen and colleagues' (2010) test. The players had to perform a 7 meter pass to a two meter bench and then receive the rebound before shuttling between 6 meter distance of two cones with zig zag. Then they had to perform another 7 meter pass to the bench on the other side which represented one round. They had to perform 5 rounds in total before finishing the test. The researchers instructed them to perform three trials before the test but at least one successful from each player. They also stopped the trial when the players lost their ball. The researchers recorded the time of the test.

Main trial procedures

The researchers classified the players in five positions which were considered as the most representative according to the literature review (Hughes et al., 2012; Di Salvo et al., 2007). Therefore, they assigned the players to one of the following positional groups: central defenders (CD), fullbacks (FB), midfielders (M), wingers (W) and forwards (F). They further excluded goalkeepers as the sample was too small as well as the requirements of their position differ significantly than other playing positions (Vänttinen, Blomqvist, & Häkkinen, 2010). Before skill testing the players performed a 15 minute without ball warming-up (jogging, running, sprinting, and stretching) as well as a 10 minute with ball warming-up (passing, dribbling, and some duels). The players completed the tests after six training sessions arranged under similar conditions of time and temperature (19:00-21:00pm; 23-25oC).

Statistical analyses

The statistical package (v. 17) was used for data analysis. Descriptive statistics (means and standard deviations) were counted for all the variables of the study. Differences in the technical skills among players of various playing position were initially evaluated by analysis of variance (ANOVA). Comparisons among the playing positions were performed using Tukey comparisons while the significance level was set at 10%.

Results

Descriptive statistics of technical skills in the total sample and in players grouped by position and sex are summarized in Table I. Although the number of sample is small a considerable technical variation among players of different position was notified for both males and females. The table also records the analyses of variances and the Tukey's comparisons between the subgroups.

Shoot

The scores of male soccer players showed that central defenders and full-backs indicate the lowest level while midfielders the highest. Furthermore, midfielders and wingers presented moderate scores. However, the only significant difference was between central defenders and midfielders who presented significantly higher scores. Concerning female soccer players, wingers and forwards showed the highest scores while central defenders and midfielders performed low scores. Moreover, full-backs revealed moderate scores. However none of the comparisons between subgroups was significant.

Short pass

Male soccer midfielders indicated the highest scores while central defenders and full-backs the lowest. Concerning subgroups of wingers and forwards, they presented moderate performance. Analyses of variance showed that midfielders performed significantly better short passes than central defenders and full-backs. In contrast, the other subgroups did not differ significantly from each other. As far as the female soccer players, the forwards performed the higher scores in short passing ability while central defenders the lower. Subgroups of full-backs, midfielders and wingers presented moderate scores.

Long Pass

Midfield male players performed the highest score of long pass skill while the other subgroups indicated similarly with lower scores. However, the only significant difference was between midfielders and central defenders who performed lower scores. In contrast, female midfielders and forwards performed the highest scores in long pass while the other groups revealed similar performance.

Dribble

The scores of male soccer players showed that midfielders and wingers performed the highest level while central defenders, full-backs and forwards indicated the lowest. However the only significant difference was between midfielders and central defenders who performed the lowest scores. Regarding dribbling skill of female soccer players it was found that wingers indicated the highest performance. Differences among other subgroups were not statistically significant.

Dribble-Pass

Finally, male midfielders performed the highest level while the forwards performed the lowest. Fullbacks and central defenders presented low scores while wingers indicated moderate performance. However it was not found any significant difference between the subgroups. As far as female soccer players the wingers revealed the highest performance while central defenders and forwards the lowest. Furthermore, midfielders and fullbacks revealed moderate performance. However, the only significant difference was between central defenders and wingers, who showed higher performance.

Table 1. Descriptive statistics technical skills

Males		Technical skills				
Position	**N**	**Shoot**	**Short Pass**	**Long Pass**	**Dribble**	**Dribble-Pass**
CD[1]	10	17.00 (3.09)	15.60 (3.84)	16.00 (2.06)	5.58 (.30)	46.44 (2.61)
FB[2]	8	18.00 (4.75)	15.13 (2.53)	16.88 (1.73)	5.57 (.46)	47.60 (1.26)
M[3]	6	23.33 (5.82)	19.67 (2.16)	20.83 (6.56)	5.16 (.29)	44.97 (2.99)
W[4]	7	20.57 (4.20)	17.14 (1.46)	16.43 (3.78)	5.24 (.25)	45.28 (1.92)
F[5]	6	20.00 (1.90)	16.17 (1.60)	16.33 (2.34)	5.47 (.18)	48.22 (4.08)
Anova		2.65**	3.07**	2.13*	2.66**	1.87
Tukey's		1<3	1<3, 2<3	1<3	1<3	
Females						
CD[1]	3	12.00 (1.73)	13.33 (.58)	11.67 (2.31)	6.68 (.71)	51.00 (4.41)
FB[2]	4	13.75 (1.26)	14.50 (1.73)	11.50 (3.79)	6.19 (.52)	47.43 (1.71)
M[3]	9	12.78 (2.77)	15.56 (1.94)	13.56 (2.51)	6.39 (.69)	48.31 (2.14)
W[4]	5	14.40 (2.51)	15.80 (1.79)	12.00 (1.23)	5.89 (.54)	46.50 (.94)
F[5]	4	15.25 (2.63)	17.00 (5.48)	13.75 (2.87)	6.09 (.31)	50.25 (1.10)
Anova		1.18	.96	.83	1.07	3.05**
Tukey's						1>4

*** $p<.01$; ** $p<.05$; * $p<.10$

Discussion

The aim of the current study was to analyze the performance of soccer players in technical skills in relation to their playing position. Differences were evident in most of the technical skills of males but the researchers found statistical significance only between some playing positions. As far as female soccer players the researchers reported differences only in dribble-pass technical skill. Extensively the results showed that in shooting skill only the male midfielders assessed significantly higher performance than central defenders, finding that is probably explained by the fact that shooting requirements for central defenders are extremely low (Hughes et al., 2012). As far as the short and long distance passing skill it was found that male midfielders better than central defenders and fullbacks. These findings are probably

related to the greater percentage of successful passes that midfielders reveal as well as the high requirements of passing that this position demands (Hughes et al., 2012; Dellal et al., 2010). In contrast literature review showed that midfielders aged 17-18 years old did not present any significant difference with players of other positional groups (Vale et al., 2009). Male midfielders also performed higher than central defenders in dribbling skill, finding that is probably explained by the fact that they cover longer distances (Mohr et al., 2005) as well as they possess the ball for longer than players of other playing positions (Dellal et al., 2010). In addition, Hughes and colleauges (2012) concluded that midfielders require higher level of passing, dribbling and run with the ball skills. On the other hand, our findings showed that female wingers performed better than central defenders in dribbling-passing skill. Literature review concludes that wingers cover greater distance than central defenders as well as they require high levels of with-ball activities (Hughes et al., 2012; Di Salvo et al., 2007). Furthermore, the non-significant findings about dribbling differences are supported by Taskin (2008) study. In contrast to the above findings many studies concluded that players did not differ significantly according to their position (Malina et al., 2005; Wong et al., 2009). This difference is probably occurred by the position classification of players (defenders, midfielder, strikers) as well as by the different age groups that past research used.

Conclusion

Although past research has discovered the relationship between technical skills and playing positions there is little evidence of any specific skill which is predictive of the positional differences between players. Thus we decided to examine this relationship in various skills as well as for both males and females players. The results showed that there were not significant differences between players of various positions. However, only the central defenders performed significantly lower scores in most of the technical skills. In contrast it is suggested that central defenders should develop technical skills so as to cope with offensive build up situations (Vaeyens et al., 2006). However the researchers of the current study do not support this suggestion as central defenders perform significantly lower scores in passing, shooting and dribbling. In contrast to male soccer players, the females differences were significantly lower. We suggest future researchers to compare various age groups on their relationship between technical skills and playing position. Future research should also evaluate technical skills through different more realistic measurement tools such as videoanalysis of high intensity small sided games with the opponent pressure.

Corresponding Author

Aristotelis GIOLDASIS

Department of Physical Education and Sport Science, National and Kapodistrian University of Athens, Greece. Lachana 11-13, 11362; Athens; Greece

Email: giold_telis@yahoo.gr; Tel: +306906511661

Conflicts of Interest

The authors have no conflicts of interest to acknowledge.

REFERENCES

Ali A (2011). Measuring soccer skill performance: a review. *Scandinavian Journal of Medicine & Science in Sports*, *21*(2), 170-183.

BenOunis O, BenAbderrahman A, Karim Chamari AA, BenBrahim M, Hammouda A, Hammami MA, Zouhal H (2013). Association of short-passing ability with athletic performances in youth soccer players. *Asian Journal of Sports Medicine*, *4*(1), 41.

Dellal A, Wong DP, Moalla W, Chamari K (2010). Physical and technical activity of soccer players in the French First League-with special reference to their playing position. *International SportMed Journal*, *11*(2), 278-290.

Di Salvo V, Baron R, Tschan H, Montero FC, Bachl N, Pigozzi F (2007). Performance characteristics according to playing position in elite soccer. *International Journal of Sports Medicine*, *28*(03), 222-227.

Gioldasis A, Bekris E, Gissis I (2014). Playing position: anthropometric and fitness demands in youth soccer. *Sport Science Review*, *23*(3-4), 151-168.

Hoare GD, Warr CR (2000). Talent identification and women's soccer: an Australian experience. *Journal of Sports Sciences*, *18*(9), 751-758.

Hughes M, Caudrelier T, James N, Redwood-Brown A, Donnelly I, Kirkbride A, Duschesne C (2012). Moneyball and soccer-an analysis of the key performance indicators of elite male soccer players by position. *Journal of Human Sport and Exercise*, *7*(2).

Malina RM, Cumming SP, Kontos AP, Eisenmann JC, Ribeiro B, Aroso J (2005). Maturity-associated variation in sport-specific skills of youth soccer players aged 13-15 years. *Journal of Sports Sciences*, *23*, 515-522.

Martindale RJ, Collins D, Daubney J (2005). Talent development: A guide for practice and research within sport. *Quest*, *57*(4), 353-375.

Menichelli, R. (2012). UEFA B' Futsal handbook (part2). *UEFA B FUTSAL* (pp. 1-32). Athens: Hellenic Football Federation and Hellenic Union Soccer Clubs of Futsal.

Mohr M, Krustrup P, Bangsbo J (2005). Fatigue in soccer: a brief review. *Journal of Sports Sciences*, *23*(6), 593-599.

Rebelo A, Brito J, Maia J, Coelho-e-Silva MJ, Figueiredo AJ, Bangsbo J, ... Seabra A (2013). Anthropometric characteristics, physical fitness and technical performance of under-19 soccer players by competitive level and field position. *International Journal of Sports Medicine*, *34*(04), 312-317.

Reilly T, Bangsbo J, Franks A (2000). Anthropometric and physiological predispositions for elite soccer. *Journal of Sports Sciences*, 18, 669-683.

Reilly T, Williams AM, Nevill A, Franks A (2000). A multidisciplinary approach to talent identification in soccer. *Journal of Sports Sciences*, *18*(9), 695-702.

Rösch D, Hodgson R, Peterson L, Graf-Baumann T, Junge A, Chomiak J, Dvorak J (2000). Assessment and evaluation of football performance. *The American Journal of Sports Medicine*, *28* (suppl), 29-39.

Taskin H (2008). Evaluating sprinting ability, density of acceleration, and speed dribbling ability of professional soccer players with respect to their positions. *The Journal of Strength & Conditioning Research*, *22*(5), 1481-1486.

e Silva MC, Figueiredo AJ, Simoes F, Seabra A, Natal A, Vaeyens R, ... Malina RM (2010). Discrimination of u-14 soccer players by level and position. *International Journal of Sports Medicine*, *31*(11), 790-796.

Vaeyens R, Lenoir M, Williams AM, Philippaerts R (2008). Talent identification and development programmes in sport: current models and future directions. *Sports Medicine*, *38*, 703-714.

Vaeyens R, Malina RM, Janssens M, Van Renterghem B, Bourgois J, Vrijens J, Philippaerts RM (2006). A multidisciplinary selection model for youth soccer: the Ghent Youth Soccer Project. *British Journal of Sports Medicine*, *40*(11), 928-934.

Vale P, Ramos A, Salgado B, Correia P, Martins P, Brito J, ... Rebelo A (2009, September). Differences in technical skill performance of Portuguese junior soccer players according to competitive level and playing position. In *International Research in Science and Soccer The Proceedings of the First World Conference on Science and Soccer* (pp. 13-20).

Vänttinen T, Blomqvist M, Häkkinen K (2010). Development of body composition, hormone profile, physical fitness, general perceptual motor skills, soccer skills and on-the-ball performance in soccer-specific laboratory test among adolescent soccer players. *Journal of Sports Science & Medicine*, *9*(4), 547.

Wong PL, Chamari K, Dellal A, Wisløff U (2009). Relationship between anthropometric and physiological characteristics in youth soccer players. *The Journal of Strength & Conditioning Research*, *23*(4), 1204-1210.

International Journal of Science Culture and Sport
December 2017 : 5(4)
ISSN : 2148-1148
Doi : 10.14486/IntJSCS694

Field ***:*** *Recreation, Sport Psychology*
Type ***:*** *Research Article*
Received: *27.10.2017* ***- Corrected:*** *28.11.2017* ***- Accepted:*** *28.11.2017*

Leisure Time Management and the Attitudes of Disabled Athletes

İ. Bülent FİŞEKÇİOĞLU[1], Arif ÖZSARI[2]
[1] Selçuk University, Faculty of Sports Sciences, Konya, TURKEY
[2] Provincial Directorate of Youth Services and Sports, Osmaniye, TURKEY
Email: arifozsari@hotmail.com

Abstract

This scientific study was done in order to evaluate the leisure time management ability and the related attitudes of disabled athletes. The average age is 25,06 ± 8,68, from the branches of athleticism, bocce, football, golfball, table tennis, chess, Wheel chair basketball, tennis, volleyball, and swimming in Osmaniye totally fifty disabled athletes four of them are physically handicapped, fourteen of them are partially-sighted, thirteen of them are hearing impaired, and nineteen of them are mentally disabled participated in this study voluntarily. In order to collect data in this study, a two phased survey was made with the help of the trainers and the companions of the athletes. The first phase of the survey comprises of the questions predicting the demographic features of the athletes (age, gender, sporting year, education of family and self etc.). In the second phase of the survey the leisure time management scale developped by those namely Wang, Kao, Huan, and Wu (2011) was used. The scale's adaptation to Turkish and validity – reliability checks were made by Akgül and Karaküçük (2015). The homogeneity and the analysis of the variance of the data were tested by way of descriptive statistics and for the binary comparisons Mann-Whitney U test, for the multiple comparisons Kruskal Wallis-H test and for the detection of difference source Tamhane'sT2 test were used. In conclusion, It can be stated that the studies related to the leisure time management ability and the related attitudes of disabled athletes are rather limited in the literature and male and female athletes differentiate from each other in a meaningful way and generally the disabled athletes become significantly different in the aspects of category, educational level, parental educational level, and their sporting history and as the level of educational and the sportive experience increase, the leisure time management becomes better

Keywords: Leisure time, Leisure time management, Disabled athletes

Introduction

One of the important issues that constitute the society is disabled people. The positions of disabled athletes in social life are considered as a phenomenon that must be met with an appreciation of being an athlete or being a role model to other disabled people.

Disability refers to individuals who are affected by attitudes and environmental conditions that limit their full and effective participation in the same conditions, together with other individuals, due to their loss at various levels in their physical, mental, mental and sensory abilities (The law about disabled, 2005). Disability is due to age, gender, social and cultural factors, the role of which is expected to be limited or not fulfilled because of a disorder (Özer, 2013).

We can classify the disability groups into four main categories: disabled, visually impaired, hearing impaired and mentally disabled. No matter which disabled group they are included, the importance of sport for people with disabilities is very large. Sports provides great convenience for the person with disabilities to participate in physical activities, as well as to show a sense of personality development and self-esteem and to adapt to social life. Sports and physical activities are used as means of physical, mental, emotional and social development in disabled people due to rehabilitation and therapeutic effect (Şentürk, 2017). At the beginning of collective adaptation of disabled individuals, sports come (Açak ve Kaya, 2015). In today's disability sports, athletes compete in different fields by making different physical activities (Öztürk, 2011). Sports of disabilities are aimed at increasing the quality of life of disabilities (Karakoç et al., 2012).

Disabled athletes can be categorized in six main categories:

1- Amputee (Partial or complete loss of limb)

2-Cerebral Palsy(Spastic etc. brain disorders)

3-Mentally disabled

4-Visually Impaired

5-Spinal cord İnjuries (Wheelchair dependent)

6-Others.

The most important feature of sports in disabilities is that they are classified according to the disability and functional levels that the athletes have, and they can participate in competitions according to the points they have (Ergun, 2011).

Conscious management of disabled athletes' time outside of training and competition hours can provide significant gains for disabled athletes and their surroundings.

It is thought that obtaining these gains is possible by utilizing the time effectively and efficiently

Time: The duration during which a work is passed, passed, or is passing through an entity is defined as time (Turkish Language Association, 2017). Time has been distributed to all human beings fairly, it is a unique and highly valuable resource; can not be collected like money, can not be stored like raw materials, it is consumed willingly or unintentionally. Time is an unrecoverable phenomenon (Ekici, 1997); the good use of time depends on the ability to establish the balance between the time it takes for individual-self and work and social life, rest and enjoyment, and the time it takes to meet its biological and physiological needs

(Kılbaş,2001a). Time perception affects people's way of managing their time (Macan,1994). Time is a factor which is essential for human life. Mankind is looking for the best methods of evaluation of time from its existence today (Yazıcıoğlu, 2010). Management; is the process of organizing and coordinating the human power and other resources that are brought together to do the work that will achieve the predetermined purposes in an organization established to meet a part of the social needs. Wherever two or more people come together to accomplish a specific purpose, there is a management event. Management, however, It is a function that is valid and necessary for everyone, from the smallest such as family, business to the largest organizations like state and international organizations (Sevil et al, 2012).

Time management is defined as identifying needs, establishing the objectives needed to meet those needs, identifying priorities and prioritizing them through time, planning, programming and listing (Smythe and Robertson,1999;Akt. Akatay, 2003). Time management is not managing real time, it is managing ourselves in the best way over time. An important point in time management is the compatibility between the individual's energy level and his or her activities (Balcı, 1990). Time management affects every aspect of an individual's life, including work, family, social and private life (Venter, 2006). To be effective in time management, it can be said that it is necessary to know the importance of time management and to apply effective time management principles in recognition of the pitfalls of time (Kaya and Erdem, 1998). Time management is actually a self-management; to control the events we experience; the individual manages the events by directing himself. How much of our events occurs in a way we want them to be occurred? How much can we determine? What are our impact in the event of occurrence? The answer to all these questions shows our success in managing our time (Güçlü, 2001). Those who manage time well can allocate more time to their own special activities as well as reach their goals effectively and efficiently in the profession and business life (Kocabaş ve Erdem, 2006).

Although the definitions and studies related to the concept of time management have been made in recent years, studies on leisure time management are not found much. However, it has been revealed that leisure time management needs to be evaluated separately, as both leisure time evaluation is becoming important and the characteristics of leisure time and school/work time are different. It is also seen that leisure time management activities are now focused on increasing quality of life (Chin-Shyang and Cheng-pin,2012; Klerk and Bevan-Dye, 2014;Covey et al., 2004; Akt: Akgül and Karaküçük, 2015).

Leisure management is a new concept (Tabarsa et al., 2013) and an important issue (Chin-Shyang and Cheng-pin,2012). This concept was first developed by Wang and Kao (2006) and covers five factors including free time, goal setting and method, programming, urgent intervention (immediate answers) and evaluation (Klerk and Bevan-Dye, 2014). Many sources point out that leisure time management has a positive effect on people's lives (Wang and Kao, 2006; Wang, Kao, Huan and Wu, 2011; Tabarsa et al.: 2013; Qian, Yarnal and Almaida, 2014). We can describe the leisure time management as individuals' acting in a planned and programmed way in order to evaluate the period left out of the time they need to work and fulfill their needs. This plan and program can include the management of the processes like what to do, when to do and how to do in a conscious and reasonable way.

According to Cross, leisure time is a free time and determined by the time allocated for work (Cross, 1990; Akt: Metin, 2013). Free time is the time frame left for individuals to use freely after their work(Broadhurst, 2001).Leisure is not an entirely feasible vision, but rather an ideal and existential situation (Kılbaş, 2010b). Leisure time is an important time of life with

being handled in every period of human life (Tel, 2007a). Leisure time includes a clear potential to redirect (Karaküçük, 1997). People enjoy life and get pleasure from life through leisure time activities (Özer et al., 2009). Activities that can be performed as an active or passive leisure activity that is freely chosen by the individual voluntarily and based on voluntary activities and which give an emotion such as relaxation, relaxation and satisfaction can be expressed as recreation (Birol, 2014). Although recreation is generally used to mean leisure time, it is also activities or experiences that people or groups have voluntarily participated in, enjoying, or acquiring certain physical, social and emotional behaviors (Kılbaş, 2001a; Karaküçük, 1997). In general, defining recreation would not be very wrong if we define it as the activities that people perform in their free time (Karakullukçu, 2009). Until now, there are many significant factors that affect the tendency to evaluate leisure time. These factors draw attention to the fact that they have important roles in people's life and they have different effects as effective variables in managing the leisure time of the individual. These factors are; social factors, cultural structure, class differences, family and friend environment, gender and age, economic factors (Birol, 2014). It is known that the leisure time of people is increasing due to the technological developments in life, and even today's people have more free time than working life. However, the gradual increase of free time brings a lot of gains in personal and social life, but also brings some negatives. These gains or negatives are directly linked to how free time is used by individuals (Arslan, 2011).

25% of the world population is affected by some kind of disability, either directly (they have) or indirectly (a family member has). Leisure activities are of great importance for people with disabilities. For some, this only means passive relaxation, while for others it is often physical activity at the elite level (Çınarlı and Ersöz, 2008). Recreational activities are used for the rehabilitation of disabled individuals, stimulating motor and mental development of these individuals and ensuring their collective integration (Ün, 1999).

Considering the athlete-licensing status of disabled people participating in my research, it is seen that they participate in sports activities on various levels and take part in social life.It is thought that the logical and reasonable management of the time spent outside of sportive activities will lead to a significant relationship between leisure time management and the quality of life of disabled athletes;thus it is a fact that the quality of life of the disabled athletes is also negatively affected by the restrictions on social and professional life.

Materials and Methods

Model of the research

In this study, causal comparative research model was used from quantitative research models.

Working group

While the universe of the study is composed of disabled athletes in Osmaniye, the sample group constitutes a total of 50 disabled athletes, including four (4) physically disabled, fourteen (14) visually impaired, thirteen (13) hearing impaired and (19) mentally disabled persons in Osmaniye. A suitable sampling method was used in the selection of the study group and a questionnaire was applied through the sportsmen's coaches and companions.

Data Collection Tool

A two-part questionnaire was used to collect data in the survey.In the first part, there are some questions that are related to the demographic characteristics of disabled athletes (age, sex,

duration of athletics, family education and education). In the second part, "Leisure Management Scale" developed by Wang, Kao, Huan, Wu (2011) was used. Adaptation of the scale to Turkish (linguistic equivalence), validity and test reliability were made by Akgül and Karaküçük (2015). Confirmatory factor analysis revealed that the scale is consistent with the original form. The Cronbach Alpha score of the scale was .83 and the test retest reliability was .86. For sub-dimensions, internal consistency coefficients ranged from .71 to .81. The calculated Cronbach Alpha value for this study was calculated as .78. The scale was composed of 4 subdimensions and 15 items which are "goal setting and method subdimensions" (1,2,3,4,5 and 6th items), "evaluation sub dimension "(7,8 and 9th items)," leisure time sub dimension "(10,11,12th items) and "Programming sub-dimension" (13th, 14th and 15th grades). The response codes for each item range from 1 to 5. The grading items consist of "5-strictly agree, 4-agree, 3-undecided, 2-not agree, 1-strictly disagree". The items in the scale programming sub-dimension consist of negative statements. The high scores on the scale indicate that leisure time management practices are better.

Analysis of Data

SPSS (Statistical Package for Social Scientists for Windows Release 16.0) program was used in the analysis of the data used in the research. The level of significance was evaluated over 0.05. Descriptive statistics were used to test the homogeneity and variance of the data. Mann-Whitney U was used in binary comparisons, Kruskal Wallis-H in multiple comparisons and Tamhane's T2 test in determining differences.

Results

Table 1. Leisure time management changes due to gender factor

Gender	n	%	Goal Setting and Method		Leisure Time Attitude		Programming		Evaluation	
			x	Ss	x	Ss	x	Ss	x	Ss
Male	45	90	2,81	0,97	3,33	0,68	1,87	0,72	2,67	0,92
Female	5	10	1,57	1,18	2,33	1,03	2,14	0,51	1,67	1,31
P			,023 *		,031		,204		,043 *	

When Table 1 is examined; the mean value of goal setting and the method sub dimension of male athletes (2,81 ± 0,97) were higher than the female athletes (1,57 ± 1,18) and this change is determined to be the statistically significant ($p < 0.05$). Male athletes of leisure attitude (3.33 ± 0.68), compared to female athletes (2.33 ± 1.03) was found out to be significantly higher and this change is statistically meaningful ($p < 0.05$). In the evaluation sub-dimension, mean values of male athletes (2,67 ± 0,92) were higher than female athletes (1,67 ± 1,31) and this change is determined to be the statistically significant ($p < 0.05$). In the programming sub-dimension, no significant difference was observed in terms of gender depending on the statistics.

Table 2. Leisure time management changes based on the disability status of the athletes

Disability Type	n	%	Goal Setting and Method		Leisure Time Attitude		Programming		Evaluation	
			x	Ss	x	Ss	x	Ss	x	Ss
Physical	4	8	2,83	0,59	3,67	0,47 [a]	1,50	0,34	2,58	0,74
Visual	14	28	3,51	0,43 [a]	3,43	0,59	1,95	0,54	3,29	0,61 [a]
Hearing	13	26	2,60	0,97 [b]	3,46	0,65	2,02	1,03	2,59	0,84
Mental	19	38	2,10	1,14 [b]	2,82	0,88 [b]	1,86	0,59	2,02	1,08 [b]
P			,001*		,029*		,614		,002*	

As can be understood from Table 2; In the goal setting and method sub-dimension, the mean value of visually impaired athletes (3,51 ± 0,43) was higher than the values of hearing impaired (2,60 ± 0,97) and mentally disabled (2,10 ± 1,14) and this change was statistically significant (P <0.05). The mean value of physically disabled athletes (3.67 ± 0.47) was higher than that of mentally disabled athletes (2.82 ± 0.88) in the leisure time attitude sub dimension and this change was statistically significant (P <0.05). On the evaluation dimension, mean value of mentally disabled athletes (2,02 ± 1,08) was found to be lower than visually impaired athletes and this change was statistically significant (P <0.05). In the programming sub-dimension, no significant change has been determined depending on all disability type factors.

Table 3. Leisure management changes due to years of sports activity of sportsmen

Duration of Sports activity	n	%	Goal Setting and Method		Leisure Time Attitude		Programming		Evaluation	
			x	Ss	x	Ss	x	Ss	x	Ss
1-3 Years	28	56	2,36	1,06 a	3,18	0,82	1,85	0,79	2,20	0,92 a
4-6 Years	10	20	2,73	1,07	2,90	0,82	1,90	0,63	2,50	0,96
6 years and over	12	24	3,40	0,65 b	3,61	0,45	2,03	0,54	3,47	0,63 b
P			,013*		,085		,759		,000*	

As seen in Table 3, according to the duration of sports activity factor in the leisure time management of disabled athletes, the average value of the athletes with an athletic past of 1-3 years (2,36 ±1,06) is lower than that of athletes with a past 6 years and above , 40 ± 0,65) in the goal setting and method sub-dimension, and this change was statistically significant (P <0.05). In the evaluation sub-dimension, it was determined that the average value of the athletes with an athletic past of 1-3 years (2,20 ± 0,92) was lower than that of athletes with a past 6 years and athletic history (3,47 ± 0,63) and this change was statistically significant (P

<0.05). There was no significant change in leisure time and programming sub-dimensions depending on the duration of sports activity factor.

Table 4. Leisure time management changes due to the level of parental education level of sportsmen

Mother Education	**n**	**%**	**Goal Setting and Method**		**Leisure Time Attitude**		**Programming**		**Evaluation**	
			x	Ss	x	Ss	x	Ss	x	Ss
Primary Education	35	70	2,62	1,05	3,25	0,73	1,76	0,56 a	2,56	0,99
Secondary Education	11	22	2,67	1,08	3,15	0,79	2,06	0,84 b	2,48	1,11
High education	4	8	3,25	1,13	3,25	1,23	2,67	0,98 b	2,83	1,00
P			,538		,936		,031*		,844	
Father Education	**n**	**%**	**Goal Setting and Method**		**Leisure Time Attitude**		**Programming**		**Evaluation**	
			x	Ss	x	Ss	x	Ss	x	Ss
Primary Education	26	52	2,72	1,09	3,23	0,79	1,83	0,58	2,65	1,04
Secondary Education	14	28	2,44	0,94	2,93	0,75	1,98	0,76	2,36	0,96
High education	10	20	2,92	1,13	3,63	0,60	1,97	0,95	2,63	0,99
P			,535		,087		,791		,660	

As can be seen from Table 4, In the programming sub-dimension, it is found that the average value of the athletes whose mother graduated from primary education (1,76 ± 0,56) is lower than the athletes whose mother graduated from secondary education (2,06 ± 0,84) and higher education (2,67 ± 0,98) and this change was statistically significant (P <0.05). There was no significant change in goal setting and method, leisure time and evaluation sub-dimensions due to maternal education factor. There was no statistically significant difference in all sub-dimensions of leisure time management depending on the level of father's education level.

Table 5. Leisure time management changes due to the level of education of disabled athletes

Education	n	%	Goal Setting and Method		Leisure Time Attitude		Programming		Evaluation	
			x	Ss	x	Ss	x	Ss	x	Ss
Primary Education	17	34	1,85	0,92 a	2,84	0,79a	1,84	0,84	1,82	0,85 a
Secondary Education	28	56	3,07	0,91 b	3,37	0,74	1,92	0,65	2,92	0,86 b
High Education	5	10	3,33	0,26 b	3,74	0,15 b	2,00	0,62	3,13	0,84 b
P			,000*		,022*		,898		,000*	

As can be understood from Table 5, It has been determined that the mean value of primary school graduate athletes (1,85 ± 0,92) in terms of goal setting and method sub-dimension is lower than middle school graduates(3,07 ± 0,91) and higher education athletes(3,33 ± 0,26) average according to educational level of disabled athletes and this change was statistically significant (P <0.05). The mean value (2.84 ± 0.79) of primary education graduates in leisure time attitude sub dimension was lower than average of athletes with higher education (3.71 ± 0.15), and this change was statistically significant P <0.05). In the evaluation sub-dimension, it is found that the average value of primary education graduate athletes (1,82 ± 0,85) is lower than the average value of secondary education graduates (2,92 ± 0,86) and athletes with higher education graduates (3,13 ± 0,84) and this change was statistically significant (P <0.05). In the programming sub-dimension, no significant change has been observed depending on the educational level of disabled athletes.

Discussion

A total of fifty (50) disabled athletes participated in this research to evaluate the leisure time management and attitudes of disabled athletes in the physical, visual, auditory and mental categories and the average age of these athletes was determined as 25.06 ± 8.68.

Significant differences were found in the two sub dimension in the the context of gender according to the results of leisure time management attitudes of disabled athletes.The values of goal setting and method and evaluation sub-dimensions of male athletes were higher than female athletes and this change was statistically significant. Although there was no statistically significant difference in leisure time and programming subscales depending on the gender, the values in the programming subscale of the women were found to be higher than those of the males (Table 1). It can be considered that male disabled athletes are more successful than female disabled athletes in goal setting and method and evaluation sub-dimensions of leisure time. In a study conducted by Akgül and colleagues (2016) to investigate the leisure time management of university students, there was no significant difference in the other sub-dimensions except for the programming sub-dimension, but scores of female participants were higher than men. According to gender variables, female students' attitudes towards leisure time activities were found to be more positive than male students and

to differ in leisure attitudes (Akyüz and Türkmen, 2016). Although there are not many studies that investigate the relationship between leisure time management and gender in the field, it is possible to find out some studies working on the relationship between participation in leisure activities and time management and gender. Individuals who are successful in time management are also thought to be successful in leisure time management. According to the results of the study on time management, it has been revealed through various studies that there are differences between the genders, mostly in favor of the female participants (Macan et al.,1990; Trueman and Hartley, 1996; Alay col. Koçak, 2003; Çıplak, 2004; Erdul, 2005; Çağlıyan and Göral, 2009; Dinçay, 2010; Sugötüren et al.; 2011; Caz and Tunçkol, 2013; Gümüşgül, 2013; Yücel, 2014). Gender has an important role to play in and participate in leisure activities (Altergoot and McCreedy, 1993; Culp, 1998; Demir and Demir, 2006; Akgül, 2011). According to Bittman and Wajcman's (2000) research, though men and women have similar amounts of leisure time, it is clear that there are differences between both genders when characteristics of leisure time is considered. According to the results of the research conducted on 966 university students, it was found that the participants showed significant differences according to gender in the levels of significant leisure time participation (Işık,2014). According to the results of Chen and colleagues's research (2013), there were significant differences between male and female teachers participating in leisure activities. There is a recreational area difference in the comparison of leisure activities according to gender in the survey conducted by Doğru (2017) within the scope of expertise thesis. Women's recreational leisure activity scores were found to be statistically significantly higher than that of men. Factors such as socio-cultural structure and economic situation are considered to be influential in the changes in time management, leisure time and leisure participation levels. In this study, it is considered that sample differences are influential.

It was determined that the values of visually impaired athletes in the goal setting and method subdimension were higher than those of hearing impaired and mentally impaired athletes as a result of analysis of disability type factor of physical, visual, auditory and mentally handicapped athletes and this change was statistically significant. In the leisure attitude subdimension, it was determined that the values of the physically disabled athletes were higher than the values of mentally disabled athletes and this change was statistically significant. In the evaluation sub-dimension, the values of mentally disabled athletes were lower than those of visually impaired athletes and it was found that this change was statistically significant. In the programming sub-dimension, no significant change was observed due to the type of disability (Table 2). According to findings, it can be concluded that visually impaired athletes are more successful than other athletes in the goal setting and method and evaluation sub-dimensions of leisure time management. In leisure time subdimension, it can be said that physically disabled athletes are more successful than visual, hearing and especially mentally disabled athletes. There are studies in the literature that investigate the participation of disabled people in recreational activities in their leisure time; McMahon (1998), for example, has shown that recreational activities are important in terms of integrating with the environment in society, creating friendships and social acceptance in disabled people (İlhan et al., 2013). According to the findings of Koçak (2016), sportive recreational activity programs were found to have a positive effect on self-esteem of mildly mentally disabled adolescents and also it was observed that sportive recreational activities also contributed to the psychological development of individuals. Çelebioğlu and İlgar (2016) found that among 313 hearing-impaired people with a mean age of 34, majority of the disabled individuals were participating in leisure time activities, according to the research they conducted. It has been determined that the life qualities of amputees between the ages of

13 and 18 with physical disabilities and their leisure time habits are not at the desired levels (Şentürk, 2017). In another survey of intake, leisure time satisfaction was found to be one of the important factors affecting the social participation of physically disabled people (Tonak, 2014). It is possible to say that leisure time satisfaction and psychological quality of life increase with increasing leisure time participation (planned and programmed leisure time participation), according to the survey: examining serious leisure time, leisure time satisfaction and quality of life of physically handicapped individuals (Munusturlar, 2016). According to the results of research conducted by Çelik (2011) on the participation status of disabled people working in public institutions on recreational activity, the vast majority of people with disabilities have participated in leisure activities, 72.2% of disabled people have opted for outdoor activities and have enough self confidence. Approximately one third of participants in Akyürek's (2011) study were professionally engaged in sports and participated in a sports club, the participation rate of sports-related disabled people in leisure time activities increased, the athlete's identity gained reputation in front of the disabled person's identity, the self- confidence increased and the participation of feelings belonging to a group is positively influential. Palisona and colleagues (2011) found that many factors affect young people's participation in leisure and recreational activities, especially the physical activity effect and orientation knowledge of their family about their activities, as a result of a survey of 205 mentally disabled young people aged between 13 and 21 years. In the contrast of Lloyd, King, Lampe and McDougall's (2001) expectations, it is well informed that mentally disabled individuals participating in leisure activities have high level of satisfaction due to leisure activities. Devine (2004, Akti: Koçak, 2016) reported that free time activities led to an increase in the social interaction of these individuals with each other, contributing to the degree of social acceptance in the study of mentally disabled individuals. Santiago and Coyle (2004) provide information on the health promotion of the leisure activities of disabled women with physical activity in their survey of 170 handicapped women, most of whom are graduates of high education and who have second disease who manage leisure time with physical activities in the United States.

In our study, it was determined that the values of the athletes with a 1-3 year sports history in the goal setting and method sub-dimension according to the sport year factor of the disabled athletes' leisure time management are lower than the athletes with 6 years and above sports history and this change is statistically significant. In the evaluation sub-dimension, it was determined that the values of the athletes having 1-3 years of athletic history are lower than those of the athletes having a past 6 years and above, and this change is statistically significant. Although there was no significant change in leisure time and programming sub-dimensions depending on the sport year factor, it was determined that the highest values belonged to individuals with a past 6 years of sports history (Table 3). Based on the findings, it can be said that individuals with a long history of athleticism are more successful in leisure time management. Yurdagül (2016) reports that individuals engaged in active sports, who have a past of 6-10 years in terms of the sporting year, are more active in leisure time management. Zekioğlu and collegues (2015) found that the athletic students' research on the relationship between time management skills and academic achievement showed that 74 time-athletes who regularly sport in a soccer club score more overall time management scores compared to non-athletes in the literature. In a study for assessing leisure time activities, Bahar(2008) reported that 1029 students enrolled in six different teacher training programs in the faculty of education reported that the average attendance period for sporting activities during the leisure time of the physical education and sports teacher training students was greater than the average attendance period for the students from the other five branches. In

this research, it is seen that the students with sports history have more control of leisure time with sporting activities. When appropriate events are selected, ordinary leisure time activities can also have positive benefits. For this reason, ordinary and systematic leisure time activities should be balanced in the lives of individuals and societies. In order for this balance to be established, the community needs to be educated about the leisure time usage and differences in free time usage (Arslan, 2011).

It has been determined that the values of the athletes whose mother are graduated from primary education in the programming sub-dimension are lower than those athletes whose mother are graduated from the secondary and higher education in leisure time management changes due to the education level factor of the parents of the athletes and this change is found statistically significant. There was no significant change in goal setting and method, leisure time attitude and evaluation sub-dimensions depending on maternal education factor. There was no statistically significant difference in all sub-dimensions of leisure time management depending on level of education of the father (Table 4). As parents' learning levels increase, it has been found that they are more likely to direct young people to manage their leisure time (Süzer,2000). In the study of Akyüz (2015), it is seen that there is a positive change in the leisure time attitude in parallel with the increase of mother education status. Although there is no significant difference in the father education level, it is seen that there is a positive change in the leisure time attitude with the increase of the father education level. It has been determined that social harmony also increases in hearing-impaired children in parallel with the increase in parents' education level (Yavuz et al., 2010). The family is the first and most important social circle that constitutes and directs the individual's leisure behavior; as well as those who have a high level of education, participate in leisure activities with more and more variety (Tel, 2007b). Parental education levels are considered to be a crucial element in leisure time attitude-management and participation in leisure time activities.

It has been determined that the values of primary school graduate athletes are lower in goal setting and method sub dimension than the athletes of secondary and higher education graduates depending on the educational level of disabled athletes and this change is statistically significant. It was determined that the values of primary school graduate athletes in leisure time attitude sub dimension were lower than those of higher education graduates and this change was statistically significant. In the evaluation sub-dimension, it is determined that the data of primary school graduate athletes are lower than those of secondary school and higher education graduate athletes and this change is statistically significant. In the programming sub-dimension, no significant change was observed depending on the educational level of disabled athletes (Table 5). Based on the findings, it can be said that disabled athletes with primary education graduation have less contribution to leisure time management than disabled athletes with secondary education and higher education. Education is thought to be an assistive process that prepares people to use their leisure time (Tezcan, 1976). In his/her research, Yurdagül (2016), found that the education level variable had significant differences in time planning, time attitudes and time waster factors subdimensions, the lowest values had primary school graduates, and the highest values had higher education and higher participants. According to findings, it has been understood that individuals can not have sufficient leisure time but, at a minimum, evaluate the leisure time they have in a more effective and planned way as their educational status increases (Karakullukçu, 2009). As the level of education of the individual increases, participation in leisure activities increases, and the tendency and activity level of the activities' selection and preference are related to

education (Tel, 2007b). According to findings, as the level of education increased, social, physical, intellectual and recreational participation increased (Ülgen, 2012). Activity scores of non-literate primary school graduates were found to be statistically significantly lower than those of high school graduates and college graduates (Doğru, 2017). According to the results of the research conducted by Droomers et al. (2001) with the participation of 3793 people; participation in leisure activities in the group with low educational level was found to be low. When the individual's leisure behavior tendency is examined; it is understood that there is a close relationship between lifestyle, education, attitudes and thoughts (Akgül, 2011). The socialization process of young people under social protection and care in the orphanages who regularly participate in leisure activities is positively affected (Kaya, 2003). As you can see in the field research, it is thought that education is an important factor at vital level in planning and management of leisure time.

Conclusion

Due to the potential limitations of this research, the attitudes of disabled athletes have been tried to be examined in terms of leisure time management, participation in leisure activities and time management concepts. Mentally disabled athletes participating in our research are trained at the public rehabilitation center, regularly participate in sports activities and competitions, and are not completely devoid of brain functions.

As a result; it has been found that the studies on the leisure time management and attitudes of the disabled athletes are very limited in the field and that there is a significant difference between the male and female athletes in leisure time management and attitudes and that the disabled athletes differ significantly according to the category, education level, family education level and sports history, and as the sporting year and level of education rises, it can be said that leisure time management is also improving.

It is envisaged that these and similar studies within the scope of disabled individuals will contribute values to literary by forming sample groups at a wider stage and new windows will be opened in the light of science for the lives of disabled people, whether they are an athlete or not.

Conflicts of Interest

The authors have no conflicts of interest to acknowledge.

Corresponding Author

Arif ÖZSARI

Gençlik Hizmetleri ve spor İl Müdürlüğü, Osmaniye, TURKEY

Email: arifozsari@hotmail.com; Tel: +905358268843

REFERENCES

Açak M, Kaya O (2015). İşitme engelli ve işitme engelli olmayan futbolcuların benlik saygıları ve saldırganlık düzeylerinin incelenmesi. İnönü Üniversitesi Beden Eğitimi ve Spor Bilimleri Dergisi, 2(2):1-11.

Akatay A (2003).Örgütlerde zaman yönetimi. Selçuk Üniversitesi Sosyal Bilimleri Enstitüsü Dergisi,10:271-280.

Akgül BM (2011).Farklı kültürlerdeki bireylerin boş zaman aktivitelerine yönelik tutumlarının değerlendirilmesi: Ankara-Londra örneği. Yayınlanmamış Doktora Tezi, Gazi Üniversitesi, Sağlık Bilimleri Enstitüsü, Ankara.

Akgül BM, Karaküçük S (2015). Boş zaman yönetimi ölçeği: geçerlik-güvenirlik çalışması. International Journal of Human Sciences, 12(2):1867-1880.

Akgül BM, Yenel İF, Karaküçük S(2016). Evaluating free time management and its relation to life satisfaction, most participated leisure activities and gender among colllege students in Turkey. Social Sciences and Humanities Journal,11(2):1-18.

Akyürek G (2011). Engelli kişilerin toplumsal katılımlarını etkileyen faktörlerin incelenmesi. Yayınlanmamış Yüksek Lisans Tezi, Hacettepe Üniversitesi, Sağlık Bilimleri Enstitüsü, Ankara.

Akyüz H (2015). Üniversite öğrencilerinin boş zaman faaliyetlerine yönelik tutumlarının incelenmesi (Bartın üniversitesi örneği), Yayınlanmamış Yüksek Lisans Tezi, Bartın Üniversitesi, Eğitim Bilimleri Enstitüsü, Bartın.

Akyüz H, Türkmen M (2016). Üniversite öğrencilerinin boş zaman faaliyetlerine yönelik tutumlarının incelenmesi (Bartın üniversitesi örneği), International Journal of Science Culture and Sport, August, 4 (Special Issue 1), 340-357.

Alay S, Koçak S (2003). Üniversite öğrencilerinin zaman yönetimleri ile akademik başarıları arasındaki ilişki. Kuram ve Uygulamada Eğitim Yönetimi, 35,326-335.

Altergoot K, McCreedy CC (1993). Gender and family status across the life: Constraints on five types of leisure, Loisir et Societe/Society and Leisure**,** 16(1):151-179.

Arslan S (2011). Serbest zaman kullanımı: Sıradan serbest zaman etkinlikleri ve sistemli serbest zaman etkinlikleri. Erzincan Eğitim Fakültesi Dergisi, 13(2):1-10.

Bahar HH (2008).Cinsiyet ve branşa göre eğitim fakültesi öğrencilerinin serbest zaman etkinlikleri (Erzincan eğitim fakültesi örneği). Erzincan Eğitim Fakültesi Dergisi,10(2):117-140.

Balcı A (1990). Zaman yönetimi. Ankara Üniversitesi Eğitim Bilimleri Fakültesi Dergisi,23(1):92-102.

Birol ŞS (2014). Sportif rekreasyon uygulama politikaları üzerine bir araştırma. Yayınlanmamış Doktora Tezi, Gazi Üniversitesi, Sağlık Bilimleri Enstitüsü, Ankara.

Bittman M,Wajcman J (2000). The rushhour: The character of leisure time and gender equity. Social Forces, 79(1):165-189.

Broadhurst R (2001). Managing environments for leisure and recreation. Routledge 11 New Fetter Lane, London,12.

Caz Ç, Tunçkol HM (2013). Beden eğitimi ve spor öğretmeni adaylarının zaman yönetimi becerilerinin incelenmesi. CBÜ Beden Eğitimi ve Spor Bilimleri Dergisi, 8(2):23-29.

Chin-Shyang S, Cheng-pin H (2012). A study on the relationship among free-time management, leisure constraints and leisure benefits of employees in resort hotel. The Journal of Global Business Management, 8(1):166-174.

Chen CC, Cheng CH, Lin SY (2013). The relationship among leisure involvement, leisure benefits, and happiness of elementary school teachers in Tainan county, International Research in Education,1(1):29-51. http://dx.doi.org/10.5296/ire.v1i1.3970

Culp RH (1998). Adolescent girls and outdoor recreation: A case study examining constraints and effective programming. Journal of LeisureResearch,30(3):356-379.

Çağlıyan V, Göral R (2009).Zaman yönetimi becerileri: Meslek yüksek okulu öğrencileri üzerine bir değerlendirme. KMU İİBF Dergisi,11(17):174-189.

Çelebioğlu K, İlgar Y (2016). İşitme engelli yetişkin bireylerde serbest zaman aktivitelerine katılım ve bakış açılarının incelenmesi. 1. Engellilik Araştırmaları Kongresi. Ankara.

Çelik G (2011). Kamu Kuruluşlarında çalışan engelli bireylerin serbest zaman engellerinin ve tatmin düzeylerinin incelenmesi(Antalya merkez örneği). Yayınlanmamış Yüksek Lisans Tezi, Akdeniz Üniversitesi, Sosyal Bilimler Enstitüsü, Antalya.

Çınarlı S, Ersöz G (2010). Engellilere yönelik spor hizmetlerinin gelişimi açısından sponsorluk ve vergisel düzenlemelere ilişkin öneriler. Süleyman Demirel Üniversitesi Sosyal Bilimler Enstitüsü Dergisi,2(12):141-156.

Çıplak E (2004). İlköğretim 2.kademe öğrencilerinin saldırgan davranışlar gösterme düzeylerine göre boş zaman değerlendirme etkinliklerinin incelenmesi. Yayımlanmamış Yüksek Lisans Tezi, Çukurova Üniversitesi, Sosyal Bilimler Enstitüsü, Adana.

Demir C, Demir N (2006). Bireylerin boş zaman faaliyetlerine katılmalarını etkileyen faktörler ile cinsiyet arasındaki ilişki: Lisans öğrencilerine yönelik bir uygulama. Ege Akademik Bakış Dergisi,1(6):36-48.

Dinçay H (2010). The relationship between physical activity levels and time management skills among selected univesity students. Yayınlanmamış Yüksek Lisans Tezi, Orta Doğu Teknik Üniversitesi, Sosyal Bilimler Enstitüsü, Ankara.

Doğru E (2017). Yaşlı hastalarda aktif boş zaman kullanımının biyopsikososyal sağlığa etkisinin değerlendirilmesi. Aile Hekimliği Uzmanlık Tezi, Yıldırım Beyazıt Üniversitesi, Atatürk Eğitim ve Araştırma Hastanesi Aile Hekimliği Kliniği, Ankara.

Droomers M, Schrijvers CTM, Mackenbach JP (2001). Educational level and decreases in leisure time physical activity: Predictors from the longitudinal globe study. J. Epidemiol Community Health,55(8):562-568.

Ekici S (1997). Yükseköğretim gençliğinin serbest zamanlarını değerlendirme alışkanlıkları ve turizme katılımları üzerine bir araştırma (Muğla ili örneği).Yüksek Lisans Tezi, Gazi Üniversitesi, Sağlık Bilimleri Enstitüsü, Ankara.

Engelliler Hakkında Kanun (2005). Kanun no:5378, Türkiye Cumhuriyeti Resmi Gazete, 25868.

Erdul G (2005). Üniversite öğrencilerinin zaman yönetimi becerileri ile kaygı düzeyleri arasındaki ilişki. Yayınlanmamış Yüksek Lisans Tezi, Uludağ Üniversitesi, Sosyal Bilimler Enstitüsü, Bursa.

Ergun N (2011). Bedensel engellilerde sportif aktiviteler ve klasifikasyon. I. Uluslararası Katılımlı Engellilerde Beden Eğitim ve Spor Kongresi,5-7 Mayıs, Konya.

Güçlü N (2001). Zaman yönetimi. Kuram ve Uygulamada Eğitim Yönetimi,25(25):87-106.

Gümüşgül O (2013). Avrupa Birliğine üye ülkelerde ve Türkiye'de öğrenim gören üniversite öğrencilerinin zaman yönetimi anlayışlarının farklı değişkenler açısından incelenmesi. Yayınlanmamış Yüksek Lisans Tezi, Dumlupınar Üniversitesi, Sağlık Bilimleri Enstitüsü, Kütahya.

Işık U (2014). Beden eğitimi ve spor yüksekokulunda okuyan ciddi boş zaman katılımcılarının kişilik özelliklerinin incelenmesi. Yayınlanmamış Yüksek Lisans Tezi, Dumlupınar Üniversitesi, Sağlık Bilimleri Enstitüsü, Kütahya.

İlhan EL, Kırımoğlu H, Çokluk GF (2013.) The effect of special physıcal education and sports program on the quality of life of the children with mental retardation. Niğde University Journal of Physical Education And Sport Sciences,7(1):1-8.

Karakoç Ö,Çoban B, Konar N (2012). İşitme engelli milli sporcular ile spor yapmayan işitme engellilerin benlik saygısı düzeylerinin karşılaştırılması. Selçuk Üniversitesi Beden Eğitimi ve Spor Bilim Dergisi,14(1):12-17.

Karakullukçu ÖF (2009). Adalet bakanlığı çalışanlarının eğitim düzeylerine göre boş zaman değerlendirme alışkanlıkları. YayınlanmamışYüksek Lisans Tezi, Gazi Üniversitesi, Sağlık Bilimleri Enstitüsü, Ankara.

Karaküçük S (1997). Rekreasyon boş zamanları değerlendirme-kavram, kapsam ve bir araştırma. Seren Ofset, Genişletilmiş İkinci Baskı, Ankara,27-51.

Kaya S, Erdem R (1998). Zaman yönetimi. Çağdaş Yerel Yönetimler Dergisi, 7(2):99-120.

Kaya S (2003). Yetiştirme yurtlarında kalan gençlerin boş zaman değerlendirme eğilimi ve etkinliklerin sosyalleşmeye etkisi. Yayınlanmamış Doktora Tezi, Gazi Üniversitesi, Sağlık Bilimleri Enstitüsü, Ankara.

Kılbaş Ş (2001a). Rekreasyon-boş zamanı değerlendirme. Anaca Yay., Adana,14-19.

Kılbaş Ş (2010b). Rekreasyon-boş zamanı değerlendirme. Gazi Kitapevi, Ankara,5.

Klerk DN, Bevan-Dye LA (2014). Free-time management amongst generation y students. Mediterranean Journal of Social Sciences, 5(21):11-18.

Kocabaş İ, Erdem R (2006). Yönetici adayı öğretmenlerin kişisel zaman yönetimi davranışları. Fırat Üniversitesi Sosyal Bilimler Dergisi,13(2):203–210.

Koçak E (2016). Zihinsel engelli ergenlerde sportif rekreasyon aktivitelerinin benlik saygısına etkisi. Yayınlanmamış Yüksek Lisans Tezi, Selçuk Üniversitesi, Sağlık Bilimleri Enstitüsü, Konya.

Lloyd C, King R, Lampe J, McDougall S (2001) The leisure satisfaction of people with psychiatric disabilities, Psychiatric Rehabilition Journal,25(2):107-113.

Macan TH, Shahani C, Dipboye RL, Phillips AP (1990). College students' time management: Correlations with Academic performance and stress. Journal of Educational Psychology,82(4):760-768.

Macan TH (1994). Time management test of a process model. Journal of Applied Psychology,79(3):381-391.

Metin TC (2013). Boş zaman literatürünün Dünya'daki gelişimi: Leisure Science dergisinde yayımlanan makaleler üzerine bir inceleme. YayınlanmamışYüksek Lisans Tezi. Anadolu Üniversitesi, Sosyal Bilimler Enstitüsü, Eskişehir.

Munusturlar-Akyıldız M (2016).Examınatıon of the serıous leısure, leısure satısfactıon and quality of life of people with physıcal dısabılıtıes. Sport Sciences,11(3):23-38.

Özer B,Gelen İ, Öcal S (2009). İlköğretim ikinci kademe öğrencilerinin boş zaman değerlendirme alışkanlıklarının günlük problem çözme becerilerine etkisinin incelenmesi. Mustafa Kemal Üniversitesi Sosyal Bilimler Enstitüsü Dergisi, 6(12):235-257.

Özer SD (2013). Engelliler için beden eğitimi ve spor. Nobel Yay. Ankara, 3.

Öztürk P (2011) . Tasarım ve teknolojinin engelli sporlarında performansa etkisi. I. Uluslararası Katılımlı Engellilerde Beden Eğitim ve Spor Kongresi,5-7 Mayıs, Konya.

Palisona RJ, Orlin M, Chiarello LA, Oeffinger D, Polansky M, Maggs J, Gorton G, Bagley A, Tylkowski C, Vogel L, Abel M, Stevenson R (2011). Determinants of intensity of participation in leisure and recreational activities by youth with cerebrelpalsy. Archives Physical Medicine and Rehabilitation, 92, 1468-1476.

Qian XL, Yarnal CM, Almeida DM. (2014). Does leisure time moderate or mediate the effect of Daily stress on positive affect? Journal of Leisure Research,46(1):106–124.

Santiago MA, Coyle CP (2004). Leisure-time physical activity and secondary conditions in women with physical disabilities. Dısabılıty And Rehabılıtatıon,26(8):485–494.

Sevil T, Şimşek YK, Katırcı H, Çelik OV, Çeliksoy AM (2012). Boş zaman ve rekreasyon yönetimi. Anadolu Üniversitesi Yayını No: 2497, Eskişehir.

Sugötüren M, Ballı ÖM, Gökçe H (2011). Spor bilimleri ve teknolojisi yüksekokulunda öğrenim gören öğrencilerin zaman yönetimi davranışları. Spormetre Beden Eğitimi ve Spor Bilimleri Dergisi, IX(3): 91-96.

Süzer M (2000).Üniversite öğrencilerinin boş zamanlarını değerlendirme alışkanlıkları. Pamukkale Üniversitesi Eğitim Fakültesi Dergisi,8:123-133.

Şentürk U (2017). Bedensel engelli 13-18 yaş amputelerin yaşam kalitelerinin ve serbest zaman alışkanlıklarının incelenmesi. Yayınlanmamış Yüksek Lisans Tezi, Gelişim Üniversitesi, Sağlık Bilimleri Enstitüsü, İstanbul.

Tabarsa A,Tehrani M, Lotfi N, Ahadian M, Baniasadi A, Tabarsa E (2013). Leisure time management: A new approach toward employees loyalty. Journal of Management and Strategy,4(3):65-80.

Tel M (2007a). Bir boş zaman aktivitesi olarak okuma etkinliğinin değerlendirilmesi (öğretim üyeleri örneği)e-Journal of New World Sciences Academy Social Sciences, 3(1):01-14.

Tel M (2007b). Öğretim Üyelerinin bos zaman etkenlikleri üzerine sosyolojik bir araştırma: Doğu Anadolu örneği. Yayınlanmamış Doktora Tezi, Fırat Üniversitesi, Sosyal Bilimler Enstitüsü, Elazığ.

Tezcan M (1976). Boş zaman eğitimi ve eğitim politikamız. Ankara Üniversitesi Eğitim Bilimleri Fakültesi Dergisi, 9(1):403-414.

Tonak HA (2014). Farklı endüstri ortamında çalışan bedensel engellilerin toplumsal katılım düzeylerinin incelenmesi. Yayımlanmamış Yüksek Lisans Tezi, Pamukkale Üniversitesi, Sağlık Bilimleri Enstitüsü, Denizli.

Trueman M, Hartley J (1996). A comparison between the time management skills and Academic performance of mature and traditional entry university students. Higher Education,32(2):199-215.

Türk Dil Kurumu, Genel Türkçe Sözlük, http://www.tdk.gov.tr, Erişim tarihi: 01.08.2017

Ülgen SY (2012). Evde yaşayan yaşlılarda sosyal katılımı etkileyen faktörlerin incelenmesi. Yayımlanmamış Yüksek Lisans Tezi, Pamukkale Üniversitesi, Sağlık Bilimleri Enstitüsü, Denizli.

Ün N (1999). Zihinsel engellilerde reaksiyon zamanının değerlendirilmesi. Yayınlanmamış Yüksek Lisans Tezi, Hacettepe Üniversitesi, Sağlık Bilimleri Enstitüsü, Ankara.

Venter F (2006). The cultural differences in time and time management: A socio-demographic approach. ActaCommercii, 6(1):39-49.

Wang WC, Kao, CH (2006). An exploration of the relationships between free time management and the quality of life of wage earners in Taiwan. World Leisure Journal, 48(1):24-33.

Wang WC, Kao CH, Huan TC, Wu CC (2011). Free time management contributes to better quality of life: A study of under graduate students in Taiwan. Journal of Happiness Studies, 12(4):561-573.

Yavuz H, Baran G, Yıldız-Bıçakçı M (2010). İşitme engelli ve işitme engelli olmayan 9-17 yaş grubundaki çocukların sosyal uyumlarının karşılaştırılması. Toplum ve Sosyal Hizmet, 21(1):7-23.

Yazıcıoğlu M (2010). Boş zaman yönetimi ve rekreatif faaliyetler: Memur emeklilerinin rekreatif faaliyetlerinin analizine ilişkin bir uygulama. Yayınlanmamış Yüksek Lisans Tezi, Beykent Üniversitesi, Sosyal Bilimler Enstitüsü, İstanbul.

Yurdagül S (2016). Aktif spor yapan bireylerde zaman yönetimi: Demografik farklılıklar (Elazığ ili örneği). Yayınlanmamış Yüksek Lisans Tezi, Fırat Üniversitesi, Sosyal Bilimler Enstitüsü, Elazığ.

Yücel BK (2014). Karabük Üniversitesi öğrencilerinin zaman yönetimi becerileri ile akademik başarıları arasındaki ilişki. Yayınlanmamış Yüksek Lisans Tezi, Karabük Üniversitesi, Sosyal Bilimler Enstitüsü, Karabük.

Zekioğlu A, Erdoğan N, Türkmen M (2015). Sporcu öğrencilerin zaman yönetimi becerileri ve akademik başarıları arasındaki ilişki. Uluslararası Hakemli Psikiyatri ve Psikoloji Araştırmaları Dergisi, 4:24-37.

International Journal of Science Culture and Sport
December 2017 : 5(4)
ISSN : 2148-1148
Doi : 10.14486/IntJSCS695

Field ***:*** *Coaching*
Type ***:*** *Research Article*
Received: *06.11.2017* ***- Corrected:*** *30.11.2017* ***- Accepted:*** *2.12.2017*

Examination of Reaction Times of Elite Physically Disabled Badminton Players[1]

Mehmet Fatih YÜKSEL
Necmettin Erbakan University, Department of Physical Education and Sports, Konya, TURKEY
Email: yukselmehmetfatih@gmail.com

Abstract

The aim of this study was to determine the reaction times of physically disabled International badminton players, and to analyze the effects of badminton on their reaction times. The study was based on physically handicapped badminton players from different countries (Turkey, France, Spain, Russia, Poland, Thailand, India, Bulgaria, and England) who attended 3rd International Enes-Cup Physically Disabled Badminton Tournament (experiment, n=39, 15 females-24 males), and physically handicapped individuals who do not deal with any sports (control, n=21, 9 females-12 males), totally 60 participants. Forming the research group, the players were divided into two groups according to the disability classification of the International Paralympic Committee, SL-3, SL-4, SU-5 (playing on foot, n=23), and WH-1, WH-2 (playing on wheelchairs, n=12). At the end of the study, it was determined that there was a statistically significant difference in between the visual-audial reaction times of the male players compared to male control group, and in between visual reaction times of the female players compared to female control group ($p<0.05$). As a conclusion, it was detected that the reaction times of both male and female players were lower (better) than the control group.

Keywords: Badminton, physically handicapped, reaction

[1] *Part of this research was presented as an oral presentation in Konya-Turkey on 20-21 October 2017, in "The 3rd International Physical Education and Sports Conference for the Disabled".*

Introduction

There are more than 1 billion people with disability globally, that is about 15% of the world's population or one in seven people. Of this number, between 110 million and 190 million adults experience significant difficulties in functioning. The number of people who experience disability will continue to increase as populations age, with the global increase in chronic health conditions. National patterns of disability are influenced by trends in health conditions and environmental and other factors (UN, 2015; WHO, 2011, 2015).

Sport highly contributes to mental, physical, social, and emotional development of the individuals. Considering the WHO and UN reports, exercise and sport gains much more importance for the individuals who have limited physical activity due to physical disabilities. Today, it is observed that disabled sportsmen and sportswomen show great paces of improvement and gain big prizes, since disabled sport branches are sought after (Auxter et al., 2001; Devilard et al., 2007; Giacobbi et al., 2008; Goosey, 2010; Özdemir and Ersoy, 2009). There are numerous adapted sport branches for the individuals with disabilities. Having an archaic past form a historical point of view, badminton is one of the paralympic sport branches that disabled individuals participate.

In badminton sport, where there is no touch to rival, quick arm movements and fast veers (Vicen et al., 2012). Coordinative talents are vital in badminton sport. One of these coordinative features, reaction is important for responding fast and instantaneously to the changing and unanticipated situations (Kale, 2011). Particularly the unbelievable speed of the shuttlecock leaves too little a time to react, thus badminton player should decide quick and accurate during the game. Reaction time is a decisive element in many kinds of sports, and it can be improved by regular exercises (Çolakoğlu et al., 1993). Şenel et al. (1998) mentioned as well, that reaction time is one of the prerequisites of success in badminton game. When the literature is observed, although there are many researches, which examined the reaction times of the badminton players and stated that they have better reaction times compared to control groups (Arslanoğlu et al., 2010; Aydoğmuş et al., 2006; Bankosz et al., 2013; Bhabhor et al., 2013; Bijanrajaeian et al., 2014; Dube et al., 2015), the reaction times of elite level physically disabled badminton players were not encountered. It is thought to be important to examine the reaction times of physically disabled international level badminton players with long years of experience, and to compare the results with physically disabled individuals who do not deal with sports, thus to determine what kind of effects does badminton sport have on the reaction times of the disabled individuals.

This research was conducted to examine simple visual and auditory reaction times of physically disabled elite badminton players.

Materials and Method

The research was conducted on physically disabled badminton players (experiment, n=39) and physically disabled individuals who did not deal with sports (control, n=21), totally 60 participants, from different countries (Turkey, France, Bulgaria, Spain, Russia, Poland, Thailand, India and Britain) participating in the 3rd International Enes-Cup Physically Disabled Badminton Tournament.

Approval was obtained from the Ethics Committee (Report No: 2017/1033) at Necmettin Erbakan University Medical Faculty. Necessary permissions regarding the tests and measurements were taken from the organization committee and the country representatives

participating in the tournament. All the volunteers participating in the research signed the informed consent and personal data form.

There were 24 male and 15 female players in the experiment group while there were 12 male and 9 female individuals in the control group. According to the disability classification of the International Paralympic Committee, the players composing the experiment group were classified in two groups: SL-3, SL-4, SU-5 (on foot), and WH-1, WH-2 (on wheelchair); while SS-6 category dwarfs were not included. 22 of physically disabled badminton players were on foot while 17 of them were on wheelchair; and 12 individuals of control group were on foot while 9 of them were living on wheelchair. In order to determine the physical features of the participants, age, stature, body weight, BMI and visual/auditory reaction times of the dominant hand tests were applied. Reaction times were located via New Test 2000 reaction devise.

Applied tests

Height and Body weight: In the linear measurements a tapeline with 0.01 m sensitivity score was used. Weight measurements were made with a digital weighing scale with a sensitivity level of 0.01 kg (Zorba and Saygın, 2009).

Body mass index: Using body weights and lengths, BMI was determined using the BMI = Body weight / (Length)2 formula (Zorba and Saygın, 2009).

Visual-auditory reaction times measurement: Visual-auditory reaction times were located via New-Test 2000 measurement devise in a noise free setting while the subject is in a sitting position. The subject was made 10 repeats and the average of the last 5 repeats was recorded in terms of msec as the reaction time (Günay et al., 2013).

Statistical analysis

SPSS 21.0 program was used in the analysis of the data obtained in the study. Arithmetic averages and standard deviations were given with descriptive statistics. The inter-group differences were detected via Mann-Whitney U test. Significance level was admitted as ($p<0.05$).

Findings

Table 1. The average values of physically disabled male elite badminton players (1) and the control group (2)

VARIABLES	Group	N	Mean	Standard deviation
Age	1	24	34.29	14.07
	2	12	38.41	7.50
Training age	1	24	5.29	3.38
	2	12	0.00	0.00
Height	1	24	172.25	9.44
	2	12	169.75	7.52
Weight	1	24	67.95	8.48
	2	12	76.91	8.44
BMI	1	24	22.95	2.85
	2	12	26.64	1.67
Visual reaction	1	24	325.91	36.59
	2	12	371.41	47.12
Auditory reaction	1	24	313.66	34.55
	2	12	354.00	38.95

Table 2. Mann Whitney U analysis of physically disabled male elite badminton players (1) and the control group (2)

VARIABLES	Group	N	Mean	U	p
Age	1	24	17.46	119.000	0.401
	2	12	20.58		
Height	1	24	19.42	122.000	0.459
	2	12	16.67		
Weight	1	24	15.02	60.500	**0.005***
	2	12	25.46		
BMI	1	24	14.44	46.500	**0.001***
	2	12	26.63		
Visual reaction	1	24	15.04	61.000	**0.005***
	2	12	25.42		
Auditory reaction	1	24	14.79	55.000	**0.003***
	2	12	25.92		

***p<0.05**

When the Table 2 is examined, it was defined that there was statistically significant differences between experiment and control groups with regards to body weight (U=60.500, p<0.05), BMI (U=46.500, p<0.05), visual reaction (U=61.000, p<0.05) and auditory reaction

(U=55.000, p<0.05) parameter, and there was no difference with regards to the other parameters.

Table 3. The average values of physically disabled female elite badminton players (1) and the control group (2)

VARIABLES	Group	N	Mean	Standard deviation
Age	1	15	29.46	9.43
	2	9	32.55	6.87
Training age	1	15	4.53	2.26
	2	9	0.00	0.00
Height	1	15	161.06	4.69
	2	9	158.77	5.69
Weight	1	15	56.46	7.24
	2	9	59.22	3.92
BMI	1	15	21.78	2.92
	2	9	23.49	0,95
Visual reaction	1	15	347.26	39.94
	2	9	388.22	45.58
Auditory reaction	1	15	338.13	38.82
	2	9	373.66	45.69

Table 4. Mann Whitney U analysis of physically disabled male elite badminton players (1) and the control group (2)

VARIABLES	Group	N	Mean	U	p
Age	1	15	11.70	55.500	0.474
	2	9	13.83		
Height	1	15	13.77	48.500	0.256
	2	9	10.39		
Weight	1	15	11.23	48.500	0.255
	2	9	14.61		
BMI	1	15	9.47	22.000	**0.007***
	2	9	17.56		
Visual reaction	1	15	9.83	27.500	**0.017***
	2	9	16.94		
Auditory reaction	1	15	10.33	35.000	0.053
	2	9	16.11		

***p<0.05**

When the Table 4 is examined, it was defined that there was statistically significant differences between experiment and control groups with regards to BMI (U=22.000, p<0.05)

and visual reaction (U=27.500, p<0.05) parameters, and there was no difference with regards to the other parameters.

Table 5. Mann Whitney U analysis of physically disabled female and male elite badminton players with regards to gender

VARIABLES	Group	N	Mean	S. D.	Mean Rank	U	p
Visual reaction	Female	15	347.26	39.94	24.13	118.000	0.073
	Male	24	325.91	36.59	17.42		
Auditory reaction	Female	15	338.13	38.82	24.83	107.500	**0.036***
	Male	24	313.66	34.55	16.98		

***p<0.05**

When the Table 5 is examined, it was defined that there was statistically significant differences between elite physically disabled female and male groups with regards to auditory reaction (U=107.500, p<0.05) parameter.

Discussion and Conclusion

In this research, it was aimed to examine simple visual and auditory reaction times of physically disabled elite badminton players participating in the 3rd International Enes-Coup Physically Disabled Badminton Tournament from different countries.

When the physical features of the participants were examined, it was observed that both female and male badminton players were younger, taller in height, lighter in weight, and lower in body mass indexes compared to the control group. There were statistically significant differences between control group and male players with regard to the body weights and BMI average values, and between control group and female players in terms of BMI average values. It was evaluated that the difference in favor of the badminton players with regards to body weight and BMI parameters were stemming from regular exercises.

When the visual and auditory reaction time results of the female and male players participated in the research were examined, it was observed that male players had better reaction times compared to the female players. Besides, the visual reaction average values of the female badminton players and visual/auditory reaction average values of the male badminton players were statistically significantly lower (better) compared to control groups. Moreover, that the reaction times of the physically disabled badminton players were lower compared to the physically disabled individuals who did not deal with sports, is an expected situation, and it can be accepted as the positive effect of the practices performed. Particularly, the significant differences in visual reaction average times were thought to be results of continuous exercises for years reacting to stimulus, which is visual in the badminton game.

In a study in India, the visual reaction times of the control group, which was composed of male badminton players and healthy individuals, were examined and significant differences

were determined in favor of the badminton players (Bhabhor et al., 2013). In another study on badminton players, it was observed that six-week visual exercises made credible improvement in visual reaction times (Bijanrajaeian et al., 2014). When the studies on disabled individuals were examined, Wang et al. (2005) the simple and selective visual reaction times of 37 basketball players with wheelchairs were determined respectively 0.19 sec and 0.25 sec. In another study on basketball players with wheelchairs, simple visual reaction times were reported 0.28 sec in right hand, and 0.31 sec in left hand (Arnhold and Auxter, 2003). While it was reported that a 12-week basketball exercise program on trainable disabled children provided statistically significant improvement compared to the prior to the program (Atan et al., 2014); in another study with a 10-week program, it was observed that the reaction times were improved but they were not statistically significant (Karahan et al., 2007). In a study on hearing impaired futsal players, it was reported that right and left hand visual reaction times of hearing impaired players were statistically significantly lower (better) than the players with hearing device aided (Açak et al., 2012). In another study on hearing impaired people, the visual reaction times of the players in different sports who regularly make exercise, were statistically significantly better than the hearing impaired individuals who do not deal with sports (Eroğlu Eskicioğlu and Çoknaz, 2016). It can be stated that, the findings obtained from this study are supported with regards to the fact that individuals with disabilities in different categories have better reaction times compared to the disabled who do not deal with sports.

As the conclusion, it was determined that the reaction times of female and male disabled elite badminton players were lower (better) compared to the control group. This situation, considering the speed of the shuttlecock, could be stemmed from the characteristic features of the game. Moreover, it can be stated that the need to quick arm movements in badminton game, and numerous exercises with racquets in practices and tournaments had a positive effect on the reaction times of the badminton players. It is thought that, during the game it is an important feature for the players to have a good level of quick reaction speed against harsh hits like smash, drive, and net-kill, and it is necessary to include reaction time improving practices in the exercise programs.

Conflicts of Interest

The author has no conflicts of interest to acknowledge.

REFERENCES

Açak M, Karademir T, Taşmektepligil Y, Çalışkan E (2012). İşitme engelli futsal sporcularının çeviklik ve görsel reaksiyon zamanının karşılaştırılması. *Selçuk Üniversitesi Beden Eğitimi ve Spor Bilimleri Dergisi,* 14(2), 283-289.

Arnhold RW, Auxter DA (2003). Evaluation of physical condition and body composition of an elite wheelchair basketball team in Istanbul. *Palaestra,* 19(1), 6–8.

Arslanoğlu E, Aydoğmuş M, Arslanoğlu C, Şenel Ö (2010). Badmintonculardа reaksiyon zamanı ve denge ilişkisi. *Nigde University Journal of Physical Education And Sport Sciences,* 4(2), 131-136.

Atan T, Eliöz M, Çebi M, Ünver Ş, Atan A (2014). Basketbol antrenmanın eğitilebilir engelli çocukların motorik özelliklerine etkisinin incelenmesi. 2nd International Physical Education and Sports Congress for the Disabled. Abstract Book. 118.

Auxter D, Pyfer J, Huettig C (2001). *Principles and Methods of Adapted Physical Education and Recreation.* 9th Ed. New York: McGraw Hill.

Aydoğmuş M, Revan S, Balcı ŞS, Şenel Ö (2006). Badminton milli takım sporcularının fiziksel profilleri. *Spormetre Beden Eğitimi ve Spor Bilimleri Dergisi,* 8(1), 34-41.

Bankosz Z, Nawara H, Ociepa M (2013). Assessment of simple reaction time in badminton players. *Trends in Sport Sciences,* 1(20), 54-61.

Bhabhor M, Vidja K, Dubal G, Padalia M, Joshi V (2013). A comparative study of visual reaction time in badminton players and healthy controls. *Indian Journal of Applied Basic Medical Sciences,* 15(20), 76-82.

Bijanrajaeian, Mokhtari P, Mousavi MV (2014). The Effect of visual practices on vision and movement performance of novice athletics in badminton sport. *Bull Env Pharmacol Life Sci,* 3(1), 114-118.

Çolakoğlu M, Tiryaki S, Moralı S (1993). Konsantrasyon çalışmalarının reaksiyon zamanı üzerine etkisi. *Hacettepe Üniversitesi Spor Bilimleri Dergisi,* 4(4), 32-45.

Devilard X, Rimaud D, Roche F, Calmels P (2007). Effect of training programs for spinal cord injury. *Annales de Readaptation et de Medecine Physique,* (50), 490-498.

Eroğlu Eskicioğlu Y, Çoknaz H (2016). Türkiye'de futbol, Türk halkoyunları, basketbol ve voleybol antrenmanlarına katılan ve katılmayan işitme engelli bireylerin görsel reaksiyon sürelerinin karşılaştırılması. *İnönü Üniversitesi Beden Eğitimi ve Spor Bilimleri Dergisi,* 3(2), 18-25.

Giacobbi PR, Stancil M, Hardin B, Bryant L (2008). Physical activity and quality of life experienced by highly active individuals with physical disabilities. *APAQ,* (25), 189-207.

Goosey-Tolfrey V (2010). Wheelchair Sport, Champaign, Loughborough University Illinois: Human Kinetics.

Günay M, Tamer K, Cicioğlu İ (2013). *Spor Fizyolojisi ve Performans Ölçümü*. (3. Baskı). Ankara: Gazi Kitabevi, 464-545.

Kale R (2011). *Okullarda ve Kulüplerde Badminton.* Ankara: Nobel Yayıncılık, 1-48.

Karahan M, Demir R, Şahin İ, Süel E (2007). Eğitilebilir zihinsel engelli erkek çocukların bazı motor becerilerine antrenmanın etkisi. *Niğde Üniversitesi Beden Eğitimi ve Spor Bilimleri Dergisi,* 1(2), 71-75.

Özdemir G, Ersoy G (2009). Engelli sporcularda beslenme, sağlık ve performans etkileşimi. *Türk Fizik Tıp Rehabilitasyon Dergisi,* (55), 116-121.

Şenel Ö, Atalay N, Çolakoğlu FF (1998). Türk milli badminton takımının antropometrik, vücut kompozisyonu ve bazı performans özellikleri. *G. Ü. Beden Eğitimi ve Spor Bilimleri Dergisi,* 3(2), 15 -20.

United Nations, (2015). Global Status Report on Disability and Development Prototype. New York

Vicen JA, Del Coso J, Millan CG, Salinero JJ, Abian P (2012). Analysis of dehydration and strength in elite badminton players. *Plos One Journal, 7*(5), 1-8.

Wang YT, Shihui C, Limroongreungrat W, Change L (2005). Contributions of selected fundamental factors to wheelchair basketball performance. *Med. Sci. Sports Exerc,* 37(1), 130–137.

World Health Organization (2011). World Report on Disability 2011. WHO Library Cataloguing-in-Publication Data. ISBN 9789240685215

World Health Organization (2015). WHO Global Disability Action Plan 2014-2021. Better health for all people with disability. WHO Library Cataloguing-in-Publication Data. ISBN 9789241509619

Zorba E, Saygın Ö (2009). *Fiziksel Aktivite ve Fiziksel Uygunluk*. (2. Baskı). İstanbul: İnceler Ofset, 205-217.

International Journal of Science Culture and Sport
December 2017 : 5(4)
ISSN : 2148-1148
Doi : 10.14486/IntJSCS696

Field *: Sport Psychology, Coaching*
Type *: Research Article*
Received: *07.11.2017* **-** ***Accepted:*** *04.12.2017*

Home Advantage in Professional Football in Iran – Differences between Teams, Levels of Play and the Effects of Climate

Richard POLLARD[1], Vasilis ARMATAS[2], Seyed Hojjat ZAMANI SANI[3]
[1] Department of Statistics, California Polytechnic State University, San Luis Obispo, CA, USA
[2] Department of Team Sports, School of Physical Education & Sport Science, National & Kapodistrian University of Athens, Athens, GREECE
[3] Department of Motor Behaviour, Faculty of Physical Education & Sport Science, University of Tabriz, Tabriz, IRAN
Email: richwpollard@yahoo.com, v-armatas@phed.uoa.gr, hojjatzamani8@gmail.com

Abstract

Although much has been written about home advantage in football, almost all studies have used data from European countries. To address this deficiency, a single Asian country, Iran, was selected, with the aim of shedding fresh light onto the many factors currently implicated with the existence of home advantage. For each season since its creation in 2001, home advantage was quantified for each team in the Persian Gulf Pro League, adjusting for annual league variation and team ability. Data were also obtained for the level 2 Azadegan League. ANOVA was used to test for differences between teams and a stepwise regression to assess the influence of the explanatory variables which included altitude and climatic variables. Overall home advantage was 59.3%, higher than in most Asian countries. It was greater ($p<.001$) at level 2 than at level 1, and differed between teams ($p<.001$), being generally high for team locations alongside the Caspian Sea, while below average for teams from Tehran. The independent effect of playing in high humidity increased home advantage ($p<.01$), whereas it was lowered for teams playing at home in a capital city ($p<.001$). Altitude, temperature and the absence of a running track had no effect.

Keywords: football, home advantage, Iran, climate, humidity, capital city, team ability, match location

Introduction

Although there is now an ever expanding literature on home advantage (HA) in football, most studies have focused on competitions involving the countries of Western Europe. Relatively little is known about how the advantage of playing at home might operate in smaller countries in other parts of the world, especially in Asia and Africa. Pollard and Gómez (2014) attempted to broaden the scope of research into HA worldwide by calculating and comparing HA from leagues in 157 different countries. They found considerable variation between nations with unusually high HA in countries as diverse as Nigeria, Bosnia-Herzegovina, Indonesia and Guatemala. A multivariate analysis suggested several possible causative factors including altitude, distance travelled, the occurrence of a recent civil war and the degree of perceived corruption in a country. Studies carried out in specific countries have shown distance to be a factor in Australia (Goumas, 2014a), distance and climate in Brazil (Pollard, Silva, & Medeiros, 2008) territorial protection in Bosnia-Herzegovina and other Balkan countries (Pollard & Seckin, 2007) and stadium characteristics in Greece (Armatas & Pollard, 2014). In Japan, Aoyagi (2011) used a mathematical model to establish the existence of HA, showing that its magnitude for individual teams depended on team strength.

Against this background, Iran provided an attractive country in which to further investigate HA in football for several reasons. Like Brazil and Australia, it is a large country with different climatic conditions, as well as an established national football league involving all parts of the country. Moreover, Iran has considerable variation in elevation and terrain, as well as some distinct cultural divisions. Previous in-depth studies of HA within a single country have been confined mostly to Europe and none have been carried out for a country in Asia. Pollard and Gómez (2014) had found that in Iran, the home team won 60.11% of all points gained in the six seasons from 2006-07 to 2011-12, a value somewhat above the world median and the seventh highest among the 32 national leagues of Asian nations included in the study.

Three previous papers on game location in Iranian football were found, but none shed light on the magnitude or causes of HA in the country. Hemayet Talab and Mehrsafar (2016) analyzed the 2014-2015 Iranian Super League, but their data set contained errors and their method of calculating HA was incorrect, measuring home performance instead of home advantage. Rahnama, Bambaeichi, & Zarei (2009) analyzed data from the two seasons 2004-05 and 2005-06 in Iran and interestingly found that away players suffered significantly more injuries that home players, but they did not quantify HA nor did they estimate the magnitude of the role that injuries might have contributed to the advantage. Alahvisi, Maleki, & Zand Salimi (2015) found no significant difference in aggression between teams playing at home and away, but how this might relate to HA was not discussed.

Professional football in Iran began in the 2001-02 season with the creation of the Iran Pro League, renamed the Persian Gulf Pro League in 2007-08. The 16 seasons up to 2016-17 form the basis for this study. Answers to the following questions were sought:

What is the overall home advantage? How does it compare with other countries? Although relatively little is known about HA internationally, especially outside Europe, HA in Iran could be interpreted against that found in the domestic leagues of 157 countries worldwide (Pollard & Gómez, 2014).

Has it changed over the years under analysis? Several studies have suggested that a decline in HA has occurred at least since the mid-1980s (Jacklin, 2005; Pollard & Gómez, 2009; Pollard

& Pollard, 2005) although there is now evidence that this decline has leveled off (Allen & Jones, 2014; Almeida & Volossovitch, 2017).

Does home advantage at level 1 in the Persian Gulf Pro League differ from that at level 2 in the Azadegan League? The available evidence suggests that in domestic professional football leagues, HA in level 2 is at least as high and possibly higher than at level 1, especially so in Brazil (Almeida, Oliveira, & Silva, 2011) and England (Pollard, 2006).

Does it vary from team to team? Previous studies have found considerable variation between teams (Pollard & Gómez, 2009; Clarke & Norman, 1995) with teams from capital cities tending to have lower HA, and teams from remote and ethnically distinct regions having higher HA, especially so within the Balkan region of south-east Europe (Seckin & Pollard, 2008).

What climatic factors might be influencing the magnitude; in particular, temperature and humidity? In Brazil, it was shown that by far the greatest HA was enjoyed by Paysandu, a team playing in Belém at the mouth of the Amazon River in conditions that are especially hot and humid (Pollard et al., 2008).

Is altitude a factor? Countries playing home games at altitude (e.g. Bolivia) are known to have high HA as shown by Pollard and Armatas (2017), but whether or not this extends to specific teams within a single country is unknown.

Does the absence of a running track in the stadium increase HA as has been suggested by Goumas (2014b) and shown to exist in Greece (Armatas & Pollard, 2014)?

Does the size of the crowd affect HA? Goumas (2014b) has presented evidence that this can be a factor but other authors have been more cautious. For example Pollard (2006) showed no difference in HA between the top 4 levels of play in England, despite wide differences in average crowd size.

Materials and Methods

Data source

Final league tables for the Persian Gulf Pro League, including complete home and away records were obtained from www.soccerway.com for all seasons from 2001-2002 to 2016-2017. For the level 2 Azadegan League, these tables were only available from 2007-2008 to 2016-2017. This website has been used to retrieve league tables for previous research studies and found to be reliable (Pollard & Gómez, 2009; Pollard & Gómez, 2014).

Calculation of home advantage

Home advantage for each team, each season was calculated as the number of points gained at home, expressed as a percentage of all points gained at home and away, a standard method in use for many years (Pollard, 1986). Thus a value of 50% represented no HA since the same number of points were gained at home as away; the greater the value above 50%, the greater the advantage of playing at home for that team. The same procedure was followed to quantify HA for a whole league in a season. Thus a value of 60% for a league meant that the home team gained 60% of all points won during that season.

Quantification of climatic variables and elevation

Three climatic variables were included in the analysis, assessed over the 10 month playing season which runs from August of one year to May of the next. These were average maximum temperature (degrees Celsius), total rainfall (mm) and average humidity (%). Readings were taken from the city in which each team played its home games. The elevation (m) of the home stadium was also recorded. Data were obtained from the website https://en.climate-data.org/ and from the Wikipedia entries for the individual cities.

Crowd size

Information on crowd size was incomplete and it was not possible to obtain average attendance for each team each year. Although this variable could not be included in the main analysis, some attendance data was available on www.soccerway.com, as well as on the Wikipedia pages on the Persian Gulf Pro League each season.

Team ability

Team ability has been shown to be related to HA when based on points won and lost and thus needed to be controlled for when comparing the different teams (Pollard & Gómez, 2009). It was quantified for each team, each season by dividing the total number of points gained by the number of games played.

Data analysis

The initial analysis involved the calculation of HA for each team each season and then deriving an adjusted value taking into account team ability and also the overall HA for the season in question. This followed the rationale and methodology described in Pollard and Gómez (2009) and subsequently used in other studies. Since not all teams played in all 16 seasons under analysis in the Persian Gulf Pro League, for each team the mean annual adjusted HA value was calculated, based on the seasons in which each particular team participated.

A one-way analysis of variance was used to establish whether or not a significant difference existed between the teams. Adjusted HA was used as the dependent variable, calculated for each team each season. In order to investigate the explanatory role of the three climatic variables as well as elevation, a multivariate regression approach was used. HA for each team each season was the dependent variable giving a total of 262 observational units. The following explanatory variables were investigated: team ability for each team each season, season overall HA, elevation of home stadium, humidity, rainfall, temperature, whether or not the team was located in the capital city Tehran, and whether or not the home stadium had a running track. A stepwise approach was adopted using the statistical software Minitab 17 (Minitab, Inc, 2016). To test for a difference between the two levels of play, a paired t-test was used for annual overall HA. This was confined to the ten seasons for which data was available for both the Persian Gulf Pro League (level 1) and the Azadegan League (level 2).

Results

Table 1 lists the 39 teams that have appeared in the Persian Gulf Pro League in descending order of adjusted HA. A considerable and significant variation between teams existed ($p<0.001$), differences between teams accounting for 30.7% of the total variation in the adjusted HA values for the 262 team seasons included in the analysis (Table 2). The term ‘team season’ refers to the value of a particular team in a particular season. For teams with more than four seasons of data, Aboumoslem, from the city of Mashhad, had easily the

highest adjusted HA, winning over 70% of its total points from home games, a figure that is high by recent international standards. None of the eight teams from Tehran had an adjusted HA value above 60%.

Table 1. Home advantage for teams in Persian Gulf Pro League 2001/02 – 2016/17

Location	Name of team	Seasons	Home points	Away points	HA (%)	HAadj (%)
Sarcheshmeh	Mes Sarcheshmeh	1	20	4	83.33	81.59
Mashhad	Aboumoslem	9	246	93	72.57	70.59
Noshahr	Shamoushak	3	56	18	75.68	68.09
Dorud	Gahar Zagros	1	14	5	73.68	66.91
Hamadan	PAS Hamadan	4	111	51	68.52	65.69
Mashhad	Siah Jamegan	2	37	20	64.91	65.31
Bandar-e Anzali	Malavan	14	337	171	66.34	65.20
Tabriz	Gostaresh Foulad	4	89	51	63.57	64.61
Abadan	Sanat Naft	6	133	71	65.20	64.50
Kerman	Sanat Mes Kerman	8	233	121	65.82	64.21
Masjed Soleyman	Naft Masjed	1	15	7	68.18	63.56
Rasht	Damash Gilan (Pegah)	8	160	89	64.26	63.40
Isfahan	Sepahan	16	491	336	59.37	60.97
Ahvaz	Esteghlal Khuzestan	4	88	66	57.14	60.73
Shiraz	Bargh Shiraz	8	163	95	63.18	60.39
Bushehr	Shahin Bushehr	3	68	39	63.55	60.31
Ahvaz	Esteghlal Ahvaz	9	199	119	62.58	60.25
Tehran	Paykan (Tehran)	7	148	95	60.91	59.89
Isfahan	Zob Ahan	16	447	303	59.60	59.81
Ahvaz	Foolad	15	403	277	59.26	59.29
Tehran	Persepolis	16	469	347	57.48	58.88
Tehran	Naft Tehran	7	183	154	54.30	57.24
Qom	Saba Qom	13	310	233	57.09	56.77
Shiraz	Fajr Sepasi	12	253	185	57.76	56.48
Bandar Abbas	Aluminium Hormozgan	1	21	14	60.00	56.43
Tehran	Esteghlal	16	475	401	54.22	56.31
Tabriz	Tractor Sazi	9	247	214	53.58	56.22
Qazvin	Paykan (Qazvin)	3	71	50	58.68	55.82
Mashhad	Padideh	3	59	47	55.66	55.67
Yazd	Shahid Ghandi	1	12	7	63.16	55.40
Tehran	Saipa	16	350	278	55.73	54.44
Tehran	Rah Ahan	11	221	166	57.11	54.13
Tehran	PAS Tehran	6	144	131	52.36	52.87
Qods	Paykan (Qods)	2	38	32	54.29	52.61
Tabriz	Shahrdari Tabriz	2	37	34	52.11	48.78
Mashhad	Payam Mashdad	1	18	17	51.43	47.62
Tehran	Steel Azin	2	40	40	50.00	47.13
Kermanshah	Shirin Faraz (Rahian K.)	1	10	11	47.62	43.45
Tabriz	Machine Sazi	1	7	9	43.75	41.04
	All teams	16	6423	4401	59.34	-

Note: 'HAadj' is HA adjusted for differences in team ability and annual HA.

Table 2. One way analysis of variance for teams, with adjusted home advantage as the dependent variable

Source	DF	SS	MS	F	P
Team	38	6144.6	161.7	2.60	<0.001
Error	223	13879.4	62.2		
Total	261	20024.0			
S = 7.889 R-Sq = 30.69%					

Note: Analysis based on 262 'team seasons', each representing a particular team in a particular season.

The final result of the stepwise multiple regression analysis is shown in Table 3. As expected the mean annual HA and team ability both had a significant relationship with HA, allowing the remaining variables to be assessed after controlling for these factors. Of the climatic variables under consideration, humidity was included in the final model, but rainfall and temperature were not. Each extra percentage point of humidity increased HA by an average 0.15 percentage points. The presence or absence of a running track did not have a significant effect, neither did the elevation of the home stadium, but being located in the capital city Tehran lowered HA by a highly significant average of 4.63 percentage points.

Table 3. Results of stepwise regression with home advantage for each team each season (n = 262 team seasons) as the dependent variable

Predictor	B	SE(b)	T	P
Constant	-0.16	10.270	-0.02	0.988
Annual HA	0.999	0.163	6.11	<0.001
Team ability	-4.065	1.515	-2.68	0.008
Capital city	-4.630	1.159	-3.99	<0.001
Humidity	0.148	0.046	3.18	0.002
S = 8.369 R-Sq = 25.6%				

Note: The regression equation is: HA = - 0.160 + 0.999(Annual HA) - 4.065(Team ability) - 4.630(Capital city) + 0.148(Humidity)

Table 4 shows the changes in HA during the 16 years of the league's existence as well as the difference between the two levels of competition which was significant for the 10 years from which comparisons can be made. For these years the mean HA for level 1 was 58.5%, significantly lower than the 64.5% for level 2 ($t = 7.87$, d.f. = 9, $p<0.001$).

Table 4. Home advantage (%) at the top two levels of professional football in Iran

Season	Persian Gulf Pro League Level 1	Azadegan League Level 2	Difference
2001-02	59.63	*	*
2002-03	55.17	*	*
2003-04	66.39	*	*
2004-05	60.25	*	*
2005-06	61.65	*	*
2006-07	60.38	*	*
2007-08	57.93	66.90	8.97
2008-09	60.39	64.14	3.75
2009-10	62.36	65.24	2.88
2010-11	63.50	67.15	3.64
2011-12	56.10	63.49	7.39
2012-13	60.15	64.80	4.65
2013-14	54.03	61.70	7.68
2014-15	59.18	66.67	7.48
2015-16	55.89	65.12	9.23
2016-17	55.89	60.00	4.11

*Note: * = information not available.*

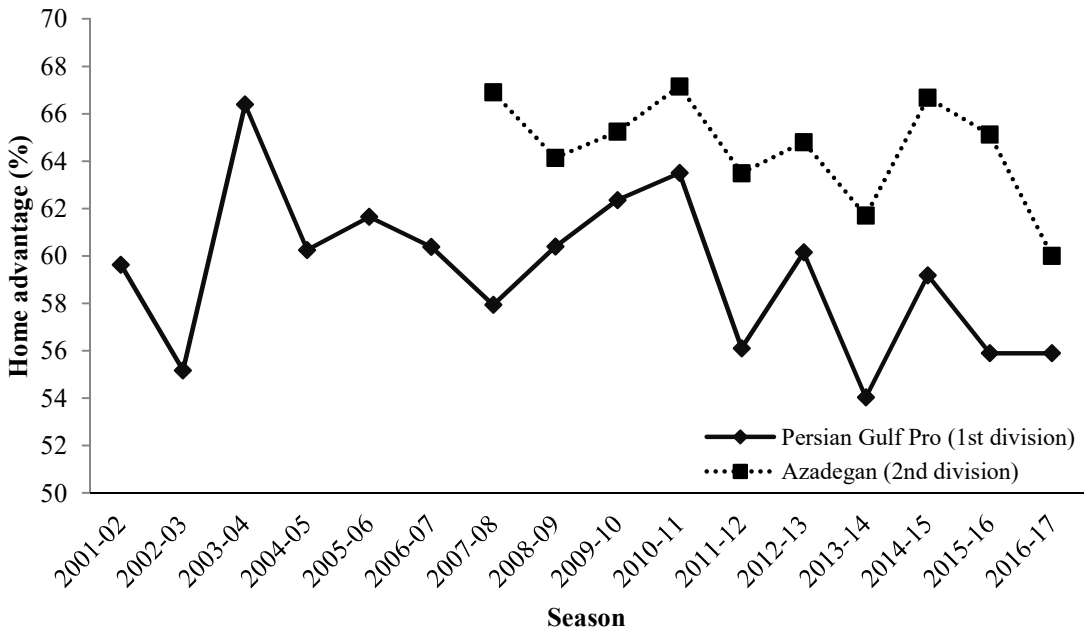


Figure 1. Comparison of home advantage in top two levels of professional football in Iran.

Discussion

Returning to the questions posed in the introduction and which provided the motivation for the study, the analysis has provided the following answers, each of which will be discussed in the context of current knowledge about HA.

Overall home advantage

The Persian Gulf Pro League was created in 2001 and the analysis covers the full 16 seasons that have taken place since then. The overall HA for these years is 59.34%, which represents the proportion of all points that have been won by the home team. In comparison to average HA reported internationally for the period 2006 – 2012 (Pollard & Gómez, 2014), this is slightly below the major leagues in Europe. These were for France and England (61%), and for Spain and Italy (62%). The median value for countries in Asia was 57.0%, while the worldwide median was 58.4%. Little can be concluded from all this other than the fact that HA does exist in Iran at a level that is somewhat higher than average internationally and thus a promising place in which to further investigate possible causes.

Change over time

After considerable annual variation up to about 2012, HA in the Persian Gulf Pro League seems to have settled down to a lower level, currently 55.9% in the last two seasons. The same time period from 2011-2012 has seen a slow decline at level 2 in the Azadegan League. Any conclusion would be somewhat speculative, but the evidence would be consistent with a decline followed by a leveling off seen elsewhere, and certainly no indication of an increase.

Differences between levels

The main feature of Table 4 is the consistent and highly significant greater HA at level 2 compared with level 1. Although this may seem somewhat surprising in view of the greater attendance at level 1, this is consistent with other leagues for which this has been investigated, especially in England where every decade since the creation of a second level in 1892-93, HA at level 2 has been greater than at level 1 (Pollard, 2006). Possible explanations which may apply in Iran include the much more comfortable travel now enjoyed at level 1 compared with level 2, as well as the more intense support which may exist in smaller more isolated locations such as are found at level 2 and which have been suggested as a factor in increased HA in various other countries including Turkey (Seckin & Pollard, 2008). In addition, players at level 1 are likely to have been better trained to cope with the adverse psychological and physiological effects of performing away from home. Likewise level 1 will have better referees, trained not make decisions influenced by the reaction of the crowd (Almeida & Volossovitch, 2017).

Variation between teams

There were large and highly significant differences in HA between the teams. There are several possible explanations for this, some of which may be interacting with each other, so that interpretation will inevitably be somewhat speculative. Three observations can be made from a quick inspection of Table 1. First, the very high HA enjoyed by Aboumoslem, a team from the far north-eastern city of Mashhad, the second largest in Iran; secondly the generally low HA in teams from Tehran, the capital city, and thirdly the well-above average HA of the three teams situated close to the Caspian Sea, Shamoushak in Noshahr, Malavan in Bandar-e Anzali and Damash Gilan (formerly named Pegah prior to 2008), located in Rasht.

There is no obvious explanation for the high HA of Aboumoslem, although it should be noted the team has not been in the Persian Gulf Pro League since the 2009-10 season, a fact that would need to be included in any future attempt to research this unusually high HA. Moreover, in the four seasons that Aboumoslem subsequently spent in the level 2 Azadegan League, their HA was 69.1%, well above the 63.9% for the other teams in the league over the same period. All this means that the high HA for Aboumoslem is a real phenomenon with no clear cause, and a worthwhile topic for follow-up research.

The generally low HA for the teams from Tehran, the capital city, was not unexpected in the light of previous research that had found HA for teams in London, Paris, Lisbon, Madrid, Istanbul and Athens, all to have lower HA than teams throughout the rest of their respective countries (Armatas & Pollard, 2014; Pollard & Gómez, 2009; Clarke & Norman, 1995; Seckin & Pollard, 2008), partly due to the extra number of local derbies involving teams from the same city. It was also suggested that capital cities are generally the home of more than one team, so that no team will have a sense of territorial protection apparent for single teams in more remote locations. Similarly players from visiting teams will likely have some familiarity with the capital city, weakening one of the hypothesised disadvantages of playing away from home.

Crowd size might have been expected to have had some effect on HA, but there was no evidence of this. Attendance is highly variable in Iran, with the home games of Tehran teams Esteghlal and Persopolis and to a lesser extent Tractor Sazi in Tabriz attracting average crowds of over 20,000, with some games filling the national stadium with 80,000 spectators. All these teams had below average HA. No other team in Iran had average attendance above 10,000, some well below this number with many games being played in front of only a few hundred spectators.

The teams located along the Caspian Sea have distinct environmental factors that might give them an advantage when playing at home. These include high humidity, high temperature and low elevation all of which will be considered further in the next section.

Climatic factors

Three climatic variables were included in the general linear model analysis reported in Table 3. The stepwise approach soon eliminated both rainfall and temperature as having an influence on HA, but humidity remained in the final explanatory model as having a highly significant effect. The highest humidity levels in Iran occur along the Caspian Sea. Average humidity during the playing season is 85% in Noshahr and Bandar-e Anzali, and 83% in Rasht, all well above any other city in which a Persian Gulf Pro League team played. Thus, the humidity factor is a plausible explanation for the high HA enjoyed by teams playing in these cities. To explore this idea further an analysis was done on the performance of teams from the Caspian Sea region in the Azadegan League. In addition to the same three cities already mentioned, there were two teams from Qaem Shahr and one from Babol. The combined HA of all these Caspian Sea teams in the Azadegan League was 68.7% compared with 64.0% for other teams in the league, lending further support for the hypothesis that home teams derive an advantage by playing at locations of high humidity.

Altitude

As with temperature, the variable representing the altitude of the stadium of the home team did not have a significant effect on HA. This was not surprising in view of the fact that all games took place below the 2000m elevation, above which the effects of altitude might be

expected to affect performance at football, according to a group of experts convened by FIFA (Bärtsch, Saltin, & Dvorak, 2008). However, it should be noted that many teams did perform at home above 1200m, the altitude at which Nassis (2013) believed that footballers start to experience a negative effect on endurance. Interestingly, the three Caspian Sea teams actually play below or just above sea level, but it appears to be the humidity and not the altitude, or lack of it, that is affecting HA.

Running track

Two previous studies had suggested the presence of a running track inside a stadium reduces HA, because it distances the game action from the spectators and thus lessons the influence of the crowd on the players and the referee (Armatas & Pollard, 2014; Goumas, 2014b). The analysis in Iran produced no evidence in support of this.

Limitations

Although the study was able to incorporate several variables implicated with HA, it was not possible to specifically include crowd size in the multivariate analysis due to the limited availability of data and the fact that a value averaged over a season would mask the highly variable attendances at specific games. Similarly the approach used precluded travel distance as a variable, as this also varied considerably from game to game. To overcome these problems, a match by match analysis would need to be done along the lines of a recent study of HA in World Cup qualification (Pollard & Armatas, 2017). This is a feasible avenue for future research, as are studies similar to the present one based on other individual countries in Asia, Africa and elsewhere thanks to the increasing availability of home and away league tables and other quantitative information relevant to HA.

Practical implications

From a practical perspective, awareness of the existence of HA and its causes is confirmed as an important aspect of match preparation for away games. This has now been shown to be the case in a part of the world where little previous knowledge of HA existed. Results suggest the need for careful consideration of the possible difficulties, both psychological and physiological, in performing at specific away venues, in any country and at any level of play. Although Pollard (2008) made some suggestions about how away game preparation might be approached, this is an area in which sports psychologists might be encouraged to contribute further.

Conclusion

The existence of HA was established for professional football in Iran, both at level 1 and especially at level 2, with HA being slightly above the world median and higher than in most Asian countries. There was evidence of a decline in HA since 2011-12. There was considerable variation between teams, with Aboumoslem Mashhad and the teams located near the Caspian Sea having especially high values, while the teams from Tehran were all below average. After controlling for mean seasonal HA and for team ability, both local mean humidity level and being located in the capital city had a significant effect on the magnitude of HA. Altitude, other climatic variables and the presence or not of a running track did not.

Conflicts of Interest

The authors have no conflicts of interest to acknowledge.

Corresponding Author

Vasilis ARMATAS
Department of Team Sports, School of Physical Education & Sport Science, National & Kapodistrian University of Athens, Athens, Greece
Ethnikis Antistaseos 41, Dafni Attikis, 17237, Athens, Greece
Email: v-armatas@phed.uoa.gr, Tel: +30 210 6614059

REFERENCES

Alahvisi F, Maleki M, Zand Salimi F (2015). Relationship between game Location and match result with the amount of aggression: Iranian premier league football teams. *Annals of Applied Sport Science*, *3*(4), 19–28.

Allen MS, Jones MV (2014). The home advantage over the first 20 seasons of the English Premier League: Effects of shirt colour, team ability and time trends. *International Journal of Sport and Exercise Psychology*, *12*(1), 10–18.

Almeida CH, Volossovitch A (2017). Home advantage in Portuguese football: Effects of level of competition and mid-term trends. *International Journal of Performance Analysis in Sport*, *17*, 244–255.

Almeida LG, Oliveira ML, Silva CD (2011). Uma análise da vantagem de jogar em casa nas duas principais divisões do futebol profissional brasileiro. *Revista Brasileira de Educação Física e Esporte, 25*(1), 49-54.

Aoyagi O (2011). Statistical definition of home advantage in soccer: Application of linear model to unbalanced-paired-comparison data. *Japan Journal of Test and Measurement in Health and Physical Education*, *11*, 35–47.

Armatas V, Pollard R (2014). Home advantage in Greek football. *European Journal of Sport Science, 14*(2), 116–122.

Bärtsch P, Saltin B, Dvorak J (2008). Consensus statement on playing football at different altitude. *Scandinavian Journal of Medicine and Science in Sports, 18*(Suppl.1), 96–99.

Clarke SR, Norman JM (1995). Home ground advantage of individual clubs in English professional soccer. *The Statistician*, *44*(4), 509–521.

Goumas C (2014a). Home advantage in Australian soccer. *Journal of Science and Medicine in Sport, 17*(3), 119–123.

Goumas C (2014b). How does crowd support contribute to home advantage in soccer? *Journal of Sport Behavior, 37*(3), 236–250.

Hemayet Talab R, Mehrsafar AH (2016). An analysis of home advantage in Iranian Football Super League. *International Journal of Sports, Exercise and Training Science, 2*(4), 137–144.

Jacklin PB (2005). Temporal changes in home advantage in English football since the Second World War: what explains improved away performance? *Journal of Sports Sciences*, *23*(7), 669–679.

Nassis GP (2013). Effect of altitude on football performance: Analysis of the 2010 FIFA World Cup data. *Journal of Strength and Conditioning Research*, *27*(3), 703–707.

Pollard R (1986). Home advantage in soccer: a retrospective analysis. *Journal of Sports Sciences, 4*(3), 237–248.

Pollard R (2006). Home advantage in soccer: variations in its magnitude and a literature review of the inter-related factors associated with its existence. *Journal of Sports Sciences, 29*(2), 169–189.

Pollard R (2008). Away disadvantage: five steps for coping. *Soccer Journal, 53*(4), 53-54.

Pollard R, Armatas V (2017). Factors affecting home advantage in football World Cup qualification. *International Journal of Performance Analysis in Sport, 17*(1-2), 121–135.

Pollard R, Silva CD, Medeiros NC (2008). Home advantage in football in Brazil: differences between teams and the effects of distance traveled. *Brazilian Journal of Soccer Science, 1*(1), 3–10.

Pollard R, Gómez MA (2009). Home advantage in football in South-West Europe: Long-term trends, regional variation, and team differences. *European Journal of Sport Science, 9*(1), 341–352.

Pollard R, Gómez MA (2014). Components of home advantage in 157 national soccer leagues worldwide. *International Journal of Sport and Exercise Psychology, 12*(3), 218-233.

Pollard R, Pollard G (2005). Long-term trends in home advantage in professional team sports in North America and England (1876-2003). *Journal of Sports Sciences, 23*(4), 337-350.

Pollard R, Seckin A (2007). Why is home advantage in South-east Europe the highest in the world. In Y. Theodorakis, M. Goudas, & A. Papaioannou (Eds.), *Book of long papers, 12th European Congress of Sport psychology* (pp. 53–56). Halkidiki, Greece: Fepsac.

Rahnama N, Bambaeichi E, Zarei M (2009). The comparison of performance and injury incidence rate in home and away games in Iran Premier League teams. *World Journal of Sports Sciences, 2*(2), 89–94.

Seckin A, Pollard R (2008). Home advantage in Turkish professional soccer. *Perceptual and Motor Skills, 107*(1), 51–54.

International Journal of Science Culture and Sport
December 2017 : 5(4)
ISSN : 2148-1148
Doi : 10.14486/IntJSCS697

Field *: Coaching*
Type *: Research Article*
Received: *07.11.2017* ***- Corrected:*** *03.12.2017* ***- Accepted:*** *07.12.2017*

Analyzing the before and after Effects of Endurance Training on ACTH Hormone

Süleyman GÖNÜLATEŞ[1], Sibel TETİK[2], Uğur DÜNDAR[1], Tansu YAAN[1], Kerim DÜNDAR[3]
[1] Pamukkale University Faculty of Sport Sciences, Denizli, TURKEY
[2] Erzincan University School of Physical Education and Sports, Erzincan, TURKEY
[3] Dokuz Eylül University Fine Arts Faculty, İzmir, TURKEY
Email: sgonulates@hotmail.com, s_tetik55@hotmail.com, udundar60@hotmail.com, tyaan@hotmail.com, krmdndr@gmail.com

Abstract

This study was conducted with the aim of determining whether there is any difference between ACTH hormone before and after endurance training. 38 students volunteered to participate in the study. Subjects were divided into morning, evening and control groups, and hormone levels were measured with blood samples given in the morning and evening. In the evaluation of durability, "Conconi Test" was applied as exercise protocol. After 6 weeks of exercise protocol, blood samples were taken and the "conconi test" protocol was reapplied. SPSS 21.0 package program was used to analyze the data. Pearson Correlation analysis was used to examine relations between variables, and Anova was used to determine differences between groups. The results are presented as mean and standard deviation, with a $P < 0.05$ significance. As a result, it is thought that the necessary balance is achieved when the relationship between the Cortisol hormone and the ACTH hormone is thought to be decreased after the endurance training and when the level of the ACTH hormone is decreased. In conclusion, there was no significant difference between the groups. It was determined that the first measurement of ACTH showed a significant relationship with Gender, Height, Weight, Bme, ACTH 's 2nd measurement with Gender, Bme, Weight, AnaHr, AnaHr b.

Keywords: hormone, ACTH, endurance training

Introduction

Physical activity and training cause the increase and decrease of some hormones in blood levels. These increases and decreases occur due to the regulation of the endocrine glands. These different blood levels also indicate metabolic changes (Hakkınen et al., 1989; Fox et al, 1999). Hormonal systems seem to be associated with both short-term hemostatic control and long-term cellular adaptations. Some studies have also considered the effects of aerobic and anaerobic sporting practices to determine the hormonal effects of different training variables on the organism (Dağlıoğlu and Hazar, 2009). The response of cortisol to physical activity differs according to the severity and duration of activity (Fox et al., 1999). As it is known, in reality the cortisol hormone is a necessary hormone for the body. Some elite athletes use cortisol pills to improve their performance. Durability can provide an advantage by blocking pain in sports. In fact, there is no objection to increasing cortisol during exercise. However, if the cortisol levels remain high level after the exercise, then a problem may arise. When some hormones are compared with exercise, training, and rest values, there is an increase or decrease in the proportions. These increases and decreases, which are the underlying cause of exercise, usually reflect adjustments in the amount of hormone secreted by the endocrine gland (Erdemir and Tüfekçioğlu, 2008). This study was conducted with the aim of determining whether there is any difference between ACTH hormone before and after endurance training.

Materials and Methods

39 students who studied at Denizli Pamukkale University Sports Science and Technology High School have voluntarily participated in the research. Subjects were divided into morning, evening and control groups. The blood tests were taken before and after the subjects started working in the morning and evening. Blood collection and examination were carried out at the central laboratory of Pamukkale University Medical Faculty Hospital. Skin fold thickness from biceps, triceps, supsapapula and suprailiac regions was measured using Skinfold calipers (Holtain Ltd. UK) and lengths Holtain anthropometry set (Holtain Ltd. UK) at body fat percentages of subjects. Determination of body fat percentages of subjects; Skin fold thickness from biceps, triceps, supscapula and suprailiak regions was measured using the Skinfold caliper (Holtain Ltd. UK) and thier lengths were measured using a Holten anthropometry set (Holtain Ltd. UK). The Body fat measurements were calculated using the formula of Durnin and Womersley (Durnin, 1974). The ConConi test was carried out to determine the durability performance. During the application of the test; This test, which was carried out circularly with the help of 5 signs at 20 m between each other, was started at a speed of 8.5 km / h and an increase of 0.5 km / h was carried out at a running speed of 200 m. The test was continued until the athletes voluntarily terminated the test or until they missed two more signals at two successive 20 m. The signal sound is set using a laptop and a CD (Conconi, 1982; Conconi, 1996). During the Conconi test, sportsmen were given to watches RS 800 (Polar Vantage NV, Polar Electro Oy, Finland) that recording the heart rate, and Sportsmen's HR (Heart Rate) values were recorded during the test, and after the test, the mean CAD corresponding to each speed was determined by passing it to the computer. By going out of these speeds; in order to improve the durability performances of the sportsmen, They did extensive durability training as every 3x10 min 2 min resting and their pulse was 150; Intensive durability as 1x20 min the pulse 165, 3x6-8 min 3-5 min resting and the pulse was 178; Widespread intervertebral extreme durability for 3 days a week for 6 weeks, and 1 day is

intense endurance and extensive interval endurance training. The blood samples of the subjects taken before the study were analyzed and after 6 weeks the same tests were repeated at the end of the study. IBM SPSS (Statistical Package for the Social Sciences) 21.0 package program was used to analyze the data. Descriptive Statistics were used to determine the distributions of the data. Pearson Correlation analysis was used to examine relationships between variables, and Anova (post-hoc / Tukey) was used to determine differences between groups. The results have been presented as mean (X) and standard deviation (SS), with a P <0.05 significance.

Findings

Table 1. The comparison of intergroup variables

	1st Group(Morning)		2nd Group(evening)		3rd Group(control)		F
	X	**SS**	**X**	**SS**	**X**	**SS**	
Gender	1,36[a]	,497	1,33[a]	,492	1,17[a]	,389	,622
Age	22,36[a]	1,499	23,33[a]	2,964	22,33[a]	2,605	,699
Height	168,43[a]	8,501	169,00[a]	6,537	169,50[a]	7,845	,063
Weight	63,54[a]	12,830	58,33[a]	9,036	59,02[a]	8,918	,950
Bme	22,17[a]	3,158	20,34[a]	2,008	20,44[a]	1,573	2,441
Fat a	15,05[a]	6,037	15,45[a]	6,109	15,68[a]	5,114	,040
Fat b	14,66[a]	5,417	13,87[a]	4,443	15,93[a]	4,934	,528
Running Speed a	11,64[a]	1,550	11,08[a]	1,428	11,54[a]	1,157	,570
Topmes a	1807,14[a]	886,188	1666,67[a]	732,782	1850,00[a]	524,838	1,632
Running speed b	11,80[a]	1,541	11,20[a]	1,276	11,09[a]	1,113	,204
AnaHr a	183,29[a]	6,342	186,92[a]	5,696	184,25[a]	2,667	1,081
AnaHr b	181,57[a]	6,394	186,83[a]	5,937	184,58[a]	3,423	3,034
Topmes b	2098,57[a]	907,794	1805,83[a]	701,874	1791,67[a]	446,111	,760
ACTH	23,65[a]	15,663	22,88[a]	16,371	15,89[a]	9,609	1,111
ACTH 2	24,70[a]	24,079	24,75[a]	12,914	16,24[a]	4,927	1,072

[a,b] *The difference between groups with different letters in the same line is significant (p<0.05)*

When the table is examined; there was no significant difference between the groups in Gender, Age, Height, Weight, Body Mass Index, Fat a, Fat b, Running Speed a, Topmes a, Running Speed b, AnaHr (Anaerobic Heart Rate), Anahr b, Topmes b , ACTH, ACTH 2 variables.

Table 2. Examining the relationship between variables

	Group	Gender	Age	Height	Weight	Bme	Fat a	Fat b	Running Speed a	AnaHr a	Topmes a	Running Speed b	AnaHr b	Topmes b	ACTH
Group	1	-,170	,004	,060	-,185	-,299	,047	,103	-,038	,088	,020	-,225	,232	-,183	-,222
		,307	,980	,722	,266	,069	,778	,539	,820	,600	,904	,174	,161	,273	,180
	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38
Gender	-,170	1	,044	,552**	,689**	,566**	-,495**	-,527**	,691**	,198	,631**	,727**	,194	,646**	,574**
	,307		,795	,000	,000	,000	,002	,001	,000	,234	,000	,000	,244	,000	,000
	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38
Age	,004	,044	1	-,140	-,031	,053	-,030	-,061	-,209	,023	-,172	-,203	,129	-,175	,052
	,980	,795		,401	,852	,751	,859	,716	,208	,893	,303	,221	,440	,294	,758
	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38
Height	,060	,552**	-,140	1	,777**	,362*	-,208	-,240	,470**	-,005	,383*	,402*	-,063	,356*	,423**
	,722	,000	,401		,000	,026	,211	,146	,003	,976	,018	,012	,706	,028	,008
	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38
Weight	-,185	,689**	-,031	,777**	1	,864**	,015	,004	,445**	,004	,292	,422**	-,107	,305	,602**
	,266	,000	,852	,000		,000	,930	,981	,005	,981	,075	,008	,522	,062	,000
	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38
Bme	-,299	,566**	,053	,362*	,864**	1	,216	,224	,274	,013	,116	,289	-,112	,154	,570**
	,069	,000	,751	,026	,000		,193	,177	,096	,940	,487	,079	,505	,356	,000
	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38
Fat a	,047	-,495**	-,030	-,208	,015	,216	1	,974**	-,519**	-,148	-,585**	-,549**	-,292	-,589**	-,120
	,778	,002	,859	,211	,930	,193		,000	,001	,376	,000	,000	,076	,000	,472
	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38
Fat b	,103	-,527**	-,061	-,240	,004	,224	,974**	1	-,495**	-,183	-,582**	-,554**	-,322*	-,603**	-,145
	,539	,001	,716	,146	,981	,177	,000		,002	,270	,000	,000	,049	,000	,385
	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38
Running Speed a	-,038	,691**	-,209	,470**	,445**	,274	-,519**	-,495**	1	,069	,904**	,946**	,022	,881**	,157
	,820	,000	,208	,003	,005	,096	,001	,002		,679	,000	,000	,896	,000	,347
	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38
AnaHr a	,088	,198	,023	-,005	,004	,013	-,148	-,183	,069	1	,179	,047	,881**	,155	,320
	,600	,234	,893	,976	,981	,940	,376	,270	,679		,281	,781	,000	,354	,050
	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38
Topmes a	,020	,631**	-,172	,383*	,292	,116	-,585**	-,582**	,904**	,179	1	,878**	,181	,970**	,051
	,904	,000	,303	,018	,075	,487	,000	,000	,000	,281		,000	,276	,000	,760
	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38

Runing Speed b	-,225 ,174 38	,727** ,000 38	-,203 ,221 38	,402* ,012 38	,422** ,008 38	,289 ,079 38	-,549** ,000 38	-,554** ,000 38	,946** ,000 38	,047 ,781 38	,878** ,000 38	1 38	,024 ,884 38	,904** ,000 38	,195 ,241 38
AnaHr b	,232 ,161 38	,194 ,244 38	,129 ,440 38	-,063 ,706 38	-,107 ,522 38	-,112 ,505 38	-,292 ,076 38	-,322* ,049 38	,022 ,896 38	,881** ,000 38	,181 ,276 38	,024 ,884 38	1 38	,146 ,383 38	,222 ,180 38
Topmes b	-,183 ,273 38	,646** ,000 38	-,175 ,294 38	,356* ,028 38	,305 ,062 38	,154 ,356 38	-,589** ,000 38	-,603** ,000 38	,881** ,000 38	,155 ,354 38	,970** ,000 38	,904** ,000 38	,146 ,383 38	1 38	,095 ,569 38
ACTH	-,222 ,180 38	,574** ,000 38	,052 ,758 38	,423** ,008 38	,602** ,000 38	,570** ,000 38	-,120 ,472 38	-,145 ,385 38	,157 ,347 38	,320 ,050 38	,051 ,760 38	,195 ,241 38	,222 ,180 38	,095 ,569 38	1 38
ACTH 2	-,208 ,211 38	,496** ,002 38	-,085 ,612 38	,103 ,538 38	,384* ,017 38	,492** ,002 38	-,079 ,638 38	-,115 ,493 38	,010 ,951 38	,357* ,028 38	-,063 ,707 38	,090 ,589 38	,325* ,046 38	-,004 ,982 38	,580** ,000 38

*** Correlation is significant at the 0.01 level (2-tailed).*

When the table is examined, the Gender variable has a significant relationship at 0.01 level with Height, Weight, Bme, Fat a, Fat b, Running Speed a, Topmes a, Running Speed b, Topmes b, ACTH, ACTH 2. The relationship of height variable is significant at 0.01 level with Gender, Weight, Running Speed a, ACTH; and is significant at 0.05 level with Bme, Tompes a, Running Speed b, Topmes b. The relationship of Weight variable is significant at 0.01 level with Gender, height, Bme, Running Speed a, Running Speed b, ACHT; and is significant at 0.05 level with ACHT 2. The relationship of Bme variable is significant at 0.01 level with Gender, Weight, ACHT, ACHT 2; and is significant at 0.05 level with Height. The Fat a variable has a significant relationship at 0.01 level with Gender, Fat b, Running Speed a, Topmes a, Running Speed b, topmes b. The Fat b variable has a significant relationship at 0.01 level with Gender, Fat a, Running Speed a, Topmes a, Running Speed b, Topmes b; at 0.05 level with AnaHr. The Running Speed a variable has a significant relationship at 0.01 level with Gender, Height, Weight, Fat a, Fat b, Topmes a, Running Speed b, Topmes b. The relationship of AnaHr variable is significant at 0.01 level with AnaHr b and at 0.05 level with ACHT 2. The relationship of Topmes a variable is significant at 0.01 level with Gender, Fat a, Fat b, Running Speed a, Running Speed b, Tompes a; and at 0.05 level with height. The relationship of Running Speed b variable is significant at 0.01 level with Gender, Weight, Fat a, Fat b, Running Speed a, Tompes a, Tompes b; and at 0.05 level with height. The relationship of AnaHr b variable is significant at 0.01 level with AnaHr a; and at 0.05 level with Fat b, ACTH 2. The relationship of Tompes b variable is significant at 0.01 level with Gender, Fat a, Fat b, Running Speed a, Tompes a, Running Speed b; and at 0.05 level wşth height. The relationship of ACHT variable is significant at 0.01 level with Gender, height, Weight, Bme, ACHT 2. The relationship of ACHT 2 variable is significant at 0.01 level with Gender, Bme, ACHT; and at 0.05 level with Weight, AnaHr a, AnaHr b.

Discussion and Conclusion

Hakinen and his colleagues have examined the sudden changes in total testosterone, free testosterone, growth hormone, cortisol and sex hormones by performing six-month endurance and explosive strength training on middle-aged women and men, older women and men and They could not find any changes in hormones during training (Hakinen et al., 2000). Buono et al. (1991) have found that ACTH and Cortisol parameters show parallel and significant increases in the amount of oxygen used with the work produced as a result of the exercises which were applied at 27 years of age, 50 watt for 2 minutes and 40-100% VO2max. While Schulz et al. (2000) found significant increases in ACTH and cortisol after anaerobic exercise applied to various male athletes aged 26 years, Farrell et al. (1983) found a significant increase in ACTH and cortisol parameters as a result of submaximal (80% max VO2) and maximal (100% max VO2) acute exercises applied to sedentary volunteers aged 26 years and they found that ACTH and cortisol increased in parallel with increasing VO 2 max. Ünal (1998) have pointed out that there is a significant relationship between the amount of VO2max consumed in lactate produced during exercise and ACTH and cortisol increases. Wittert et al. (1996) have reported that sedentaries were significantly lower in ACTH and cortisol parameters in control sedanter groups than in chronic exercise-athletes. Gozansky et al. (2005) have reported a significant increase in serum cortisol levels after exercise in 10 female subjects exposed to 90% maximal heart rate for 10 min. Maimoun et al. (2006) found that cortisol levels in the samples taken from 7 male cyclists who were subjected to 50 minutes bicycle exercise after 15 min of exercise and after exercise showed a significant increase ($p < 0.05$) compared to pre-exercise values. Thomas et al. (2003) reported that there was no significant increase in cortisol levels after exercise in 32 boys and girls, aged 10-11 years, who were running 20 m. ; and Güneş (1995) reported that cortisol did not increase or decreased very little in low-intensity exercises, and cortisol also accompanies this increase as exercise intensity increases.

To conclude, this research has found that there was a significant relationship between the first measurement of ACTH and Gender, Length, Weight, Bme and between ACTH's 2nd measurement and Gender, Bme, Weight, Mother's, AnaKah b, while there was no significant difference between the groups. Therefore, it is thought that this type of regular exercise has many positive effects on the organism, such as struthenic disturbance, elevation of blood sugar, not gaining weight, and acts as a balance and also the cortisol level could decrease.

Conflicts of Interest

The authors have no conflicts of interest to acknowledge.

REFERENCES

Buono MJ, Yeager JE (1991). Increases in Aldosterone Precede Those of Cortisol During Graded Exercise. *J. Sports Med. Phys. Fitness 31, 48-51.*

Conconi F, Ferrari M, Ziglio PG, Droghetti P, Codeca L (1982). Determination of the Anaerobic Threshold by a Noninvasive Field Test in Runners. J.Appl. Physiol., 52, 869–873.

Conconi F, Grazzi G, Casoni I (1996). The Conconi Test: Methodology After 12 Years of Application. Int J Sports Med., 17, 509-519.

Dağlıoğlu Ö, Hazar M (2009). Yüksek Hız Koşu Yüklemesinin Bazı Vücut Hormonlarının Ani Değişimine Etkisi. *Atabesbd 11 (2), 35-45.*

Durnin JVAG, Womersly J (1974). Body Fat Assessed From Total Body Densityandits Estimation From Skinfold Thickness: Measurements on 481 Men and Women Aged from 16 to 72 years. *Br. J. Nutr., 32, 77-97.*

Erdemir İ, Tüfekçioğlu E (2008). Kortizol Sirkadiyen Ritmini Etkileyen Bazı Fiziksel Ve Fizyolojik Parametrelerin Karşılaştırılması. *Balıkesir Üniversitesi Sosyal Bilimler Enstitüsü Dergisi, 11 (20), 1-10.*

Farrell PA, Garthwaite TL, Gustafson AB (1983). Plasma Adrenokorticotropin and Cortisol Responses to submaximal and Exhaustive Exercise. *J. Apply Physiol., 55 (5), 1441-1444.*

Fox EL, Bowers RW, Foss ML (1999). Beden Eğitimi ve Sporun Fizyolojik Temelleri. *Bağırgan Yayımevi Ankara.*

Gozansky WS, Lynn JS, Laudenslager ML, Kohrt WM (2005). Salivary Cortisol Determined by Enzyme Immunoassay is Preferable to Serum Total Cortisol for Assessment of Dynamic Hypothalamic-PituitaryAdrenal Axis Activity. *Clin Endocrinol (Oxf), 63, 336-341.*

Güneş R (1995). Egzersiz Hormonal Uyumlar. *I. Klinik Spor Hekimliği Sempozyumu Ankara, 76-97.*

Hakkinen K, Keskinen KL, Alen M, Komi PV, Kauhanen H (1989). Serum Hormone Concentrations During Prolonged Training in Elite Endurance-trained and Strength-trained Athletes. *Eur J Appl Physiol Occup Physiol., 59 (3), 233-8.*

Hakkinen K, Pakarinen A, Kraemer WJ, Newton RU, Alen M (2000). Basal Concentrations and Acute Responses of Serum Hormones and Strength Development During Heavy Resistance Training in Middle-Aged and Elderly Men and Women. J Gerontol A Biol Sci Med Sci., 55(2), B95-105.

Maimoum L, Manetta J, Couret I, Dupuy AM, Mariano-Goulart D, Micallef JP, Peruchon E, Rossi M (2006). The Intensty Level of Physical Exercise and the Bone Metabolisim Responge. *Int J Sports Med, 27, 105-111.*

Schulz A, Harbach H, Katz N, Geiger L, Teschemacher H (2000). βEndorphin İmmunoreactive Material and Authentic β-Endorphin in the Plasma of Males Undergoing Anaerobic Exercise on Rowing Ergometer. *İnt. J. Spors Med. 21, 513-517.*

Thomas JC, Gail F, Panagiota K (2003). Effects of Physical Activity, Body Fat and Salivary Cortisol on Mucosal Immunity in Children. *J Appl Physiol, 95, 2315-2320.*

Ünal M (1998). Aerobik ve Anaerobik Akut/Kronik Egzersizlerin Immun Parametreler Üzerindeki Etkileri. *İ.Ü. Sağlık Bilimleri Enstitüsü İstanbul, 20.*

Witert GA, Livesey JH, Espiner EA, Donald RA (1996). Adaptation of the Hypothalamopituitary-Adrenal Axis to Chronic Exercise Stress in Humans. *Med. Sci. Sports Exerc. 28, 1015-1019.*

International Journal of Science Culture and Sport
December 2017 : 5(4)
ISSN : 2148-1148
Doi : 10.14486/IntJSCS698

Field ***:*** *Coaching, Physical Fitness*
Type ***:*** *Research Article*
Received: *11.11.2017* ***- Corrected:*** *04.12.2017* ***- Accepted:*** *07.12.2017*

Analysis of the Talent Selection in Turkish Wrestling

Ömer KAYNAR, M. Fatih BİLİCİ
Muş Alparslan University, School of Physical Education and Sports, Muş, TURKEY
Email: o.kaynar@alparslan.edu.tr

Abstract

The aim of this study was to determine whether elite wrestlers in Turkey are subjected to a talent test when they begin their wrestling. A total of 425 volunteer athletes who actively wrestling in sports clubs in 51 different cities of Turkey participated in the research. A semi-structured interview was used in this study which covered qualitative data collection techniques. The semi-structured interview form was developed by researchers. It was determined that no aptitude test was performed when 425 (75.52 %) of the 321 athletes wrestling actively began to wrestle in Turkey. On the other hand the talent test was evaluated to 104 (%24.48) wrestlers, 30 (28.84%) of them were evaluated in the wrestling competition, 52 (50%) were evaluated by physical structure and 22 (21.15%) were evaluated by looking at the technical capacities of the athletes in the wrestling competition. As a result, it was understood that the majority of wrestlers haven't performed a talent test and that the talent tests which have been performed are inadequate. It is thought that the application of physical, mental, physiological and genetic tests together during the selection of talent in the wrestling sport is important in increasing the number of promising talented athletes.

Keywords: sport, wrestling, talent selection

Introduction

Thanks to the advancement of the science and technology in our day, many countries invest in many fields such as improving the sport infrastructure in both political and economic terms, building sports facilities and training successful athletes to succeed in international sporting events, to advertise and to gain prestige. One of the most remarkable among these investments is the talent selection.

One of the ways to succeed in sports is to be talented. The talent of a person can be possible through the appropriation of the genetic properties, physical, physiological and mental capacity to the related sport (Çetin, 1996; Çankaya et al., 2004; Miah and Rich, 2006; Karakuş and Kılınç, 2006; Küçük, 2009). If the physical structure of an individual is suitable for the given sport, it is likely for him/her to be successful (Ayan and Mülazımoğlu, 2010). Therefore, talent selection is very important for the identification of talented athletes.

The concept of talent is defined in the Turkish Language Association as "the quality, ability, capability to understand or do something". The concept of talent in sports, on the other hand, can be defined as all of the characteristics such as genetic factors, innate physical and physiological capacity, mental talent, and high performance that are thought to be effective for a person to succeed in sports.

It is known that two main methods, namely Natural Selection and Scientific Selection are applied for talent selection in the science of sports. Natural selection can be defined as one's tendency towards a sport that is randomly chosen without any scientific test and starting that particular sport by the guidance of his / her family or a sports teacher. The scientific selection can be defined as directing the person to the most appropriate sports branch by using various scientific tests in order to identify talented persons (Bompa, 2003; Muratlı, 2007).

Talent tests used in the identification of talented athletes have an important role in determining the successful athlete candidate (Coşan and Demir, 2005; Demiral et al. 2011; Eniseler et al., 2011). In the literature, there are many important studies in determining the talents of the athletes. It has been reported that genetic factors and muscular, anthropometric, and psychological properties are influential in determining talent (Karakuş and Kılınç, 2006; Küçük, 2009; Ayan and Mülazımoğlu 2010; Eynon et al., 2011). Another study emphasized that physical, physiological and motor features are effective in achieving the highest level of achievement for children guided to perform particular sport branches (Çankaya et al., 2004; Milanese et al., 2010; Hekim et al., 2012).

In Turkey, wrestling is the most successful sports branch that has earned the highest number of medals in international championships and compared to other sports branches. The incremental improvement of this success can only be possible if talented athletes are detected and directed to this sport. Talented athletes are identified by performing talent tests under the light of scientific data. In this context, talent tests play a critical role in determining the athlete candidates who may be successful in the wrestling sport in the future. In particular, talent tests conducted along with genetic studies are very important for the protection of athletes' health and for increasing sportive performance.

However, in the literature review, there is no study that used talent test on new athletes. Whereas, talented athletes can be identified by performing talent tests. For this reason, this study aimed to determine whether any talent test is applied on the new wrestlers.

Materials and Methodology

Participants

The study group, planned according to the descriptive research model, consisted of 428 volunteer athletes active in wrestling sports from different provinces of Turkey, with a mean age of 17.99 ± 4.7 years, a mean height of 168.00 ± 5.28 cm and a mean weight of 66.50 ± 9.54 kg.

Data Analysis

In this research, which uses qualitative data collection technique, semi-structured interview technique is preferred. Semi-structured interview form developed by the researchers is preferred as data collection tool.

In order to obtain comparative results, the written semi-structured interview form was developed to determine the talent test of wrestlers. In the interview form, there are questions about "education background, active years in sport, best sports success , whether the coaches applied any talent test before starting the sport, if so, what kind of tests are applied, age of starting the sport". A preliminary application was carried out before the interviews with the wrestlers were carried out and the interview form was finalized after the necessary corrections were made according to the recommendations of the experts. Attention has been paid to principles such as the need for questions to be clear, understandable, and easily answered, as well as being complicated and non-directing for the preparation of interview questions developed by experts (Yılmaz and Altınkurt, 2011).

The written interview forms were applied to the wrestlers at their convenient time after they were informed about the subject. The written interview forms applied to the wrestlers were transferred to computer environment, the data were recorded .The frequency ranges, and percentages of the recorded data were calculated and interpreted.

Frequency and percentage are usually used to interpret the data. Appropriate themes are determined, tables are formed, and the research findings are interpreted and evaluated by interpreting the most and least given answers. In qualitative research, generalization has been advocated by another person who does a similar work to the researcher's study (Büyüköztürk et al., 2012).

Results

23 voluntary athletes who were the mean age 17.99 ± 4.7, height 168.00 ± 5.28 and weight 66.50 ± 9.54 were included in the study.

Table 1. The educational status of the wrestlers, the best sports grades, sports starting age and the age of the sports

Educational Status

primary school	secondary school	high school	under graduate	graduate	post graduate
11	69	229	30	83	3

The best result

National champion	European champion	World champion	Olympic champion	International tournaments	none
112	29	5	12	99	168

Sports starting age

6 years	7 years	8 years	9 years	10 years	11 years	12 years	13 years	14 years
21	10	36	39	92	69	60	37	61

Sports age

1-2 year	2-4 year	4-6 year	6-8 year	8-10 year	10-12 year	12-14 year	14-16 year	above 16 year
42	127	94	51	38	29	22	15	7

Table 2. The number and percentage of sports success of wrestlers took and didn't take talent test (%)

Sports success of wrestlers who took talent test **(n/%)**		Sports success of wrestlers who didn't take talent test **n (%)**	
championships	**104 (24.48)**	**championships**	**321 (75.52)**
National championships	16 (3.91)	National championships	96 (29.90)
European championships	6 (1.46)	European championships	23 (7.16)
World championships	1 (0.24)	World championships	4 (1.24)
Olympic games	2 (0.48)	Olympic games	10 (3.11)
International tournaments	26 (6.36)	International tournaments	73 (22.74)
No sports success	53 (12.96)	No sports success	115 (35.82)

Table 3. Talent selection tests

Talent test		
Wrestlers applied talent test **(n/%)**		Wrestlers not applied talent test **(n/%)**
104/ 24.47		321/75,53
Tests applied in talent test		
Physical characteristics (n/%)	Wrestling (n/%)	Technical characteristics (n/%)
52	30	22

In the present study, it was found that 321 (75.52%) of 425 athletes active in wrestling in 51 different provinces of Turkey started to wrestle and no talent test was applied on them and 104 (24.48%) wrestlers were tested for talent. It was found that 52 (50%) of the wrestlers were evaluated based on their physical characteristics, 30 (28.84%) on wrestling competition performance and 22 (21.15%) on technical capacities during competitions (Table 3).

Discussion and Conclusion

Talent selection is an important criterion for identifying promising athletes. It is very important to determine their talents of champion athlete candidates by early scientific tests and to direct them to the related sports branch. Therefore, many developed countries such as the USA, UK, China, Russia and Germany have used a variety of talent tests to direct the athlete candidates to another sport branch in which they can be more successful (Mirwald et al., 2002; Arabacı et al., 2008).

In the present study, it was found that 321 (75.52%) of 425 athletes active in wrestling in 51 different provinces of Turkey started to wrestle and no talent test was applied on them and 104 (24.48%) wrestlers were tested for talent. It was detected that 52 (50%) of the wrestlers were evaluated based on their physical characteristics, 30 (28.84%) on wrestling competition performance and 22 (21.15%) on technical capacities during competitions.

In the literature review, many scientific studies have been found on the physical and motor characteristics of the athletes. According to the results of the present study, the criteria of talent determination in sports branches have been developed. In general, different parameters such as the physical characteristics, mental characteristics, technique, tactics and experience of athletes are emphasized to be crucial (Aydın and Pehlivan, 1998; Gökdemir and Koç, 2000; Bompa, 2003).

In the study of Demiral et al. (2011) on elite female judo athletes, the body composition, paused long jump, static and dynamic balance, coordination, quickness and speed tests were used to detect talented athletes. Mülazımoğlu and his colleagues (2009) applied a test battery consisting of six chapters in determining the talent of 91 children of age group 9. Tests such as throwing ball to the hoop, throwing skimming ball to the hoop, dribbling ball, tilting pin, throwing ball to the target on the wall, fast pass on the wall were applied in the test battery. It has been envisaged that applications in the test battery may be a criterion in determining children's basketball-specific talent levels and can contribute to the talent selection studies to be performed in this field. In the study conducted on wrestlers, on the other hand, tests such as

800 m running, 30 m running, flexibility, mental talent tests were applied to determine the talent tests of the athletes who would be accepted to the wrestling training center. Tests used in wrestling training centres to identify talented wrestlers have been advocated as a criterion. Demirkol et al. (2006) emphasized that the technique played a significant role in their study conducted on young male basketball players aged between 13 and 15 (Özal et al., 2003).

In their study, Carter and Heath (1990) examined the somatotypes of the elite athletes participating in the Olympic Games and found that the mesomorphic structure dominated in all branches, the short distance runners usually had a mesomorphic and ectomesomorphic structure, mesomorphic success of the athletes decreased while ectomorphic success increased in long distance running competitions; athletes throwing disc, hammer and putting shot had a endomesomorphic structure, athletes of javelin had a balanced mesophase, athletes of decathlon, pole vaulting, high jump, long jump and triple jump had ectomesomorphic structure.

It is known that body composition, muscle mass and fat ratios are calculated in many sport branches and especially in weight sports. It has been determined that footballers with lower body fat percentage are more successful than those with excess fat (Kerr et al., 1995; Kürkçü et al., 2009).

In a study on wrestlers, the cardiac functional and anatomical parameters of the wrestlers at the national team level were examined and hypertrophy was detected in the left ventricle of the heart of the wrestlers. The study conducted by Atan et al. (2013) in different sports branches found that the vital capacity value of wrestlers, swimmers and taekwondo athletes was statistically significant higher than the sedentary (Hazar and Koç, 2003).

It is argued that all kinds of motor features such as neuromuscular and cardiorespiratory stability and coordination have a role in achievement of football players. Because genetic predisposition, muscle structure, physical, mental and physiological characteristics of a person are determined by talent tests (Yang et al., 2003; Köklü et al., 2009; Cicioğlu et al., 2010).

As mentioned above, many physical and physiological tests have been used to determine talent. However, in recent years, the use of genes has been one of the most remarkable developments in the identification of talented athletes. According to the physiological and anatomical predispositions determined by the genes of individuals, they can be directed to the sports branch and individual training programs can be developed. These personal programs allow athletes to be more successful, especially in individual sports. There are many studies about genes affecting sportive performance in the literature (Alonso et al., 2014; Sercan et al., 2016).

It is known that the effect of exercise on the heart is controlled by genes, and that exercise has different effects on heart and cardiac functions at different levels. Ulucan et al. (2013) suggest that individuals with the ACE genotype may be more successful in sprinting, long jump, high jump, throwing disc or speed-force-requiring sports such as short-range swimming. Genetic factors have been reported to affect physiological characteristics such as VO2max capacity, strength, endurance, types of muscle fibers, cardiac size, lactate (Sözen, 1996; Mustafina et al., 2014).

When the sport success of the wrestlers who took and didn't take the talent test examined, it was determined that the wrestlers who did not take a talent test had better sportive success than the athletes who did. In the literature, athletes are expected to be successful as their

talents are detected through talent tests (Ulucan et al., 2013; Sercan et al., 2016), however the present study found that those who did not take a talent test were more successful contrary to the literature findings.

In the present study, it is thought that the reason for this confliction is related to not applying physical, mental, physiological and genetic tests together while determining the talent in the wrestlers and using a mostly observation-based method.

In the literature studies, it was observed that the physical, mental, physiological and genetic tests were performed in the determination of talented athletes. It is foreseen that it is important to apply physical, mental, physiological and genetic tests together in talent selection. It has been determined that 75% of the athletes participating in the present study did not have a talent test, and 25% had. In the talent tests applied to the athletes, it has been determined that talent selection has been made considering the physical and technical characteristics.

At the end of the present study, it has been understood that the vast majority of wrestlers are not tested for talent, and that the talent tests are inadequate. It is believed that the application of physical, mental, physiological and genetic tests together during the talent selection in the wrestling sport is important to increase the number of talented athletes in the future.

Conflicts of Interest

The authors have no conflicts of interest to acknowledge.

Corresponding Author

Ömer KAYNAR
Çanakkale Muş Alparslan University, Physical Education and Sports Department,
Muş, TURKEY
Email: omer_kaynar49@hotmail.com,o.kaynar@alparslan.edu.tr; Tel: +905327751949

REFERENCES

Alonso L, Souza E, Oliveira M, Nascimento L, Dantas P (2014). Heritability of aerobic power of individuals in northeast Brazil, Biol. Sport 31 (2014) 267–270.

Arabacı R, Koparan Ş, Öztürk F, Akın M (2008). Olimpiyatlar İçin Sporda Yetenek Seçimi ve Spora Yönlendirme Projesi II. Aşama Sonuçlarının İncelenmesi (Bursa Örneği), ISSN:1306-3111, e-Journal of New World Sciences Academy, 3, 2: 86-98.

Atan T, Akyol P, Çebi M (2013). Bireysel sporlarla uğraşan yıldızlar kategorisindeki sporcuların solunum fonksiyonlarının karşılaştırılması. Dicle Tıp Dergisi; 40 (2):192-198.

Ayan V, Mülazımoğlu O (2010). Sporda yetenek seçimi ve spora yönlendirmede 8–10 yaş grubu kız çocuklarının fiziksel özelliklerinin ve bazı performans profillerinin incelenmesi (Ankara örneği). Niğde Üniversitesi Beden Eğitimi ve Spor Bilimleri Dergisi, 4(3), 152-159.

Aydın MS, Pehlivan A (1998). Elit Judocuların Fizyolojik ve Fiziki Profili. Spor Araştırmaları Dergisi, S.2, 34-37.

Bompa TO (2003). Antrenman kuramı ve yöntemi. (T. (çev) Bağırgan, Ed.). Ankara: Bağırgan Yayınevi.

Büyüköztürk Ş, Çakmak EK, Akgün ÖE, Karadeniz Ş, Demirel F (2011). Bilimsel araştırma yöntemleri, PegemA yayıncılık, 8. baskı, Ankara.

Çankaya C, Arabacı R, Doğan M, Kılıç C (2004). Bursa'daki güreş eğitim merkezi ve faal güreş kulüplerinde yetenek seçimi. Beden Eğitimi ve Spor Bilimleri Dergisi, 6(1), 11-17.

Carter J, Heath B (1990). Somatotypeing-Development and Applications, Camrıdge University Press, pp 234-236, Cambridge.

Çetin A (1996). Atletizmde Yetenek Seçiminde Kullanılan Testler ve Yoğunluk Parametreleri-III, A.B.T.D., 23, 15-22.

Cicioğlu İ, Gunay M, Gökdemir K (1998). Farklı Branşlardaki Elit Bayan Sporcuların Fiziksel ve Fizyolojik Profillerinin Karşılaştırılması, Gazi Beden Eğitimi ve Spor Bilimleri Dergisi, Cilt 3, (Sayı 4), 9 – 16.

Coşan F, Demir A (2005). Atletizm alt yapı çalışmalarının bilimsel temelleri, Olimpiyatlar için sporcu kaynağı projesi. İstanbul: İstanbul Olimpiyat Oyunları Hazırlık ve Düzenleme Kurulu Eğitim Yayınları.

Demiral Ş, Erdemir İ, Kızılyaprak AH (2011). Bayan judocularda yetenek seçimi. USAD, 3(1), 29-31.

Demirkol B, Tavacıoğlu L (2006). İstanbul 1. ve 2. Lig Takımlarında Oynayan 13-15 Yaş Erkek Basketbolcuların Oyuncu Pozisyonuna Göre Fiziki Uygunluklarının Araştırılması. 9. Uluslar Arası Spor Bilimleri Kongresi. Muğla P-161.

Eniseler N (2010). Bilimin ışığında futbol antrenmanı. 1. Baskı. İzmir: Birleşik Matbaacılık.

Eynon N, Ruiz JR, Oliveira J, Duarte JA, Birk R, Lucia A (2011). Genes and elite athletes: A road map for future research. J Physiol 598: 3063–3070.

Gökdemir K, Koç H (2000). Üst Düzey Hentbolcu ve Voleybolcu Bayan Sporcuların Bazı Fizyolojik Parametrelerinin Değerlendirilmesi. Dumlupınar Üniversitesi Sosyal Bilimler Dergisi, 1 (4) : 259 -262.

Hazar S, Koç H (2003). Türk Güreş Milli Takımı Seviyesindeki Güreşçilerin Kalp Yapı ve Fonksiyonlarının Elektrokardiografi Yöntemiyle İncelenmesi. Gazi Beden Eğitimi ve Spor Bilimleri Dergisi, 8 (1), 3-14.

Hekim M, Tokgöz M, Reyhan S, Yıldırım Y (2012). To Compare Some Motoric Features of 12-14 Age Group Girl Children Making Sport And Don't Make Sport. SSTB International Refereed Academic Journal of Sports, 2(3): 31-38.

Karakuş S, Kılınç F (2006). Postür ve sportif performans. Kastamonu Eğitim Dergisi,14(1), 309-322.

Kerr DA, Ackland TR, Schreiner AB (1995). The Elit Athlete-Assessing Body Shape, Size, Proportion and Composition, Asia Pacific J ClinNutr 4, 25-29.

Köklü Y, Özkan A, Alemdaroğlu U, Ersöz G (2009). Genç Futbolcuların Bazı Fiziksel Uygunluk ve Somatotip Özelliklerinin Oynadıkları Mevkilere Göre Karşılaştırılması. SPORMETRE Beden Eğitimi ve Spor Bilimleri Dergisi, 7 (2) : 61-68.

Küçük V (2009). Futbolda yetenek seçimi. Türkiye Futbol Federasyonu Futbol EğitimYayınları, İstanbul.

Kürkçü R, Hazar F, Özdağ S (2009). Futbolcuların Vücut Kompozisyonu, Vücut Bileşenleri ve Somatotip Özellikleri Üzerine Bir İnceleme. Niğde Üniversitesi Beden Eğitimi ve Spor Bilimleri Dergisi, 3 (2) : 113-119.

Miah A, Rich E (2006). Genetic tests for ability: talent identification and the value of an open future. SportEducSoc 11: 259–273.

Milanese C, Bortolami O, Bertucco M, Verlato G, Zancarano C (2010). Anthropometry And Motor Fitness in Children Aged 6-12 Years. Journal of Human Sport & Exercise, 5 (2): 265-279.

Mirwald RL, Baxter-Jones ADG, Bailey DA, Beunen GP (2002). An assessment of maturity from anthropometric measurements. Medicine and Science in Sports and Exercise, 34(4), 689–694.

Mülazımoğlu O, Vedat A, Mülazımoğlu ED (2009). Basketbol Yetenek Test Bataryası Geçerlik ve Güvenilirlik Çalışması. Niğde Üniversitesi Beden Eğitimi ve Spor Bilimleri Dergisi 3 (1):23-26.

Muratlı S (2007). Antrenman bilimi yaklaşımıyla çocuk ve spor. 2. Baskı. Ankara: Nobel Yayın Dağıtım.

Mustafina LJ, Naumov VA, Cieszczyk P, Popov DV, Lyubaeva EV, Kostryukova ES, et al. (2014). AGTR2 gene polymorphism is associated with muscle fibre composition, athletic status and aerobic performance. Exp. Physiol. 99 1042–1052.

Özal M, Gökdemir K, Arslan C, Orhan S (2003). Güreş Eğitim Merkezlerine Yetenekli Sporcu Seçme Sınavlarında Uygulanan Testlere İlişkin Bir Araştırma. Gazi Beden Eğitimi ve Spor Bilimleri Dergisi (Gazi BESBD), VIII (2003), 2 : 19 – 32.

Sercan C, Eken BF, Erel Ş, Ülgüt D, Kapıcı S, Ulucan K (2014). Spor Genetiği ve Ace Gen İlişkisi. İnönü Üniversitesi, Beden Eğitimi ve Spor Bilimleri Dergisi, 2016, 3(2), 26-34.

Sözen AB (1996).Turkiye Birinci Profesyonel Futbol Ligi Futbolcularında Elektrokardiyografi ve Ekokardiografi Bulguları, (TU), İstanbul Üniversitesi, İstanbul Tıp Fakültesi, İç Hastalıkları Anabilim Dalı, İstanbul ,1996

Ulucan K, Göle S, Altindas N, Güney A (2013). Preliminary findings of alphaactinin-3 gene distribution in Turkish elite wind surfers. Balkan journal of medical genetics, 16(1), 69- 72.

Yang N, MacArthur DG, Gulbin JP, Hahn AG, Beggs AH, Easteal S, et al. (2003). ACTN3 genotype is associated with human elite athletic performance. The American Journal of Human Genetics, 73(3), 627–631.

Yılmaz K, Altınkurt Y (2011). Göreve Yeni Başlayan Özel Dershane Öğretmenlerinin Kurumlarındaki Çalışma Koşullarına İlişkin Görüşleri. Kuram ve Uygulamada Eğitim Bilimleri, 11 (2), 635-650.

International Journal of Science Culture and Sport
December 2017 : 5(4)
ISSN : 2148-1148
Doi : 10.14486/IntJSCS699

Field ***:*** *Coaching, Sport Psychology*
Type ***:*** *Research Article*
Received: *11.11.2017* ***- Corrected:*** *02.12.2017* ***- Accepted:*** *07.12.2017*

Investigation of the Mental Endurance Levels of the Athletes Participating in the Table Tennis Championship of Universities in Turkey

Arslan KALKAVAN[1], Mehmet ACET[2], Gökhan ÇAKIR[3]
[1] Recep Tayyip Erdoğan University, School of Pysical Education and Sports, Rize, TURKEY
[2] Dumlupınar University, School of Pysical Education and Sports, Kütahya, TURKEY
[3] Regional Directorate of Youth Services and Sports, Rize, TURKEY
Email: arslan.kalkavan@erdogan.edu.tr, acetmehmet44@dpu.edu.tr, gokhancakir8891@hotmail.com

Abstract

The purpose of this study was to investigate the mental endurance of the athletes who participated in the table tennis championship inter Universities in Turkey. To investigate the mental endurance of the athletes who participated in the study, the mental endurance rubric whose validity and reliability work has been done by Erdoğan (2016) was used. Also, some questions including some personal data of the subjects were also included in the inventory. For statistical tests, The Saphiro-Wilks test was performed to determine if the data had a normal distribution. Due to data not having a normal range, non-parametric tests such as Mann-Whitney U test and Kruskal-Wallis test were applied. According to the results of the analysis, it has been seen that there is no meaningful difference between the mental endurance score of the athletes based on categories such as; age, sex, playing sports year, and playing sports under a license. Results showed that the male athletes (57,79±6,676) have a higher average of mental endurance compared to female athletes (46,82±6,525), the athletes with higher playing sports year, 13-15 years, (50,87±6,329)compared to lower playing sports years, 7-9 years, (57,13±7,731) have a lower average of mental endurance, athletes who play in the unileage (56,18±7,795) have a higher average of mental endurance compared to the athletes who play in 1.,2.,3. Leagues (51,48±5,714) and athletes who play in other leagues or athletes who don't play in any leagues ((50,98±4,415) and athletes aged 21-23 (54,88±7,142) has a higher average of mental endurance compared to ages 18-20 (53,38±6,260), ages 24-26 (53,06±6,752).

Keywords: sport, table tennis, mental toughness

Introduction

The purpose of this study was to investigate the mental endurance of the athletes who participated in the table tennis championship inter universities in Turkey. For many times, we have seen that athletes attribute their bad performances to a loss of concentration, getting nervous under pressure or the mental aspect of the games.

Another mistake both trainers and athletes do is the attempt to try to fix their mistakes by increasing their training. But mostly the problem is not caused by the lack of physical skills but by a lack of mental skills (Weinberg and Gould, 2015). Being mentally strong and displaying a perfect performance is not hereditary but something that can be learned (Loehr and James, 1986).

Loehr and James (1986) emphasizes that whether the person is outgoing or shy, displaying a perfect performance is based on some psychological and mental elements and these can be learned with any skills. On the other hand, athletes failing to improve themselves mentally and emotionally, ignoring the development of their psychological skills might affect the physical performance they once thought was unique in a bad way and hence resulting in failure. Moreover, many athletes spare little time for their mental preparation training or avoids the training completely (Ercan, 2013).

The Psychological Skills Training (PST), is the systematic and reliable training of psychological and mental skills. The aim of improving the performance, increasing the joy in participation to sports or the satisfaction that is caused by participation in sports or physical activities (Weinberg and Gould, 2015).

When various studies and publications are examined, it can be seen that there are several misunderstandings towards psychological skills training. These misunderstandings are as follows: PST is only for the problematic athletes or high-level trainings, and PST provides an easy way out and not necessarily beneficial. The concept of mental toughness has been defined in various ways in the literature. Some of these definitions are;

According to Jones and others (2002), mental toughness is defined as being more consistent and having a better performance than their opponents; being determined, focused, and confident and being able to sustain control when under pressure. Clough et al. (2002) has defined mental toughness as “having an impenetrable faith of controlling a person’s fate.”

Mental toughness is a cognitive skill that allows the athletes to deal with difficulties that may come up during their performances, and enables them to control their motivation, concentration, confidence, feelings and thoughts and sustain them in a positive direction (Weinberg et all. 2011). When physical skills are equal, the winner is mostly the sportsman with a higher level of mental toughness. Nonetheless many serious athletes spare 10-20 hours (or more) to their physical training, they spare so little time (if there’s left any) to their mental toughness training. This ratio doesn’t mean anything. It should not be forgotten that psychological elements are the main reasons of daily ups and downs of the performance (Weinberg & Gould, 2015: 247-248).

With this purpose on mind, measuring mental toughness is a very important factor in order to evaluate and improve psychological performance (Durand-Bush & Salmela, 2002). Since there’s 11 points to every set in table tennis, every point is crucial to win the game. It is believed that the athletes’s mental toughness level will affect their performances in a game where attention and focus is very important. There are some studies that investigates the

relationship between the psychological parameters and mental toughness along with their validity and reliability.

In this study, the mental toughness level between athletes, who competed in Turkey Table Tennis Championship among universities, will be researched based on some variables.

With this aim in mind, the following hypothesises will be examined:

H1: There is no difference between the score of athletes's mental toughness based on sex

H1: There is no difference between the score of athletes's mental toughness based on age

H3: There is no difference between the score of athletes's mental toughness based on their sports experience

H4: There is no difference between the score of athletes's mental toughness based on their category doing licensed sport.

Materials and Method

This study has been conducted with the method of scanning in the frame of quantitative research approach. The athletes who competed in Turkish Inter-Universities Table Tennis Championship in 2016-2017 season of the table tennis federation constituted the sample group of the study. The number of athletes out of the 313 athletes which constituted the research's sample group who volunteered to participate in the survey activity and filled out the surveys completely was 107. Firstly, the athletes were informed about the purpose of the study. In this context, every sportsman filled out a survey an hour before the competition.

MTR (Mental Toughness Inventory) has been developed by Madrigal, Hamill and Gill in 2013. MTR is a 5 Likert scaled inventory containing (1) I don't agree at all (2) I disagree (3) I'm indecisive (4) I agree (5) I agree completely.

While the inventory has been developed, the sample group had consisted of 87 males and 184 females out of 271 amateur and professional athletes and not all of them were students. When forming the inventory's item pool Jones et. al.'s study (2007) had been used as a base. Jones et. al had tackled with Mental Toughness in four aspects: "attitude", "training", "competition" and "post-competition".

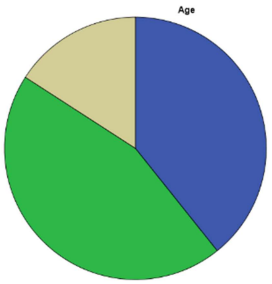
This study which is conducted via using the mental toughness inventory has been applied to athletes before competitions along with a personal data inventory. They have gathered an 11 itemed, one-element constitution which includes the training and competition after Exploratory Factor Analysis (EFA). The translation and Turkish adaption was done by Erdogan (2016) which was applied to the sample in this study.

To designate the general aspects of the data, definitive statistics, cross tabulation frequency and percentage distribution has been conducted. Out of the normalcy tests, the Kolmogrov-Smirnov (K-S) test and Shapiro-Wilk test has been applied as part of the statistics tests based on athletes age, gender, doing sports experience and licensed category. Due to data not having a balanced distribution, the non-parametric tests such as Mann-Whitney U test and Kruskal-Wallis test has been applied.

Findings

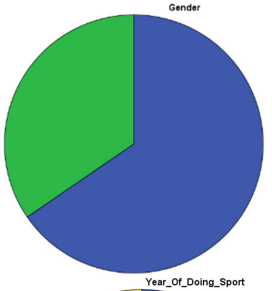
General Features:

In Graphics 1-4, various information is given regarding the athletes who participated in the survey.



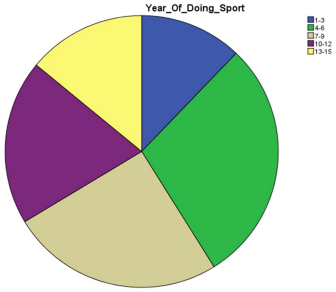
Age

39.2% (n=42) of the athletes, in age of 18-20,
44,9% (n=48) of the athletes, in age of 21-23,
15,9% (n=17) of the athletes, in age of 21-23,
were participated in the study.



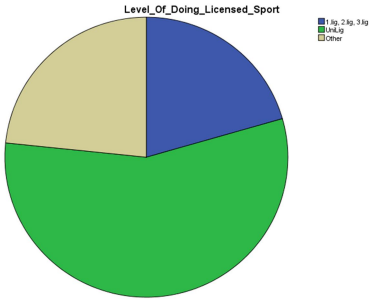
Gender

65.9% (n=70) of the athletes were Male,
34.6% (n=37) of the athletes were Female



Year of Doing Sport

12.1% (n=13) of the athletes, in 1-3 Years,
29.0% (n=31) of the athletes, in 4-6 Years,
25.2% (n=27) of the athletes, in 7-9 Years,
19.6% (n=21) of the athletes, in 10-12 Years,
14.0% (n=15) of the athletes, in 13-15 Years,
were participated in the study.



Licensed Category

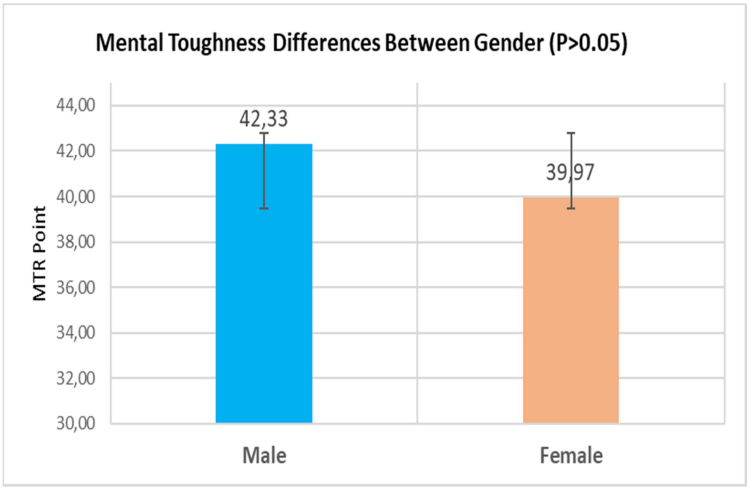
20.6% (n=22) of the athletes, in 1.,2.,3. Leagues,
56.1% (n=60) of the athletes, in University Leagues,
23.4% (n=25) of the athletes, in Other leagues,

were participated in the study.

General Findings

Gender: To find out significant differences between gender a Mann Whitney-U test were performed (α=0.05). It has been seen clearly that the difference between the mental toughness score of athletes based on gender is not meaningful (U=1029.5, $p<0.05$).

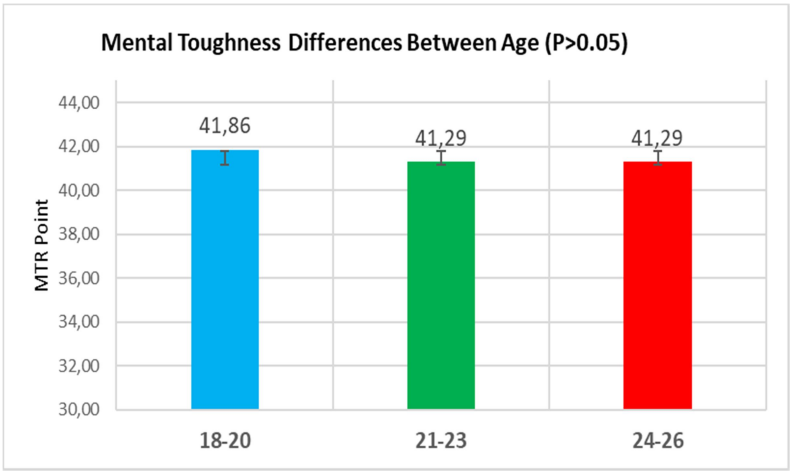
It has been discovered that the male athletes (42.33±6,67) have higher mental toughness score than female athletes (39.97±6,52). But this difference does not make a difference statistically. It is possible to assume that the male athletes in our sample group are superior to female athletes in terms of recovering quickly during competition, dealing with pressure and hardships and confidence (Graphic 5).



Graphic 5. Mental Toughness between Gender

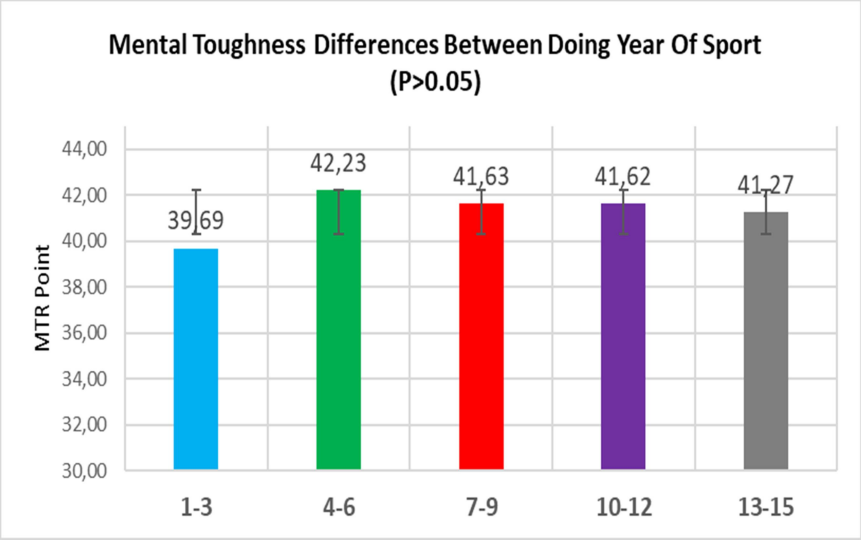
Age: To find out significant differences between ages a Kruskal Wallis test were performed (α=0.05). The results showed that age does not make any difference on the averages of mental toughness scores X^2 (2) = 0.71, p = >0.05

The athletes of age 18-20 (41.86 ± 6.26) have higher scores of mental toughness compared to the athletes of age 21-23 (41.29 ± 7.14) and age 24-26 (41.29 ± 6,75). This result can be interpreted as the age increase in athletes does not form a meaningful difference on the level of mental toughness between athletes (Graphic 6).



Graphic 6. Mental Toughness between Age

Sport experience: To find out significant differences between sport experience a Kruskal Wallis test were performed (α=0.05). The results show that there is no meaningful difference based on the difference of mental toughness score of athletes according to their doing sports experience X^2 (4) = 0.89, p = >0.05. The results showed that athletes, with 4-6 years experiences (42.23 ± 6,49), have higher mental toughness score than doing sports experience, such as 1-3 years (39.69 ±8.64), 7-9 years (41.62 ± 7.73), 10-12 years (41.62 ± 4.49) an 13-15 years (41.51 ± 6.69).



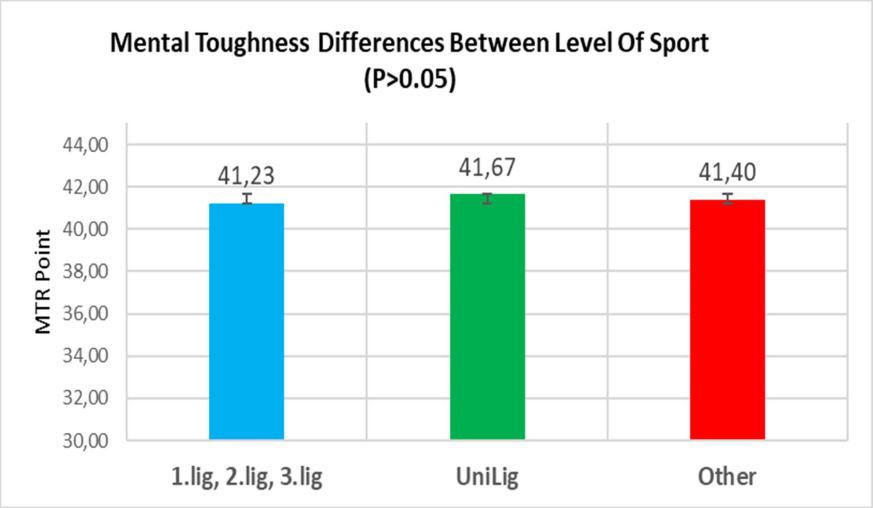
Graphic 7. Mental Toughness between Sport Experiences

Doing Licensed Sport: To find out significant differences between doing licensed sport a Kruskal Wallis test were performed (a=0.05).

The results show that there is no meaningful difference based on the difference of mental toughness score of athletes according to their doing licensed sport X^2 (2) = 0.68, p = >0.05

The results showed that athletes in Universiy Lig (41.67 ± 7.79), have higher mental toughness score than 1st, 2nd, and 3rd leagues (41.23 ± 5.71) and others (41.40 ± 4.42).

In contrast of our findings, it was seen that most studies shows the differences between various parameters of mental toughness (Graphic 8).



Graphic 8. Mental Toughness between Doing Licensed Sport

Discussion

There aren't many studies that investigated the relationship between mental toughness and other parameters. Therefore, the aim of this study is to infill the gap in the literature. There are

some studies which are about the factors that play a role in the mental toughness and about the relationship between validity, reliability and mental toughness. Gucciardi and Daniel (2010) has proven that the athletes with high instinct relatedly have a high mental toughness level on a study he conducted on 214 Austrian footballers.

Crust and Swann (2011) exhibited that there is a positive correlation between general mental toughness and dispositional flow as a result of their study on 135 people whose age average was 20. Altıntaş (2015) has investigated the role of target path, triggering level and dispositional flow in defining the toughness of different athletes by testing the reliability and validity of The Inventory of Mental Toughness in Sports in Turkish population on his doctoral thesis. Consequently, a meaningful difference between the score of athletes's mental toughness based on age, sex, doing sports experience and licensed category could not be found.

The importance of mental skills can be seen in recently discovered Mental Toughness' features. With psychological skills training, the constitution and development of these skills can be achieved. In this context, when every set of Table Tennis includes 11 points and each of those points are crucial; the mental toughness level of the athletes could be increased by adding more psychological skills training into the Table Tennis training programmes.

The training programmes which emphasizes the importance of skills development, that athletes could taring in joy, emphasizes the importance of the performance and rewards it, could be established in order to increase the mental toughness of the athletes. Within the scope of future studies, a similar study could be conducted on athletes competing in different fields. Also, the study could be conducted on athletes who deal with team sports and the results of that study can be compared with this one. Along with that, the study could be repeated with a bigger sample group which includes wider socio-economic parameters.

Conflicts of Interest

The authors have no conflicts of interest to acknowledge.

REFERENCES

Altıntaş A (2015). "Sporcuların Zihinsel Dayanıklılıklarının Belirlenmesinde Optimal Performans Duygu Durumu, Güdülenme Düzeyi ve Hedef Yöneliminin Rolü." Doktora Tezi. Ankara Üniversitesi Sağlık Bilimleri Enstitüsü.

Clough P, Earle K, Sewell D (2002). Mental Toughness: The Concept and Its Measurement. In Cockerill I, Solutions in Sport Psychology. 1st ed. London: Thomson.

Crust L, Swann C (2011). "Comparing Two Measures of Mental Toughness." Personality and Individual Differences 50: 217-221.

Durand B, Natalie S, John H (2002). "The Development And Maintenance of Expert Athletic Performance: Perceptions of World and Olympic Champions." Journal of Applied Sport Psychology 143: 154-171.

Ercan Y, Hülya Y (2013). Spor ve Egzersiz Psikolojisi, 2. Baskı, Ankara: Nobel Yayıncılık.

Gucciardi G, Daniel F (2010). "Mental Toughness Profiles and Their Relations with Achievement Goals and Sport Motivation in Adolescent Australian Footballers." Journal of Sports Sciences 286: 615-625.

Henman T, Rusedki G (1996). Coaching Excellence, Mental Toughness Question and Answered. 13 p.3.

Jones G, Hanton S, Connaughton D (2002). What is Thirsting Called Mental Toughness? An Investigation of Elite Sport Performers. Journal of Applied Sport Psychology 14:205–218. Doi:10.1080/10413200290103509.

Loehr J, James E (1986). Mental Toughness Training For Sports: Thestephen Green Press. Penguin Books.

Weinberg RS, Butt J, Culp B (2011). "Coaches' Views of Mental Toughness and How it is Built" International Journal of Sportand Exercise Psychology." 9:156–172. Doi:10.1080/1612197x.2011.567106.

Weinberg RS, Gould D (2015). Spor ve Egzersiz Psikolojisinin Temelleri, M. Şahin ve Z. Koruç tarafından 6.Basımdan Çeviri. Ankara: Nobel Yayıncılık.

International Journal of Science Culture and Sport
December 2017 : 5(4)
ISSN : 2148-1148
Doi : 10.14486/IntJSCS702

Field ***:*** *Coaching*
Type ***:*** *Research Article*
Received: *05.11.2017* ***- Corrected:*** *04.12.2017* ***- Accepted:*** *07.12.2017*

Inclusive Coach between Theory and Practice

Angela MAGNANINI
University of Rome Foro Italico, Department of Movement, Human and Health Sciences, Rome, ITALY
Email: angela.magnanini@uniroma4.it

Abstract

In the first part, the study (through a pedagogical approach) outlines the theoretical characteristics of an inclusive coach, after clarifying the concept of inclusive sport. In the second part, the study present the data from a survey conducted on 70 Baskin (Integrated Basketball) coaches working with 53 Baskin clubs in Italy. Baskin is an inclusive sport in which people with disabilities (of various types) and people without disabilities play together in the same team, through a series of rules and roles that allow everyone to participate, based on the principles of accessibility and equal opportunities.

Through a questionnaire for baskin coaches, the analysis focuses on the following topics: 1. Education; 2. Motivation and interest in working in the field of inclusive sports; 3. The skills of the inclusive coach; 4. Any training needs. The aim is to clarify which training, such as skills, must embrace an inclusive coach in order to provide an innovative university education.

Keywords: inclusive coach, sport, education, inclusion

Introduction

Before addressing the topic of the inclusive coach, and therefore inclusive training, a conceptual introduction is needed, as the first part of this essay, to clarify what we mean by inclusive sport and present a theoretical model. The model and inclusive sport would be meaningless without the coach, who provides a practical understanding of the theoretical and methodological aspects, and ensures that all the people involved have the same possibilities of expression, regardless of their health conditions. This theoretical first part is essential to outline the basic aspects of what we define as the inclusive coach, in terms of skills and characteristics, with specific focus on the training required. In the second part, the study present the data from a survey conducted on 70 Baskin coaches working with 53 Baskin clubs in Italy, (total of 4072 athletes, including 350 with disabilities, Baskin Census, 2015)[1]. These are affiliated with sports promotional bodies and participate in regional championships. The coaches were given a questionnaire to fill out (sent and returned via e-mail), which was divided into ten items with the aim of shedding light on the following topics: 1. Education: to establish whether this was in the field of inclusive education, motor development-sports, neither of these, or both; 2. Motivation and interest in working in the field of inclusive sports; 3. The skills of the inclusive coach (to be listed - multiple choice - from some suggested items, divided into three macro areas: inclusive education skills, cross-sector skills, technical and sporting skills); 4. Any training needs.

Baskin is a practical realization (one of many possibilities) of inclusive sport model. Baskin (or Integrated Basketball),is a sport in which people with disabilities (of various types) and people without disabilities play together in the same team, through a series of rules and roles that allow everyone to participate.

We have examined and approached this research through the lens of Special Education. Italian pedagogical studies over the last decade (De Anna, 2009; Cunti, 2011; Moliterni, 2013; Magnanini, 2015) have sought, from an educational perspective, to establish the scientific and methodological prerequisites for creating a series of sports activities that are educationally based and oriented, accessible and truly practicable, not merely for socialization or recreation purposes, but that preserve the essential characteristics of sport.

An educational approach means care for individuals in every aspect, with focus on building relationships, autonomy, motivations and interests, promoting growth and encouraging people to face challenges. This is why sport is a privileged area... but why inclusive?

Special Pedagogy is centered on the inclusion of people with disabilities in the socio-cultural context in terms of education and creation of a common word (Canevaro, 2000; de anna, 2014). It is a short step: if education for all is an attainable goal (proven by the events in Italian schools in the 1970s, de Anna, 1998), then why not try to make a sporting activity that is accessible and enjoyed by all? In other words, why not make it a practical example of inclusion, fully mindful that inclusion is not merely putting people together, but building a working system in which each one, in their own specific way, can make their own contribution to the realization of the system. Is this a utopia for sport?

Article 30 of the 2006 UN Convention of the Rights of Persons with Disabilities not only reaffirms the right of persons with disabilities to engage in sport, but suggests their doing so in "mainstream" rather than "exclusive" activities, where not only physical but also structural

[1] *Baskin Census 2015, in www.baskin.it (last access October 2017)*

accessibility is possible. Structural, in this case, refers to a series of "reasonable accommodation" measures (to use the terms of the convention) in order to make training sessions functional and the "game" truly played by and adapted to all[2]. This does not only mean adapting traditional sports but also creating new activities that can meet the needs of people with disabilities to be with others, including people without disabilities, and to compete in a welcoming sports environment where everyone's abilities are valued. This need is also reflected by the success of the European integrated sports project promoted by the Italian National Educational Sports Centre (CSEN), which organised events and competitions in 12 Italian cities in May 2015, with the participation of over 5,000 athletes (with and without disabilities) in integrated sports (www.csen.it).

The inclusive sports model, which I will try to explain briefly, is the result of work conducted in the Inclusive Teaching and Education Workshop at the Foro Italico University of Rome (directed by Prof. de Anna and Prof. Moliterni). Through publications, seminars, conferences, master's programs and the creation of a sports association for students with and without disabilities (ACEMIS), it has focused on creating a positive dialogue between physical education and the educational sciences, making a major contribution to the development of Integrated Sports. We have tried to bring the educational and training methods tested in inclusive educational environments (tutoring, cooperative approaches and task culture, to give some examples) to the sporting world, through the theory-practice circle, so that they could become new tools for operators in this sector. This model is aimed at paving the way for developing concrete proposals for inclusive sports.

Integrated sport for inclusion

Internationally, Great Britain has been most active in this field, together with scholars from Australia and Ireland, seeking to develop sporting practices for people with disabilities, with significant consequences for the training system in terms of full participation by the athletes, overcoming the concept of sport adapted (Wilhite, Mushett, Goldenberg, Trader, 1997; Sherrill, 1998; Sorensen, Kahrs, 2006; Fitzgerald, 2009). Goodwin and Peers highlights that "mainstreaming, within a sport context, refers to the participation of all youth within sport programs designed for, and made up mostly of, those who do not experience disabilities" (2012, 189). Some youth sport programs have endeavored to remove disabling barriers in order to integrate a wider variety of athletes into the same activities. Examples included integrated youth cricket… where all youth people play together (189).

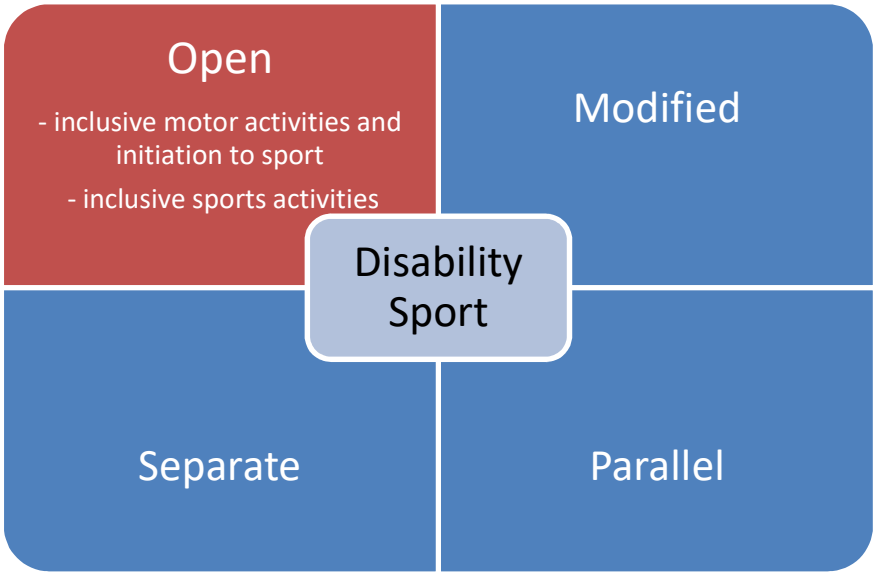
Starting from Integration continuum for sport participation (Winnick, 1987), David Tillotson and Ken Blach (1996, in Fitzgerald, 2009) produced the inclusion spectrum, which create a circular format and provided more detailed explanation and examples of each approach. The different strategies for participation could be adopted but that no one strategy is superior to another.

The inclusion spectrum provides an activity-center approach to the inclusion of pupils who have different abilities in physical activity (Stevenson, 2009, 125). Abilities, not disabilities.

Our model, pedagogically based, focuses in the direction of OPEN ACTIVITIES, with the aim of expanding them.

---

[2] *International Paralympic Commitee, the UN Convention of the Rights of Persons with Disabilities, Bonn, 2012, p. 7.*



Stevenson Adapted by Magnanini, 2017

They can be divided into inclusive motor activities and initiation to sport on the one hand, and structured inclusive sports activities on the other. All come under the model of "integrated sport".

A study of the pedagogical and sports literature (Le Boulch, 1991; Parlebas, 1997; Arnald, 2002) has enabled us to identify the elements (keywords-indicators) that characterize its basic structure.

These are composed of educational principles and sports principles, confirming the dialogue we mentioned earlier: Principles of Special Education: 1. Accessibility, 2. Acceptance, 3. Education for all, 4. Equal opportunities, 5. Active participation, 6. Cooperation, 7. Diversity as a resource. Principles of sport: 1. Play, 2. Fun, 3. Comparison-competition, 4. Rules-coding, 5. Competitive spirit. 6. Professionalisation, 7. Official and commonly accepted rules.

We can therefore summarize the criteria for integrated sport as follows:

1. The centrality of the person; 2. The participation of people with different health conditions and various disabilities; 3. Roles defined on the basis of skills and not disabilities, 4. Rules with possible exceptions, therefore including flexibility, 5. Codified spaces, 6. Competitiveness, 7. Competition, 8. Enjoyment, 9. Active participation with equal opportunities; 10. Adaptation of equipment and materials, if necessary, but not of the objectives.

We can therefore define integrated sport as a series of gymnastic, game, exercise or movement activities practiced together by able-bodied people and people with disabilities (of various degrees), whether recreationally or professionally, for the purpose of competitive challenge, where each player, through relatively intense physical effort, improves their own potential, based on equal opportunities and active participation, through flexible rules that allow for individual characteristics. This definition clearly reflects the three elements of special education that ensure the inclusiveness of sport: accessibility (to places, but especially to activities), active participation and equal opportunities (ensured by the rules). The principle of active participation brings us directly to training and how it should be organised.

We have developed some "pedagogical" phases for this, which we believe should characterize the moments of any training considered to be integrated. Training in itself is already an educational challenge, because it calls for commitment to strive to achieve continuously improved results, which have consequences for the entire well-being of the individual.

Training can be divided into five phases, each comprising targeted exercises: 1. Acquaintance and acceptance (building relationships); 2. Building confidence; 3. Cooperating in small or large groups (including personalised exercises if necessary), 4. Playing (technical training), 5. Thinking together.

In step 4, coaches can use the STEPS methods if the conditions of the athletes require special modifications. The STEPS formula provides a framework for coaches to make changes to their coaching in the areas of SPACE, TASK, EQUIPMENT, PEOPLE and SPEED. Not all athletes require the same adaptation, so special attention is required in assessing needs and skills in order to organize the most effective training plan.

It is essential to turn activities into an inclusive way and to create a specific activity for everyone.

It is very important the phase in which the involved people get to know each other and, as well the phase in which all the activities and strategies are addressed towards a cooperative approach to working, and so not only based on the exclusive adaptation of the activity. It must be stressed that training sessions are carried out together, at the same times and in the same places, with assistance from one's companions, if necessary, and with personalized moments for particular roles or needs. Throughout the phases we have described, it is essential to remember that training in technical movements can be reinforced by a climate of trust and collaboration, knowledge and the creation of meaningful relationships, all of which are elements obtained through appropriate pedagogical training. Point 5 is fundamental, because it allows both the players and the coach to monitor their own activities.

Inclusive coach: a definition

The complexity of the management, organisation and planning of an integrated sporting activity calls for specific reflection on the coach, in terms of the skills that need to be acquired.

The Italian educational literature has followed up the crucial key role of the trainer as educator (Mantegazza, 1999, Farne 2008, 2010; Milani, 2010, Isidori, 2017) and so did the foreigner literature in this sector (Siedentop, 1994; Launder, 2001; Armour Robyn Jones, Potrac, 2004; Caplan, 2007). However regarding the inclusive coach, the literature is quite poor. There are some guides that teachers can use in order to make their job inclusive but there are none for trainers. To this extent it is significant to recognize the importance of the jobs conducted by M.F. Block, among which, we want to cite: A teacher's Guide to including students with disabilities in general physical Education (2007).

The scarcity of studies shows how little is spreaded the inclusive sports activities are.

That is why we want to start giving some theoretical background information, which can clarify how the coach can become educationally inclusive.

I am not referring to a professional figure who works exclusively with people with disabilities in sports (there are various university training courses for these professionals, such as those in

Germany and Denmark), but a new type of coach, capable of working in an "integrated" group, able to combine pedagogical/educational and technical/sports skills to effectively orchestrate a group composed of multiple performance levels and various functional characteristics, inspiring everyone to achieve their best. An inclusive coach must be able to design a training plan tailored to specific needs and must be able to recognise strengths and build on them. Thus, at every stage of its design (observation of reality-needs analysis; drafting objectives, definition of the action plan, implementation of the activities and evaluation) the coach should always view the tasks from both the technical-sports perspective and the educational perceptive, in order to make the most appropriate choices for the group.

Inclusive coaches do not need to be experts on various types of disabilities, they are not doctors, but they must know the people they work with, who happen to have disabilities. They need to know the most useful methods and educational principles for managing groups and achieving significant progress in learning. They must be prepared for uncertainties and the possibility of failure with the variable of disability. This puts them to the test and makes them question their work, in the attempt to lead everyone involved to possible levels of autonomy, even when simply understanding the direction of the basket poses a complex challenge for a person with autism, which calls for a process of continuous generalisation of learning.

Inclusive coaches must be competent coaches, capable of intervening in any situation. Their defining aspect, to emphasise its particularity (I won't dwell on training theories here, as you are all experts on them), is that their knowledge, know-how and interpersonal skills enable them to design inclusive training plans, based on pedagogical and inclusive principles, without neglecting the principles of sports and transforming the sessions into therapy, but allowing them to be occasions of growth for all.

In coaching terms, an 'inclusive coach' has the ability to positively and effectively coach a group of people who may have very different needs. A good coach will always be working inclusively because they want everyone in their session to improve. In a session of non-disabled people, there will be different needs within a group, but with disabled athletes, the differences may be highlighted (eg the use of totally different equipment or the length of time a swimmer can stay in the water without getting cold).

An inclusive coaching session cannot be planned without knowledge of the individuals that make up the group. Some strategies that support one person may further exclude another (eg one individual may feel self-conscious when performing individually while another finds group tasks too challenging). Sessions can be made inclusive during their delivery, though, by working with the athletes and discussing with them what is working (or not working) for them.

Some disabled people need little, if any, change to the coaching process and can easily articulate and communicate their needs with the coach. In an individual coaching session, coaches can comfortably discover the best coaching techniques and experiment with adapted equipment and coaching styles, working with the athlete to achieve maximum results.

In a group coaching session, there may be additional issues as athletes may have very different needs and there is not as much time to devote to individuals. There is no magic formula for inclusive coaching, and some athletes have combined and complex needs. The key is to keep communicating with those who are being coached (Quik Guide: Inclusive coaching).

With regard to what we have said so far, we can list eight points defining these professional figures (from general to specific). They must: 1. Have a solid educational background; 2. Know the best ways to assess problems in their professional field, 3. Possess knowledge and technical, theoretical and methodological skills, to be gradually consolidated in their chosen field of operation: specific knowledge of sport. 4. Have a capacity for continuous research in their field; 5. Possess refined communication skills, knowing how to interact with people with communication difficulties; 6. Possess the ability to create meaningful relationships, never based on dependence but on help; 7. Have knowledge in the field of education and inclusion, and of integrated teaching methods; 8. Have the ability to constantly combine technical and special teaching skills in order to plan for full active participation and equal opportunities for all in terms of accessibility.

We have underlined the characteristics that all inclusive coaches must have, and we realise, perhaps, that many of them are qualities that every coach should have!

Research on Baskin coach: education, skills and training needs

This is clear from the research we have done on Baskin coaches. The sport is growing, both in Italy and abroad. It is the only sport that truly allows everyone to participate, based on the principles we described earlier. Currently, until there is a more organised system, to train a Baskin team you simply need to attend the courses organised annually or upon request by the Italian branches of the Cremona Baskin Association, which supervises and organises the entire Baskin movement nationally and internationally, together with the regional delegates. The theoretical and practical course includes a weekend to get to know the game, the rules and the roles, and play it on the court. Aspiring coaches must then develop their knowledge through an internship in a Baskin club and submit a proposal for a training plan to the Association, which will assess its suitability.

Baskin is a sport invented in Cremona in 2003 whose objective is to create an activity literally everyone – girls, boys, the able and those with physical or mental challenges to overcome – can participate in and enjoy to the fullest extent of their abilities (Bodini, Capellini, Magnanini, 2010).

The men who came up with baskin are Antonio Bodini, an engineer by profession and father of a disabled daughter and Fausto Capellini, a P.E. teacher at a local junior high school in Cremona. The idea is simple yet ingenious: a sport inspired by basketball but with modified rules that allow anyone to take part in the game in a meaningful way. No longer do people have to adapt to an existing sport but finally we have a sport that is constructed so that it can adapt to the diversity of those taking part.

Baskin is not an activity that allows some to play and have fun while other “help out” from time to time; baskin makes sure that everyone gets a chance to play a decisive role in the game, each of them making their own contribution and giving their all. In this sense it is no mere game, but an authentic sport with no room for paternalism, where everyone can use their abilities to the maximum in order to win.

From our analysis of the general data from the questionnaires (2016), an identikit of the typical Baskin coach has emerged:

Male (55 out of 70), aged between 30 and 45 years old, from Northern Italy (where the sport is more widespread, with the highest concentration in Lombardy and Piedmont), with a

degree in Physical Education, a diploma from a Physical Education College or a Master's degree in Sport and Physical Education (60 out of 70). This data allows us to make an initial consideration regarding the interest of PE graduates in this specific activity.

With regard to the four areas of exploration mentioned earlier, we can briefly present the following significant elements, through a quantitative and qualitative analysis. With no intention to generalise, we present an initial examination of a new and growing phenomenon.

1. Education

a) 60 PE Degrees, b) 5 Degrees in Education Sciences specialising in support activities, c) 5 High school diplomas.

Of these, more specifically: a) 24 have taken courses in the inclusion and education of people with disabilities (15 in universities, 5 with associations and 7 CIP courses for sports educators for disabilities [3 with Form'Univers]) and 30 people have taken courses for coaching and technique courses in basketball organised by the Italian Olympic Committee. 6 people state that they only possess a PE degree (three-year course).

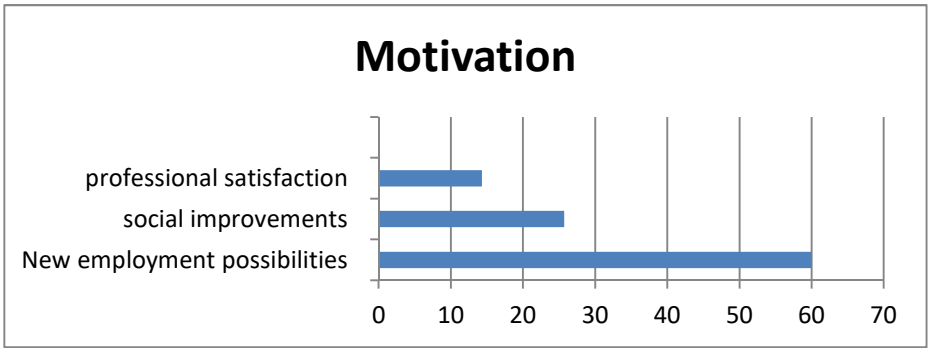
b) 3 of them have taken disability sport education courses organised by the Italian Paralympic Committee (CIP).

c) 4 have taken courses for basketball coaches, and 1 has taken a course on inclusion (sports education organised by the CIP).

In general, we have: 30 profiles with courses in the field of inclusion; 40 profiles with courses in the field of sport.

2. Motivation and interest in working in this specific field

The analysis of the responses highlighted three basic areas around which all the indications from the sample examined gravitate:



a. New employment possibilities (60%);

b. Confidence in the idea of creating new sports opportunities for people with disabilities, in terms of social improvement (25,71%);

c. Interest in a new sports model that can provide innovative professional satisfaction (14,29%).

3. Skills that inclusive coaches must possess

From the recurrence of certain key elements in the responses examined, these can be summarised as follows (divided on a proportional basis):

Trainers could choose among the following skills (indicated within brackets the choice percentages):

- Inclusive education skills (50): the ability to manage diversity (71,43), to build effective relationships in an integrated group (85,71), to include everyone (100), to plan for all (100), to place education at the heart of their sports projects (42,86), to resolve conflicts (50), to use inclusive educational methods (92,86), to observe, interpret and respond to the needs of the athletes (100), and to make assessments (94,14);
- Cross-sector skills (28,57): the ability to communicate effectively (97,14), to take risks and to bear frustration (100), willingness to listen and adapt (100), and creativity (92,86);
- Technical and sporting skills (21,43): the ability to organise training with people of different skills and levels of ability or complexity (92,86), the ability to organise an effective teaching programme that respects the learning speeds of the athletes (100), the ability to set feasible targets (85,71), the ability to assess the possibility of increasing technical skills and improving athletic performance (42,86), the ability to evaluate training times and methods (35,71), the ability to draft a schedule of planned activities with detailed organisation of the sporting activities (92,86), the ability to select appropriate exercises and motor sequences (100), the ability to make technical adjustments to their programmes (92,86), and the ability to observe and evaluate (95,71).

4. Possible training needs

70% of the sample stated that they did not consider themselves adequately trained and felt they lacked methodology.

It takes more than mere good will to manage such a complex new activity involving several variables, from specific technical knowledge to management of an integrated group. These require special training, which is not acquired through experience alone but above all through specially designed training courses.

Conclusion

The research has highlighted important theoretical aspects in order to define the inclusive coach figure, emphasizing- through the presentation of some data- how a specific education would be needed in order to conjugate- in the field of inclusive sport but as well in the sport in general- the technical sporting skills with those relational-educational. This can be carried out through a constant and cooperative dialogue between sport discipline and educational discipline. The results – despite being conducted upon a limited sample - are the first unequivocal data of a widespread need on the territories, meaning that the coaches need to be provided with a sound preparation. They, especially, feel the primary need to implement (100% of the sample) the ability to manage diversity, to plan for all, interpret and respond to the needs of the athletes, the ability to communicate effectively, the ability to set feasible targets, the ability to observe and evaluate.

It is important to implement educational and communicative skills. Working with people in the sports field involves fundamental relational aspects useful for sport but especially for individual life.

The aspects highlighted so far have repercussions on the educational courses for physical education students, which already, in live with the Dublin descriptors, not onlydevelop skills in “physical literacy” but also across a broader range that also includes teachings from the pedagogical sciences.

We believe, therefore, that graduates with a sports degree should have the option of choosing a Master’s course in Integrated Sport that covers all the aspects we have presented so far. This may open up new career opportunities.

However, this new approach to understanding and practicing sport requires further theoretical, cultural and methodological examination, in a course of studies following the master’s degree in Sport and Physical Education.

Conflicts of Interest

The author has no conflicts of interest to acknowledge.

REFERENCES

Armour Robyn Jones K, Potrac P (2004). Sports Coaching Cultures: From Practice to Theory. London: Routledge.

Arnald P (2002). Educazione motoria, sport e curricolo. Roma: Guerini.

Block MF (2007). A teacher’s Guide to including students with disabilities in general physical Education. Caltimore: P. Brookes Publishing.

Bodini A, Capellini F, Magnanini A (2010). Baskin. Uno sport per tutti. Milano: FrancoAngeli.

Canevaro A (2000). Pedagogia speciale: la riduzione dell’handicap. Milano: Mondadori.

Caplan G (2007). BTEC National Sport I. London: British Library.

Cunti A (2011). La rivincita dei corpi. Movimento e sport nell'agire educativo. Milano: FrancoAngeli.

de Anna L (1998). Pedagogia speciale. I bisogni educativi speciali. Milano: Guerini

de anna L (2009). Processi formativi e percorsi di integrazione nelle scienze motorie. Milano: FrancoAngeli.

de anna L (2014). Pedagogia speciale. Integrazione e inclusone. Roma: Carocci.

Farnè R (2008). Sport e Formazione. Milano. Guerini.

Farnè R (2010). Sport e infanzia. Milano: FrancoAngeli.

Goodwin D, Peers D (2012). Disability, sport and inclusion. In S. Dagkas, K. Armour. Inclusion and Exclusion through youth sport. London, Routledge.

Isidori E (2017). Pedagogia e sport: la dimensione epistemologica ed etico-sociale. Minao. FrancoAngeli.

Launder AG (2001). Play Practice: The Games Approach to Teaching and Coaching Sports. Usa: Wikgren;

Le Boulch J (1991). Sport educativo: psicocinetica ed apprendimento motorio. Roma: Armando.

Magnanini A (2015). Sport for all. Italian Model. International Journal of Science Culture and Sport, 3(2): 114-126, http://dergipark.ulakbim.gov.tr/intjscs/article/view/5000130199.

Mantegazza R (1999). Con la maglia numero 7. Milano. Unicopli.

Milani L (2010). A corpo libero. Sport, animazione e gioco. Milano: Mondadori.

Moliterni P (2013). Didattica e scienze motorie. Roma: Armando.

Parlebas P (1997). Giochi e sport : corpo, comunicazione e creatività ludica. Torino: Il Capitello.

Sherrill C (1998). Adapted physical activity, recreation and sport: Crossdisciplinary and lifespan. WCB/McGraw Hill, Dubuque.

Siedentop D (1994). Sport education. Champaign: Human Kinetics.

Sorensen M, Kahrs N (2006). Integration of disability sport in the Norwegian sport organizations: Lessons learned. Adapted Physical Activity Quarterly, 23(2), 184. Fitzgerald, H. (2009). Disability and youth sport. Routledge.

Stevenson P (2009). The pedagogy of youth sport, in H. Fitzgerald, Disability and youth sport, London: Routledge.

Wilhite B, Mushett C, Goldenberg L, Trader B (1997). Promoting inclusive sport and leisure participation: Evaluation of the Paralympic Day in the schools model. Adapted Physical Activity Quarterly, 14, 131-146.

Winnick JP (1987). An integration continuum for sports participation. Adapted Physical Activity Quarterly 4: 3: 157-161.

International Journal of Science Culture and Sport
December 2017 : 5(4)
ISSN : 2148-1148
Doi : 10.14486/IntJSCS706

Field ***:*** *Coaching*
Type ***:*** *Research Article*
Received: *13.11.2017* ***-*** ***Accepted:*** *08.12.2017*

Effects of High Intensity Interval Training on Balance Ability and Recovery Time in Soccer Players

Özkan GÜLER, Fatma Neşe ŞAHİN, Gülfem ERSÖZ
Ankara University, Faculty of Sport Sciences, Ankara, TURKEY
Email: ozkanguler@msn.com

Abstract

Specifically, high intensive interval training (HIIT) may induce fatigue, which is a natural physiological response. Fatigue decreases dynamic balance ability and subsequently may negatively affect technical performance such as passing, shooting and dribbling. These technical skills are an important component of soccer players. Therefore, the aim of this study was to investigate the effects of HIIT on balance ability and the time required for turning back to baseline in young athletes. Twenty one soccer players (12 males, 9 females, age = 21.76 ± 3.09 years; weight = 64.5 ± 9.8 kg; height = 169.4 ± 7.18 cm) having no history of lower extremity injury participated in this study. The Biodex SD balance system was used in order to determine the non-dominant athletic single-leg stability. To become familiar with athletic single leg balance testing on the BBS, the subjects performed six practice testing sessions within a week. Monark cycle ergometer was used for high intensity anaerobic exercise. Each subject performed four maximal efforts cycling on an electronically braking cycle ergometer against a resistance equivalent to 0.075kg/kg body mass for 30 seconds with three-minute rest intervals. Subjects were verbally encouraged to continue pedaling as fast as possible throughout the each test. After four maximal cycling, subsequently subjects performed athletic single leg stability test and then repeated same test with a five-minute passive rest period for 4 times. The result of this study has indicated that, HIIT negatively effects single leg dynamic balance ability ($p<0.05$). Furthermore, single leg balance ability turn to the baseline status after 10 minutes passive recovery duration ($p>0.05$).

Keywords: Balance, Fatigue, HIIT, Recovery, Soccer, Support Leg

Introduction

The balance is defined as vertically keeping the body's center of gravity within the base of support by means of feedbacks coming from visual, vestibular, and somatosensorial structures and performing the regularly coordinated neuromuscular movements (Nashner, 1997). Balance skill is a key factor in order to show the optimal performance in soccer (Pau et al., 2016).

Showing the technical skills is one of the most important components in soccer (Stolen et al. 2005; Stone and Oliver 2009). High performance especially in technical skills such as passing, shooting, and drippling plays important role in achieving the success in soccer (Stone and Olivar 2009; Ali et al. 2007: Lago et al. 2010). The performance of technical actions such as shooting, drippling, and passing requires maintaining the balance over the support leg (Paillard and Noe 2006). Many of the technical skills are performed in unstable situations in soccer. The soccer players generally use their non-dominant legs in performing technical skills. Especially in performing various technical skills such as passing, shooting, and drippling, the support leg plays important role in sustaining and maintaining the body balance (Teixeira et al. 2011). In a study, in which the center of pressure (COP) velocity was measured before the soccer game, in half-time, and after the game, it was determined that the balance ability of support leg has decreased (Pau et al., 2016).

The fatigue is an important factor acutely influencing the balance ability. There are many studies reporting that the balance ability is negatively affected after the fatigue (Toshimitsu et al., 2011; Susco et al., 2004; Fox et al., 2008; Paillard, 2012). Depending on the frequency, intensity, and duration of exercise that is performed, the fatigue is divided into two based as peripheral and central nervous system fatigues (Millet et al., 2004; Glaister, 2005). Aerobic activities influence the central nervous system, whereas the anaerobic activities cause peripheral nervous system fatigue (Millet et al. 2004; Glaister, 2005). Peripheral fatigue originates from inability of meeting the sufficient energy for the muscles despite the increasing energy requirement (Glaister, 2005). During a 90-minute soccer game, the soccer players perform high-intensity activities approx. once every 70 seconds. In a study, it was reported that soccer players perform high-intensity movements such as sprint, change of direction, acceleration, deceleration, and jumping for approx. 150-200 times (Bangsboo, 1994). As a result of these high-intensity activities, the fatigue level increases and the technical skills and performance of players are negatively affected (Lyons et al., 2006; Rampini et al. 2009). As well as the physical performance (Mohr et al., 2005) and technical skills (Russel et al., 2011), also the balance ability is influenced as a result of deterioration in quality, efficiency, and related motor outcomes of sensorial inputs (visual, vestibular, and proprioceptive) (Paillard, 2012).

In many studies, it has been shown that there is a relationship between soccer-specific technical skills and balance ability (Paillard and Noe, 2006). Moreover, it is known that, when compared to the low-level soccer players, the high-level soccer players have better technical skills and also better balance abilities (Pailard et al., 2006). Top level soccer players feel fatigue in last 15 minutes of both halves (Krustrupet al., 2005; Mohr et al., 2005). Besides that, the deterioration of balance abilities of soccer players occurred in last 15 minutes of both halves and soccer-specific fatigue affects the functional stability of players during the game (Greig and Walker-Johnson, 2007). Rampini (2007) reported that the deterioration was observed in passing skills of players after high-intensity activities. For this reason, it can be thought that the decreases in technical skills of players at the last moments of games might be related with the deterioration of balance abilities.

To date, the effects of fatigue on balance performance were analyzed in numerous studies. But, in many of these studies, the authors focused on the effects of fatigue on double leg or dominant leg balance abilities. However, many soccer-specific technical skills require support leg balance ability. For this reason, the aim of this study is to investigate the acute effects of high intensity interval trainings (HITT) on support leg balance ability and the recovery period of impaired balance ability.

Method

12 male and 9 female soccer players were involved in this study (age: 21.76±3.09 years, weight: 65.5±9.84 kg, height: 169.42±7.18cm; training age: 6.38±1.93 years; Body Mass Index: 22.34±2.17). The subjects voluntarily participate into this study. The players, who had ankle, knee, and joint injuries in last 6 months, were not involved. The participants didn't perform exercise, which cause fatigue, during 48 hours before the tests. The participants were asked to not use matters such as alcohol and caffeine, which have stimulant effect, in last 24 hours.

Table 1. Descriptive Information of Participants

	Age (years)	Height (cm)	Weight (kg)	BMI (kg/cm^2)	Training age (years)
Males	23.58±2.90	173.33±6.27	69.45±9.13	22.99±2.22	6.19±1.08
Females	19.33±0.86	164±4.65	57.91±6.45	21.47±1.88	5.11±1.05
Mean	21.76±3.06	169.42±7.18	64.5±9.84	22.34±2.17	6.14±1.38

BMI: Body Mass Index

High Intensity Interval Training

Anaerobic fatigue protocol was executed using Wingate cycle ergometer. In high intensity interval training protocol, the participants were asked to pedaling at maximum speed for 30 seconds. The intensity of training was set to the weight load level corresponding to 7.5% of body weights of participants. The scale fell when the tire speed of cycle reached at 150 rpm after the participant started pedaling. Then they continued pedaling maximally for 30 seconds. The soccer players were verbally motivated throughout the training. They repeated the Wingate test protocol for 6 times with 4 minutes interval.

Balance Tests

Biodex SD (Biodex, Shirley. NY) athletic single leg test protocol was applied to the participants. In order to prevent the learning effect, the subjects performed balance test familiarization during 5 days in last week before the test. Athletic Single Leg test protocol consisted of 3 repeats of 20-second session with 10 second interval. The intensity level of test was set 4th level. During the test, the participants were allowed to place their feet in the way they wanted. The balance tests were carried out with subjects on their support leg in akimbo position. The subjects were asked to keep their dominant leg at 45º flexion. The participants

were taken into balance test immediately after the end of HITT protocol. The after-fatigue balance tests were carried out at 0th, 5th, 10th, 15th, and 20th minutes with 5 minutes interval. The participants were allowed to rest passively during their 5-min recovery period.

Lactate Test

The blood lactate levels of participants were analyzed right after the fatigue protocol and right before the balance test at 0th, 5th, 10th, 15th, and 20th minutes of recovery period. For the lactate test, the fingertips of subjects were cleansed using a paper tissue soaked with alcohol, and the capillary blood sample was taken by using lancet. Blood lactate level was measured using Accutrend Plus (Roche Diagnostics, Basel, Switzerland) blood lactate analysis device.

Statistics

The data were analyzed using SPSS 22.0 package software. In order to identify the participants before the test, the mean and standard deviation values of age, height, weight, BMI, and training age parameters were calculated. Balance test scores before HITT, immediately after HITT, and at 0th, 5th, 10th, 15th, and 20th minutes and the blood lactate values were analyzed using Repeated Measurement ANOVA method. Benforroni Post Hoc test was employed in order to determine from where the difference originated. For all the analyses, the level of statistical significance was set at $p<0.05$.

Findings

At the end of study, it was determined that the balance abilities of players significantly decreased at the end of HITT ($p<0.001$).

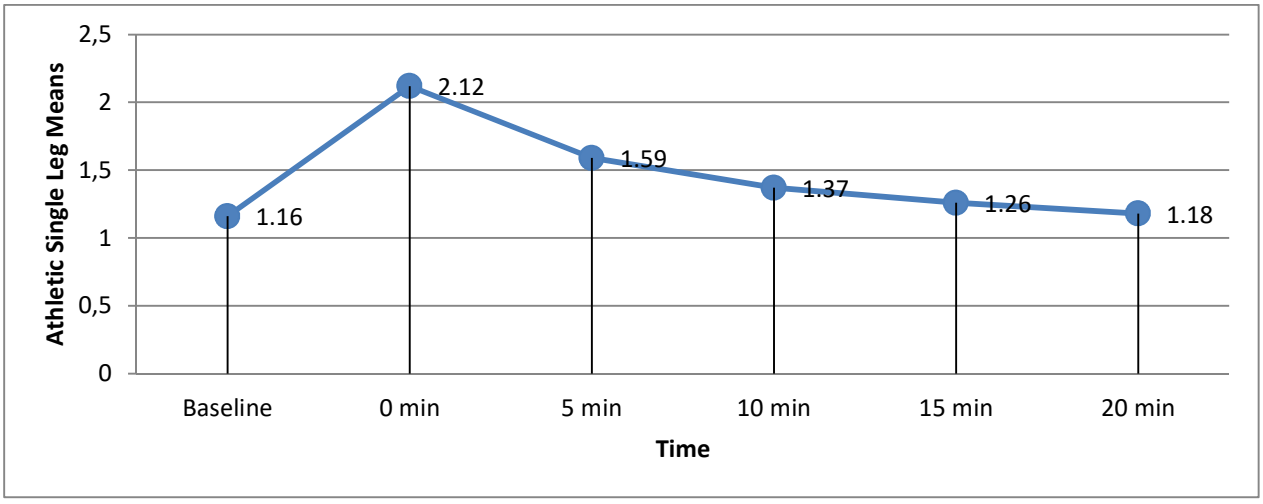


Figure 1. Mean Values of Repetitive Measurement Athletic Single Leg (ASL) Balance Test

In Figure 1, the mean values of players' athletic single leg balance test before HITT and at 0^{th}, 5^{th}, 10^{th}, 15^{th}, and 20^{th} minutes after HITT are presented.

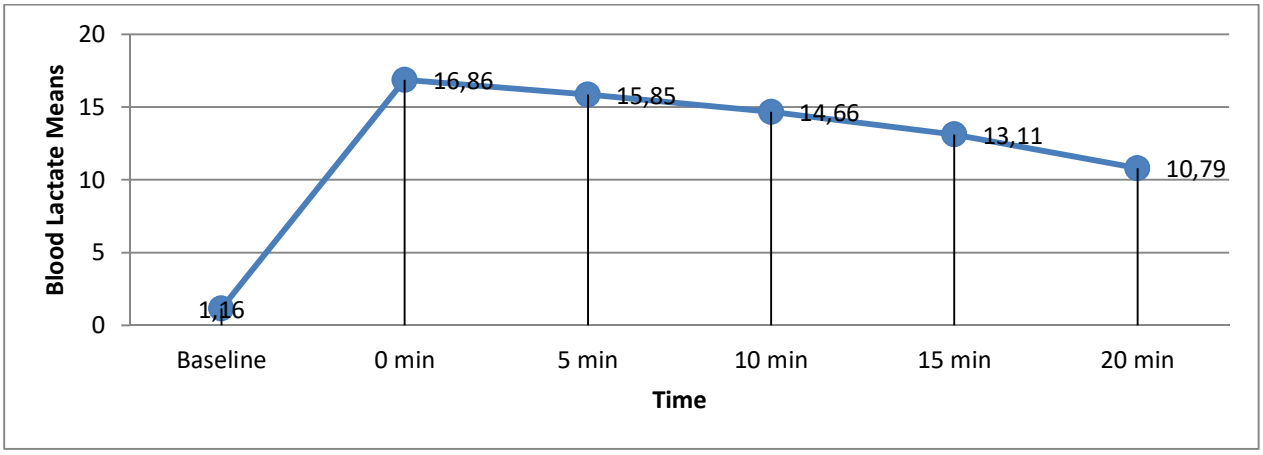


Figure 2. Repetitive Measurements Lactate Test Mean Values

In Figure 2, the mean blood lactate level values of players before HITT and at 0th, 5th, 10th, 15th, and 20th minutes after HITT are presented.

Table 2. Statistical analysis results of Repetitive Measurement Balance and Lactate Tests

	Time Interval	Mean Difference	Std. Error	Sig.
Athletic Single Leg Baseline	Post-Test	-.967*	.162	.001
	5 min	-.429*	.104	.008
	10 min	-.214	.078	.189*
	15 min	-.105	.037	.150*
	20 min	-.024	.028	1.000*
Lactate Test Baseline	Post-Test	-15.7	0.61	0.001
	5 min	-14.69	0.55	0.001
	10 min	13.5	0.71	0.001
	15 min	11.95	0.68	0.001
	20 min	-9.63	0.77	0.001

*$p>0.05$

In Table 2, a statistically significant difference was found between the pre-test and post-test values ($p<0.001$). Moreover, there is a statistically significant difference between the pretest value and the value observed in balance test at 5th minute ($p<0.05$). No statistically significant difference was observed between the values obtained before HIIT training and the values obtained from balance test at 10th, 15th, and 20th minutes ($p>0.05$). A statistically significant difference was observed between the pre-training blood lactate levels and the values obtained after training and at 0th, 5th, 10th, 15th, and 20th minutes.

Discussion

The aim of present study was to examine the acute effects of HITT on support leg balance ability of soccer players. At the end of this study, it was determined that the HITT acutely and negatively affected the support leg balance ability ($p<0.05$). Moreover, it was also determined

that it took approx. 10 minutes for the support leg balance abilities to turn back to baseline ($p>0.05$). But, the post-training blood lactate values were observed to not turn back to baseline in 20 minutes after the training ($p<0.05$).

There are many studies reporting that balance ability has been negatively affected after the fatigue (Toshimitsu et al., 2011; Susco et al., 2004; Fox et al., 2008; Paillard, 2012; Cetin et al., 2008). Depending on the intensity, frequency, and duration of performed exercise, the fatigue is divided into two groups as peripheral nervous system fatigue and central nervous system fatigue (Millet et al., 2004; Glaister, 2005). Aerobic activities influence the central nervous system, whereas the anaerobic high-intensity activities cause peripheral nervous system fatigue (Millet et al., 2004; Glaister, 2005). The peripheral nervous system fatigue originates from the inability of providing muscles with sufficient energy despite the increasing energy requirements (Glaister, 2005). The most significant indicator of peripheral nervous system fatigue is the blood lactate level (Finsterer, 2012). In this study, the blood lactate levels significantly increased after HITT (16.86mMol/L) ($p<0.001$). It can be obviously seen that the trainings performed caused peripheral nervous system fatigue.

In this study, the support leg balance ability turned back to its initial level within 10 minutes after the HITT exercise. Similarly, in a study carried out using cycle ergometer, the participants performed 2 repeats of 30-second Wingate test with 2 minutes interval. Similarly with the results obtained from that study, it was also observed in this study that the balance abilities were negatively affected after high-intensity activity, and that the initial levels were achieved in 10 minutes (Yaggie and Armstrong, 2004). Moreover, in a study involving 11 male and 7 female soccer players, the fatigue protocol was applied to the players. According to the results obtained from Biodex Limit of Stability Test applied after fatigue, it was determined that the test results turned back to baseline in 10 minutes (Toshimitsu et al., 2011). In addition to that, in a study employing aerobic and anaerobic load protocols, it was observed that the balance ability turned back to initial levels in 8-13 minutes in both loading methods (Fox et al., 2008). On the contrary with these studies, there also are studies reporting that recovery period took more than 10 minutes, as well as the studies reporting that the balance ability was not affected after the fatigue. In a study employing exhaustion protocol including sportive activities, the balance test results indicated that the baseline was re-achieved in 20 minutes (Susco et al., 2004).

In a study, in which Biodex balance system was used for balance measurement before the soccer game and in half-time, a decrease was determined in dominant leg balance performance, whereas no effect was observed in support leg (Yamada et al., 2012). In this study, it was determined that the support leg balance performance significantly reduced after HITT activity. The reason of difference observed here is believed to arise from difference between the balance test levels. Moreover, the reason of difference between dominant and non-dominant legs might be the balance performance of non-dominant leg of soccer players better than that of dominant leg. In literature, there also are studies reporting no change in balance performance after the fatigue. In balance measurements performed using Biodex balance system after soccer-specific fatigue (Greig and Walker-Johnson, 2007) and soccer training (Gioftsidou et al., 2011), it was reported that the balance performances of soccer players were not affected form fatigue. Paillard (2012) reported that the recovery of balance ability values to baseline after the fatigue depends on the duration, frequency, and intensity of fatigue protocol. It is believed that the reason for no difference in balance ability after the fatigue might be that the fatigue protocol was not applied at sufficient intensity and frequency in those studies.

Soccer game involves many high-intensity activities (Bangsboo, 1994; Stolen, 2005). During these activities, the soccer players maintain their balance on their support legs in order to show optimal performance (Teixeira et al., 2011). In a previous study, it was shown that there is a positive relationship between the support leg balance ability and shooting skills (Tracy et al., 2012). The decrease in balance performance of support leg after the performance is believed to be related with decreases of players' technical skills during last 15 minutes of both halves. In further studies, the aerobic endurance and recovery skills of soccer players might be examined together with the balance performance. Moreover, it is not clear yet how the balance exercises would affect the balance performance during fatigue. For this reason, it is recommended to carry out studies on these subjects in future.

Conflicts of Interest

The authors have no conflicts of interest to acknowledge.

REFERENCES

Bangsbo J (1994). The physiology of soccer—with special reference to intense intermittent exercise. Acta Physiol Scand Suppl, 619:1–155

Cetin N, Bayramoglu M, Aytar A, Surenkok O, Yemisci OU (2008). Effects of Lower-Extremity and trunk muscle fatigue on balance. The Open Sports Medicine Journal, 2, 16– 22

Finsterer J (2012). Biomarkers of peripheral muscle fatigue during exercise BMC Musculoskelet Disord., 13: 218

Fox G Zachary. Jason P. Mihalik, J. Troy Blackburn, Claudio L. Battaglini, Kevin M (2008). Guskiewicz Return of Postural Control to Baseline After Anaerobic and Aerobic Exercise Protocols Journal of Athletic Training, 43(5):456–463

Gioftsidou A, Malliou P, Pafis G, Beneka A, Godolias G (2011). Effects of a soccer training session fatigue on balance ability. J Hum Sport Exer., 6(3):521–527.

Glaister M (2005). Multiple sprint work. Physiological responses, mechanisms of fatigue and the influence of aerobic fitness. Sports Med 35: 757–777

Greig M, Walker-Johnson C. The influence of soccer-specific fatigue on functional stability. Phys Ther Sport. 2007;8(4):185–190

Krustrup P, Mohr M, Bangsbo J (2005). Physical demands during an elite female soccer game: importance of training status. Medicine and Science in Sports and Exercise, 37, 1242-1248

Lago-Penas C, Lago-Ballesteros J, Dellal A, Gomez M (2010) Game-related statistics that discriminated winning, drawing and losing teams from the Spanish soccer league. J Sports Sci Med 9: 288–293

Lyons M, Al-Nakeeb Y, Nevill A (2006). Performance of football passing skills under moderate and high-intensity localized muscle fatigue. J Strength Cond Res, 20: 197–202

Pau M, Mereu F, Melis M, Leban B, Corona F, Ibba G (2016). Dynamic balance is impaired after a match in young elite soccer players, Physical Therapy in Sport, 22: 11-15

Millet GM, Lepers R (2004). Alterations of neuromuscular function after prolonged running, cycling and skiing exercises. Sports Med 32: 105–116

Mohr M, Krustrup P, Bangsbo J (2005). Fatigue in soccer: a brief review. Journal of Sports Sciences, 23(6), 593-599.

Nashner LM (1997). Practical biomechanics and physiology of balance. In: Jacobson GP, Newman CW, Kartush JM, editors. Handbook of balance function testing. San Diego (CA): Singular Publishing Group, 261-79

Paillard T (2012). Effects of general and local fatigue on postural control: a review. Neurosci Biobehav Rev. 36(1):162–176

Paillard T, Noé F (2006). Effect of expertise and visual contribution on postural control in soccer. Scandinavian Journal of Medicine & Science in Sports, 16, 345–348

Paillard T, Noe F, Riviere T, Marion V, Montoya R, Dupui P (2006). Postural performance and strategy in the unipedal stance of soccer players at different levels of competition. J Athl Train., 41(2):172–176

Rampinini E, Impellizzeri FM, Castagna C, Coutts AJ, Wisløff U (2009). Technical performance during soccer matches of the Italian SerieA league: effect of fatigue and competitive level. J Sci Med Sport, 12: 227–33

Susco, TM, Valovich McLeod, TC, Gansneder, BM, Shultz, SJ (2004). Balance recovers within 20 minutes after exertion as measured by the balance error scoring system. J Athl Training, 39: 241–246

Stolen T, Chamari K, Castagna C, Wisloff U (2005). Physiology of soccer: An update. Sports Med. (Auckl. N. Z.), 35: 501–536

Stone KJ, Oliver JL (2009). The effect of 45 minutes of soccer-specific exercise on the performance of soccer skills. Int. J. Sports Physiol. Perform., 4: 163–175

Teixeira LA, de Oliveira DL, Romano RG, Correa SC (2011). Leg preference and interlateral asymmetry of balance stability in soccer players. Research Quarterly for Exercise and Sport, 82(1), 21-27.

Tracey SY, Chew-Bullock DI, Anderson Kate A, Hamel Mark L, Gorelick SA, Wallace B (2012). Sidaway Kicking Performance in Relation to Balance Ability Over The Support Leg Human Movement Science, 31: 1615–1623

Toshimitsu I, Rebecca A, Hess BR, Marc SF, Yosuke Y (2011). Recovery of Time on Limits of Stability From Functional Fatigue in Division II Collegiate Athletes, Journal of Strength and Conditioning Research, 25(7)/1905–1910

Yaggie J, Armstrong WJ (2004). Effects of lower extremity fatigue on indices of balance. J Sport Rehabil 13: 312–322, 2004.

Yamada RK, Arliani GG, Almeida GP (2012). The effects of one-half of a soccer match on the postural stability and functional capacity of the lower limbs in young soccer players. Clinics (Sao Paulo), 67(12):1361-1364

International Journal of Science Culture and Sport
December 2017 : 5(4)
ISSN : 2148-1148
Doi : 10.14486/IntJSCS708

Field ***:*** *Sport Psychology*
Type ***:*** *Research Article*
Received: *07.11.2017* ***-*** ***Corrected:*** *04.12.2017* ***-*** ***Accepted:*** *11.12.2017*

Attitudes to Body Image in Athlete and Non-Athlete Female Students

Tahmineh SAEEDI, Mani IZADI, Hamid ARAZI
Department of Exercise Physiology, Faculty of Sport Sciences, University of Guilan, Rasht, IRAN
Email: mani.izadi1989@gmail.com

Abstract

The aim of this study was to compare attitudes to body image in athlete and non-athlete female students. For this purpose, 200 athlete and non-athlete female students were randomly selected and took part in the present study. Questionnaires were distributed among volunteers and finally, 160 questionnaires were collected and used. Self-Body image was assessed using the Multidimensional Body-Self Relations Questionnaire (MBSRQ) included 69 items, 7 factors subscales and 3 additional subscales. Variables regarding athletes and non-athletes were compared using independent sample t test. Research findings showed that the scores of some subscales such as “Appearance Orientation” ($p<0.05$), “Health Evaluation” ($p<0.01$), “Health Orientation” ($p<0.01$) and “Body Areas Satisfaction” ($p<0.01$) in athletes were significantly higher than those of non-athletes. However, scores of fitness evaluation in non-athletes were significantly higher than athletes ($p<0.01$). There was no significant difference between the two groups in other subscales. Exercise training appears to improve some subscales of attitudes to body image of female athletes and it can serve as a therapeutic way to enhance the attitudes of non-athlete ones.

Keywords: Appearance, Satisfaction with body, Exercise Training, Female Students

Introduction

Throughout their lifespans, human beings always internalized an image of their body and various biological, environmental and psychological factors contributing to body image. Social stress is originated by the increasing interest in being thin and a wide range of ideas on body structure has led to the prevalent dissatisfaction with body among women which, in turn, reduces self-esteem and causes depression and other kinds of psychological disorders (Zarshenas et al., 2010). Body image is an individual's subjective image of his/her body size, shape and form and includes personal feelings about body parts and structures (Raygan et al., 2007). Thompson believes that the construct of the physical appearance involves three components: 1- perceptual components referring to estimation of body size; 2- subjective components concerning aspects such as satisfaction, attention, concern, cognitive evaluation and anxiety; 3- behavioral components referring to avoiding situations causing an individual to experience shame about his/her physical appearance (Thompson, 1990).

Both males and females put emphasis on body image but they often consider the latter to be more significant because the current social standards regarding feminine beauty put excessive emphasis on the tendency to being thin. Numerous studies have shown a significant dissatisfaction with body size and body shape among females (Rodin et al., 1984; Tiggemann, 2004). Therefore, females are simply exposed to possible factors of distress regarding their body image (Cash et al., 1999; Schwartz et al., 2004). body image is a momentary subjective thought which a person has about his/her body (Zarei et al., 2012). Prevalence of dissatisfaction with body is now a main concern since it is associated with mental disorders such as decrease of self-esteem, depression, social anxiety, eating disorders, sexual disorders and diseases related to body shape (Cash et al., 1990; Nye et al., 2006). Although the pressure is seen in the society, most of individuals are expected to experience a feeling of dissatisfaction with their body image throughout their life (Babiss et al., 2009).

In addition to various preventive and therapeutic methods available in this field, physical exercise and activity is considered as a pleasant way of enhancing satisfaction with body image (Fox et al., 1989; Sonstroem, 1997). Moreover, physical activity plays a positive role in individual perception of their physique, increasing the sense of strength and, ultimately, satisfaction with the whole body. As mentioned in the literature, people with high levels of satisfaction with their body image and low levels of intellectual and mental problems may take the most advantages of their capacities because of their high self-confidence and mental and physical health (Home et al., 1991). This is directly related to the rate of physical activity and of participation in regular exercise.

Most researches on body image and exercises, which evaluate the effect of aerobics, have shown that this type of exercise is effective in enhancing level of satisfaction with body image and reducing social/physical anxiety (Bartlewski, 1996; Davis et al., 1991; Eickhoff et al., 1983). Besides, exercise may cause obvious changes in the body such as muscle strength, overall reduction of skin fold thickness and increase of body net weight, and finally, increase in level of satisfaction with body image (Tucker, 1987a, 1987b). Furthermore, participating in physical activities can be considered as a way that helps the individual to be accepted by their friends, parents, teachers and tutors. Egotism or stating one's own beliefs and characteristics is also acquired and enhanced through taking part in physical and athletic exercises (Stice et al., 2002).

Negative body image is associated with mental disorders and anxiety regarding one’s body and appearance (Feingold et al., 1998). Findings of Bellino et al (2006) indicate that the

prevalence of phobia of body deformity and fear of body image among general populations and populations with psychological disorders are 2 and 12%, respectively (Bellino et al., 2006). Biby (1998) showed that 72% of the university students are dissatisfied with their bodies and appearances and have a phobia regarding their body image and the other 28% have body deformity disorder. Findings suggest that fear of body deformity and dissatisfaction with physical appearance are associated with psychological disorders such as depression, O.C.D, social anxiety and drug abuse (Biby, 1998). In addition, Veale & Riley (2001) have reported that there is a relationship between fear of deformity and O.C.D. behavior; in such a way that such individuals express a variety of obligatory – O.C.D. behaviors in order to find subjective defect (Veale et al., 2001).

In regards to prevalence of the negative approach and deficient body image in athlete and non-athlete university students and their level of physical activity, it is necessary to consider the issue in the scope of the therapeutic treatment based on their role in the recruiting targeted activities. Moreover, a few researches have been done on the approach to body image. Hence, the present study seeks to compare attitudes to body image in athlete and non-athlete university students.

Material and Methods

Participants

The research sample included 200 athlete and non-athlete female university students living in dormitories of Guilan University who were selected using random sampling. The athletes were involved in regular exercise training at least 3 sessions per week and at the period of the present research were students of sport sciences. The questionnaires were distributed among all the members of the sample and a total of 160 (80 for the athletes and 80 for the non-athletes) questionnaires were collected and used for the research.

Data collection

The questionnaire used in this research was the Multidimensional Body-Self Relations Questionnaire (MBSRQ) (Cash, 2000). MBSRQ consists of a total of 69 items. It includes seven subscales named “Appearance Evaluation”, “Appearance Orientation”, “Fitness Evaluation”, “Fitness Orientation”, “Health Evaluation”, “Health Orientation” and “Illness Orientation” which represent 2 dispositional dimensions — “Evaluation” and “Orientation” for each of three somatic domains of “Appearance”, “Fitness” and “Health/Illness” with the exception of the last domain which only contains orientation dimension (Illness Orientation).

In subscales, “Evaluation” refers to feelings of physical attractiveness, physical fitness and physical health. The higher scores in three domains reflects more satisfaction with them. Likewise, Orientation (Cognitive-Behavioral Orientation) refers to extent of investment in appearance, physical fitness, physical health and extent of reactivity to being ill. The higher scores in three domains reflects more importance and subsequently more effort for enhancing them.

In addition to seven subscales mentioned above, MBSRQ has three special subscales: (1) The Body Areas Satisfaction Scale (BASS) evaluates satisfaction with specific body attributes, (2) The Overweight Preoccupation Scale assesses anxiety about fat, weight vigilance, dieting and eating restraint and, (3) The Self-Classified Weight Scale evaluates self-assessment of weight from “very underweight” to “very overweight”.

Reliability of MBSRQ subscales has been shown to be adequate to very good. Cronbach's alpha for the subscales ranges from 0.73 to 0.89 for females and from 0.70 to 0.91 for males (Cash, 2000).

Statistical analysis

The normality of data was determined through Kolmogorov-Smirnov test. Descriptive statistics (mean ± standard deviation) were used to describe the results. The independent sample t test was used to compare variables studied regarding athletes and non-athletes. Data was analyzed using SPSS 16 software at the significance level of $p<0.05$.

Results

Table 1 presents the mean and standard deviation of scores of subscales. According to table 1, scores pertaining to subscales of "Appearance Orientation" ($p<0.05$), "Health Evaluation" ($p<0.01$), "Health Orientation" ($p<0.01$) and "Body Areas Satisfaction" ($p<0.01$) in athletes are significantly higher than those of non-athletes. However, scores of "Fitness Evaluation" in non-athletes is significantly higher than that in athletes ($p<0.01$). There is no significant difference between the two groups in other subscales.

Table 1. Mean and standard deviation of subscales regarding attitudes to body image in athletes and non-athletes

MBSRQ SUBSCALES	**Athlete (n=80)**	**Non-athlete (n=80)**	**P value**
FACTORS SUBSCALES:			
APPEARANCE EVALUATION	2.58±0.35	2.57±0.34	0.887
APPEARANCE ORIENTATION	2.62±0.78	2.34±0.67	0.018*
FITNESS EVALUATION	2.90±0.40	3.09±0.33	0.002**
FITNESS ORIENTATION	2.61±0.34	2.52±0.28	0.055
HEALTH EVALUATION	2.85±0.53	2.51±0.45	0.001**
HEALTH ORIENTATION	2.52±0.45	2.33±0.44	0.004**
ILLNESS ORIENTATION	2.93±0.37	2.91±0.36	0.672
ADDITIONAL SUBSCALES:			
BODY AREAS SATISFACTION	2.43±0.78	2.01±0.69	0.001**
OVERWEIGHT PREOCCUPATION	2.80±0.71	2.89±0.65	0.481
SELF-CLASSIFIED WEIGHT	2.91±0.74	2.73±0.62	0.088

* Significance at $p\leq 0.05$, ** Significance at $p\leq 0.01$

Discussion

Since body image is a complicated construct relating to the individual's perceptions and how he/she is seen, especially regarding his/her physical appearance, aspects such as body satisfaction, self-appearance, importance of internalized appearance ideals and mentalities concerning body image are also proposed in the area of body-image-therapy (Cash et al., 2004).

Results obtained from McCreary et al (2008) showed that individuals have a strong tendency to have a muscular body and these are the ones who are more satisfied with their body limbs and face lesser risks of feeling anxious about their body weight and their body image (McCreary et al., 2009). Moreover, an increase in strength and power enhances individuals' capabilities to manage their daily affairs (specifically regarding the affairs requiring physical effort) and this may contribute to their success. However, for everybody, improvement of physical variables is more tangible than mental variables such as level of anxiety, self-confidence or satisfaction with body image. For example, satisfaction felt by an individual as a result of the enhancement of power in initial weeks of the strengthening program is more pleasant and clear than other mental alterations. Therefore, this pleasant feeling naturally improves individual's satisfaction with their own body image. Another reason is the increase of the level of self-esteem (Babiss et al., 2009; Sonstroem, 1997).

College students are particularly susceptible to social pressures related to physical appearance. This period of time coincides with formation of one's identity and self-worthy in many number of domains such as physical self-perception (Crocker et al., 2003; Crocker et al., 2001). Thus, Dissatisfaction with body image, weight concerns and physical attractiveness are significant among college students. So that as much as 90 percent of them are worried about body image. While, those students who pursued health-related behaviors had higher self-esteem, and lower body shame and physical dissatisfaction (Lowery et al., 2005).

Results of the present research show that scores of "Appearance Orientation" and "Body Areas Satisfaction" in athletes were significantly higher than non-athletes. Some studies found that athletes report lesser or analogous concerns about body image compared to non-athletes (Anderson et al., 1996; Fulkerson et al., 1999; Hausenblas et al., 1999). However, athlete population because of sport-related tasks such as performance advantages and weight requirements, or social pressures which are exerted by coach, judge and teammates seek to obtain an ideal physique (Davis et al., 1989; Hausenblas et al., 2001; Roa et al., 1986). Thus, athletes may typically follow the behaviors relating to physical appearance and ideal physique because either aesthetic aspects or functional advantages.

Based on findings of the present study, scores pertaining to "Health Evaluation" and "Health Orientation" in athletes were significantly higher than those of non-athletes. Conversely, scores of "Fitness Evaluation" in non-athletes were significantly higher than athletes. This result complies with that of Strelan et al which showed that individuals exercising for continuous muscle improvement and enhancement of physical attractiveness have lower levels of self-esteem and achieve no improvement in their body status. However, those who exercise with the purpose of getting healthy, fit, to have a better mood and for entertainment see a positive effect on satisfaction with body and self-esteem (Strelan et al., 2003).

Additionally, A reason for these results is the multidimensionality of body aspects since fitness evaluation includes cases such as muscle strength measurement, muscle endurance and flexibility (Fisher et al., 1994), while the questionnaire used in this research emphasizes more

on aspects regarding skill and consistency in doing fitness exercises and physical appearance. On the other hand, individuals selected in this research as the sample were chosen among general population of the society and not those who were patients in treatment centers.

There is no significant difference between the two groups in other subscales. Therefore, the least differences between athletes and non-athletes were especially seen in "Appearance Evaluation", "Ilness Orientation", "Overweight Preoccupation" and "Self-Classified Weight". Although the results of the current study indicated some advantages of exercise and physical activity in terms of self-report measures of body image, Competitive athlete female students may experience incompatibilities between athletic physique and ideal feminine body which can influence their body image and suppress positive impacts of exercise training on self-perception of physical appearance. It is worth noting that the kind of sport and competitive level among athletes subjects did not evaluated in this study. This along with other constraints such as fail to assess the age, body composition and BMI may complicate interpretation of results.

Conclusion

In short, the present study can be applied to various populations such as females and males from different age groups and various socioeconomic classes. In this way, it is possible to compare results. Moreover, since the research was performed on general individuals, doing a similar investigation on patients with clinical body image disorders or eating disorders may be effective in increasing the accuracy of the results and conclusion of the present study. Exercise training and Being physically active can influence the improvement of some aspects of the body image approach in female athletes and it may be used as a treatment tool to change the perspective of non-athlete ones.

Acknowledgements

The authors would like to sincerely thank the female students for their willing participation in this study.

Conflicts of Interest

The authors have no conflicts of interest to acknowledge.

Corresponding Author

Mani IZADI
Department of Exercise Physiology, Faculty of Sport Sciences, University of Guilan, Rasht, IRAN
Email: mani.izadi1989@gmail.com

REFERENCES

Anderson SL, Zager K, Hetzler RK, Nahikian-Nelms M, Syler G (1996). Comparison of Eating Disorder Inventory (EDI-2) scores of male bodybuilders to the male college student subgroup. *International Journal of Sport Nutrition, 6*(3), 255-262.

Babiss LA, Gangwisch JE (2009). Sports participation as a protective factor against depression and suicidal ideation in adolescents as mediated by self-esteem and social support. *Journal of Developmental & Behavioral Pediatrics, 30*(5), 376-384.

Bartlewski PP (1996). Effects of aerobic exercise on the social physique anxiety and body esteem of female college students. *Women in Sport and Physical Activity Journal, 5*(2), 49-62.

Bellino S, Zizza M, Paradiso E, Rivarossa A, Fulcheri M, Bogetto F (2006). Dysmorphic concern symptoms and personality disorders: a clinical investigation in patients seeking cosmetic surgery. *Psychiatry research, 144*(1), 73-78.

Biby EL (1998). The relationship between body dysmorphic disorder and depression, self-esteem, somatization, and obsessive–compulsive disorder. *Journal of clinical psychology, 54*(4), 489-499.

Cash TF (2000). Multidimensional body-self relations questionnaire (MBSRQ). *Norfolk, VA: Author*.

Cash TF, Hicks KL (1990). Being fat versus thinking fat: Relationships with body image, eating behaviors, and well-being. *Cognitive Therapy and Research, 14*(3), 327-341.

Cash TF, Roy RE (1999). Pounds of flesh: Weight, gender, and body images. *Interpreting weight: The social management of fatness and thinness*, 209-228.

Cash TF, Thériault J, Annis NM (2004). Body image in an interpersonal context: Adult attachment, fear of intimacy and social anxiety. *Journal of social and clinical psychology, 23*(1), 89-103.

Crocker J, Luhtanen RK, Cooper ML, Bouvrette A (2003). Contingencies of self-worth in college students: theory and measurement. *Journal of personality and social psychology, 85*(5), 894.

Crocker J, Wolfe CT (2001). Contingencies of self-worth. *Psychological review, 108*(3), 593.

Davis C, Cowles M (1989). A comparison of weight and diet concerns and personality factors among female athletes and non-athletes. *Journal of Psychosomatic Research, 33*(5), 527-536.

Davis C, Cowles M (1991). Body image and exercise: A study of relationships and comparisons between physically active men and women. *Sex Roles, 25*(1-2), 33-44.

Eickhoff J, Thorland W, Ansorge C (1983). Selected physiological and psychological effects of aerobic dancing among young adult women. *The Journal of sports medicine and physical fitness, 23*(3), 273-280.

Feingold A, Mazzella R (1998). Gender differences in body image are increasing. *Psychological Science, 9*(3), 190-195.

Fisher E, Thompson JK (1994). A Comparative Evaluation of Cognitive-Behavioral Therapy (CBT) Versus Exercise Therapy (ET) for the Treatment of Body Image Disturbance Preliminary Findings. *Behavior Modification, 18*(2), 171-185.

Fox KR, Corbin CB (1989). The physical self-perception profile: Devlopment and preliminary validation. *Journal of sport and Exercise Psychology, 11*(4), 408-430.

Fulkerson JA, Keel PK, Leon GR, Dorr T (1999). Eating-disordered behaviors and personality characteristics of high school athletes and nonathletes. *International journal of eating disorders, 26*(1), 73-79.

Hausenblas HA, Downs DS (2001). Comparison of body image between athletes and nonathletes: A meta-analytic review. *Journal of Applied Sport Psychology, 13*(3), 323-339.

Hausenblas HA, Mack DE (1999). Social physique anxiety and eating disorder correlates among female athletic and nonathletic populations. *Journal of Sport Behavior, 22*(4), 502.

Home RL, Van Vactor JC, Emerson S (1991). Disturbed body image in patients with eating disorders. *American Journal of Psychiatry, 148*(2), 211-215.

Lowery SE, Kurpius SER, Befort C, Blanks EH, Sollenberger S, Nicpon MF, Huser L (2005). Body image, self-esteem, and health-related behaviors among male and female first year college students. *Journal of College Student Development, 46*(6), 612-623.

McCreary DR, Saucier DM (2009). Drive for muscularity, body comparison, and social physique anxiety in men and women. *Body image, 6*(1), 24-30.

Nye S, Cash TF (2006). Outcomes of manualized cognitive-behavioral body image therapy with eating disordered women treated in a private clinical practice. *Eating disorders, 14*(1), 31-40.

Raygan N, Shaeery M, Asghari Moghaddam M (2007). The effect of cognitive therapy-a behavioral pattern based on 8 steps to cache on negative body image of female. *J Shahed Univ, 8*(19), 11-22.

Roa VP, Overman S (1986). Psychological well-being and body image: a comparison of black women athletes and nonathletes. *Journal of Sport Behavior, 9*(2), 79.

Rodin J, Silberstein L, Striegel-Moore R (1984). *Women and weight: a normative discontent.* Paper presented at the Nebraska symposium on motivation.

Schwartz MB, Brownell KD (2004). Obesity and body image. *Body image, 1*(1), 43-56.

Sonstroem RJ (1997). The physical self-system: A mediator of exercise and self-esteem.

Stice E, Whitenton K (2002). Risk factors for body dissatisfaction in adolescent girls: a longitudinal investigation. *Developmental psychology, 38*(5), 669.

Strelan P, Mehaffey SJ, Tiggemann M (2003). Brief report: Self-objectification and esteem in young women: The mediating role of reasons for exercise. *Sex Roles, 48*(1-2), 89-95.

Thompson JK (1990). *Body image disturbance: Assessment and treatment*: Pergamon Press.

Tiggemann M (2004). Body image across the adult life span: Stability and change. *Body image, 1*(1), 29-41.

Tucker L (1987a). Effect of weight training on body attitudes: Who benefits most? *The Journal of sports medicine and physical fitness, 27*(1), 70-78.

Tucker L (1987b). Mental-health and physical-fitness. *Journal of Human Movement Studies, 13*(6), 267-273.

Veale D, Riley S (2001). Mirror, mirror on the wall, who is the ugliest of them all? The psychopathology of mirror gazing in body dysmorphic disorder. *Behaviour research and therapy, 39*(12), 1381-1393.

Zarei A, Ghasemi A (2012). Comparison of Body Image in Male Disabled Athletes with both Disabled and Non-disabled Non-athletes. *European Journal of Experimental Biology, 2*(6), 2145-2150.

Zarshenas S, Karbalaee Noree A, Hosseini S (2010). The effect of aerobic exercise on women's attitudes about body image. *Journal of Rehabilitation of Social Welfare and Rehabilitation Sciences University, 11*, 15-20.

International Journal of Science Culture and Sport
December 2017 : 5(4)
ISSN : 2148-1148
Doi : 10.14486/IntJSCS709

Field *: Physical Education, Special Education*
Type *: Research Article*
Received: *08.11.2017* ***- Corrected:*** *09.12.2017* ***- Accepted:*** *11.12.2017*

Determining Awareness Levels of Benefits of Sports in Individuals with Autism with Regards to their Families and Private Education Teachers

Zeynep EROL[1], Gizem ÖZDEMİR[1], Mehmet GÜNAY[2], Taner BOZKUŞ[1]
[1] Bartin University, School of Physical Education and Sports, Bartin, TURKEY
[2] Gazi University, Faculty of Sport Sciences, Ankara, TURKEY
Email: zeyneperol.1989@gmail.com

Abstract

The purpose of this study was to determine the levels of awareness by families and private education teachers regarding individual benefits of sportive events realized with the aim to facilitate the lives of individuals with autism. In the research as data gathering tool, "Personal Information Form" that is developed by the researchers and "Awareness Scale aiming for the impacts of sports in individuals with mental disabilities (ZEBSEYFO)" being developed by İlhan and Esentürk (2015) was used. Research population was composed of 187 people living in the cities of Zonguldak, Bartın and Karabük, 74 of which are parents having individuals with autism. According to the findings obtained from SPSS 21 package program in the study, when gender variable is handed with respect to the family, it was determined that difference between the levels of scores obtained by female and male participants (mothers and fathers) from ZEBSEYFO was at a meaningful level in favor of female participants as statistically (U:271,000; $p<0,05$). According to the findings obtained, it was determined that as per the educational status of participants, difference of ZEBSEYFO scores between educational levels was statistically meaningful and a meaningful difference was found in the awareness level of parents who were not literate (0,038) ($p<0,05$). As a result of these findings, it was determined that awareness level of mother in a family having an individual with autism was higher and that awareness level of parent not being literate was higher.

Keywords: Autism, Private Education Teacher, Parent, Sports, Awareness Level

Introduction

Autism is an organic damage that causes perception disorder and it means "Autos" in Greek language. Perceiving in a different way and interpretation of perceptions differently in the brain causes for differences in behaviors which is called autism. (Tufan, 2006).

Autism is an extreme complex developmental disorder which appears in the first three years of children as depending on various reasons, being revealed with insufficiency of communication and social skills, limited interest, obsessive and repeating actions. Most common features of children with autism are not being able to learn language, being introverted, giving extreme reactions to changes, insisting on continuing the same behaviors, not being content with monotony, having difficulty in learning abstract concepts, not being able to learn time concept, not being able to perceive speeches, having limited relations with people, and not being able to have eye contact (Ozbey, 2009).

Today majority of information about autism is based on theory. Meaning that autism event is observed as a result of interpretations of findings being based on observations and experiences but its reasons can only be predicted. It is being tried to help the child with autism and his family as being based on interpretations and not proofs. It can not be stated that it always yields successful outcome but pleasing results can also be reached. Many scientists present their experiences and knowledge accumulation being obtained from different disciplines for the child, family, and the society. Sociologist, psychologist, psychiatrist, and therapists are realizing studies and observations in this area (Tufan, 2006).

Autism is not a problem that can be completely treated with the information and methods that are currently had. However, with a convenient training plan and with medicine, that would be considered as providing support under certain cases, person can reach the maximum possible level with his own capacity. But when treatment is commenced, it is not possible to predict to which point the child can reach. This also depends on professional support obtained and the quality of training, besides the severity of child's problem and the symptoms being revealed (Vural, 2007).

Individuals with autism can demonstrate skills that can not be normally observed. Although these are skills observed in a specific area, they can show variations. Their puzzle making skills are good. Sometimes, these skills can become extraordinary and out of rules. Among people with autism, ratio of those demonstrating superior talents is significantly high. These skills are mainly in areas relating with art, music, sports, and calculations (Turan, 2005).

Extreme mobility is observed in majority of children with autism. If the energy and physical power of these children is not directed to a positive direction, aggression or extreme mobility could be observed. First way of making these energies of children become useful is to teach them how to play and to provide them the opportunity to continuously play games. Another way is to make them ride horses and to deal with sports. In both of these events, all muscles of child work and reveal regular development. As a result of this, positive developments are observed in motor skills of child and their obsessions are reduced (Özbey, 2005).

Sports help in the development of muscles, improvement and development of hand, eye and balance coordination, and establishment of social relations as being the major problem of autistic children. For example, bilateral activities performed within the scope of socialization program with sports and being present in a different social environment such as small contests as being independent from their families, play an important role in the social relations of autistic children. Children who can communicate or conduct their works with the help and

mediation of a second person, can observe what they can realize on their own with this independent application and they can start communicating by relying on their self-respect and using different ways. They can mainly move with their own skills and confidence without needing someone else and this slowly eliminates lack of socialization which is their biggest disadvantage. Children with autism disorder can not be in the same environment with others apart from their families and they can not take part in certain fundamental social interactions (İlhan, 2010).

Being accepted by the community and establishing good relations in the society are issues regarding which individuals with autism have great difficulty. At this point exercise activities are used and they indirectly eliminate social restrictions. Hence, in these individuals due to their loose muscle structure, considerable slow down in their mental activities, and advancement of age, causes for loss in motor development to increase gradually (Öner, 1997).

Sports is a tool that can enable for autistic children to come together with people whom they did not know beforehand in an environment they did not know, as being away from their limited family environment. In this way, autistic children can communicate with different people and they can participate in exercise activities being accompanied with certain rules. Autistic children restrict their social lives, the borders of which are already limited, with their impatient and stubborn behaviors. By means of sportive events, their behaviors which disturb harmonization are limited and autistic individuals gain the skill to communicate with other people by acting jointly (Özer-Sevimay, 2001).

Sports help in the development of muscles, improvement and development of hand, eye and balance coordination, and establishment of social relations as being the major problem of autistic children. For example, bilateral activities performed within the scope of socialization program with sports and being present in a different social environment such as small contests as being independent from their families, play an important role in the social relations of autistic children. Children who can communicate or conduct their works with the help and mediation of a second person, can observe what they can realize on their own with this independent application and they can start communicating by relying on their self-respect and using different ways. They can mainly move with their own skills and confidence without needing someone else and this slowly eliminates lack of socialization which is their biggest disadvantage. Children with autism disorder can not be in the same environment with others apart from their families and they can not take part in certain fundamental social interactions (Özer-Sevimay, 2001).

Method

Research group

Research population is composed of 187 people living in the cities of Zonguldak, Bartın and Karabük, 74 of which are parents having individuals with autism and 187 of which are private education teachers working with these individuals.

Data gathering tool

In the research as data gathering tool, “Personal Information Form” that is developed by the researchers and “Awareness Scale aiming for the impacts of sports in individuals with mental disabilities (ZEBSEYFO)” being developed by İlhan and Esentürk (2015), have been used. It is specified that the scale is composed of 32 articles and one dimension. Variance being

explained by a single dimension is % 75.083. For the whole scale, Cronbach alpha reliability coefficient is 0.989. Within the scope of scale validation study, corrective factor analysis was conducted and structure being revealed with explanatory factor analysis was validated. With the aim to evaluate the responses given by participants to the articles, 5 Likert type scaling has been used. Choices for positive expressions were listed as "I completely agree", "I agree", "I am indecisive", "I don't agree", "I absolutely don't agree" and they were scored respectively as 5, 4, 3, 2 and 1. Choices for negative expressions were scored reversely as 1, 2, 3, 4 and 5. When it is considered that there are 32 articles in the scale, lowest score that can be obtained from the scale is 47 and the highest score is 235.

Analysis of data

Before starting with the analysis of data, scales being obtained from participants were controlled and those filling them in as missing or wrongly were left outside the evaluation in the statistical analysis regarding validity and reliability of scale. As a result of this process, in accordance with the results coming from 187 participants participating in the research, statistics of research was realized. Data being obtained was analyzed by using SPSS 21.0 package program. In the research to review the distribution of data first of all, Barlett Sphericity test was evaluated. Later on, with the aim to investigate the difference between variables, Man-Whitney U test was applied and to determine score coefficients, Kruskall Wallis test was applied.

Findings

Table 1. Descriptive statistics parents being part of the research group as per ZEBSEYFO

ZEBSEYFO	N	Minimum	Maximum	X	Ss	Skewness		Kurtosis	
Total Score	74	83,00	160,00	139,39	16,55	-1,031	,279	1,550	,552

When Table 1 is reviewed, average of scores obtained by research group from Awareness Scale regarding impact of sports in mentally disabled individuals ''ZEBSEYFO'' was found out to be X:139,39 and its standard deviation was found as 16,55, while skewness and Kurtosis values were determined as -1,031 ,279 and 1,550 ,552 respectively. Besides, it is found out that the highest score obtained from the general scale was 160, whereas the lowest score was 83.

Table 2. Regarding the scores of parents taking part in the research group relating with ZEBSEYFO, Man-Whitney U test scores as per gender types

Dealing with sports	**N**	Row average	Row total	U	p
Yes	12	31,67	380,00	302,000	**0,303**
No	62	38,63	2395,00		
Total	74				

*p<0,05

As Table 2 is examined, row average of awareness levels of participating women and men (mothers and fathers) was determined as 39,56 for women and as 27,85 for men. According to the findings we obtained, it is found out that the difference between the levels of scores obtained by female and male (mothers and fathers) participants from ZEBSEYFO was at a statistically meaningful level in favor of female participants (U:271,000; p<0,05).

Table 3. Kruskall Wallis test scores regarding occupational distribution of parents taking part in the research group as relating with ZEBSEYFO

OCCUPATION	**N**	**Row Total**	**Sd**	**X^2**	**p**
STAFF	9	37,44	4	3,788	,435
WORKER	10	27,80			
RETIRED	3	31,33			
SELF-EMPLOYMENT	3	51,33			
NOT WORKING	49	39,02			
Total	74				

***p<0,05**

When Table 3 is evaluated, row total values of participants as per their vocations throughout ZEBSEYFO scale were determined as 37,44 for staff, 27,80 for workers, 31,33 for retired people, 51,33 for self-employed people, and 39,02 for those who are not working. However, the score that they obtained from the scale did not have any meaningfulness regarding occupations (p>0,05).

Table 4. Kruskall Wallis test scores of patients taking part in the research group as per vocational distributions relating with ZEBSEYFO

FAMILY EDUCATION	N	Row Total	Sd	X^2	p
ILLITERATE	2	1,50	4	10,123	**0,038**
ELEMENTARY SCHOOL	31	35,39			
HIGH SCHOOL	29	43,98			
HIGHER EDUCATION	11	35,23			
POST GRADUATION	1	12,00			
Total	74				

***p<0,05**

When Table 4 is examined, row total values of parents which they obtained from scale scores as per their education status, were determined to be 1,50 for illiterate, 35,39 for elementary education, 43,98 for high school education, 35,23 for higher education, and 12,00 for post graduation. According to the findings obtained, it is found out that the difference of scores obtained by participants from ZEBSEYFO as per their education status, was statistically meaningful among education levels (p<0,05).

Table 5. Mann-Whitney U test scores of parents taking part in research group as per their dealing with sports regarding ZEBSEYFO

Dealing with sports	N	Row average	Row total	U	p
Yes	12	31,67	380,00	302,000	**0,303**
No	62	38,63	2395,00		
Total	74				

*p>0,05

When Table 5 is examined, row averages of scale scores of participant families giving the reply of yes or no to the questions about dealing with sports were found out as 31,67 and 38,63 respectively. As a result of Mann-Whitney U test being conducted, a statistically meaningful difference was not observed among the scores obtained by participants who answered as yes or no to the scales depending on dealing regularly with sports or not, as being obtained from ZEBSEYFO (0,303,p>0,05).

Table 6. Descriptive statistics of private education teachers taking part in research group as per ZEBSEYFO

ZEBSEYFO	N	Minimum	Maximum	X	Ss	Skewness		Kurtosis	
Total Score	113	42,00	127,00	107,41	11,06	-3,702	,228	1,750	,453

When Table 6 is examined, average of scores obtained by research group from Awareness Scale regarding the impacts of sports in mentally disabled individuals was X:107,41 and its standard deviation was 11,06, while Skewness and Kurtosis values were found out to be -3,702, 228 and 1,750, 453 respectively. Besides, it is determined that the highest score obtained from the scale in general was 127,00 and that the lowest score was 42,00.

Table 7. Mann-Whitney U test scores of private education teachers taking part in research group as per gender type regarding their scores relating with ZEBSEYFO

Gender	N	Row Average	Row total	U	p
Women	71	58,46	4151,00	1387,000	**0,536**
Men	42	54,52	2290,00		
Total	113				

*p>0,05

When Table 7 is examined, row average of awareness levels of female and male private education teachers as being participants, was found out to be 58,46 for women and as 54,52 for men. According to the findings obtained, it is determined that the difference between the levels of scores obtained by female and male participants from ZEBSEYFO was not statistically meaningful (U:1387,000; p<0,05).

Table 8. Kruskall Wallis test scores of private education teachers participating in research group as relating with their scores according to their vocational experiences regarding ZEBSEYFO

VOCATIONAL EXPERIENCE	N	Row total	Sd	X^2	p
LESS THAN 1 YEAR	13	51,08	3	1,147	,766
1-4 YEARS	41	55,00			
5-9 YEARS	24	61,79			
MORE THAN 10 YEARS	35	58,26			

Total	113

When Table 8 is examined, Kruskall Wallis test scores of research participants regarding their scores relating with ZEBSEYFO as per their vocational experiences were determined as 51,08 for less than 1 year, 55,00 for periods between 1-4 years, 61,79 for periods between 5-9 years, and 58,26 for periods more than 10 years. A statistically meaningful result could not be obtained between vocational experiences of private education teachers and their awareness levels (,766 p>0,05).

Discussion and Conclusion

As a result of research, row average of awareness levels of participant women and men (mothers and fathers) was determined as 39,56 for women and as 27,85 for men. According to the findings we obtained, it is found out that the difference between levels of scores obtained by female and male (mothers and fathers) participants from ZEBSEYFO was at a statistically meaningful level in favor of female participants (U:271,000 ; p<0,05). When the body of literature is examined and as various attitude studies aiming for disabled individuals are reviewed, it is seen that there are studies in which female participants notified higher attitudes than male participants and it is observed that findings of this study supported the findings of our study. It is seen that the findings of İlhan resulting from the study being conducted in 2010, were in parallel with the outcomes of this study. Ciarrochi et al., 2001, Goldenberg et al., 2006, 2005, Goldberg et al. 1990, have found out in their studies that awareness levels of female participants, meaning those of mothers, were higher than awareness levels of fathers and these outcomes were in parallel with our study.

Row total values of parents as per vocations with which they were involved, throughout ZEBSEYFO scale, were determined as 37,44 for staff, 27,80 for workers, 31,33 for retired people, 51,33 for self-employed people and 39,02 for those who are not working. However, the score obtained from the scale did not have any meaningfulness with respect to vocational status (p>0,05). It is reached to the conclusion that there is no relationship between vocational levels of parents and awareness levels of benefits of sports in individuals with autism.

Row total values obtained by parents as per their education status from scale scores are 1,50 for illiterate, 35,39 for elementary school, 43,98 for high school, 35,23 for higher education and 12,00 for post-graduation. As per the findings obtained, it is found out that difference of scores obtained by participants as per their education status from ZEBSEYFO was statistically meaningful. It was determined that awareness levels of illiterate parents were higher and it is thought that this situation supported the outcome that as education level increased, level of involvement of families with their disabled children got reduced as per the studies being conducted. (0,038,p<0,05).

Row averages of scale scores of participant families who replied as yes or no to the question regarding their involvement with sports, were determined as 31,67 and 38,63 respectively. As a result of Mann-Whitney U test being conducted, a statistically meaningful difference was not found among the scores obtained from ZEBSEYFO by the participants answering as yes or no to the question regarding regularly dealing with sports (0,303,p>0,05).

Row averages of awareness levels of female and male private education teachers as being participants, were determined as 58,46 for women and as 54,52 for men. According to the findings obtained, it is found out that the difference between the levels of scores obtained

from ZEBSEYFO by female and male participants was not statistically meaningful (U:1387,000 ; p<0,05).

Kruskall Wallis test scores of research participants as per their vocational experiences regarding their scores relating with ZEBSEYFO, were found out to be 51,08 for less than 1 year, 55,00 for periods between 1-4 years, 61,79 for periods between 5-9 years, 58,26 for periods more than 10 years. A statistically meaningful outcome could not be found between vocational experiences of private education teachers and their awareness levels (,766 p>0,05). When the body of literature is examined, it is seen that there are no other studies being conducted with the aim to determine the relationship of vocational experiences and awareness levels and it is being recommended for this type of studies to be increased and for them to be extended by being implemented in other cities as well.

Conflicts of Interest

The authors have no conflicts of interest to acknowledge.

Corresponding Author

Zeynep EROL
Bartin University, School of Physical Education and Sports, Bartin, TURKEY
Email: zeyneperol.1989@gmail.com; Tel: +905071035971

REFERENCES

Ciarrochi J, Chan EY, Bajgar J (2001). Measuring emotional intelligence in adolescence, Personality and Individual Differences, 31 (7): 1105- 1119

Goldenberg I, Matheson K, Mantler J (2006). The assessment of emotional intelligence: a comparison of performance-based and self-report methodologies, Journal of Personality Assessment, 86 (1): 33–45

Goldberg S, Morris P, Simmons R J (1990). Chronic illness in infancy and parenting stress: a comparison of three groups of parents, Pediatric Psychology, 15:347-358

İlhan L (2010). The effect of the participation of educable mentally retarded children in the special physical education classes upon the anxiety levels of the parents of the children Ovidius University Annals, Series Physical Education and Sport / Science, movement and health, 10(2) pages 304-309

İlhan L, Esentürk O (2015). Development study regarding Awareness Scale in mentally disable individuals relating with the impacts of sports (ZEBSEYFO), CBU Physical Education and Sports Sciences Journal 9(1), pages. 19-36.

Öner N (1997). Validity of continuous concern inventory situation in Turkish Community, Ankara: Thesis for Associate professorship.

Özbey Ç (2005). Autism and training of children with autism, Journey to the country of loneliness, İstanbul: İnkılâp Publishing House.

Özbey Ç (2009). Special children and therapy methods, biomedical, psychological, and attitude based training, treatment and therapy methods being applied for children with autism, hyperactivity, down syndrome, and mental disability, İstanbul: İnkılap Publishing House.

Özer-Sevimay D (2001). Physical education and sports for disabled individual. İstanbul: 1nd Ed., Nobel Publishing House.

Tufan İ (2006). Are autistic children genius or are they disabled? İstanbul: İletişim Publishing House.

Turan A (2005). Children talking with the love language, Guidance book for language development and disorders relating with down syndrome, autism and stuttering, System Publishing House.

Vural İ (2007). Training of children with autism and lack of communication, İstanbul: Evrim Publishing House.

International Journal of Science Culture and Sport
December 2017 : 5(4)
ISSN : 2148-1148
Doi : 10.14486/IntJSCS710

Field *: Recreation, Sport Psychology*
Type *: Research Article*
Received: *11.11.2017* ***- Corrected:*** *11.12.2017* ***- Accepted:*** *12.12.2017*

The Study of the Relationship between Individual Perception of Loneliness and Socialization with Recreational Activities: A Research on University Students[1]

Murat KOÇYİĞİT[1], Murat ERDOĞDU[1], Özgen KARAGÜLLE[2]
[1] Necmettin Erbakan University, Faculty of Tourism, Konya, TURKEY
[2] Necmettin Erbakan University, Institute of Social Sciences, Konya, TURKEY
Email: mkocyigit@konya.edu.tr, muraterdogdu06@gmail.com, karagulleozgen@gmail.com

Abstract

Recreational activity is an important means of socialization, as well as providing psychological relief in order to achieve socialization and to overcome loneliness. Accordingly, the aim of the study is to analyze the relationship between the perception of loneliness and socialization with recreational activities. Another aim of this study is to analyze whether there is a statistically significant difference between the demographic variables and the sense of loneliness of the individuals. In this context, relations between variables were tested using the data based on the questionnaire applied to university students studying at state universities in Konya and the theoretical hypotheses were tested. In addition, in the analysis of the research, descriptive statistics, difference tests were used to determine the difference between demographic variables and loneliness perception and correlation analysis was used to determine the relation between loneliness variable and the variable of socialization with recreational activities. As a result of the analyses, it was detected that there was a positive and meaningful relationship between loneliness perception and the variable of socialization with recreational activities. In this respect, as mentioned in the findings, it was determined that the individuals who have perceptions of loneliness are trying to increase their level of socialization by participating in recreational activities.

Keywords: Perception of Loneliness, Recreational Activities, Socialization, Communication, Individual

[1] *This study was delivered as a presentation in the 4th International Students Congress of Sports Sciences Tourism and Recreation in Burdur Mehmet Akif Ersoy University on 21.04.2017.*

Introduction

With the increase in the technological developments, the time that the individuals allocate to themselves and to their environments decreases, which isolate the individuals from themselves and from the society they live in (Ekinci et al., 2015: 72). Today, the over-use of technology that the individuals are exposed to in their daily lives, subjected the individuals to various negativities that originated from the existence in loneliness and virtual reality. That is why in their spare times, individuals tend to predominantly socialization experiences that have high level of interaction between individuals (Argan et al., 2013: 3).

It is always mentioned that individuals, who comprise the community, inherently tend to stay together. It is known that the individuals who are not being together with others, generally experience negative emotions, particularly loneliness. In terms of coping with loneliness and providing socializing, recreative activities not only help relief in natural environment but also are important means of providing socialization (Uzuner and Karagün, 2014: 111).

Socialization level is enhanced with participation in various group activities in social life. The leading of these are recreative applications. Individual increases the social perception or socialization level with recreation applications, thus participate in the life more actively. Recreative applications help improve self-confidence, self-realization, and self-esteem. With the help of this improvement, the individual obtains a better position in the social life. At this point, recreative applications make great contributions to individuals for social integration (Atalay, Akbulut and Yücel, 2013: 18).

In this study, it is aimed to examine relationship between individual perception of loneliness and socialization with recreational activities. Accordingly, literature review is made in the first phase, in which similar studies conducted before were analyzed. The data was collected by using "UCLA Loneliness Perception Scale" and "Socialization Scale in Recreational Activities". The data obtained was statistically analyzed according to the aim of the study and the results were taken.

Literature Review

Loneliness

Loneliness is defined as the unfavorable subjective psychological situation which originates from the discrepancy between the existing social relations and desired social relations (Perlman and Peplau, 1984:15). Although loneliness is evaluated as the synonym of "being alone", it doesn't mean the same. The individual may feel alone while there is none around, but he/she can feel alone within the crowds or within other people as well (Buchholz and Catton, 1999: 204).

Loneliness is a sense that can affect the whole life of an individual. It can cause the person to feel lonely, to think that the life is aimless and useless, and to experience the emotion of emptiness and abandonment. This emotion can affect their life perception and life satisfaction. Thus, the loneliness emotion of the individuals can be correlated with the satisfaction that they get from life, in other words life satisfaction (Yılmaz and Altınok, 2009: 456).

Loneliness is the cognitive and emotional compulsion situation which originates from the interaction of individual and outer environmental factors, and which hurts and frustrates people, kills their hopes. For instance; individually lack of self-perceiving, self-awareness, and self-esteem; environmentally effects of factors such as losing a relative, divorce,

migration, social stress, uncertainty, chaos, and lack of social interaction and communication etc. and many other factors mutually stimulate each other and drag individual to alienation and loneliness. On the other hand, interaction and communication is a phenomenon that connects the person to life, socializing and building the individual. From this point of view, loneliness is the imprisonment in oneself, while interaction and communication is the basic activity which frees the person from imprisonment, brings one into being, and enriches the person (Armağan, 2014: 28).

Recreation and Socialization

According to Neumeyer (1958), in general terms, recreation is defined as any kind of activity that is performed individually or collectively in spare times for enjoyment and satisfaction, and that is freely decided among alternatives by the individuals. According to Torkildsen's (2005) definition, recreation is the volunteered activity or experience that the individuals participate and freely decide among alternatives in their spare times in order for satisfying desires and wishes (Argan et al., 2013: 18).

Recreation is generally defined as the voluntarily chosen individual or group activities, which are in spare time not related with the time allocated for work or obligatory needs, and which are aimed to get pleasure and delight to recover, protect and maintain mental and physical health that is affected or endangered by the intense work burden, routine life style, or negative environmental factors (Karaküçük, 1997: 54).

Çelik (1996) defines socialization as the process of learning and adoption of a doing, perceiving, and thinking styles of a certain society at the end of mutual interaction of a person with other people. For Kenyon and Pherson (1974) socialization is assimilation and development of knowledge, skill, value, tendency, and personality perceptions that are necessary for fulfilling existing or expected duties in the society (Atalay, Akbulut and Yücel, 2013: 20).

Healthy socialization has numerous positive effects on the individual. Ultimately, self-confidence, and rules and values system of an individual develops. Socialization also helps understanding and tolerance towards others. Socialization helps social integration realized (Coşgun, 2012: 5).

Human beings inherently created with social features. They do not only meet their basic physologic needs in their relations with each other. They meet their social needs such as participation, adoption, and intimacy as well. Socialization is a long process. Recreation activities are a service process for socialization. Particularly the habits adopted in the spare times affect the whole life. With socialization process, the individual learns the role expectaitons of the society that he/she lives in (Ağduman, 2014: 10).

Recreation activities have an important place in one's socialization because they provide participation of the individual to the dynamic social environments. All of the human beings are socialized by participating in plays, sports, and other activities in the childhood. All kinds of recreation activities form a social experience (Doğduay and Yenigün, 2012: 1014). Especially as a result of economic development, reduction of working hours, and increase of family income, people found more chance to take part in various leisure time activities to fulfill their social needs (Türkmen, 2013: 2141).

Method

The aim of this research is to examine the relationship between individual perception of loneliness and socialization with recreational activities. Additionally, another aim of this study is to analyze whether there is a statistically significant difference between the demographic variables and the sense of loneliness of the individuals.

The universe of the research is composed of the students who are studying in state universities in Konya province. Sample group is comprised of 371 students studying at Necmettin Erbakan University Faculty of Tourism, Recreation Department and Selçuk University Faculty of Sport Sciences, Recreation Department. The research was conducted with convenience sampling method, which is one of the non-probability sampling methods, due to the time limitation, cost, and difficulty in reaching to all of the members of the research universe. 372 students participated in the survey, 6 of which were excluded from the evaluation due to missing information or mistakes. Accordingly, the analyses are conducted on 366 questionnaire forms.

The questionnaire form used in the research consisted of two sections. The first section of the survey is comprised of the questions to determine the demographic features of the participants. *"UCLA Loneliness Perception Scale"* that was adapted to Turkish by Durak and Şenol-Durak (2010), and *"Socialization Scale in Recreational Activities"* which was developed by Şahan (2007) were used in the second section. The questionnaire forms in this section are comprised of 44 questions. The articles in the questionnaire form were evaluated by the five point Likert scale such as "Strongly Disagree (1)", "Disagree (2)", "Undecided(3)", "Agree (4)", "Strongly Agree (5)".

SPSS 22.0 program was used in the data analysis. The difference between the loneliness perception levels of the participants was observed with independent variables T-Test analysis according to the gender, age difference, and the university variables; while the difference between the loneliness perception levels of the participants was observed with one-way ANOVA analysis. In order to measure the relation and the direction of the relation, between the loneliness perception variable and socialization with recreational activities variable, correlation and regression analyses were used respectively.

Findings

In the analyses, firstly the distributions of the participants based on socio-demographic features were evaluated with frequency analysis. Demographic data regarding gender, age, educational status of parents, and the universities that the students are studying was shown in Table 1.

Table 1. Demographic Features of the Participants

Demographic Variables	Value	Frequency	Percentage	Demographic Variables	Value	Frequency	Percentage
Gender	Male	224	61,2	Education Status (Father)	Primary	133	36,3
					Secondary	87	23,8
	Female	141	38,5		High School	103	28,1
					University	40	10,9
	Lost Value	**1**	**0,3**		**Lost Value**	**3**	**0,8**
	Total	**366**	**100**		**Total**	**366**	**100**
Age	16-20	224	61,2	Education Status (Mother)	Primary	144	39,3
					Secondary	78	21,3
	21-25	142	38,8		High School	49	13,4
					University	12	3,3
	Total	**366**	**100**		**Lost Value**	**83**	**22,7**
					Total	**366**	**100**
University	Necmettin Erbakan University	187	51,1	University	Selçuk University	179	48,9
					Total	**366**	**100**

When Table 1 is examined it is seen that 61,2 % of the participants are male while female participants account for 38,5 %. Moreover, 61,2 % of them are in between 16-20 ages, while 38,8 % of them are in between 21-25 ages. On the other hand, when the universities that the participants were studying at are examined, it is seen that 51,1 % of them are students at Necmettin Erbakan University, while Selçuk university students account for 48,9 %. When the educational status of the parents of the participants are examined, it is determined that 36,3 % of the fathers are graduate of primary school, 23,8 % secondary school, 28,1 % high school, and 10,9 % university; while 39,3 % of the mothers are graduate of primary school, 21,3 % secondary school, 13,4 % high school, and 3,3 % university.

Both *"Loneliness Perception Scale (Cronbach's Alpha; α=,797)"* and *"Socialization Scale in Recreational Activities (Cronbach's Alpha; α=,888)"* scales were determined to be quite reliable according to the results of reliability analysis.

When the results of the T-Test and ANOVA analysis regarding the difference between loneliness perceptions based on the demographic features of the (gender, age, educational status of parents, university studied at) participants are analyzed, it is determined that there was no statistically significant difference between the perception levels of the participants regarding "Loneliness Perception".

Table 2. Results of Correlation Analysis

		Loneliness Perception	Socialization with Recreational Activities
Loneliness Perception	Pearson Correlation	1	,393**
	Significance (Sig.)		,000
	N	366	366
Socialization with Recreational Activities	Pearson Correlation	,393**	1
	Significance (Sig.)	,000	
	N	366	366

***Correlation is significant in 0.01 level.*

At the end of the correlation analysis, when the Table 2 is examined, it is observed that there is a positive and 0,393 significant relation between loneliness perception variable and socialization with recreational activities variable.

Table 3. Results of Regression Analysis

Model Summary	F value	Significance p value	R^2	Standardized Factor(Beta)	t statistics	Significance p value
	66,634	,000	,155			
Loneliness Perception				,393	8,163	,000

Dependent Variable: Socialization with Recreational Activities.

The most important figure that should be interpreted on Table 3 is the F=66,634 value, which shows the significance of the model, and p=0,000 value which shows the significance level of this value. The findings obtained at the research are supporting that the model is statistically significant. The explanatory power of the established regression model is R^2=,155. According to this result, 95 % change in the dependent variable is explained with the independent variable that was included into the model. With other words, 95 % part of the change in socialization with recreational activities is explained with the changes in loneliness perception. As seen on Table 3 are the imputed values of the factors (β=,393) obtained from regression analysis, and t value (t=8,163) regarding these. At the end of the research, it was determined that the loneliness perception of the individuals have a positive (β=,393) and significant (p=0,000) effect on the socialization with recreational activities variable. In this context, we can mention that the individuals with a perception of loneliness increase their socialization levels by participating in recreational activities and try to be free from the loneliness perception.

Discussion and Conclusion

In this research, which aimed to examine the relation between loneliness perception and socialization with recreational activities, it was determined that the individual tries to socialize with recreational activities in order to be free from loneliness perception she/he suffers. Additionally, it was determined that there is no statistically significant result between socio-demographic features of the participants and loneliness perception.

It was determined that there is no statistically significant difference between socio-demographic features (gender, age, educational status of the parents, and the universities of the students) of the participant students and their loneliness perception. Similarly, in the study of Uzuner and Karagün (2014) it was determined that there was no statistically significant difference between gender, age and loneliness perception. Moreover, in the study of Karademir and Öz (2016) it was determined that there was a statistically significant difference between age and loneliness perception, while there was a statistically significant difference between gender and loneliness perception. In this study it was observed that female students have more loneliness perception compared to male students. In spite of that it was determined that the male students have more loneliness perception compared to female students in Armağan (2014).

When the socio-demographic findings are examined, as shown by the results of similar studies, it was determined that some variables pertaining to demographic structure do not have any effect on loneliness perception, rather it rises as the result of one's own values. In this research, no statistically significant result was obtained depending on socio-demographic variables close to the results of the previous similar researches. Accordingly, in further studies, identity, personality, and character features, which differentiate individuals from others, can be studied in order to reach a significant difference or relation with loneliness perception rather than variables in socio-demographic structure of the individual.

In the studies conducted by Atalay et al. (2013), it was determined that the individual increases the socialization level with recreational activities and thus continues to her/his life more social and free of loneliness perception in social life. In the study conducted by Ekinci et al. (2015), it was determined that there was a statistically significant difference between loneliness perception and participation in recreational activities, and this result is evaluated that recreative activities help individual socialize and this factor naturally contributes individuals to not feel lonely. Similar results were reached in this study. It was determined that the individuals get free from loneliness perception they suffer by tending towards recreational activities. In the light of this information, it is thought that recreative applications help improve self-confidence, self-realization, and self-esteem, thus the individual obtains a better position in the social life, and they make great contributions to individuals for social integration.

As the conclusion, in line with the aim of the research, it was examined whether there was a statistically significant relation between loneliness perception and socialization with recreational activities. At the end of the analyses conducted, it was determined that there was a statistically significant relation between loneliness perception and socialization with recreational activities. It was observed that recreational activities have a decreasing effect on the loneliness perception and that individuals with perception of loneliness increase their socialization levels by participating in recreational activities and try to be free from the loneliness perception.

Conflicts of Interest

The authors have no conflicts of interest to acknowledge.

Corresponding Author

Murat KOÇYİĞİT
Necmettin Erbakan University, Institute of Social Sciences, Department of Recreation Management, Konya, TURKEY
Email: mkocyigit@konya.edu.tr; **Tel:** +90545 3352706

REFERENCES

Ağduman F (2014). Üniversite Öğrencilerinin Boş Zaman Motivasyon ve Tatminlerinin İncelenmesi. 10. Erzurum: Masters Thesis.

Argan M, Yüncü D, Coşkun İO, Sevil T, Özel Ç, Yüncü H, Şimşek K (2013). *Rekreasyon Yönetimi.* Eskişehir: Anadolu Üniversitesi Yayınları.

Armağan A (2014). Yalnızlık ve Kişilerarası İletişim İlişkisi: Öğrenciler Üzerinde Bir Araştırma. *Uluslararası Sosyal Araştırmalar Dergisi*, 28.

Atalay A, Akbulut K, Yücel S (2013). Bireylerin Sosyal Algı ve Sosyalleşme Düzeylerinin Gelişiminde Rekreasyonel Uygulamaların Önemi. *Uluslararası Hakemli Aile Çocuk ve Eğitim Dergisi, 1*(1), 18-20.

Buchholz E, Catton R (1999). Adolescents' perceptions of aloneness and loneliness. *Adolescence*, 204.

Coşgun M (2012). Gençlerin Kimlik Gelişimi ve Sosyalleşme Sürecine Televizyon Dizilerinin Etkisi (Sakarya İli Kocaali İlçesi Örneği). *Akademik Bakış Dergisi*(28), 5.

Doğduay G, Yenigün Ö (2012). Mental Retardasyonlu Çocuklarda Rekreasyon Faaliyetlerinin Sosyal Gelişime Etkilerinin İncelenmesi. *1. Rekreasyon Araştırmaları Kongresi*, (s. 1014). Antalya.

Durak M, Şenol-Durak E (2010). Psychometric Qualities of the UCLA Loneliness Scale-Version 3 as Applied in Turkish Culture. *Educational Gerontology*, 36(10-11), 988- 1007. DOI: 10.1080/03601271003756628

Ekinci NE, Demirel M, Demirel Harmandal D, Utku I (2015). Lise Öğrencilerinin Yalnızlık Algılarının Rekreasyonel Etkinliklere Katılımları ve Bireysel Değişkenlere Göre İncelenmesi. *Sportif Bakış: Spor ve Eğitim Bilimleri Dergisi*, 72.

Karademir Y, Öz E (2016). Güzel Sanatlar Ve Spor Eğitimi Alan Üniversite Öğrencilerinin Yalnızlık Düzeylerinin İncelenmesi: Karabük Üniversitesi Örneği. *Sosyal ve Liberal Bilimlerde Yeni Yönelimler*, 129.

Karaküçük S (1997). *Rekreasyon: Boş Zamanları Değerlendirme.* Ankara: Gazi Kitabevi.

Perlman D, Peplau LA (1984). Loneliness Research: A Survey Of Empirical Findings. *Preventing the Harmful Consequences of Severe and Persistent Loneliness* (s. 15). içinde U.S. Government Printing Office.

Şahan H (2007). Üniversite Öğrencilerinin Sosyalleşme Sürecinde Spor Aktivitelerinin Rolü. Unpublished Doctoral Thesis. Konya: Selçuk University, Social Sciences Institute.

Türkmen M, Kul M, Genç E, Sarıkabak M (2013). Konaklama İşletmesi Yöneticilerinin Rekreasyon Algı ve Tutumlarının Değerlendirilmesi: Batı Karadeniz Örneği. *Turkish Studies*,8(8), 2141.

Uzuner ME, Karagün E (2014). Rekreatif Amaçlı Spor Yapan Bireylerin Yalnızlık Düzeylerinin İncelenmesi. *Kocaeli Üniversitesi Sosyal Bilimler Dergisi*(27), 111.

Yılmaz E, Altınok V (2009). Okul Yöneticilerinin Yalnızlık ve Yaşam Doyum Düzeylerinin. *Educational Administration: Theory and Practice*(59), 456.

International Journal of Science Culture and Sport
December 2017 : 5(4)
ISSN : 2148-1148
Doi : 10.14486/IntJSCS711

Field ***:*** *Sports Biomechanics*
Type ***:*** *Research Article*
Received: *13.11.2017* ***-*** ***Corrected:*** *12.12.2017* ***-*** ***Accepted:*** *12.12.2017*

Effects of Fatigue Related to Uphill on Kick Double Pole Kinematics of Young Cross Country Skiers

Mehmet GÜNAY, Elif ÖZ, İmdat YARIM, Ebru ÇETİN
Gazi University, Faculty of Sport Sciences, Ankara, TURKEY
Email: mgunay@gazi.edu.tr, elifoz@gazi.edu.tr, imdat@gazi.edu.tr, ecetin@gazi.edu.tr

Abstract

The purpose of this study was to examine the effect of fatigue due to uphill on the kick double pole technique. Ten young male subjects volunteered to study. Subjects' cross country sprint times were taken using a kick double pole technique with maximum effort for 1 km in a climbing course with an average slope of 4%. In accordance with these measured times, a separate average speed for each subject was modified, and the subjects were tested on the treadmill at these specified speeds, with the same duration, slope, and technique. Each participant was asked to perform three trials with half an hour between them. Kinematic data were obtained using a three-dimensional motion capture system (Vicon Peak, Oxford, UK). Statistical analysis was performed by separating the variables into 3 separate groups: a) periods of time b) distance data c) joint angles. In conclusion, in kinematic data analyzed according to the fatigue of climb, there was a significant difference between the duration of the poling times, duration of the first cycles with the left leg propulsion and the last cycles, and the duration of the first cycles with the right leg propulsion and left leg propulsion. Significant differences were found in the hip, shoulder, elbow and trunk angles. Significant differences were also found among all the identified distances.

Keywords: Cross country skiing, kinematics, simulated competition, sports biomechanics

Introduction

Contemporary skiing races are characterized by higher skiing speed and performance, with higher and lower body capacities being higher (Saltin, 1997), the development of neuromuscular and technical skills. The majority of cross-country (XC) skiing techniques have undergone significant changes over the past decade (Holmberg, 2005; Holmberg et al., 2005; 2006; Mikkola et al., 2007, Stöggl et al., 2008; Lindinger et al., 2009a). Kick double poling is characterized by a propulsive leg push between double poling actions for momentum conservation in light uphill conditions (Smith, 2002) and leg push is similar to diagonal skiing (Lindinger et al., 2009b).

Sprint races in XC skiing was first held in the mid-1990s. In short, a sprint contest in the XC skiing is divided into two parts: the first one is a qualification heat in the form of a time trial, and the second one is a three series final competition with about 20-25 minutes between, after a 1-3 hour break. The fastest 16 or 30 skiers qualify for the final competition, where each heat competes with four to six athletes (depending on the mode), only the fastest two being the next level. In the past few years, with regard to the classic WC sprint races in the XC skiing, a single sprint run has a mean distance of 1350 m and a qualification duration of 2 minutes and 50 seconds. In order to be in the first eight in a sprint competition, an athlete must pass four heats with a race time of about 3-4 hours (Smith, 2002). With sprint events becoming more popular, different approaches to specific sprint training, testing, and skiing techniques have begun to emerge. To date, the published literature on physiological stress and biomechanical properties measured in the XC skiing sprint race is not sufficient.

Technical changes have been developed in the XC skiing over the past decade (eg Stöggl and Müller, 2009). For example, Holmberg et al. (2005) introduced the new, “modern” double-poling technique characterized by smaller joint angles, higher flexion velocities, and higher pole forces applied during a shorter poling time compared to “traditional” double-poling technique. One of the most important sub-techniques of the classical style, the kick double poling technique, in the skiing run, is due to the better transfer of thrust to the baton (Losnegard et al., 2017). It is also frequently used at the start and finish of all competitions, except for the classic sprint ski run competitions. In addition, it can be assumed that the XC sprint is determinant for ski performance. Therefore, it can be said that neuromuscular characteristics and kick double poling performance characteristics are important in competition performance.

Simulated XC sprint skiing induces muscle fatigue (reduction in sprinting performance, leg force, and upper limb power output; Zory et al., 2006). Furthermore, Vesterinen et al. (2009) observed a decrease in the spurt velocity associated with decreased neural muscle activation during the heats. The fatigue accumulation in a sprint race also depends on the recovery times between the series. Zory et al. (2009) suggested that fatigue in a sprint race alters kinematic patterns (greater trunk, hip, and pole angles) of double poling leading to a decreased cycle (and sprinting) velocity. However, the extent to which fatigue affects the power output in the XC sprint ski race has not been reported.

When the investigations were examined, it was observed that they carried out with the athletes on the elite level. In addition to the importance of increasing the number of repetitions applied to the substructure for the perfection of the technique. It is also one of the main objectives to adapt to the factors such as the physiological changes that take place when applying the technique. In addition to the biomechanical analysis of the technical movements of the elite level athletes, it is very important that the kinematic variables exhibited by young

athletes during this technique are observed and evaluated. Therefore, the aim of this study is to examine the effect of fatigue due to uphill on the kick double pole technique.

Methods

Participants

Ten XC skiers from the Turkish national team (mean age = 17,6 ± 1,3 yr, body weight = 65.6 ± 8.0 kg, body height = 175.0 ± 4.0 cm) volunteered to participate in the study. The selected skiers were familiarized with the skiing on the treadmill. All participants were fully acquainted with the nature of the study before they gave their written, informed consent to participate.

Experimental procedure

XC sprint times of subjects were taken using a kick double pole technique with maximum effort for 1 km in a climbing course with an average slope of 4%. The trial times were recorded by a stopwatch (Seiko Interval Timer, Tokyo, Japan). In accordance with these measured times, a separate average speed for each subject was modified, and the subjects were tested on the treadmill at these specified speeds, with the same duration, slope, and technique. Each participant was asked to perform three trials with half an hour between them.

Trials were performed on a treadmill (h/p/Cosmos Saturn 4.0, Germany) customized for XC roller skiing, with speed and steepness controlled by a computer. After a 20-min warm-up skiing at a self-selected but low intensity (under lactate threshold), a rest period of 20 min was observed during which small reflective spherical markers (diameter 17 mm) were attached to the participant's left and right front heads (over the left and right temple), left and right back heads (on the back of the head, roughly in a horizontal plane of the front head markers), 7th cervical vertebrae, 10th thoracic vertebrae, clavicle (Jugular Notch where the clavicles meet the sternum), sternum (Xiphoid process of the sternum), right back (in the middle of the right scapula), left and right shoulders (on the Acromio-clavicular joint), left and right upper arms (on the upper arm between the elbow and shoulder markers), left and right elbows (on lateral epicondyle approximating elbow joint axis), left and right forearms (on the lower arm between the wrist and elbow markers), left and right wrists (A: left and right wrist bar thumb side, B: left and right wrist bar pinkie side), left and right fingers (on the dorsum of the hand just below the head of the second metacarpal), pelvis (left and right ASIS: over the left and right anterior superior iliac spines, left and right PSIS: over the left and right posterior superior iliac spines), left and right knees (on the lateral epicondyle of the left and right knees), left and right thighs (over the lower lateral 1/3 surface of the thigh, just below the swing of the hand), left and right ankles (on the lateral malleolus along an imaginary line that passes through the transmalleolar axis), left and right tibial wands (over the lower 1/3 of the shank), left and right toes (over the second metatarsal head, on the mid-foot side of the equinus break between fore-foot and mid-foot), left and right heels (on the calcaneous at the same height above the plantar surface of the foot as the toe marker).

The simulation consisted of three 1000 m trials (with an average incline of 4º) using kick double pole technique. Participants skied at their own average speeds from beginning of the test to the end. Participants were instructed to ski as naturally as possible, using kick double pole technique and to adopt the ski technique that was most comfortable under the current condition. Similar models of roller skis (NORD, SkiSkett, Italy) and poles (CT1, Swix, Norway) were used by the participants.

The positions of the anatomical markers were continuously sampled using a motion capture system (200 Hz) with eight MX T10-S cameras (Vicon Motion Systems Ltd, UK) placed around the treadmill in order to locate the markers whatever their positions. At the beginning of the test, calibration measurements were taken for the reconstruction of the 3D coordinates of the anatomical markers.

Data treatment

Three-dimensional reconstruction of the coordinates of the markers was obtained, digitized and modeled with the Vicon Nexus software (Nexus 1.8.4, Vicon, Oxford, UK) with an error of about 1 mm in each dimension. Marker trajectory data were filtered using a Woltring quantic spline filter with a predicted mean square of 20 mm (Woltring, 1986).

Statistical analysis was performed by separating the variables into 3 separate groups: a) periods of time b) distance data c) joint angles. Wilcoxon paired two-sample test was used to determine whether there was a significant difference in the variables, and the level of significance was determined as $P < 0.05$.

Results

Time characteristics

All time variables and differences are shown in Table 1 and 2. Left foot push cycle time and poling time was greater than right foot push. Especially, poling time is the main focus of this study and it was significantly different between first 5 cycles (right leg stroke and left leg stroke, 1,35 ± 0,14 and 1,35 ± 0,13 sec) and first and last cycles during left leg stroke (1,37 ± 0,14 and 1,36 ± 0,12 sec).

Distance characteristics

All distance variables and differences are shown in Table 3 and 4. Significant differences were found at all other distances except the right shoulder-treadmill distance in the first cycles with the left and right leg propulsion ($P<0.05$). Differences were determined by the distance between the right foot-pole and the left foot-pole relative to the thrust foot in the initial cycles. The left foot-pole distance is longer than the right foot-pole distance (left foot-pole distance is 1.00 ± 0.17, and right foot-pole distance is 0.49 ± 0.12 m) in the first cycles with the left leg propulsion. However, in the first cycles, it was determined that the distance between the elbow and the treadmill and the distance between the shoulder and the treadmill were greater in the cycles with the left leg propulsion than the cycles with the right leg propulsion (Left leg propulsion and right leg propulsion respectively, left elbow-treadmill distance is 1.27 ± 0.05 and 1.26 ± 0,05 m; right elbow-treadmill distance is 1.28 ± 0.05 and 1.26 ± 0.04 m; left shoulder-treadmill distance 1,45 ± 0,05 and 1,44 ± 0,06 m).

Significant differences were found in the other parameters except right hand-right shoulder and right shoulder-treadmill distance in the last cycles with the left and right leg propulsion. As in the initial cycles, the right foot-pole distance in the last cycles with the right leg propulsion, the left foot-pole distance in the last cycles with the left leg propulsion is longer than the other pole and foot distances (In the last cycles of the right foot propulsion, the left foot-pole is 0.46 ± 0.10 m and the right foot-pole is 0.96 ± 0.19 m; in the last cycles of the left foot propulsion, the left foot-pole is 0.94 ± 0.17 and the right foot-pole is 0.46 ± 0,12 m). The distances in the variables determined in the last cycle of the left foot impulse were found to be longer than those of the right foot impulse.

When the start and end cycles of the same limb are compared; a more significant difference was detected in the left propulsive cycles than the right leg propulsive cycles. A significant decrease was detected at only the right foot-pole distance in the first and last cycles of the right leg propulsion (First cycles with right leg propulsion 1,02 ± 0,18 m, last cycles 0,96 ± 0,19 m). In the first and last cycles of the left foot propulsion, a significant decrease in the right hand-shoulder (0,34 ± 0,05 and 0,33 ± 0,05 m), the left foot-pole (1,00 ± 0,17 and 0,94 ± 0.17m), right foot-pole (0.49 ± 0.12 and 0.46 ± 0.12 m), right hand-treadmill (1.36 ± 0.03 and 1.35 ± 0, 04 m) have been detected.

Angle characteristics

All angle variables and differences are shown in Table 5 and 6. There was a significant difference in the hip, shoulder and trunk-treadmill joints in the first cycles of right and left leg propulsion. The hip joints on the side of the propulsive leg are larger than the hip joint on the other side (In the right leg propulsion cycles, right hip joint angle is 163,4 ± 6,9º, left hip joint angle is 148,9 ± 8,1º; in the left leg propulsion cycles, left hip joint cycle angle is 168,1 ± 5,8º, right hip joint angle is 144,9 ± 8,6º). Conversely, the shoulder joint angle at the side of the propulsive leg is smaller than at the shoulder joint angle at the other side (In the right leg propulsion cycles, right shoulder joint angle is 67,2 ± 7,2º, left shoulder joint angle is 69,4 ± 7,8; in the left leg propulsion cycles, left shoulder joint angle is 67,9 ± 8,7º, right shoulder joint angle is 68,8 ± 6,2º). In the initial cycles, the trunk-treadmill angle was greater in the left leg thrust (In left leg thrust, 60,7 ± 5,2º; and in right leg thrust, 59,8 ± 5,4º).

There was a significant difference between the hip, shoulder and left elbow joints in the last cycles. As in the initial cycles, the hip joint angles on the thrusting leg side are larger than the hip joint angles of the other side (In the right leg propulsion cycles, right hip joint angle is 167,1 ± 9,3º, left hip joint angle is 143,8 ± 8,4º; in the left leg propulsion cycles, left hip joint angle is 166,4 ± 7,6º, right hip joint angle is 143,6 ± 8,1º). Conversely, the angle of the shoulder joint at the side of the thrusting leg is smaller than at the angle of the shoulder joint at the other side (In the right leg propulsion cycles, right shoulder joint angle is 66,9 ± 8,8º, left shoulder joint angle is 70,3 ± 8,3; in the left leg propulsion cycles, left shoulder joint angle is 68,3 ± 9,8º, right shoulder joint angle is 69,4 ± 8,5º). In the end cycles, the angle of the left elbow joint was larger in the left leg propulsion (In left leg thrust, 70,4 ± 8,6º; and in right leg thrust, 68,4 ± 7,4º).

When the start and end cycles of the same limb are compared; there was no significant difference in left leg thrust cycles. In the first and last cycles of the right leg propulsion, there was a significant difference in the hips, left elbow, and trunk-treadmill sides. In the last cycles of right leg thrust compared to the beginning, the left hip, left elbow and trunk-treadmill angles were decreased (Left leg propulsion and right leg propulsion respectively, left hip joint angles were 148,9 ± 8,1º and 143,8 ± 8,4º; left elbow joint angles were 70.2 ± 8,1º and 68,4 ± 7,4º; trunk-treadmill angles were 59,8 ± 5,4 and 58,5 ± 5,4), and the right hip joint angle has increased (First and last cycles respectively, 163,4 ± 6,9º and 167,1 ± 9,3º).

Table 1. Time characteristics during XC double poling (n=10, the cycle number for each subject=60, Total cycle number for each parameters=600)

Time (second)	Right Leg First 5 cycle	Left Leg First 5 cycle	Right Leg Last 5 cycle	Left Leg Last 5 cycle
Cycle time	1,35 ± 0,14	1,35 ± 0,13	1,37 ± 0,14	1,36 ± 0,12
Poling time	0,40 ± 0,05	0,41 ± 0,05	0,40 ± 0,04	0,40 ± 0,05
Recovery time	0,95 ± 0,15	0,94 ± 0,14	0,97 ± 0,16	0,97 ± 0,14

Table 2. The P values of the time characteristics

	Right vs. Left First 5 cycle	Right vs. Left Last 5 cycle	Right vs. Right First 5-Last 5	Left vs. Left First 5-Last 5
Cycle time	0,922	0,492	0,332	0,232
Poling time	0,004*	0,846	0,77	0,037*
Recovery time	0,375	0,557	0,492	0,084

**: P<0,05*

Table 3. Distance characteristics during XC double poling (n=10, the cycle number for each subject=60, Total cycle number for each parameters=600)

Distance (m)	Right Leg First 5 cycle	Left Leg First 5 cycle	Right Leg Last 5 cycle	Left Leg Last 5 cycle
Left hand-left shoulder	0,35 ± 0,04	0,35 ± 0,04	0,35 ± 0,04	0,36 ± 0,04
Right hand-right shoulder	0,34 ± 0,05	0,34 ± 0,05	0,33 ±0,04	0,33 ± 0,05
Left foot-pole	0,46 ± 0,10	1,00 ± 0,17	0,46 ± 0,10	0,94 ± 0,17
Right foot-pole	1,02 ± 0,18	0,49 ± 0,12	0,96 ± 0,19	0,46 ± 0,12
Left hand-treadmill	1,34 ± 0,04	1,34 ± 0,04	1,33 ± 0,05	1,32 ± 0,05
Right hand-treadmill	1,34 ± 0,03	1,36 ± 0,03	1,34 ± 0,03	1,35 ± 0,04
Left elbow-treadmill	1,26 ± 0,05	1,27 ± 0,05	1,27 ± 0,05	1,28 ± 0,05
Right elbow-treadmill	1,26 ± 0,04	1,28 ± 0,05	1,27 ± 0,05	1,27 ± 0,06
Left shoulder-treadmill	1,44 ± 0,06	1,45 ± 0,05	1,44 ± 0,05	1,45 ± 0,06
Right shoulder-treadmill	1,44 ± 0,06	1,45 ± 0,06	1,44 ± 0,06	1,45 ± 0,06

Table 4. The P values of the distance characteristics

	Right vs. Left First 5 cycle	Right vs. Left Last 5 cycle	Right vs. Right First 5-Last 5	Left vs. Left First 5-Last 5
Left hand-left shoulder	0,014*	0,037*	0,695	0,846
Right hand-right shoulder	0,049*	0,322	0,131	0,037*
Left foot-pole	0,002*	0,002*	1	0,037*
Right foot-pole	0,002*	0,002*	0,010*	0,049*
Left hand-treadmill	0,010*	0,006*	0,625	0,275
Right hand-treadmill	0,002*	0,006*	0,846	0,020*
Left elbow-treadmill	0,002*	0,010*	0,064	0,232
Right elbow-treadmill	0,049*	0,846	0,232	0,557
Left shoulder-treadmill	0,004*	0,027*	0,922	1
Right shoulder-treadmill	0,064	0,432	0,625	0,557

*: $P<0,05$

Table 5. Angle characteristics during XC double poling (n=10, the cycle number for each subject=60, Total cycle number for each parameters=600)

Angle (Degree)	Right Leg First 5 cycle	Left Leg First 5 cycle	Right Leg Last 5 cycle	Left Leg Last 5 cycle
Left hip	148,9 ± 8,1	168,1 ± 5,8	143,8 ± 8,4	166,4 ± 7,6
Right hip	163,4 ± 6,9	144,9 ± 8,6	167,1 ± 9,3	143,6 ± 8,1
Left shoulder	69,4 ± 7,8	67,9 ± 8,7	70,3 ± 8,3	68,3 ± 9,8
Right shoulder	67,2 ± 7,2	68,8 ± 6,2	66,9 ± 8,8	69,4 ± 8,5
Left elbow	70,2 ± 8,1	71,3 ± 8,6	68,4 ± 7,4	70,4 ± 8,6
Right elbow	68,7 ± 13,9	69,5 ± 13,6	67,2 ± 13,6	68,1 ± 13,7
Left knee	139,4 ± 6,2	143,1 ± 8,5	140,0 ± 6,2	142,6 ± 7,9
Right knee	140,9 ± 7,0	138,9 ± 8,7	136,1 ± 10,8	131,9 ± 18,5
Trunk-treadmill	59,8 ± 5,4	60,7 ± 5,2	58,5 ± 5,4	59,2 ± 6,1

Table 6. The P values of the angle characteristics

Angle (Degree)	Right vs. Left First 5 cycle	Right vs. Left Last 5 cycle	Right vs. Right First 5-Last 5	Left vs. Left First 5-Last 5
Left hip	0,002*	0,002*	0,002*	0,232
Right hip	0,002*	0,002*	0,049*	0,232
Left shoulder	0,014*	0,020*	0,375	0,625
Right shoulder	0,004*	0,004*	0,846	0,77
Left elbow	0,084	0,049*	0,027*	0,275
Right elbow	0,16	0,232	0,131	0,084
Left knee	0,064	0,322	0,625	0,557
Right knee	0,432	0,557	0,557	0,922
Trunk-treadmill	0,0,27*	0,375	0,037*	0,084

*: $P<0,05$

Discussion and Conclusion

The purpose of this study is to examine the effect of fatigue due to uphill on the kick double pole technique. The kick double pole in skiers is the most complicated technique especially applied in classical style technique. But it is important to use that in technical transitions and acceleration. Transitions in the classical technique are mostly made by kick double poles. The more this technique is, the better the speed transfer will be. In a competition, the result can be determined in milliseconds. It is also extremely important in terms of not losing time between techniques and making it accelerate gradually. In this study, phase durations, joint angles, and distances of the subjects in the kick double pole technique were examined in the beginning and ending cycles (as the right and the left leg propulsion cycles). When the start and end cycles were compared, there was a significant decrease related to fatigue between the hip, shoulder, elbow joints and trunk-treadmill angles. This difference in angles brought about changes in the distance between the right and left leg thrust cycles as well as the starting and ending distances. This also affected the cycle characteristics.

A significant decrease in fatigue between the hip, shoulder, elbow joints and trunk-treadmill angles was determined when the initial and final cycles were compared. The most significant decrease in the beginning and end of the right leg propulsion cycles was observed at the left hip joint angle (First and last cycles respectively, 148,9 ± 8,1º and 143,8 ± 8,4º, %3). However, a 2% decrease in the angle of the left elbow joint and a 1% decrease in the body-treadmill angle were determined (Respectively, 70,2 ± 8,1º and 68,4 ± 7,4º; 59,8 ± 5,4º and 58,5 ± 5,4º). As mentioned by Holmberg et al. (2005), the analysis of angle patterns showed that skiers before the beginning of the poling phase used a strong extension of the hip and knee followed by flexion of hip, knee, and ankle during the entire poling phase. Conversely, the poling phase began by a slight flexion of the elbow in the sagittal plan followed by a considerable extension. This flexion–extension alternation reflects the use of the stretch–shortening cycles which constitute an advantageous movement pattern for the triceps brachii muscle driving elbow extension (Smith et al., 1996). Despite the absence of modifications of angular patterns between the first and the last bouts, fatigue significantly modified some angle values. As shown by Holmberg et al. (2005) during double poling, the entire body works as a chain of segments and muscles that are engaged in sequential order starting with trunk and hip flexors, followed by shoulder extensors and the elbow extensor triceps brachii. The alteration of angle patterns of one segment or articulation could induce a series of adaptations for all the other segments. It is thought that this decrease in joint angles may be caused by fatigue. However, if this technique is thought to be better applied by high-level athletes; it can be said that the athletes in this age group are more challenged when applying this technique.

As a result, significant differences in time, angle and distance characteristics were determined depending on the fatigue of the subjects in the study in which biomechanical differences were investigated in relation to fatigue in the climbing of kick double pole technique in young XC skiers. While there have been a lot of studies about biomechanical analysis of elite athlete's technique in the literature (Zory et al., 2006; Zory et al., 2009; Mikkola et al., 2013; Stöggl et al., 2007; Stöggl et al., 2008; Göpfert et al., 2013; Holmberg et al., 2005) not enough research has been found on young athletes. Therefore, these findings are important for practitioners. Also, if biomechanical analyses are performed by elite athletes using the kick double pole technique; the difference between the technical pattern applied by young athletes and elite athletes; will set the course for young athletes to achieve the optimal technique.

Acknowledgements

This article was supported by Gazi University Projects of Scientific Investigations Unit with project code 20 / 2012-02.

Conflicts of Interest

The authors have no conflicts of interest to acknowledge.

Corresponding Author

Elif ÖZ
Gazi University, Faculty of Sport Sciences, Gazi Mahallesi Abant Sokak No:12
06330 Yenimahalle/Ankara, TURKEY
Email: elifoz@gazi.edu.tr; **Tel:** +905056342227

REFERENCES

Göpfert C, Holmberg HC, Stöggl T, Müller E, Lindinger SJ (2013). Biomechanical characteristics and speed adaptation during kick double poling on roller skis in elite cross-country skiers. Sports biomechanics, 12(2), 154-174.

Holmberg HC (2005). Physiology of cross-country skiing – With special emphasis on the role of the upper body (Doctoral dissertation). Karolinska Institutet, Stockholm.

Holmberg HC, Lindinger S, Stöggl T, Eitzlmair E, Muller E (2005). Biomechanical analysis of double poling in elite cross-country skiers. Medicine and Science in Sports and Exercise, 37, 807–818.

Holmberg HC, Lindinger S, Stöggl T, Bjorklund G, Muller E (2006). Contribution of the legs to double-poling performance in elite cross-country skiers. Medicine and Science in Sports and Exercise, 38, 1853–1860.

Lindinger SJ, Stöggl T, Müller E, Holmberg HC (2009a). Control of speed during the double poling technique performed by elite cross-country skiers. Medicine and Science in Sports and Exercise, 41, 210–220.

Lindinger SJ, Göpfert C, Stöggl T, Müller E, Holmberg HC (2009b). Biomechanical pole and leg characteristics during uphill diagonal roller skiing. Sports Biomechanics, 8, 318–333.

Losnegard T, Myklebust H, Skattebo Ø, Stadheim HK, Sandbakk Ø, Hallén J (2017). The Influence of Pole Length on Performance, O2- Cost and Kinematics in Double Poling. International Journal of Sports Physiology and Performance, 12(2): 211-217.

Mikkola JS, Rusko HK, Nummela AT, Paavolainen LM, Hakkinen K (2007). Concurrent endurance and explosive type strength training increases activation and fast force production of leg extensor muscles in endurance athletes. Journal of Strength and Conditioning Research, 21, 613–620.

Mikkola J, Laaksonen MS, Holmberg HC, Nummela A, Linnamo V (2013). Changes in performance and poling kinetics during cross-country sprint skiing competition using the double-poling technique. Sports biomechanics, 12(4), 355-364.

Saltin B (1997). The physiology of competitive c.c. skiing across a four decade perspective; with a note on training induced adaptations and role of training at medium altitude. In ESH Müller, E Kornexl, C Raschner (Eds.), Science and skiing (pp. 435–469). Cambridge: Chapman & Hall.

Smith GA, Fewster JB, Braudt SM (1996). Double poling kinematics and performance in cross-country skiing. Journal of Applied Biomechanics, 12, 88–103.

Smith GA (2002). Biomechanics of cross country skiing. In H. Rusko (Ed.), Cross country skiing: Olympic handbook of sports medicine (pp. 32–61). Oxford: Blackwell Publishing.

Stöggl T, Lindinger S, Müller E (2007). Analysis of a simulated sprint competition in classical cross country skiing. Scandinavian journal of medicine & science in sports, 17(4), 362-372.

Stöggl T, Müller E, Lindinger S (2008). Biomechanical comparison of the double-push technique and the conventional skate skiing technique in cross-country sprint skiing. Journal of Sports Sciences, 26, 1225–1233.

Stöggl T, Müller E (2009). Kinematic determinants and physiological response of cross-country skiing at maximal speed. Medicine and Science in Sports and Exercise, 41, 1476–1487.

Vesterinen V, Mikkola J, Nummela A, Hynynen E, Hakkinen K (2009). Fatigue in asimulated crosscountry skiing sprint competition. Journal of Sports Science, 27, 1069–1077.

Woltring HJ (1986). A FORTAN package for generalized cross-validatory spline smoothing and differentiation. Advances Engineering Software, 8, 104-113.

Zory R, Millet G, Schena F, Bortolan L, Rouard A (2006). Fatigue induced by a cross-country skiing KO sprint. Medicine and Science in Sports and Exercise, 38, 2144–2150.

Zory R, Vuillerme N, Pellegrini B, Schena F, Rouard A (2009). Effect of fatigue on double pole kinematics in sprint cross-country skiing. Human Movement Science, 28, 85–98.