EUROPEAN Journal of Physical Education and Sport

Has been issued since 2013.
E-ISSN 2409-1952
2022. 10(1). Issued once a year

Journal is indexed by: CrossRef (UK), **Electronic scientific library** (Russia), **European Reference Index for the Humanities and the Social Sciences** (ERIH PLUS) (Norway), **Global Impact Factor** (Australia), **Open Academic Journals Index** (USA), **ULRICH's WEB** (USA).

Postal Address: 1717 N Street NW, Suite 1, Washington, District of Columbia, USA 20036

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Founder and Editor: Cherkas Global University

Release date 05.12.22.

Headset Georgia.

Order № 24.

European Journal of Physical Education and Sport

2022
Is. 1

C O N T E N T S

Articles

Published in the USA
European Journal of Physical Education and Sport
Has been issued since 2013.
E-ISSN: 2409-1952
2022. 10(1): 3-16

DOI: 10.13187/ejpe.2022.1.3
https://ejpes.cherkasgu.press

Articles

Coach Opinions on the Role of Sports in Changing Unaccepted Behaviors in Society

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Abstract

This research was conducted to examine the opinions of coaches about the role of sports in changing behaviors that are not accepted in society. The research was designed as a qualitative research and was carried out by interview method. The research group consists of 23 coaches, which is one of the non-probabilistic sampling strategies and determined by the maximum variety sampling, one of the purposive sampling methods. Research data were collected through a semi-structured interview form developed by the researchers. In the study, the data were evaluated by content analysis method.

According to the first result of the research problem, sports enable individuals to be disciplined, develop a sense of self-confidence, socialize, develop personality, evaluate time correctly, improve their self-skills, lead an orderly life, and make judgments. It also helps individuals to prevent them from making bad friends and to gain awareness of cleanliness. In this context, sports contribute positively to the personal development of individuals. According to the second result of the research problem, sports allow the revealing of behaviors accepted by the society, making individuals useful to the society, directing the society to positive behaviors, changing the perspective that separates the society, and eliminating the understanding of racism. In addition, it helps to adopt the rules of society, to develop the value of love, to gain a sense of brotherhood and to increase the trust in friends. In this context, sports provide positive contributions to social development. According to the third result of the research problem, sports provide positive contributions to the prevention of substance and technology addiction and the prevention of harmful habits by enabling smoking cessation. According to the fourth result of the research problem, sport provides positive contributions to the moral development of individuals by enabling the development of moral behaviors and the value of respect. According to the fifth result of the research problem, sports provide positive contributions to behavioral development by preventing negative behaviors. According to the sixth result of the research problem, sports provide positive contributions to psychological development by allowing anger control. According to the seventh result

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of the research problem, sport provides positive contributions to cognitive development by enabling to distinguish between right and wrong. According to the eighth result of the research problem, sports provide positive contributions to health development by enabling nutrition habits. Finally, according to the ninth result of the research problem, sports create negative effects on value development by causing normalization of behaviors contrary to social values.

Keywords: coach, behavior, sports, society.

1. Introduction

Sports is all of the body movements performed according to some rules, usually based on competition, in the form of individual or collective games (Coknaz, 1998; Erkal, 1992). From the past to the present, great importance has been attached to the phenomenon of sports in every society. So much so that there are many benefits that sports add to people. At this point, it can be stated that sports have positive effects on the health, physical, mental, moral, social and psychological development of individuals. Erden (2007) stated that the main purpose of sports is to contribute to the physical development of individuals, as well as to their spiritual and mental development. In addition, keeping the individual fit and enjoying life is one of the aims of sports (Erden, 2007).

Today, sports and human life have become an inseparable whole. For this reason, conscious and systematic sports based on scientific foundations, regardless of age, play an important role in keeping individuals healthy, successful and happy throughout their lives, as well as keeping their morale high (Yalcinkaya et al., 1993). Sports have become an important element in preventing the loneliness of individuals in society and their irresponsible actions alone. Thanks to sports, individuals begin to tend towards the same goals and experience the feeling of acting together. This situation reveals the aim of unity-togetherness and the same ideal in the society. It can be said that it will be difficult for societies with such a structure to be destroyed or dissolved (Ramazanoglu et al., 2005). Societies that consciously make their individuals do sports, on the one hand, make positive contributions to their individuals, on the other hand, they fulfill an important function for the society as one of the elements of social development. Societies that consist of healthy individuals from all aspects are equally healthy, conscious, strong, prudent, moral, hardworking, and in national unity and integrity. In this context, the most general social purpose of sports is to raise a person who know their duties and responsibilities towards society, has good physical and mental health, constructive, creative, competitive, productive, ethic, virtuous, strong, high moral, behave humanely, personality, honorable, prudent, hardworking generations. Therefore, it can be said that sports allow the creation of a modern society with a high cultural level, a solid social structure and value (Yetim, 2000).

It is an undeniable fact known by all societies that sports play an important role in the moral and social development of individuals, and that sports events teach individuals concepts such as moral character, self-respect, team friendship, competition, game rules, ethics and fair play (Păunescu et al., 2013). Therefore, the adoption of the cultural and moral values accepted by the society by the individuals, the fulfillment of the duties and responsibilities expected from the individual in the society in which they live, will ensure the existence of healthy societies (Gungor, 2000). In order for these actions to take place smoothly, it can be stated that the endless power of sports is constantly needed. On this subject, V. Popescu (2012) in her research aiming to determine which moral values sports activities affect, determined that sports prevent anti-social behaviors such as violence, discrimination and marginalization. Apart from this, in the same study, he concluded that sports develop social behaviors that are accepted by the society such as cooperation, mutual support and understanding other individuals in the relationship. Again, in other studies on this subject, it has been stated that it is possible to learn and teach material and spiritual values through sports activities. Because sports has the power to provide a universal framework for instilling multifaceted values into individuals. Thus, through sports activities, individuals can be provided with unity and solidarity, trust, leadership skills, respect, love, tolerance, peace, conscience, morality, etc. In addition, material values such as earning money and meeting needs can be gained (Deveci and Yildiz, 2022; Yildiz and Guven, 2013).

Despite the above explanations, it has also been stated in the literature that studies on the multifaceted benefits of sports on individuals are limited and inconclusive (Bailey et al., 2009; Morris et al., 2003). For this reason, it can be said that there is a need for research on the effect of

sports on many developmental areas of individuals. In addition, it is known that sports have numerous positive effects in directing the behaviors that are not accepted in the society to positive behaviors. In this context, it is a fact that deeper information on the subject is needed. In particular, when the literature is examined, it is seen that the opinions of the coaches, who are one of the most important stakeholders of sports, are not reflected in the studies carried out. Therefore, it can be said that knowing what the effective power of sports is as a result of the opinions of the trainers will shed light on the society and especially the studies to be carried out on the current issue. As a result, this research was conducted to examine the opinions of coaches about the role of sports in changing behaviors that are not accepted in society.

2. Method

Research Model

The study was designed as a qualitative research. Qualitative design can be defined as an effort to understand and make sense of existing situations as a result of a certain phenomenon and the interaction that occurs in this phenomenon (Patton, 2014). In this context, the purpose of a qualitative research design is; to form a perspective on how individuals make sense of their lives, to outline the meaning-making process in terms of the result and the resulting output, and to explain how individuals express their opinions about the situations they experience. However, the important thing at this stage is to look at the events not from the perspective of the researcher, but from the perspective of the participant (Merriam, 2018).

In the research, the interview method, which is frequently used in qualitative research designs, was used in order to hear directly the experiences of the participants about the subject at first hand (Yildirim, Simsek, 2018). In the interview method, interviews take place in the form of face-to-face conversations with people selected by the researcher in the field where the research will take place (Kumbetoglu, 2005).

The efforts of researchers who prefer the interview method in qualitative research designs to increase the number of participants for the research is one of the mistakes that should not be made (Creswell, 2013; Makatouni, 2002). In this context, it should be known that the important thing in the interview method is not the number but the quality. It can even be said that in the interview method, even a single participant will provide the required data for the solution of the research problem (Merriam, 2018; Patton, 2014; Teddlie, Yu, 2007).

Research Pattern

Qualitative research designs can be defined as a strategy that determines the approach of the planned research and allows the various stages that may occur in the research process to show consistency thanks to the determined approach. In this research, a strategic framework was created by using the phenomenology research design, which is one of the qualitative research designs. The phenomenology design is a qualitative methodology that focuses on events that are known but do not have an in-depth and detailed understanding (Yildirim, Simsek, 2018). The reason why the phenomenological pattern constitutes the framework of the research in this research is that the raw data sources are individuals who experience the phenomena that are the focus of the study and will reflect these experiences in detail to the outside.

Research Group

The research group consists of 23 trainers working in different sports branches throughout Turkey.

In studies planned with qualitative design compared to studies planned with quantitative design, the number of participants who make up the research group may be insufficient. According to Patton (2014) and Yildirim and Simsek (2018), the number of participants in qualitative research is determined by the repetition of concepts and processes while collecting data. This situation is called “data saturation” (Patton, 2014; Yildirim, Simsek, 2018). Therefore, it can be said that the concept of data saturation is an important factor in determining the number of participants in the research group. Based on this information in the literature, the number of participants in this study was determined as 23, as the researchers ended the data collection process as soon as the processes and relationships started to recur during the analysis of the data they collected from the participants.

In the research, purposive sampling method (Merriam, 2018), which is one of the frequently preferred non-probability sampling strategies in studies planned with qualitative design, and

maximum diversity sampling method, which is one of the purposive sampling methods (Yildirim, Simsek, 2018). In this context, the fact that the participants participating in the research had different education levels, sports branches, and coaching levels caused the maximum diversity sampling method to be preferred in the research.

The distribution of information regarding the nickname codes, age, education level, profession, branch, coaching level, term of office and interview date of the coaches who make up the research group is given in Table 1.

Table 1. Distribution of Data on the Age, Education Status, Job, Branch, Coaching Level, Mission Time and Interview Date of the Coaches who Make Up the Research Group

Participant Code	Age	Education Status	Job	Branch	Coaching Level	Mission Time	Interview Date
A1	42	Bachelor's Degree	Teacher	Football	TFF C*	13	15.03.2022
A2	44	Bachelor's Degree	Officer	Football	TFF C*	15	15.03.2022
A3	38	Bachelor's Degree	Coaches	Kick Box	Level 3	9	17.03.2022
A4	45	Master's Degree	Teacher	Swimming	Level 3	17	18.03.2022
A5	42	Bachelor's Degree	Teacher	Volleyball	Level 4	12	23.03.2022
A6	36	Bachelor's Degree	Coaches	Tennis	Level 3	6	27.03.2022
A7	42	Master's Degree	Officer	Football	TFF C*	14	27.03.2022
A8	35	Master's Degree	Teacher	Basketball	Level 3	7	28.03.2022
A9	41	Bachelor's Degree	Coaches	Basketball	Level 4	12	29.03.2022
A10	37	Bachelor's Degree	Teacher	Swimming	Level 4	10	01.04.2022
A11	40	Master's Degree	Coaches	Volleyball	Level 4	11	03.04.2022
A12	49	Bachelor's Degree	Teacher	Basketball	Level 4	20	07.04.2022
A13	31	Master's Degree	Teacher	Swimming	Level 3	4	07.04.2022
A14	36	Master's Degree	Teacher	Football	TFF C*	10	08.04.2022
A15	41	Master's Degree	Teacher	Athletics	Level 3	11	10.04.2022
A16	37	Bachelor's Degree	Coaches	Wrestling	Level 4	14	11.04.2022
A17	40	Bachelor's Degree	Teacher	Table tennis	Level 3	9	11.04.2022
A18	43	Master's Degree	Teacher	Athletics	Level 4	18	14.04.2022
A19	42	Bachelor's Degree	Teacher	Tennis	Level 3	10	18.04.2022
A20	40	Bachelor's Degree	Teacher	Volleyball	Level 3	12	21.04.2022
A21	38	Master's Degree	Lecturer	Tennis	Level 3	15	21.04.2022
A22	45	Master's	Coaches	Football	TFF C*	18	23.04.2022

		Degree					
A23	39	Bachelor's Degree	Coaches	Basketball	Level 4	11	26.04.2022

*TFF C = Turkish Football Federation C Category

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The distribution of information regarding the nickname codes, age, education level, profession, branch, coaching level, term of office and interview date of the coaches who make up the research group is given in Table 1.

Data Collection Tools

Personal Information Form

In the personal information form, there is information about the age, education level, job, sports branch, coaching level and mission time of the participants.

Semi-Structured Interview Form

Eysenbach, Kohler (2002) and Seidman (2006) stated that it is important that semi-structured interview forms contain specific and few questions. In this context, in the research, attention was paid to form the question in the semi-structured interview form in a logical, easily understandable way that does not allow for short answers. In this context, in the semi-structured interview form, the coaches were asked, "What would you like to say about the role of sports in changing behaviors that are not accepted in society?" the question has been posed.

Validity and Reliability of the Research

A good determination of validity and reliability in qualitative research is one of the most important factors that determine the quality of the research. This situation has been expressed in many studies (Punch, 2005; Golafshani, 2005; Baskale, 2016, Yagar, Dokme, 2018).

In order to ensure the validity and reliability of this research and to eliminate or minimize the factors affecting the validity and reliability of the research, some necessary precautions have been taken by the researchers. In this context, credibility, long-term interaction, depth-oriented data collection, expert review, participant confirmation, confirmability, transferability, and consistency strategies were used to ensure the validity and reliability of this research (Yildirim, Simsek, 2018).

It is known that in the reliability dimension of qualitative research analyzes, it is impossible for a single researcher to make a coding that is free from his own subjective thoughts. In order to cope with this situation, it is important that the qualitative data set is coded by more than one expert and that the similarity ratio between these codes is close (Fidan, Ozturk, 2015). In this context, the raw data obtained from the interviews should be given to different researchers who are experts in their fields at the same time, and the correlation between the evaluation of the raw data and the results should be calculated (Miles, Huberman, 1994) This assumption increases the effectiveness and reliability of his research by countering the distorting effect of memory (Miles, Huberman, 1994; Patton, 2014; Tavsancil, Aslan, 2001). Inter-coder reliability refers to the consistency of different people using the same data (Sevilmis, Yildiz, 2021). In the light of this

information, the data obtained by converting the audio recordings into written documents by the researchers were analyzed independently by three experts who carried out the research, and the correlation between the results obtained from each of them was calculated.

The reliability of the data was calculated with the formula of Miles and Huberman (1994). This formula is as follows.

"[Theme with consensus/(Theme with consensus + Theme with disagreement)] x 100"

It is expected that the result of the above formula, which is intended to test the compatibility among the coding experts, is higher than 70 % (Miles and Huberman, 1994; Patton, 2014). As a result of the application of the formula, 30 of the 32 codes suggested by the experts were approved, and a consensus was reached at the rate of 30/(32+2) X 100 = 93.75 on the suitability of the codes. The 2 codes on which no consensus could be reached were combined with other appropriate codes. As a result of the obtained result, it can be said that the analysis of the data is reliable.

Data Collection Process

Field application of the semi-structured interview form developed by the researchers took place between 15.03.2022 and 26.04.2022. The raw data in the research; It was obtained as a result of face-to-face interviews, by obtaining permission and appointment from the participants participating in the research. The interviews were carried out on a voluntary basis at the participants' own work or at different meeting points (cafes, etc.). By the researchers; the interviews with the participants were recorded with a mobile phone with a voice recording feature after obtaining the necessary permissions from the participants and in order to prevent data loss. Since this situation eliminates the note-taking problems of the researchers; During the interview, the researchers had the opportunity to ask questions and to perform the listening functions more comfortably. The audio recordings obtained from the interviews were transcribed, edited and turned into a 6-page document by the researchers. In order to prevent data loss in the research, each data obtained was analyzed on the day of the interview. The analyzes were confirmed by showing them to each participant again to ensure the reliability of the research. This provided the researchers with the convenience of ending the data collection process when the data reached saturation.

Analysis of Data

Content analysis method, one of the analysis methods used in qualitative research designs, was used in the evaluation of qualitative data (Miles, Huberman, 1994; Silverman, 2005; Yildirim, Simsek, 2018). It can be said that the data obtained after the evaluation of the qualitative data are categorized by dividing them into themes with an inductive approach (Stake, 1995). In this context, it is stated that the main purpose of content analysis is to reach concepts and relationships that will support the explanation of the data obtained. With content analysis, new concepts are discovered by processing the raw data in depth. In fact, the basic process done here is to gather similar data (codes) around certain concepts and themes, and to organize and interpret these data in a way that the reader can understand (Yildirim, Simsek, 2018; Neuman, 2012).

Ethical Aspect of Research

It can be said that the following measures have been taken to protect the ethics of the research:

The researchers first stated that all personal information of the participants would be kept confidential at the beginning and at the end of the practice, in accordance with ethical rules. Based on this, it was stated to the participants that the research will be used only for scientific purposes, their names will be kept secret, they will not suffer any physical or psychological harm, and the names of the teams they work with will not be included in the study. In order to keep the names of the participants confidential in the research, pseudonym codes in the form of A1, A2...A23 were given to the participants. Then, verbal and written consents were obtained from the participants regarding all these issues. Raw data are also filed to prove all these situations explained by the researchers.

3. Results

In this part of the research, findings based on the analysis results of qualitative data are included.

Table 2. Findings on coaches' views on how sports have an effect on changing behaviors that are not accepted in society

Categories	Themes	Codes	Participants	Frequency
Positive Impact	Individual Dimension	✓ Contributing to Being Disciplined	A1, A10, A11, A14, A16	5
		✓ Revealing a Sense of Self-Confidence	A2, A5, A8, A16	4
		✓ Helping to Socialize	A2,A4	2
		✓ Contributing to Personality Development	A1	1
		✓ Ensuring the Right Evaluation of Time	A3	1
		✓ Developing Self-Skill	A11	1
		✓ Helping to Lead an Orderly Life	A11	1
		✓ Ensuring the Ability to Reason	A16	1
		✓ Avoiding Making Abusive Friends	A17	1
		✓ Gaining Awareness of Cleanliness	A14	1
	Total			**18**
	Social Dimension	✓ Revealing Socially Accepted Behaviors	A14,A15,A18	3
		✓ Supporting Individuals to Make Them Useful to Society	A12,A19,A22	3
		✓ Directing the Society to Positive Behaviors	A7, A9	2
		✓ Changing the Perspective That Divides Society	A4, A13	2
		✓ Eliminating Racism Understanding	A12	1
		✓ Adopting the Rules of Society	A20	1
		✓ Developing the Value of Love	A1	1
		✓ Gaining a Sense of Brotherhood	A4	1
		✓ Increasing Trust in Friends	A5	1
	Total			**15**
	Harmful Habit Dimension	✓ Substance Abuse Prevention	A2,A4,A12,A18,A19, A22,A23	7
		✓ Preventing Technology Addiction	A4, A18,A23	3
		✓ Helping Quit Smoking	A5	1
	Total			**11**
	Moral Dimension	✓ Developing Moral Behaviors	A1, A6, A14, A19, A20, A22	6

		✓ Developing the Value of Respect	A1,A10	2
	Total			**8**
	Behavioral Dimension	✓ Preventing Negative Behaviors	A8, A17, A18, A21, A22, A25	6
	Total			**6**
	Psychological Dimension	✓ Öfke Kontrolünün Sağlanmasına Yardımcı Olma	A2,A5, A22	3
		✓ Helping Achieve Anger Control	A23	1
	Total			**4**
	Cognitive Dimension	✓ Assisting in Distinguishing Right and Wrong	A16	1
	Total			**1**
	Health Dimension	✓ Eating Habit	A11	1
	Total			**1**
Negative Impact	Value Dimension	✓ Normalization of Behavior Contrary to Social Values	A25	1
	Total			**1**

When Table 2 is examined, the opinions of the coaches participating in the research about the role of sports in changing the unacceptable behaviors in the society are given in order according to the frequency of repetition of the themes and codes: The themes determined for the purposes of the research and the sentences directly quoted from the participant's views on the codes that make up these themes are given below.

"It has an extremely positive effect for a person who has received a good sports training. Sports contribute to moral and personality development. Even the stance of an athlete who has received a certain discipline, love and respect training will be different. Therefore, I can say that it enables the development of these features" (A1)

"I can say that an introverted and insecure person becomes socialized and self-confident thanks to sports, and an aggressive person uses that impulse in a positive way thanks to sports. Again, I think that individuals get away from all harmful habits that will harm themselves, both environmental and material, thanks to sports." (A2)

"I think it has a good effect. Athletes at least use the time correctly to reach their goals..." (A3)

"...It is possible to overcome the point of view that divides society along with unacceptable behaviors such as technology and substance abuse, with sports. Apart from this, gains that provide brotherhood and cohesion can be achieved with sports..." (A4)

"It supports the athletes to quit smoking and to control their aggressive attitudes in the competition. In addition, it has a positive effect on trusting his teammates and increasing self-confidence..." (A5)

"...If the child is in a team or club where he will receive the right messages, it will benefit him morally..." (A6)

"... Considering that sports are driving the masses, I can say that it is very effective to direct the society in a positive way through sports..." (A7)

"It has a very important and beneficial effect. Especially school-age individuals may engage in negative behaviors in order to show themselves in different places or to prove themselves to the opposite sex. Sports can be helpful in eliminating these negative behaviors. At the same time, this makes the individual self-confident." (A8)

"Sport, which drags the masses after it, has the power to positively influence and direct the nations in every sense..." (A9)

"Discipline and respect can have a very positive effect on the basis of..." (A10)

"It has a lot of influence. Being disciplined, developing self-skills and gaining nutritional habits is possible with sports. By this means, individuals can lead a more organized life, unlike other people." (A11)

"It enables disadvantaged groups (substance addicts) to get rid of harmful habits such as substance addiction by introducing them to sports. Apart from this, individuals become beneficial individuals to society through sports. Before I forget, I would like to say that it is a fact that sports also helps to eliminate racism." (A12)

"...The pressures and divisive perspectives that occur in the society due to unacceptable behaviors are prevented by the successes achieved in sports." (A13)

"The discipline, cleanliness and morality gained by the individual are the effects of sports. In this context, only people who do sports can display more acceptable behaviors." (A14)

"Sport has an important place in changing behaviors that are not accepted in society. For example, a person makes an effort and relaxes by boxing or in another branch. This is a factor that prevents the person from exhibiting negative behaviors." (A15)

"Sports teaches individuals discipline and what is right and wrong in life. It also provides reasoning and self-confidence." (A16)

"...The basic condition of not making friends with friends with bad habits starts with sports. At the same time, it is obvious that people who have negative behaviors get rid of these behaviors with sports." (A17)

"A person who does sports tries to stay away from harmful habits and negative behaviors such as all kinds of substance and technology addiction. He does not behave in ways that are not accepted by the society by seeing the athletes around him." (A18)

"It definitely has a huge impact. A person needs to do sports from childhood to old age. This is a philosophy of life. When a child adopts sports ethics, he becomes a very moral and very useful individual. Conscious exercise already provides benefits. In addition, individuals stay away from bad habits such as substance abuse thanks to sports. Even if these bad habits exist, this situation is reduced to a very small level thanks to sports." (A19)

"...While doing sports, individuals learn the rules of society and universal moral principles..." (A20)

"I think it has a direct impact. We see a positive behavior of a football player very often, especially in children and young people. Most of the time, this situation has a great effect on preventing negative behaviors..." (A21)

"...Individuals raised in the consciousness of sports become an exemplary individual by exhibiting behaviors within the framework of moral values, getting rid of their anger, bad habits, if any, such as substance addiction, and negative behaviors at the maximum level." (A22)

"... Participation in sports prevents substance and technology addiction. Again, thanks to sports, the bad consequences of an unhealthy life can be eliminated. In addition, we see that regular sports are beneficial in the improvement of psychological and cognitive disorders..." (A23)

"...Besides that, it prevents the emergence of negative behaviors to a large extent. However, the presence of some behaviors that are contrary to social values in sports makes those behaviors more normal." (A23)

4. Discussion

According to the first result of the research problem, sports enable individuals to be disciplined, develop a sense of self-confidence, socialize, develop personality, evaluate time correctly, improve their self-skills, lead an orderly life, and make judgments. It also helps individuals to prevent them from making bad friends and to gain awareness of cleanliness. In this context, sports contribute positively to the personal development of individuals. According to the second result of the research problem, sports allow the revealing of behaviors accepted by the society, making individuals useful to the society, directing the society to positive behaviors, changing the perspective that separates the society, and eliminating the understanding of racism. In addition, it helps to adopt the rules of society, to develop the value of love, to gain a sense of brotherhood and to increase the trust in friends. In this context, sports provide positive contributions to social development. According to the third result of the research problem, sports provide positive contributions to the prevention of substance and technology addiction and the

prevention of harmful habits by enabling smoking cessation. According to the fourth result of the research problem, sport provides positive contributions to the moral development of individuals by enabling the development of moral behaviors and the value of respect. According to the fifth result of the research problem, sports provide positive contributions to behavioral development by preventing negative behaviors. According to the sixth result of the research problem, sports provide positive contributions to psychological development by allowing anger control. According to the seventh result of the research problem, sport provides positive contributions to cognitive development by enabling to distinguish between right and wrong. According to the eighth result of the research problem, sports provide positive contributions to health development by enabling nutrition habits. Finally, according to the ninth result of the research problem, sports create negative effects on value development by causing normalization of behaviors contrary to social values.

The phenomenon of sports in societies is accepted as the basic element of economic, social and cultural development. In this context, the phenomenon of sports; activities that increase the fighting power of individuals, support the development of their personalities, improve their physical and mental health, strengthen their environmental adaptation, and encourage the behavior of obeying the rules. These activities consist of deliberate actions, especially around certain rules (Erkal, 1982; Ramazanoglu et al., 2020).

The results of the research in the literature indicated that the personal, social and physical development of young people is supported, especially through their participation in physical education and sports (Danish et al., 1992; Smoll, Smith, 2002; Fraser-Thomas et al., 2005; Gould, Carson, 2008; Weiss, 2011; Holt et al., 2011; Opstoel et al., 2020). In addition, it is stated that sports not only improve the physical health of individuals, but also contribute to their versatile development, increase their academic success, higher self-confidence, the formation of love and honesty, and the development of the spirit of solidarity (Keten, 1974; Clark, Brennan, 1991). With sports, individuals gain competency, character development, self-care skills, teamwork, leadership, management skills and discipline understanding in the work they do (Bliss ve Hancock, 1976). Sports allow the development of peer relations, increase in parental interaction, avoidance of risky behaviors, voluntary work, awareness of responsibility, and self-control (Deutsch, 1968). Sport equips the individual to help differentiate behavior from what is right and wrong through interaction with peers and adults. It also allows people to live happily in peace (King, 1978). Gano-Overway et al. (2009) found in their study that young people who participate in sports activities improve their self-care and self-control skills and gain empathic thinking skills. Holt et al. (2009) found in their study that individuals gain life skills in sports environments together with their peers through regular sports programs. Popescu (2010) concluded in her study that the majority of athletes answer the question of what do you understand when athletes are called morality in high performance sports by following the rules and order. Yildiz et al. (2021) in their studies, in the sports activities that students participate in; They determined that they gained multifaceted values (national, cultural, personal and social) such as unity and solidarity, national consciousness, national feeling, social development, self-confidence, respect, taking duties and responsibilities and representing their group in the best way. In addition, it was determined that the participants who participated in the study stated that such activities are important in transferring cultural values to future generations and that knowing the past for students will be a guide for the future. Akandere et al. (2009) also found in their study that students who do sports have a higher level of moral judgment than those who do not. Therefore, it is seen that these studies support the results of the current research.

Sports environments are an arena to test values (Lee, 2003). However, it is important to consider that although sports have many positive aspects regarding their role in supporting personal and social development, participation in sports does not always lead to positive results (Bailey et al., 2009; Cryan, Martinek, 2017; Fraser-Thomas, Côté, 2009). Especially today, the rules in sports events always focus on the top and always on winning. Even, when the phenomenon of sports ceases to be a leisure time activity and confronts the individual as a profession, it creates new values that are not accepted by the society. In this context, it can be said that many of the values defended in sports are incompatible with the values of society. In today's world where making money is an indispensable value, the ideals of sporting virtue and olympism cannot be realized by defending them by the athletes. In addition, it will not be possible to protect sports in a structure that will not be affected by the worn-out values of the society. It is very

difficult in today's society for an individual who chooses sports as a profession to internalize sports within the framework of professional ethics and to implement attitudes and behaviors suitable for sports understanding. Because the mission attributed to sports is changing, values in sports develop in the same direction with the changing values in society. The approach of "winning at any cost" and "losing is the end of everything" in sports causes all kinds of ugly attempts such as match-fixing, doping and violence to be perceived as normal on the way to success (Sahin, 1998). In the results of the current research, it can be said that the role of sports in normalizing behaviors contrary to social values, although rarely seen, is important. Because, since the phenomenon of sport includes situations such as winning and losing, struggling, sometimes people stop acting according to the common values prevailing in society and behave in the most primitive way against these emerging situations. Of course, this situation, when it starts to grow like a snowball, causes behaviors that are not accepted by the society to become acceptable by the society after a point. Therefore, it can be stated that this situation will pave the way for a society to assimilate over time in terms of values.

With the understanding of inactivity, which has become a problem of the age, many individuals turn to harmful habits that can lead to dangerous consequences in their lives. Technology and substance abuse are at the forefront of these habits that harm individuals. Individuals who know and experience the phenomenon of sports generally direct all their energies to healthy actions as they spend their time much more productively. At the same time, this situation allows the energy concentration in individuals to be thrown out with the most appropriate method. As a result of this situation, individuals do not have time to spare for bad habits. As a result, it can be said that it is important to direct young people to sports in order to protect them from bad habits and to enable them to spend their spare time more valuable, especially since the younger generations become more addicted. Halldorson et al. (2014) found in their study that young people participating in sports clubs avoid harmful habits (alcohol, substance abuse, smoking, etc.). In addition, in the same study, it was determined that young people avoid making bad-tempered friends by participating in sports. Therefore, it can be said that this finding supports the results of the present study.

5. Conclusion

As a result, sports especially individuals' personal and social responsibility, cooperation, discipline, respect and so on it is seen that it is accepted as an appropriate tool to develop personal and social skills such as (Martinek, Hellison, 1997; Miller et al., 1997; Parker, Stiehl, 2005). In this context, it has been stated that many explanations and research results in the literature about the multi-faceted benefits of sports have an important place in learning many positive behaviors and reflecting these behaviors in life. Therefore, it can be said that this current study supports the literature results.

6. Suggestions

Since the phenomenon of sports causes many positive results on the behaviors exhibited by individuals in particular and by societies in general, new methods and practices should be implemented for the participation of individuals in sports through sportive activities.

New methods and practices to be carried out on participation in sports should be done by taking into account the emotional, cognitive and physiological structures of individuals.

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Published in the USA
European Journal of Physical Education and Sport
Has been issued since 2013.
E-ISSN: 2409-1952
2022. 10(1): 17-25

DOI: 10.13187/ejpe.2022.1.17
https://ejpes.cherkasgu.press

Critical Analysis of Performance Factors between Indian and Foreign Soccer Players

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Abstract

The aim of this study was to critically analyze the performance factors between Indian and foreign soccer players. According to the research method, 90 soccer players were selected for this study, 30 of them were from India and 60 soccer players from other foreign countries. All Indian soccer players who had participated only for the national soccer team and who have their own FIFA rankings were only selected for the study. Foreign soccer players who were selected for the study were from different countries and who also have their own FIFA rankings. Four performance factors were considered for this study, namely ball skills, defensive skills, passing abilities and Shooting abilities. Ball skills were measured with the help of ball control and dribbling skills. Defensive skills were measured using players' markings, slide tackles and stand tackles. The passing abilities were measured with the help of crossing pass, short pass and long pass. Shooting abilities were measured with the help of heading, shot power, finishing, long shot, curve shot, free kick assistance, penalties and volley skills. Secondary data has been used for this study. The Student 't' test statistics was applied to examine the existence of significant differences between the performance factors of Indian and foreign soccer players. In conclusion, significant differences were observed across all performance factors in respect of foreign soccer players.

Keywords: ball skills, defensive skills, passing ability, shooting abilities, soccer players.

1. Introduction

Soccer is the most popular sport in the country as well as internationally, which helps to prepare players for physical fitness, skill, psychology and planning if the training program is appropriate for them at the level of their physical ability and the basic skill of the rules of science. On physical skill, and psychological skills the athlete strives to achieve the best level and achieve success. The game of soccer puts the ball in the opponent's goal as much as possible and protects the goal itself from being broken in order to find the winner. The effectiveness of the ball would only be achieved if the training could be done and focused on the whole training aspects including the player's personality, physical condition, technical skills, strategic skills, and mental performance of the player (Firmansyah et al., 2017).

Performance in soccer depends on many factors, including technical, tactical, mental and physical. Players will experience fatigue during a match, manifested through a reduced work rate, reduced ability to perform high-intensity exercise, and a progressive decrease in muscle strength at the end of match-play. Resistance to fatigue is an important factor that determines the

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effectiveness of a player's ability to perform consistently in efficient manner and in precise movements within soccer. Soccer is characterized not only by a player's ability to perform repeated high-intensity tasks, but also by the maintenance of efficient execution of skills when in possession of the ball, such as passing, dribbling, and shooting usually towards the end of the game (McGregor et al., 1999).

Soccer is a game that requires good cooperation and requires that the players have good basic skills individually. The basic procedure is the most important part of soccer (Alexander et al., 2020). In soccer there are 4 basic methods, pulling, passing, controlling, and shooting to kick the ball into the opponent's goal, the player must be able to kick well even on target (Bettega et al., 2018). Among the above basic techniques, the most important procedure is to kick the ball.

Dribbling a soccer ball is a natural skill that players can only perform by running and kicking; however, the ability to defeat an opponent under pressure is one of the hardest skills to acquire. The ball handler must be able to control the ball with all surfaces of his foot, such as the inside, outside, instep and sole. Hours of practice should be devoted to learning touch and controls while changing the pace. Players must master the four techniques of cutting, facing, shielding and speed dribbling. Ball handlers must practice these moves for years to become proficient in performing them properly. Players who wish to become highly competitive will need to spend an enormous amount of time practicing with the ball to develop these essential dribbling skills (KU ScholarWorks).

Soccer players have to move from hand-eye coordination to foot-eye coordination. Babies are more prone to using their hands because they are developing these fine-motor and gross-motor skills from birth. But when they start playing soccer, they have to develop these same neuro-pathways with their feet and other parts of the body. It is extremely challenging because players are not able to use their most developed senses, the hands, to manipulate the soccer ball (KU ScholarWorks).

Soccer is a sport that requires good cooperation and requires players to master good basic personal techniques. Basic technique is the most important component in soccer. According to Luxbacher (2011) the basic technique of soccer states that: "with this capital all the activities that fall under the activities may be well played or directed practice".

The most important of the above basic techniques is kicking the ball (shooting). Kicking the ball can be done in the ball at rest, the ball rolling or the ball floating in the air. However, the main purpose of kicking the ball (shooting) is to put the ball into the opponent's goal and the ability to kick the ball is very important to achieve that goal (Ridwan, Putra, 2019). With the ability to kick in a goal, a team will have a greater chance of scoring and winning against an opponent.

Keeping this in mind, researchers now state that several performance factors are responsible for becoming an elite soccer player and these factors need to be developed. Therefore, the researcher conducted this research entitled "Critical Analysis of Performance Factors between Indian and Foreign Football Players".

Statement of the problem

The purpose of this research study was to critically analyse the performance factors between Indian and foreign soccer players.

2. Materials and methods

Subject

The study was descriptive survey type. Thirty Indian soccer players (N = 30) and Sixty foreign soccer players (N = 60, from different countries) were selected for this study, whose age from 22 to 32 years. Indian soccer players who performed only for the Indian national soccer team and foreign soccer players, performed only for their own national soccer team as well as participated in different Soccer League were only selected for the study.

Test/tools

Ball skills: Ball skills were measured with the help of ball control and dribbling skill.

Defensive skills: Defensive skills were measured with the help of players marking, slide tackle and Stand Tackle.

Passing ability: Passing ability was measured with the help of Crossing pass, Short pass and long pass.

Soothing skills: Shooting skills were measured with the help of heading, shot power, finishing, long shot, curve shot, free kick assist, penalties and volley skills.

Scoring system

The researcher has used secondary data for this study. The data is collected from the official website of FIFA. EA (Electronic Arts Sports Network) Sports employs a team that is responsible for ensuring that all player data is up to date, while a community of over 6,000 FIFA data reviewers or talent scouts from around the world is constantly providing suggestions and changes to the database. They carefully observe what happens on the pitch to assess, assess and evaluate players with more than 30 characteristics that define a football player's skill level. Their assessments come together to form a FIFA rating (Electronic Arts Inc.)

Once this group submits opinions on this or that player, their feedback is obtained through a secure EA (Electronic Arts Sports Network) Sports website. This data is then handled by 300 editors, who organize it into 300 fields and 35 attribute categories. The EA uses this subjective feedback in conjunction with its own statistics (obtained from other agencies) to determine the rating. FIFA Ultimate Team gives players upgrades during Team of the Week following stand-out performances and then refreshes the overall ratings in January and February each year (EA explains....).

Rating Range

Player Attributes are rated from 0 to 99. The higher value results the better quality for the attribute. Below is the info graphic that shows the quality level for the player attribute ratings. Players with higher physical attributes will perform better on-field, often dominating the course of a match in the game.

Table 1. Player Attributes

	0-39	40-49	50-59	60-69	70-79	80-89	90-99
QUALITY	RATING RANGE						
Excellent	90-99						
Very Good	80-89						
Good	70-79						
Fair	60-69						
Poor	50-59						
Very poor	40-49						

Source: Player Attributes

3. Results

Statistical procedure and result

Student t' test was applied to investigate the existence of significant difference of performance factors between Indian and foreign soccer players.

Table 2. Mean, SD and T' ratio of height, weight and age of Indian and foreign soccer players

Variable	Test	Subject	Mean	Variance	SD	T' value
Height (CM)	Indian Soccer Players	30	178.53	41.58	6.44	2.61*
	Foreign Soccer Players	60	182.26	40.36	6.35	
Weight (K.G)	Indian Soccer Players	30	73.36	31.09	5.57	3.02*
	Foreign Soccer	60	77.86	50.81	7.12	

	Players					
Age (Year)	Indian Soccer Players	30	31.53	20.44	4.52	2.85*
	Foreign Soccer Players	60	28.91	15.07	3.88	

* Significant at 0.05 level
t' value required to be significant at 0.05 level of confidence with 88 degree of freedom was 1.89.

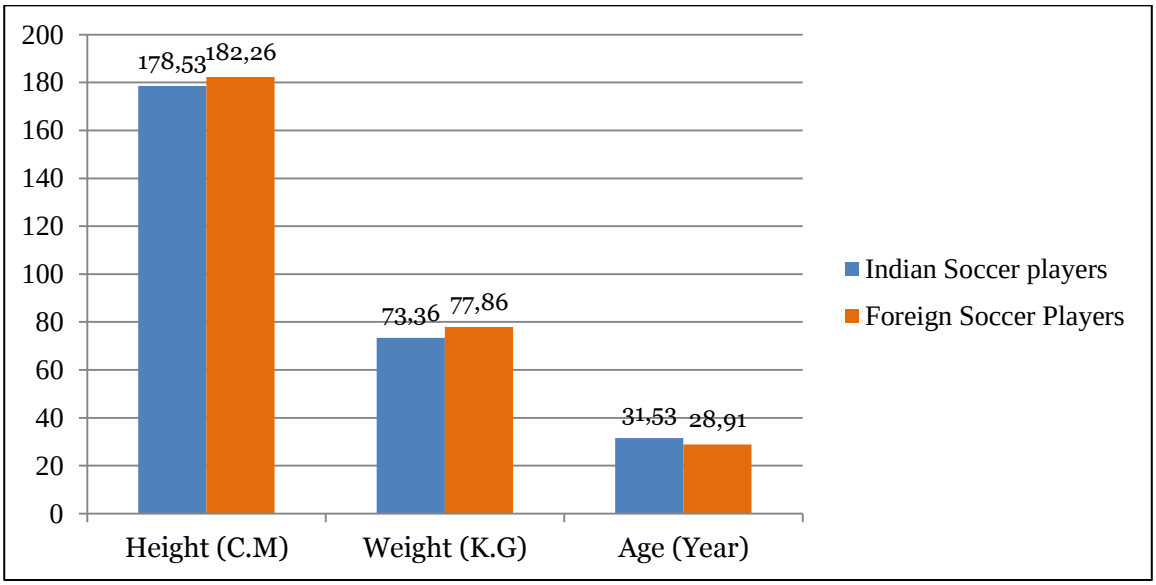

Fig. 1. Graphical presentation of height (cm), weight (kg) and age (years) of Indian and foreign soccer players.

Table 3. Mean, SD and T' ratio of ball skills of Indian and foreign soccer players

Variable (soccer ball skill)	Test	Subject	Mean	Variance	SD	T' value
Ball Control	Indian Soccer Players	30	54.43	103.77	10.18	15.23*
	Foreign Soccer Players	60	82.51	50.31	7.09	
Dribbling	Indian Soccer Players	30	51.93	160.86	12.68	9.75*
	Foreign Soccer Players	60	77.38	123.90	11.13	

* Significant at 0.05 level
't' value required to be significant at 0.05 level of confidence with 88 degree of freedom was 1.89

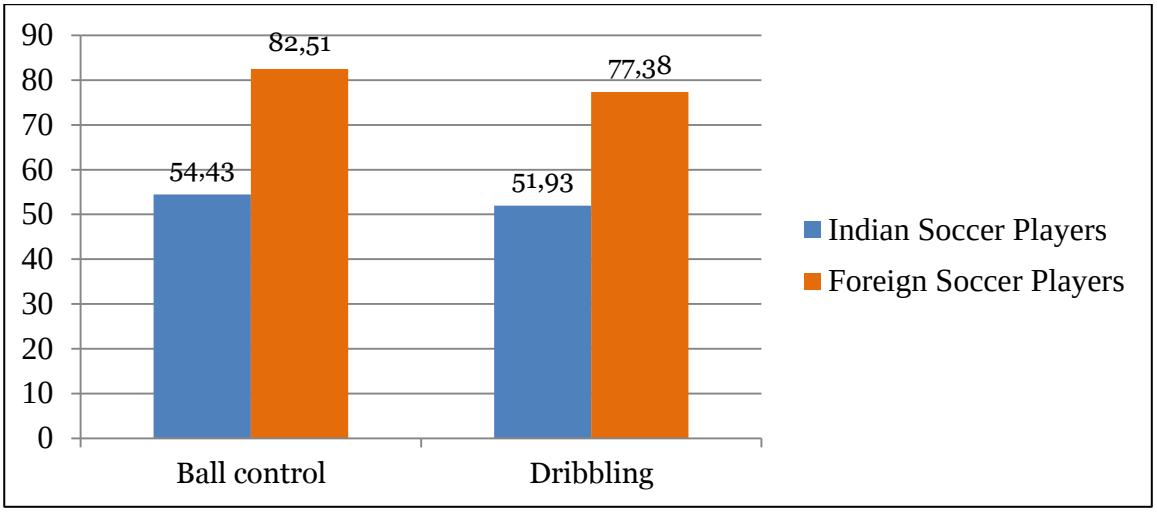

Fig. 2. Graphical presentation of ball skills of Indian and foreign soccer players

Table 4. Mean, SD and T' ratio of ball skills of defensive skills of Indian and Foreign soccer players

Variable soccer defensive skills	Test	Subject	Mean	Variance	SD	T' value
Marking	Indian Soccer Players	30	36.33	336.95	18.35	7.19*
	Foreign Soccer Players	60	68.81	441.88	21.02	
Slide Tackle	Indian Soccer Players	30	39.00	308.53	17.56	5.46*
	Foreign Soccer Players	60	65.38	543.43	23.31	
	Indian Soccer Players	30	41.20	304.96	17.46	6.14*
	Foreign Soccer Players	60	69.03	463.03	21.51	

* Significant at 0.05 level
't' value required to be significant at 0.05 level of confidence with 88 degree of freedom was 1.89

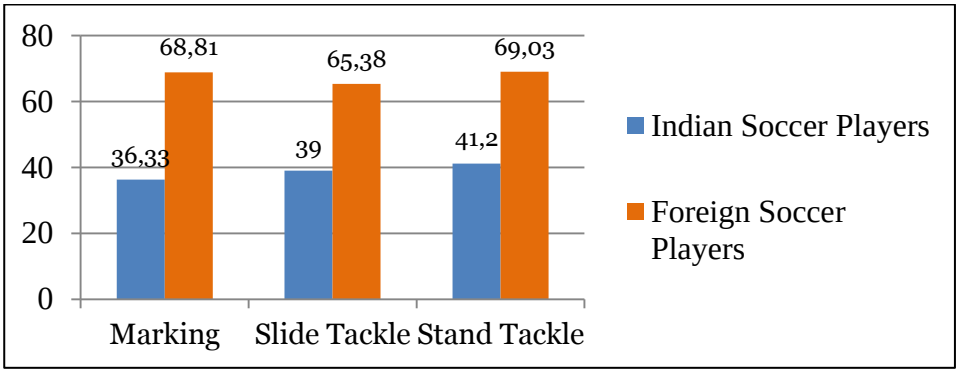

Fig. 3. Graphical presentation of defensive skills of Indian and foreign soccer players

Table 5. Mean, SD and T' ratio of passing abilities of Indian and Foreign soccer players

Variable	Test	Subject	Mean	Variance	SD	T' value
Crossing	Indian Soccer Players	30	48.13	145.71	12.07	6.92*
	Foreign Soccer Players	60	71.21	260.06	16.12	
Short pass	Indian Soccer Players	30	51.63	114.16	10.68	16.62*
	Foreign Soccer Players	60	81.63	40.96	6.40	
Long pass	Indian Soccer Players	30	47.80	109.76	10.47	13.21*
	Foreign Soccer Players	60	76.68	88.44	9.40	

* Significant at 0.05 level
't' value required to be significant at 0.05 level of confidence with 88 degree of freedom was 1.89

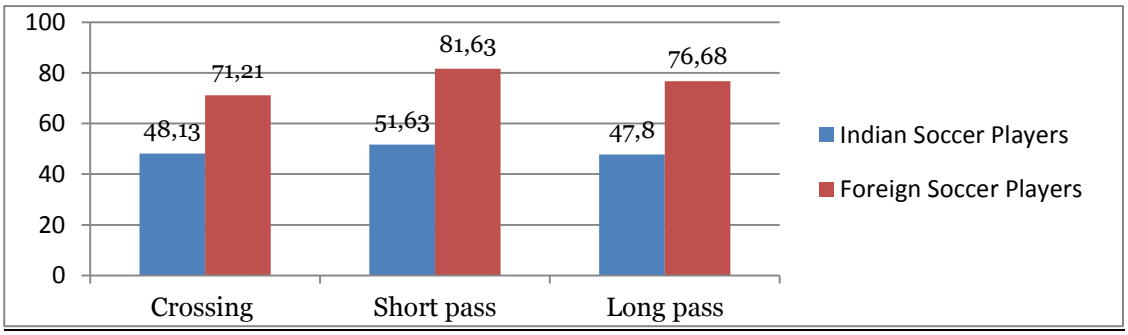

Fig. 4. Graphical presentation of passing abilities of Indian and foreign soccer players

Table 6. Mean, SD and T' ratio of shooting abilities of Indian and foreign soccer players

Soccer shooting abilities	Test	Subject	Mean	Variance	SD	T' value
Heading	Indian Soccer Players	30	51.06	122.52	11.06	8.85*
	Foreign Soccer Players	60	73.91	138.47	11.76	
Shot power	Indian Soccer Players	30	54.6	79.57	8.92	10.37*
	Foreign Soccer Players	60	77.83	110.43	10.50	
Finishing	Indian Soccer Players	30	47.33	160.95	12.68	4.86*
	Foreign Soccer Players	60	67.06	411.32	20.28	
Long shot	Indian Soccer Players	30	45.00	180.13	13.42	6.47*

	Foreign Soccer Players	60	69.30	331.74	18.21	
Curve shot	Indian Soccer Players	30	48.66	167.82	12.95	6.44*
	Foreign Soccer Players	60	71.05	277.11	16.64	
Free kick Assist	Indian Soccer Players	30	46.46	200.91	14.17	4.41*
	Foreign Soccer Players	60	62.70	304.61	17.45	
Penalties	Indian Soccer Players	30	48.20	144.62	12.02	4.82*
	Foreign Soccer Players	60	65.16	198.27	17.27	
Volleys	Indian Soccer Players	30	44.90	208.95	14.45	4.71*
	Foreign Soccer Players	60	64.01	386.88	19.66	

* Significant at 0.05 level
't' value required to be significant at 0.05 level of confidence with 88 degree of freedom was 1.89

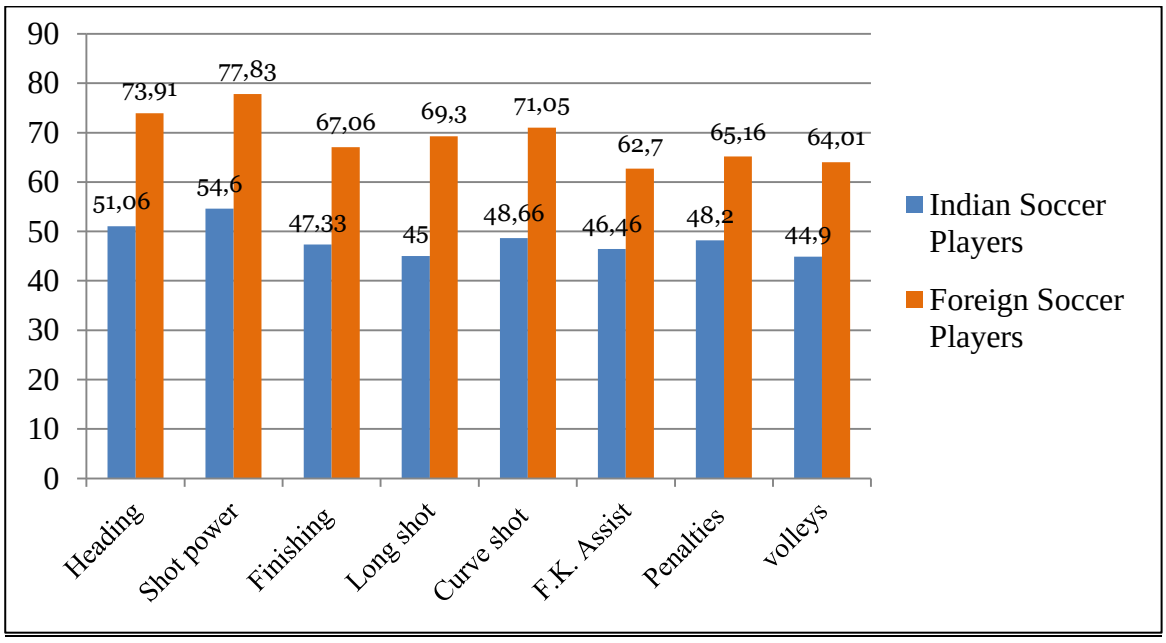

Fig. 5. Graphical presentation of shooting abilities of Indian and foreign soccer players

4. Discussion

From the above statistical calculation (Table 2) it was found that average height (cm) and weight (k.g) of the Indian players are less than foreign players and difference were statistically significant. Height and weight take a significant role when soccer performance is concern.

Tall players are always the ones who can use their head during play, whether on defense or offense. Their high legs and arm length can be of great use in marking and tackling opponents. It also creates a large shot blocking area. Often with height comes strength, so it can be useful in a positional fight. However, the only disadvantage of tall players' physical characteristics is a higher

center of gravity which makes their balance more unstable. Weight can also predict greater success for soccer athletes in specific positions, as goalkeepers and defenders are usually heavier than midfielders and forwards (What are the Characteristics...).

From the above statistical calculations (Tables 3-6), it was found among Indian soccer players that all performance factors are lower than that of foreign players and the difference is statistically significant.

The principle of a great dribbler of the ball must be gifted with speed and endurance in a football-specific context. Scientists from the Department of Sports Science at the University of Beira Interior, Covilha, Portugal, found that anaerobic strength (essentially speed and power) was influenced by genetic factors "30 to 90 percent" and was influenced by peak oxygen uptake ("endurance 40 to 70 percent"). (Footballing Speed...).

In conclusion, significant differences were observed across all performance factors in respect of foreign soccer players. There are lots of physical, physiological and anthropological reasons behind this significant difference between the performance of Indian and foreign soccer players. Some researchers also explained this reasons according to their point of views.

Reilly et al. (2000) indicated that a number of physical and anthropological prerequisites are necessary to compete at an elite level in soccer. In particular, players are expected to have well-developed aerobic fitness and anaerobic strength, coupled with good agility to be able to maintain high power during fast movements throughout the match. This suggests that the higher the fitness level, the less the fatigue experienced by the players for a given full intensity, resulting in less degradation in technical efficiency. Players must master the four techniques of cutting, facing, shielding and speed dribbling. Ball handlers must practice these moves for years to become proficient in performing them properly. Players who wish to become highly competitive will need to spend an enormous amount of time practicing with the ball to develop these essential dribbling skills. Piaget's theory of cognitive development revealed that children build learning by practicing and experimenting with their environment such as dribbling a soccer ball.

There are two important motor areas in the brain, located in the cortex. One is the motor area located in the frontal lobe and the other is the sensory area located in the cerebellum. Both these areas control the legs, feet, thighs, arms, hands, neck, etc. along with many other muscles. The motor area and sensory area use a process called servomechanism that acts as a correction factor once the muscle starts to move. This system continuously sends information to the brain so that correction and adjustment can be achieved throughout the movement (Fox et al., 1993).

Limitations of the present study include the fact that the number of study subjects was small and the subjects' ages ranged from 22 to 32 years and that secondary data were also used to meet the purpose of the present study. Furthermore, there environmental factors, socio-economic background and their lifestyle habits are not considered, so that the results of the present study cannot be easily generalized. Therefore, in the future, studies may be conducted in which such limitations are complemented by studies.

5. Conclusion

In conclusion, significant differences were observed across all performance factors in respect of foreign soccer players. There are lots of physical, physiological and anthropological differences between the performance of Indian and foreign soccer players in terms of training, facilities available, environmental factors and professionalism.

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Published in the USA
European Journal of Physical Education and Sport
Has been issued since 2013.
E-ISSN: 2409-1952
2022. 10(1): 26-35

DOI: 10.13187/ejpe.2022.1.26
https://ejpes.cherkasgu.press

Investigation of Cognitive Flexibility and Happiness Levels of University Students Receiving Sports Education

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Abstract

The aim of this study is to determine whether there is a relationship between cognitive flexibility and happiness levels of university students who receive sports education. In this study, descriptive (scanning) research model based on quantitative observation has been used. The study group consisted of 374 students who received sports education at Selçuk University and Necmettin Erbakan University in 2021–2022 Academic Year in Turkey and were selected by random sampling method. In the study as a data collection tool Personal Information Form developed by researchers, Cognitive Flexibility Scale (CFS) developed by Martin and Rubin (1995) and adapted into Turkish by Çelikkaleli (2014), Happiness Scale (HS) developed by Demirci and Ekşi (2018) have been used. In the data analysis of the study; independent sample t test, Pearson Correlation test, one-way analysis of variance (Anova) test have been applied.

As a result of the research, it has been found that cognitive flexibility levels of university students who received sports education did not have a significant difference according to gender, age of starting sports and family total income status variable. While it has been determined that happiness levels of university students who received sports education were not a significant difference according to the age of starting sports and family total income status variables, it has been determined that there was a significant difference as regards the gender status variable. It has been found that there was a significant weak relationship between the cognitive flexibility and happiness level of university students who received sports education and that there was a significant weak relationship between the gender variable and cognitive flexibility and happiness levels of male and female students.

Keywords: university, cognitive flexibility, happiness level, sports education.

1. Introduction

People have basic needs for psychological and physiological well-being (Sargın, Güleşce, 2022). One of the most important of these basic needs is happiness. As individuals are happy, they feel safe and adapt to their cognitive functions more easily (Öztekin, 2016).

People experience some transitional periods in which they face difficulties in meeting their basic needs. They have to adapt to these transition periods (Erdoğan et al., 2005). University life, which requires getting used to changes and overcoming the problems encountered, is one of the challenging transition periods. University life, which covers the ages of 18-25, is also referred to as the transition period to adulthood. Individuals try to gain identity for social maturity at this age

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when they transition from adolescence to adulthood. University students often face social, emotional, academic and economic problems (Erkan et al., 2012).

The transition period to adulthood, which includes the university years, is a process in which the person changes over time and therefore their happiness levels can be adversely affected (Hu et al., 2021; Özhan, Boyacı, 2018).

Individuals can be more resilient if they can show a flexible attitude in the face of problems and see alternative options for solving problems. However, if they always exhibit the same attitude in the face of problems and do not try alternative solutions, the adaptation processes are quite difficult (Toksöz, Kolburan, 2018). For this reason, their ability to cope with the difficulties encountered is of great importance (Bedel, Ulubey, 2015). One of the most important qualities that university students are expected to acquire in order to adapt to innovations is cognitive flexibility (Scott, 1962).

Cognitive flexibility can be defined as the capacity of the individual to adapt to certain situations and to approach problems in multiple directions (Stevens, 2009). Cognitive flexibility as an crucial component of the capacity of individuals to adapt to changes and the ability to change maladaptive behaviors with adaptive thinking (Dennis, Vander Wal, 2010). According to Ram, Chandran, Sadar and Gowdappa (2019), cognitive flexibility is the ability to change cognitive perspectives to adapt to changing environmental conditions (Ram et al., 2019). As can be seen from the definitions expressed, cognitive flexibility is to have the ability to make changes in affective, behavioral and cognitive areas and to cope with problems in order to overcome the situations that individuals encounter in every period of their lives.

People who are cognitively flexible show better coping when faced with any problem and can develop appropriate alternatives instead of ideas that prevent them (Küçüker, 2016). Especially in sports activities, there are many positions that need to be made during the game. For this reason, the high level of cognitive flexibility in athletes is an important determinant on the accuracy of the decisions to be made. Considering that the correct and successful decisions to be made will increase sports performance, athletes should have high levels of cognitive flexibility in order to reach the highest sports performance (Kiss et al., 2020).

When we look at the relationship between cognitive flexibility and sports, we can say that sports develop self-expression and creativity opportunities. Because the use of the body in the expression of emotions is of great importance in the formation of new movements. At the same time, sport provides appropriate opportunities for controlling emotions and discharging emotions (Kuter, Kuter, 2012). Sport is beneficial to human physical and biological health as well as emotional, neurological and cognitive processes.

In order to gain and develop these skills, the psychological health of the person is expected to be good. One of the basic requirements for psychological health is high levels of happiness. Happiness is the emotion felt at the end of a successful action and is almost a reward for human beings (Öztekin, 2016). Since happiness is the purpose of humanity's existence, it is a powerful source of motivation for it to live better (Özgen, 2007).

The concept of happiness is defined by some researchers as the affective and cognitive evaluation of life (Doğan et al., 2013). Happiness shows that man has found a solution in the face of all the situations brought about by life conditions and is considered as the criterion of competence or perfection achieved in life (Fromm, 1995). It can be stated that individuals with high levels of happiness have a system of emotions and thoughts that can find alternative solutions in the face of events and make the most appropriate feedback (Diener, Seligman, 2002).

As a result, it is understood that the concept of happiness is related to the perspective of events encountered in life and it is believed that people who are cognitively flexible may have high happiness levels. In order for individuals to adapt to the changes they experience during the university period, their happiness levels and cognitive flexibility levels should be high. The purpose of the current research is to examine the relationship between the cognitive flexibility and happiness levels of university students who receive sports education and to create the necessary awareness to increase these qualities.

2. Method

In the current research, a descriptive (scanning) research model based on quantitative observation was used. The descriptive model is a research model that aims to describe a situation that has existed in the past or still exists (Karasar, 2017).

Research Group

The research group consisted of 374 university students who received sports education at Selçuk University and Necmettin Erbakan University in 2021-2022 Academic Year in Turkey and were selected by random sampling method.

Data Collection Tools

Personal Information Form: The personal information form prepared by the researchers in order to collect information about the university students participating in the research consists of questions to determine the gender of the students, the age of starting sports and the total income status of the family.

Cognitive Flexibility Scale: Cognitive Flexibility Scale (CFS) has been developed by Martin and Rubin (1995) to determine the cognitive flexibility levels of individuals and Çelikkaleli (2014) adapted it into Turkish. The scale, which consists of 12 items and one dimension, is of the 6-point Likert type. The internal consistency coefficient (α) of the measurement tool is stated as .80 and the test-retest reliability coefficient is stated as .83.

Happiness Scale: Happiness Scale (HS) has been developed by Demirci and Ekşi (2018) in order to determine happiness levels of individuals. Happiness Scale consisted of a one-dimensional structure consisting of 6 items with an intrinsic value of 3.248 and explaining %54.129 of the total variance. The Cronbach alpha internal consistency coefficient of the scale was calculated as .83. The test-retest reliability coefficient of the scale was determined as .73.

Analysis of Data

In the statistical analysis of the data, SPSS 22 package program has been used. For the normality analysis of the data, skewness and kurtosis values have been examined. It has been determined that data exhibited a normal distribution. Pearson Correlation test, one-way analysis of variance test for multiple comparisons, independent sample t test have been applied to determine the relationship between scales.

3. Results

Table 1 shows Skewness and Kurtosis values for normality analysis of the data.

Table 1. Normality Analysis of Data

	Skewness	Kurtosis
Cognitive Flexibility	-,085	-,267
Happiness Level	-,733	,617

The data show a normal distribution since skewness and kurtosis values in the range of -1.5 and +1.5 (Tabachnick et al., 2007).

In Table 2, the numerical distribution of Personal Information Form comprising of 3 questions is given on account of specify personal information of the students receiving sports education.

Table 2. Numerical Distribution of Personal Information Form

Variable	**Group**	**N**	**%**
Gender	Female	158	42,2
	Male	216	57,8
Family Total Income	0-4000 TL	117	31,3
	4001-5500 TL	95	25,4
	5501-7000 TL	74	19,8
	7001-8500 TL	27	7,2
	8501-10000 TL	25	6,7
	10001 TL and over	36	9,6

Age to Start Sports	4-8	50	13,4
	9-13	173	46,3
	14-18	120	32,1
	19 and over	31	8,3

In Table 3, the conclusions of t test for the cognitive flexibility and happiness levels of the students who received sports education according to the gender variable are included.

Table 3. Independent Sample by Gender Variable t Test

	Group	**N**	**$\bar{x}$**	**ss**	**P**
Cognitive Flexibility	Female	158	4,64	,626	,745
	Male	216	4,61	,696	
Happiness Level	Female	158	3,98	,753	**,037***
	Male	216	3,80	,836	

*p < .05

As a consequence of independent sample t test conducted to specify whether there was a significant difference between cognitive flexibility and happiness level according to gender variable, there was no significant difference in happiness levels and no significant difference in cognitive flexibility levels.

In Table 4, the results of the one-way variance analysis for the cognitive flexibility and happiness levels of the students who received sports education according to the variable of the age of starting sports are included.

Table 4. One-Way Analysis of Variance According to the Age of Starting Sports Status Variable

		Group	**N**	**$\bar{x}$**	**Ss**	**F**	**P**
Cognitive Flexibility	A	4-8	50	4,74	,712	2,251	,082
	B	9-13	173	4,61	,662		
	C	14-18	120	4,53	,642		
	D	19 and over	31	4,83	,671		
Happiness Level	A	4-8	50	3,94	,938	1,924	,125
	B	9-13	173	3,93	,725		
	C	14-18	120	3,74	,829		
	D	19 and over	31	4,03	,879		

*p < .05

As a conclusion of one-way analysis of variance conducted to designate whether there was a significant difference between cognitive flexibility and happiness level as regards age of starting sports variable, no significant difference was found between cognitive flexibility and happiness level.

In Table 5, the consequences of one-way variance analysis for cognitive flexibility and happiness levels of the students who received sports education according to the family total income status variable were included.

Table 5. One-Way Analysis of Variance by Family Total Income Status Variable

		Group	**N**	**$\bar{x}$**	**ss**	**F**	**P**
Cognitive Flexibility	A	0-4000 TL	117	4,61	,647	,421	,834
	B	4001-5500 TL	95	4,62	,607		
	C	5501-7000 TL	74	4,56	,699		
	D	7001-8500 TL	27	4,76	,834		

	E	8501-10000	25	4,69	,635		
	F	10001 TL and over	36	4,63	,723		
Happiness Level	A	0-4000 TL	117	3,88	,731	1,611	,156
	B	4001-5500 TL	95	3,80	,872		
	C	5501-7000 TL	74	3,91	,843		
	D	7001-8500 TL	27	4,20	,681		
	E	8501-10000	25	3,99	,636		
	F	10001 TL and over	36	3,68	,923		

*p < .05 TL: Turkish Lira

As a conclusion of one-way analysis of variance conducted to specify whether there is a significant difference between cognitive flexibility and happiness level according to the family total income status variable, no significant difference was found between cognitive flexibility and happiness level.

In Table 6, the consequences of Pearson Correlation Test conducted to designate the relationship between cognitive flexibility and happiness levels of students receiving sports education are included.

Table 6. Pearson Correlation Test to Designate the Relationship Between Cognitive Flexibility and Happiness Levels of Students Receiving Sports Education

		Cognitive Flexibility	Happiness Level
Cognitive Flexibility	**r**		,264**
	p		,000
Happiness Level	**r**	,264**	
	p	,000	

According to the conclusions of Pearson Correlation Test, which was conducted to reveal whether there was a significant relationship between cognitive flexibility and happiness level for all participating students, it has been found that there was a significant weak relationship between cognitive flexibility and happiness level.

In Table 7, the consequences of Pearson Correlation Test conducted to specify the relationship between cognitive flexibility and happiness levels of students who received sports education according to gender variable are included.

Table 7. Pearson Correlation Test to Designate the Relationship Between Cognitive Flexibility and Happiness Levels of Students Receiving Sports Education As Regards Gender Variable

			Cognitive Flexibility	Happiness Level
Female	Cognitive Flexibility	**r**		,318**
		p		,000
	Happiness Level	**r**	,318**	
		p	,000	
			Cognitive Flexibility	Happiness Level
Male	Cognitive Flexibility	**r**		,231**
		p		,001
	Happiness Level	**r**	,231**	
		p	,001	

According to the consequences of Pearson Correlation Test, which was conducted to reveal whether there is a significant relationship between cognitive flexibility and happiness level as

regards gender variable, it has been found that there was a significant weak relationship between cognitive flexibility and happiness level of female students who received sports education. It has been found that there was a significant weak relationship between cognitive flexibility and happiness level of male students who received sports education.

4. Discussion

In the current study, which examines the relationship between cognitive flexibility and happiness levels of university students receiving sports education, the variables of gender, family total income and age of starting sports were examined and the determined results were discussed in this section.

When the gender variable was examined in Table 3, it was found that there was no significant difference in the cognitive flexibility levels of university students who received sports education, while there was a significant difference in their happiness levels. It has been found that happiness levels of female university students who received sports education were higher than male students. Although there was not a big enough difference to make a significant difference, when the findings were examined in detail, it has been found that the cognitive flexibility levels of female students who received sports education were higher than male students.

It is thought that cognitive flexibility levels of female university students who receive sports education are higher than male students may be due to cultural reasons. Since women in society grow up with a more oppressive upbringing style than men, it is thought that their ability to produce alternative ideas to problems is more developed and at the same time, since women can think more in detail on the current issue due to their nature and approach it with different perspectives, their cognitive flexibility levels are higher than men, although not big enough to make a significant difference. It is thought that happiness levels of female university students who receive sports education are higher than men may be related to their cognitive flexibility levels and may be due to the fact that women inherently experience all emotions intensely.

When the literature is examined, although many of the studies on cognitive flexibility support the current study, there are studies that have reached opposite conclusions.

In the study in which Kara (2020b) examined the meaning of life, forgiveness flexibility, cognitive flexibility and psychological symptoms in individuals who do and do not do sports according to various variables, Kara (2020a) examined the decision-making styles and cognitive flexibility levels of athletes in the karate branch, Parvizi and Özabacı (2021) examined that cognitive flexibility affects psychological well-being and life satisfaction of university students. In the study in which Bayram, Özkamalı and Çiftçi (2021) examined the relationship between uncertainty intolerance and cognitive flexibility levels of university candidates in the preference process, Aktepe (2019) examined the gender and humor styles of high school students' cognitive flexibility, and Tuncer and Tanaş (2022) examined the relationship between cognitive flexibility and self-regulation skills in the research in which they examined the relationship between cognitive flexibility and self-regulation skills. It was found that it did not differ.

In the study in which Yavuz (2019) analyzed psychological resilience and cognitive flexibility levels of physically disabled athletes, it was designated that there was a significant difference in the levels of cognitive flexibility as regards gender variable and that female athletes had more cognitive flexibility levels than male athletes. In the study in which Yukay Yüksel, Sayın and Dinç (2020) examined the effect of cognitive flexibility and rumination on the prediction of academic procrastination behaviors of high school students, it has been found that there was a significant difference between cognitive flexibility levels as regards gender variable and that the cognitive flexibility levels of female students were higher than male students.

In the study in which Yelpaze and Yakar (2019) examined the life satisfaction and cognitive flexibility of university students, it was found that the cognitive flexibility levels of male students were higher than female students where cognitive flexibility levels differed according to gender variable.

When the literature is examined, there are studies on the level of happiness. In the research in which Ekinci and Hamarta (2020) examined the perseverance and happiness levels of vocational school students, it has been stated that happiness levels did not differ significantly in terms of gender variable.

In the research in which Kırık and Sönmez (2017) examined the relationship between communication and happiness, Kızılay (2018) examined the effect of psychological empowerment on happiness and job satisfaction, and Asıcı and İkiz (2015) examined cognitive flexibility levels of university students on the way to happiness, it has been specified that there was no significant difference in happiness levels in the way of gender variable.

When the age of starting sports variable was examined in Table 4, it has been determined that there was no significant difference between cognitive flexibility and happiness level. However, when the findings are examined in detail, it is seen that the group that starts sports at the age of 19 and over and the group that starts sports at the age of 4-8 have a higher level of cognitive flexibility than other groups. The reason for this may be that the individuals who started sports in the 4-8 age range have been in sports for many years and that they have gained the ability to think in many ways, which is among the benefits of sports, and on the contrary, it is thought that the cognitive flexibility levels are high in the findings because the individuals who start sports after the age of 19 can have positive contributions to their lives due to the high level of cognitive flexibility. It is seen that there is no significant difference between happiness levels, but it is seen that the happiness levels of individuals who start sports after the age of 19 are at the highest level. It is thought to be caused by similar causes. It is observed that cognitive flexibility and happiness levels progress in parallel. In the literature, there was no study examining the effect of the age of starting sports on cognitive flexibility and happiness level.

When the family total income status variable was examined in Table 5, it has been designated that there was no significant difference between cognitive flexibility and happiness level. Although there are small differences that do not make a significant difference, it is seen that individuals with a family total income status of 7001-8500 TL are the group with the highest level of cognitive flexibility and happiness. The fact that the group with the highest cognitive flexibility from the findings also had the highest level of happiness, cognitive flexibility and happiness level supports the relationship test results.

In literature Öz (2012) examined the cognitive flexibility, adaptation and anxiety scores of adolescents as regards their gender, socio-economic and learning levels and Ekici and Balcı (2019) specified cognitive flexibility levels and emotional reactivity levels of preschool teacher candidates, it has been found that there was no significant difference in cognitive flexibility levels in terms of income level.

As a result of the research in which Yıldız (2015) examined the socialization and happiness levels of university students who doing sports or not, it has been stated that there was no significant difference in the happiness levels of the students as regards the family income status variable. In the research in which Barutcu (2022) designated the relationship between emotional intelligence and happiness levels of students of the Faculty of Health Sciences, it has been determined that happiness levels did not differ according to economic status. In the study in which the emotional intelligence and happiness of Tingaz and Hazar (2014) physical education and sports teachers and some teacher candidates were examined, it has been specified that there was no significant difference in the happiness levels of physical education and sports teaching students according to their income status.

In Table 6, it has been determined that there was a significant weak relationship between the cognitive flexibility and happiness level of all participating sports students.

It is thought that individuals with high cognitive flexibility have good psychological health and therefore their happiness levels are high because they can easily overcome the problems they encounter due to the fact that they can look at events in many ways, adapt more easily to innovations and are open to change.

When the field was examined, Asıcı and İkiz (2015) examined the relationship between cognitive flexibility and happiness levels in the research “A path to happiness: Cognitive flexibility” and concluded that there was a significant relationship in a positive direction. The results support the current study. There has been no other research in the literature investigating the relationship between cognitive flexibility and happiness level. However, there are studies that examine the relationship between positive emotions and psychological well-being and cognitive flexibility. In the research in which Özhan and Boyacı (2021) determined that there was a relationship between cognitive flexibility and well-being levels of university students, it has been found that there were affirmative significant relationships between cognitive flexibility and emotions, meaning, success and

attachment levels, which are the components of total well-being and well-being. In the research in which Parvizi and Özabacı (2021) examined that cognitive flexibility affects psychological well-being and life satisfaction of university students, it has been found that there is a relationship between cognitive flexibility and psychological well-being of university students.

In Table 7, it has been stated that there was a significant weak relationship between cognitive flexibility and happiness level of female students who received sports education according to gender variable and between cognitive flexibility and happiness level of male students who received sports education.

When the findings are examined in detail, it is observed that the relationship between the cognitive flexibility and happiness level of female students is higher than that of male students. Since women may be more affected by their emotions than men, it is not thought to be a coincidence that happiness levels have a higher impact on cognitive flexibility levels than men. When the literature was examined, there was no study that examined the relationship between cognitive flexibility and happiness level according to gender variable.

5. Conclusion

As a result, it has been designated that the high level of cognitive flexibility of university students who received sports education increased their happiness levels and that the cognitive flexibility levels of the students with high happiness levels were also high.

6. Suggestions

In order for students to lead a happier and more successful life, recreational activities can be organized at the university where they are located in order to increase their cognitive flexibility levels and therefore their happiness levels.

Since it is determined that the happiness levels of female students are higher in the current study, it can be investigated what kind of activities they participate in different from male students and what they do differently from men in daily life and studies can be carried out to increase the happiness levels of male students in line with the results obtained.

The effect of cognitive flexibility levels of students receiving sports education on academic success can be investigated.

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Published in the USA
European Journal of Physical Education and Sport
Has been issued since 2013.
E-ISSN: 2409-1952
2022. 10(1): 36-49

DOI: 10.13187/ejpe.2022.1.36
https://ejpes.cherkasgu.press

What Can the Great Traditions of Mankind Teach to Sports Scientists?

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Abstract

The ontology of Sports Science is well-defined with its various themes and subjects being studied and presented in various works such as journal articles and textbooks, as well as by being in the curriculum of the various university departments. However, there is much to discover when turning our gaze somewhere else, to Traditions and Great Schools that have been dealing for many centuries with the development of many aspects of what we now call "expertise". On the spiritual side, the Traditions included in this study extend from Yoga to Taoism and from the various Tantras to Kabbalah. On the artistic side, Schools such as Iwama Aikido, Wing Tsun, and Russian piano School have been considered. Classic Epistemology is also taken into account. Be it out of ignorance or out of hesitance, seldom do we turn our gaze to discover the richness such Traditions have in so many aspects, no less in matters pertaining to Sports Science. This paper is a first effort to map some of the most important findings several such Traditions treasure and keep for their practitioners. The results of this exploration consist of insights about overlooked performance parameters such as breathing, slow practice, visualizations, sleep practices, basics, relaxation and psychotherapy.

Keywords: methodology, sports science, schools, Taoism, Tantra, martial arts, distal method.

"Yes, he said, I know.
- And do you not also know that although they make use of the visible forms and do reason about them, they are thinking not of these, but of the ideals which they resemble; not of the figures which they draw, but of the absolute square and the absolute diameter, and so on – the forms which they draw or make, and which have shadows and reflections in water of their own, are converted by them into images, but they are really seeking to behold the things themselves, which can only be seen with the eye of the mind?
- That is true."
Plato, The Republic, Book IV.

1. Introduction

I was invited by the editors to produce an article for this issue of European Journal of Physical Education and Sport. At this stage of my research, after having finished developing the Distal Method, and after having extensively published about all the parts that make up this system, but also after producing several papers on Epistemology, I chose a subject that combines all of my interests, focusing on something that is not so popular despite its potential immense impact;

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something more personal also that presents a part of what I have been exploring in depth for the last decade: Spiritual Traditions and their relations to mainstream science (e.g. Sports Science).

Consider Bodhidharma (or Dámó) who spread Buddhism in China. He spent his last years in a Chinese monastery meditating, where he noticed that the monks there where of very poor physical condition, prone to all kinds of diseases. He taught them a specific Chi-Kung (exercises for the cultivation of energy). How effective was it? Fast-forward many centuries into the future, we may identify this monastery as no other than the infamous Shaolin Monastery with the spectacular Shaolin Monks whose mastery of physical skills almost defy the laws of physics and biology. It doesn't get more effective that this! Doesn't Sports Science have to learn a great deal from this great Tradition? That is, taboos and the difficulty to penetrate through the thick mist of mysticism of such Traditions apart.

Laymen, even scientists themselves, oftentimes fail to recognize that science is neither settled nor finalized. Science is to be viewed as a net catching a very isolated and small portion from the ocean of the world-phenomena. Even this catch is only too often problematic, as various research has demonstrated over the years – take for example the various occasions where "scientific facts" where reconsidered:

- Ioannides showed that an overwhelmingly high percentage of medical research is false (Ioannidis, 2005);
- Lamarckian epigenetics do apply after all (Jablonka, Lamb, 2008);
- "Hard scientific facts" are not so "hard" (Latour, Woolgar, 1986).

Even major theories in physics are not "safe", such as the Standard Model and the Theory of Relativity (Kroupa et al., 2012; Thomas, 2022). On the other hand, even though we do *not* have definite and final answers about most of the occult phenomena, current research comes to identify mechanisms which were thought to be "supernatural" and "unscientific". Examples include tummo, meridians, Distant Intentionality Therapies, Reiki, telepathy and more (Achterberg et al., 2005; Demir Doğan, 2018; Watts, 2011; Konkoly et al., 2021; Kozhevnikov et al., 2013; Longhurst, 2010; Radin et al., 2018; Robinson, 2009; Schlitz, Braud, 1997; Shaw, 2013; Shaw et al., 2022; Sheldrake, Beeharee, 2016; Wiseman, Schlitz, 1997). We are merely scratching the surface of what is to be discovered in these fields of study.

Major Schools, such as those existing in martial arts, music and various practices (yoga, chi kung, tummo, etc.) already implement methodologies and methods that are noteworthy if only by judging from the amazing performers and results they produce – but what are the (shared?) mechanisms for producing such results? Since other (sports-related) disciplines would greatly benefit from the implementation of the insights of such Schools, this paper aspires to serve as a first step in a long and complex path of transferring know-how from Schools* to what we consider as the basic core of Sports Science.

This section will include many anecdotal reports. This does not mean that these reports are arbitrarily chosen or biased. Many of the notions in this paper have been partly presented in existing literature as results of various research studies. However, the closer examination of great traditional School practices will provide some more insights. A more complete and final synthesis of such insights is the outcome of the Distal Method, a system incorporating insights from all fields that are relevant to what is known as "motor expertise" (Papageorgiou, 2019; Papageorgiou, 2020c; Papageorgiou, 2020a).

One may argue that the very examination of School teachings is against the author's epistemological views (Papageorgiou, Lekkas, 2018; Papageorgiou, Lekkas, 2020; Papageorgiou, Lekkas, 2021). More specifically, judging from the outcome (School teachings) it is not sufficient to infer the cause (a mechanism). Because literature is largely based on this way of conducting research (affirming the consequent, i.e. statistical models and not deterministic ones), one would be better off deferring until a better epistemology be applied, or, even better, until *not* the wrong one is applied; until such time, the author considers the approach expressed here a step forward in the right direction: recent findings are consistent enough so that i. practitioners (trainers,

* Schools may be defined as systems of ideas, practices and studies that require dedicated practice for many years under an accomplished Teacher aiming at enlightenment of some sort – or being able to transcend reality and reach some kind of deeper knowledge, as the one described in the Platonic text presented above.

educators) may benefit from such insights and ii. scientists may focus more on discovering potential mechanisms without the fear of being labelled as "fringe".

Next, we shall look at some examples of Schools/Traditions the author himself has been a part of.

2. Schools examined

2.1. Martial Arts

As it has already been mentioned, martial arts are a fine example of a traditional School's training, and the author had many of the teachings of his Aikido, Ju-Jutsu (Goshin Ryu) and Wing-Chun Teachers in mind when conceiving this paper.

The minds that conceived and founded the various martial-art Schools had a clear view of the determinants of motor development – when of course no such scientific field even existed. Now, through a more exact – in terms of science – approach the teaching protocol may be decoded. This has multiple benefits:

- Apart from the inspired Teachers, it would be beneficial for anyone else teaching or learning a martial art to have this theoretical background.
- The fact that many martial arts are nowadays separated into traditional and competitive ones (thus becoming mere sports), means that a traditional methodology available to the competitive edition of the martial art may be of some value.
- Other fields would greatly benefit by examining the Paradigm of (traditional) martial arts.

2.2. Music

The practice of musicians swirls around a group of basic exercises which include scales, arpeggios, legatos, or some more instrument-specific exercises, such as octaves (piano) and specific breathing exercises (wind instruments). There is another level of study which includes what we could call "progressive studies", pieces that sound more attractive in terms of musicality and address a specific technical aspect. Another type of study addresses an even higher understanding of music. It is *études* which have been written from great composers like F. Chopin, works that we very reluctantly even call "exercises" in any narrow sense, as they sound so much like music, and one could arguably say that they indeed are. Still, they are composed in order to address technical or interpretational aspects of playing a specific instrument.

In this context, the Teacher chooses the appropriate combination of basic exercises, progressive studies, études and musical pieces for the student. This choice is made through a *curriculum* that corresponds to the tradition and beliefs of the School the Teacher comes from. However, even though some Schools address the distal causes of performance (Papageorgiou, 2019) better than others, there is a definite need for a more detailed and structured approach in order to answer the question "How exactly should one practice to improve".

The author has attended two such Schools being himself a musician. The author is also a direct student and collaborator of D.E. Lekkas who is a musician, a composer and mathematician (the only full representative of pure reason and theoretical epistemology).

2.3. Great Spiritual Traditions

Spirituality is not just about believing to some form of higher power and praying. For thousands of years the great Spiritual Traditions of our times have developed an unbelievably wide array of tools and methods addressing every aspect of the life of practitioners: from the cultivation of energy and healing methods, to activating "locked" capacities of our bodies and minds. Needless to say that there are practices that require years of dedicated practice to yield fruits. Yoga and Chi-Kung are one of the most physical types of practice and meditation as well as several types of visualizations represent the esoteric practices. When writing these lines, the author had in mind Traditions such as Taoism, Yoga, Tantra, Vajrayana, Trika Shaivism, Dzogchen, Kabbalah. The author has extensively practiced in these (and others) such Traditions.

Next, we shall explore some shared characteristics of the aforementioned Schools and Traditions trying to link them back to what we know from Sports Science. No particular order will be used; the following is just a list of various insights.

3. Specific insights

3.1. Deliberate Practice

Deliberate and well-structured practice is the mode of practice of all expert performers regardless of expertise domain (Ericsson, 2006; Ericsson et al., 1993; Hambrick et al., 2014). Generally speaking, it is not a playful activity but rather it involves learning tasks that are just beyond the learner's capacity

but can be successfully completed with the help of teachers or trainers. Slow Deliberate Practice is central in practicing technique in various musical instruments. To the novice student's dissatisfaction, it is requested to invest the majority of practice in such activities.

In some rare footage (Cziffra practicing), one can listen to G. Cziffra, one of the world's greatest and highly virtuoso pianists ever, deliberately practicing even musical pieces that were regularly included in his repertoire. His practice seems to be at a speed predicted by the attacking attractor model (Papageorgiou, 2016).

3.2. Relaxation

Relaxed performance is a hallmark of all the major School's performers. Science has not emphasized that much this aspect of performance; however, in various Schools it is a prerequisite for any further development of the student. Breathing exercises, body posture, biomechanics – all are recruited to help the performer eliminate even the slightest tension that can nowadays be detected with modern biofeedback devises.

Cziffra, Pletnev, Richter, and many other pianists and Schools had, and still have, an intuitive understanding of the violation of Fitts' law (sometimes faster movements are more accurate), and when performing they let their limbs move freely and forcefully without restrictions even if this method leads to some mistakes. However, they seem to recognize that there is no other way to achieve "relaxed speed". Valery Sagaidachny's School recommends the same. The same applies to the way martial artists in Aikido and Jeet Kune Do alternate between complete relaxation and intense tightening when performing a specific exercise. In yoga, full muscle relaxation is achieved even during the most demanding stances (asanas) especially using breathing techniques.

Relaxation of the musculature in dynamic movements is not at all the same as being relaxed during sleep. It means to use only the necessary muscle groups, keep other muscle groups relaxed and also to be able to rapidly and fully relax any muscle that has just been activated but is no longer needed – even if it will be activated again within tenths of a second. Slow study is the key to achieving relaxed high performance.

3.3. Feedback & Self Discovery

The role of feedback in learning has been extensively studied (Amirault, Branson, 2006; Halsband, Lange, 2006; Simon et al., 2008). Each form of feedback is more appropriate for specific instances – for example a type of summative feedback is more appropriate for more experienced performers (Schmidt, Lee, 2014). What is the preferable type of teaching for advanced performers in the various Schools? In Iwama Aikido, the Sensei (Teacher) demonstrates the technique once or twice and then lets the practitioners repeat on their own. This happens in a highly structured environment, where the sequence of actions (who performs first, how many repetitions etc.) is predetermined and the very name of the technique includes already a significant amount of information in a coded way. It is expected that the practitioner has consistently done his/her homework and is – to the best of her abilities – well-intended to improve on technique and not just to fool around needing someone to thoroughly explain things to them or to even force compliance. Whoever is not dedicated when in practice, he/she is not welcome (it may even be dangerous to not be concentrated in martial arts). If needed, Teachers will usually provide summative feedback by demonstrating the whole technique again, by explaining some critical parts of the technique, or take a pair of students and correct them so that all can see. Personal feedback is also utilized especially when the number of the students is small enough. For extremely advanced students, a form of feed-forward is used: Sensei just demonstrates once even an extremely complicated sequence of techniques and then lets the students repeat on their own expecting proficiency without any further feedback.

During practice the concept of "optimal feedback delay" is also employed. Optimal feedback delay refers to the idea that simultaneous feedback leaves no room for self-reflection and may not be optimal for learning; waiting too long to provide feedback is equally detrimental to learning since learners could forget what they were doing in the first place (Schmidt, Lee, 2014). Optimal feedback delay is utilized in order to address the whole class in a general manner after the Teacher has permitted the class to go on for some time.

Each practice session has a goal. A Teacher utilizes many strategies to achieve this goal. Many Teachers line up their students at the end of every practice and expect a brief comment on behalf of everyone about what they have learned, noticed or want to comment on. This is a form of peer-learning. This benefits everyone in multiple ways: by being more self-conscious, by listening to

other people's problems and solutions – for everyone has encountered the same problems more or less – and by incorporating notions in broader concepts. A part of the knowledge was (is) embedded in fellow competitors. A more direct form of peer-learning happens when Sensei asks students to correct their teammates: students may alternatively be granted the role of the instructor helping each other in pairs, providing immediate feedback. For example, an "instructor-student" stands in front of the other student and has the duty to instruct "STOP!" as soon as they spot a mistake in the succession of a technique or a "kata". An example of self-learning is when students correct themselves by executing the technique in front of a mirror or by pausing at predefined checkpoints of the technique to assess their current situation. This is in line with the conclusion that for optimal motor learning, many forms of feedback should be mixed.

The end of self-discovery is called enlightenment by many spiritual paths, and for Dzogchen transpersonal therapy, this state, also called "discovery of our True Nature" is considered the end of psychotherapy, the "Definitive True Sanity" (Capriles-Arias, 2020) – a process referred to by Carl Jung as the unconscious becoming conscious. Maybe there is a lesson here also for Sports Psychologists.

Sports Psychologists should also consider a fact that is unknown to western scientists: all great Spiritual Traditions have special systems for psychotherapy which have existed for hundreds and thousands of years before we have applied the first psychotherapeutic technique in the west. Such systems include the various forms of Chöd and Jioti as well as Rasa Tantra, all leading also to the *unconcealment* of our True Nature. True, western psychology has since evolved far beyond such practices, but the lesson here is that hard-working practitioners, such as monks, athletes and even coaches do need psychotherapy to create a complete experience. Especially the latter, coaches, usually do not consider doing any form of psychotherapy hence counter-transferring and projecting their neurotic mindset to athletes and children, which is unacceptable.

3.4. Striving for Perfection

"*Demand a perfect repetition, as slow as necessary to avoid confusion and haste*". This seems to be the *modus operanti* of several Schools.

Great martial art and music Teachers are renowned for their austerity. To the general public they seem to have some kind of obsession for performing everything perfectly and they never seem happy, despite the impressive skills their students demonstrate. It seems that the Teachers understand very well what is proposed here: a skill that is not perfect will not improve on its own merely because it gets repeated. Students more often than not have what a great Teacher doesn't: magical thinking (Papageorgiou, 2018). They seem to wishfully think that just playing around – even while doing that successfully by some standards – is enough for improvement to come. This seems to contradict Lee & Simon who argue that (Lee, Simon 2004: 29):

"In this chapter, we describe the effect of a practice variable called contextual interference that contradicts the wisdom of this saying ['Perfect Practice makes Perfect']. Moreover, in our discussion of the reasons for this effect, we explain why attempts to optimize performance and learning in practice are generally doomed to failure".

Lee, Simon, 2004: 29

However, one needs to distinguish between constricting study to simple and easy exercises to avoid making mistakes and constantly challenging his/her skills, *trying to* (but not necessarily always achieving to) remain flawless. Mistakes are central in learning activities. That is why, in martial arts, instead of real swords they practice with wooden ones (*bokkens*), and when training involves real weapons in high levels, the protocol becomes extremely strict.

For technical perfection, slow practice is an essential element. Tai chi and yoga might base their training almost entirely on slow practice, but every single other martial art has its fair share of it. Granted, some Schools stress it more than others but masters have a unique obsession with it either way. In one occasion the author recollects of having been advised: "practice so slow that you feel your bones as they turn in your flesh".

This answers the basic question "how slow is slow enough?" The better the practitioners the slower they can practice – and for longer periods, because practicing slow is much more difficult that speeding. A better practice than slow study is to go even slower study!

Another example comes from *kihon* (basic) practice in aikido which is basically the full technique performed slow (and segmented) with the major stress being in a) *form* of final positions, b) *transition* between positions and c) *preparation* of subsequent transitions in relation to the subsequent final positions (*prehensive practice*). This brings us to the perfection part. *Form* is very important in martial arts. Without proper form a technique loses its essence. *Katas, Taos* and many other special exercises are used to develop – among other things – a perfect form. Perfect in this context means biomechanically and stylistically sound movement. All this is reminiscent of the approach we take in Classic Epistemology where there is a fully abstract archetype (an idea) and we always try to assign "imperfect" observatory data to those perfect models.

One advantage of slow practice is that it allows time to approach movement in an exploratory manner, and to put a great deal of attention on the subtle details of the movement. The practitioners will make natural adjustments to correct their technique. Thus, slow practice enhances the kinaesthetic feeling of the movement and permits to troubleshoot one's own technique. In essence, slow practice, even if it can be conceptually separated from "perfect practice", is the other side of the same coin.

Another point several Schools stress is the *detrimental effects of daydreaming*. From what the author understands, there is a deliberate conscious mind, and an automatic, lower-order thought process. The more one lets the lower automatic processes to take over, the less one uses their conscious mind, thus becoming less conscious and more mechanical. This is somewhat similar to the discussion about the automatization of motor skills – *cf*. the bottleneck theory of processing information (Schmidt, Wrisberg, 2008). This requirement about explicating every aspect of movements is also present is Classic Epistemology where nothing is to be taken for granted when discussing the various sciences. Classic or Theoretical epistemology also forwarded a different type of scientific methodology, one that has degenerated into what is currently known as "The Scientific Method" (Papageorgiou, Lekkas, 2021). Many of the problems of structuring complete theoretical systems and also of accommodating many of the insights presented here are due to the methodological limitation of the current Scientific Method, e.g. the Scientific Method's obsession to go backwards from the result (e.g. an experiment) to the cause (e.g. a mechanism), which is a logical error. Sports scientists, if they want to be considered scientists and not merely "scientific workers" should pay extra attention to this situation.

Finally, an important consideration is about the weighting factors of each exercise. Indeed, not all exercises have the same importance on the long run. This has not been particularly addressed in western literature. A special case of exercises with increased weighting factor are the "basics", discussed next.

3.5. Segmentation/Simplification & Basics

Segmentation of techniques, as a means of simplification, has been extensively discussed by various authors (Magill, 2007; Schmidt, Lee, 2014). Why is it that all too often we fail to perform a skill and behave like much less-skilled individuals? Why is it that even very well-trained performers fail, leaving us to wonder how could they fail in something a mediocre performer would not?

Quite often, by acquiring too many and too complex skills, we tend to forger, well, basics! So, when the time comes for us to just do that basic movement that schoolchildren already perform well, we are in trouble. Choking apart, this is due to us becoming too automated – and too much automaticity leads to failure. It is too common then, that in martial arts one is expected to study basics forever.

As already mentioned, in Aikido practice, the various armed and unarmed techniques are trained in the kihon way, which is a slow segmented way. In previous chapters it has been explained how efficient this way is, despite the slow-fast paradox: one only gets to be effective in high speeds through slow practice.

Chunking is another means of simplification related to segmentation. Chunks are perceptual or memory structures that bond more elementary units into larger organizations (Feltovich et al., 2006). Chunking is a very familiar way to practice rapid sequences and can be combined very well with slow deliberate practice. Chunking is a basic strategy which musicians (e.g. pianists) take advantage of to improve. To the author's experience, chunking techniques are included and applied in a very broad spectrum of instrumental practice. For example, musicians study fast passages as separate chunks of two, three or four notes (according to tempo).

The kihon way (Iwama aikido) or basic way is fundamental to high performance. Every traditional art has fundamentals, that is, simple movement segments that address the core and the essence of the skill and are equally practiced by both early beginners and top performers. Oftentimes, these "basics" might appear to have little relation to the target-skill in the eyes of non-experts, but it is the basics that the knowledgeable Teacher sees as the key to success. For example, the "wax-in wax-out" movement the Karate Kid did in the homonymous movie was such a simple and basic movement that seemed irrelevant, yet was soon to be translated to a very effective fighting skill. In reality however, basics are beneficial in the long term. Morihiro Saito (Iwama Aikido founder) when asked about his seemingly impossibly high level of performance replied that he trained "the basics" for more than fifty years, this answer being equivalent in the context of this presentation to the acknowledgment of the value of this notion. Sviatoslav Richter said something similar when replying to the question "how can you play the piano so incredibly well" by saying the almost cliché answer: "I study the difficult parts more"!

In martial arts and in music, basics in the "very long-run", appear to be beneficial. It is not a monotonous practice program that corresponds to the blocked and part practice as it is performed in various research protocols. It consists of some basic "core" movements that are repeated in every practice session, such as *tai no henko* and kihon exercises, scales in music. Therefore, it may be of value to develop and implement such basics in practice, when long term development is the goal.

3.6. Duration of practice: insist, insist, insist

Deliberate practice literature predicts that learners should engage with this type of study for a considerable amount of time, spanning from 2.000 hours (in about two years) for simple activities such as memorization skills, to even as much as 25.000 hours (in periods surpassing that of a decade but a lot) for complex activities such as piano playing at world-class level (Ericsson, 2012). In the movie Karate Kid, Daniel had to "wax-in – wax-out" all day long – hundreds of identical repetitions. In reality, that is not quite as effective for learning (massed practice). Many more repetitions are needed, maybe hundreds of thousands, but extending in a period of years to a lifetime, and scheduled more randomly. The legendary fighter, Musashi, in the Book of the Five Rings constantly urges practitioners to study hard using phrases such as (Musashi, 1974):

- You ought to think deeply about this.
- You must do sufficient research.
- You must study hard.
- Men must polish their particular Way.
- These are things you must learn thoroughly.
- You must train constantly.
- You must train repetitively accumulate practice day by day, and hour by hour.

This seemingly endless practice is the "bad" news. The good news is that one following the steps and practicing for long enough, *can't go wrong*. There is no such thing as talent or anything else between any individual and high performance that cannot be overcome with *proper* practice – even if this means (and it usually does) a lifetime-long dedication (Papageorgiou, 2015). In Taoism there are practices that require from the practitioner to spend around ten years in darkness and solitude. Iwama founder, Morihiro Saito, when asked how he can be so good at aikido replied that it was due to practicing the basics for 40 years.

As an anecdote goes, a man heard a famous pianist playing a concerto. He then went to congratulate him and said "Maestro, you are so brilliant, I would give my life to play like you!" and the pianist replied "well, that is exactly what I did". Another famous pianist, Franz Liszt is said to have noted: "If I don't study one day, I notice, If I don't study for two days my friends also notice and if I don't study for three (consecutive) days, the whole world notices".

3.7. Preparation-Readiness

"Check the ground around you". These were the first words of Ueshiba, Aikido's founder when he explained how to start a confrontation. He did not ask to prepare to attack, choose a strategy or check the defense. His prioritized the accumulation of the maximum amount of information from the environment before someone even *thinks* to do something. This is very similar to *Zanshin*, a state of awareness and relaxed alertness.

This idea of "be prepared" (the boy-scout's motto) is heavily stressed in the processes of all Schools. The idea is that nothing at all is left to chance. From the preparations a shaman does before a ceremony to the unimaginably complex and multi-aspect practices of advanced monks in

Traditions such as Taoism and to the exhausting study of all logically possible cases in Classic Epistemology, one sees the same repeating motif: take into consideration everything, care for all parameters but do that within a long term horizon; a never-ending effort, which, exactly because it takes so much time (a lifetime) is done in a relaxed and steady pace. There is no need to hurry; nothing will be completed in a lifetime anyway – there is no reason to give up practice; there may be no end, but the important thing is to be better today than yesterday.

Preparation also refers to the concept of *prehension*, i.e., preparing our body's posture and our limbs' placement for the upcoming motor task. In 3.6 it was mentioned how important kihon practice is. Kihon practice is important as it trains preparatory skills as well. In piano schools, the proper preparation of the fingers before they strike the keyboard is separately trained as well.

3.8. Creativity

Creativity is considered a concept very close to expertise but with important differences. For example, if an expert specialist is expected to demonstrate consistency in his/her repetitiveness, a creative expert is expected to do the exact opposite: produce original and novel work each time (Simonton, 2013). The exceptional basketball player is expected to repeat successfully the same task (shooting) whereas a painter producing the exact same painting each time is considered at best a mediocre artist.

In Russian School, creativity is expected from the learners: imagine the feelings of a violin or piano student in a Russian conservatory who has flawlessly prepared a demanding musical piece, only to hear comments like: "Richter played it like this too. Please don't bring it again unless you have something better to present". Of course, someone would imagine that having reached the level of world-class musicians such as Richter or Heifetz is a feat by itself. Such expectations to exceed even the great masters put things in perspective and force students to "think outside the box", demystifying high performance.

Exactly the same goes for Classic Epistemology, where researchers within this School are asked to evaluate established scientific fields, fix them, and present new approaches to improve them.

3.9. Grouping of similar techniques, skill transfer and variable practice

This relates to varied practice, but also to the phenomenon of skill transfer (Issurin, 2013; Kerr, Booth, 1978). Grouping of techniques may be related to functional or contextual relevance. In martial arts both ways are used. Anyone having taken some judo classes is familiar with the grouping of techniques into e.g. te waza (hand techniques), ashi waza (leg techniques) or koshi waza (hip techniques) etc. In aikido or in any other system, the writer is familiar with a similar grouping of techniques that takes place as well. Techniques are categorized based on a movement pattern which repeats on the background and may or may not be visible at first glance. The study in this way makes more sense both conceptually and physically to the extent that the students are presented the skill from various perspectives, thus enabling them to create a better proprioceptive map (*cf.* variable practice). This might help both transfer and contextual interference strategies, as it will be an easier task to select different groups to mix.

Training a technique with a counter technique or just in combination with other techniques that work complementary in a certain situation is also usual. The students learn this way the contextual relevance of their actions. In music the grouping of techniques is very usual: scales, arpeggios, trills etc. are common groupings of exercises.

In aikido and the rest of the martial arts, as well as in music, there is always a multitude of variations of one basic technique. Some variations (e.g. *ai-hanmi katate dori nikkio: omote & ura*) seem so different, that one has to broaden her/his thinking to understand how and why one technique stems from the other. Or, similar movements (in the eye of the non-expert) are presented as completely different techniques. The variability (*cf.* perturbations) increases with the addition of weapons to perform the same techniques and other additions (mixing of weapons) or constraints (blindfolded or lights-out training to induce visual occlusion variations).

Another practice that is used in both aikido and ju-jutsu (and many other systems of course) is that pairs change constantly, after every technique. There is no distinction between novices and advanced performers in that respect: everyone will benefit by practicing with everyone, no matter what level, age, weight, etc. each is at. A striking exception is in weapons practice: there, the tradition is *not* to change pairs throughout the practice. Maybe the cost for potential injury due to the introduction of greater unpredictability outweighs the benefit of increased contextual interference.

3.10. Prompting techniques and rhythms

Prompting is the faster activation/reaction due to previously presented stimuli (prompts) either external or internal (self-prompting) (MacLeod, 1991). Rhythm is one of the most important parameters in all sports (Papageorgiou, 2020d). Good rhythmic sense is not developed if not consciously practiced. In martial arts, rhythm development is mainly achieved by the utilization of breath as a reference point for many techniques and group-exercises where the teacher acts as an external metronome, in the sense that students are trying to synchronize their movements to an external source (a Zeitgeber), in this case the teacher who performs the exercise – usually in a segmented way. This is also a part of the many types of feedback learners receive.

In exercises involving the training of a specific technique, on its own or in a more complex combination (like a counter technique) a definite rhythmic pattern is always evident:

"one, two aaaand three!"

"ke-bap!"

…most usually trying to denote the intonation – the climax of the technique (a throw in judo, a strike in karate etc. – see also *motowords* (Papageorgiou, 2020b)).

Self-prompting or self-priming is practiced in major piano schools as well. It is called *perspective playing* and includes the visualization – while performing – of the immediately following parts (i.e. notes) of the piece. It requires, among other things, perfect automatization.

3.11. Testing effect & motivation

Ueshiba might have never said a good word to Morihiro Saito, his most beloved student, but apart from the internal reward of good performance, both martial arts and music have incorporated methods to motivate and at the same time to improve learners. This is accomplished through examinations for levels, "Belt"/"Kyu-Dan" lifetime system etc.

While examinations for the attainment of the next level in martial arts are a testing protocol as well, they would take place only once or twice a year. Testing new skills is something done in every lesson: the *randory* in the end of the session is for this purpose – *cf.* the testing effect (Roediger, Karpicke, 2006). In this special type of fight, the competition is absent. Both parties try freely the newly obtained (or older) techniques and their couple brings no resistance when they see that their teammate is in a position to effectively apply a technique. In a playful but still meaningful manner students "use" the bodies of their teammates to try their techniques. Flow, cooperation, safety and an exploratory mood are promoted. The same applies in Capoeira.

In traditional practices, such as in Aikido, competition is excluded altogether. In other martial arts, there are several levels of competition (from *randory* to full submission) but there always exists a form of "*non-competitive competition*" for the purpose of testing what has been learned. It is only natural that this testing will employ means that are relevant to the practitioners' level, such as more competitive forms of fight, but in the end, everybody, irrespective of their level, will devote a fair amount of time in non-threatening – or mildly threatening – testing activities.

The value of a belt is only symbolic. Note that the system for levels in the form of belts – or other similar concepts – is *equally important and prestigious for both the 10-year-old child and the 60-year-old teacher.*

Other advantages of a system rewarding the obtainment of a certain level are that it helps to develop a certain form of respect, hierarchy and structure between the participants that is critical for the development of a value (or even a virtue) system among the participants. Moreover, it is much more realistic: if ten people have a university degree or a certification, this by itself reveals nothing about the level of each individual in that specific discipline. Still, their real difference could be something like someone having a black belt with someone who is 8 Dans. One could compare that in relation to the downward discrimination notion of Collins & Evans (2007) about how lesser experts cannot judge their superiors (Collins, Evans, 2007). This is formalized in martial arts, and indeed, protocol forbids such criticisms of superiors from inferiors – much like what is the case in the army.

Now, about the testing effect, this can take many forms. For example, in judo, exhausted students take part in randories being (unavoidably) relaxed, thus testing the real effectiveness of their skills without using force. This of course is by no means advisable as it has inherent health risks, but the point is that advanced students take pleasure and add to their experience by occasionally taking their training to the extreme.

Exhibitions, more aggressive fighting games and exhaustive repetitions in a fast rhythm are ways to perform this testing of the stability of the technique in martial arts. Naturally, one will ripe maximum benefits when one applies some form of periodization. No matter how beneficial testing is, some modern training systems (e.g. in tennis) stress the testing part too much (only fast drills and competition), leaving no room for other kinds of practice.

There should always be discrimination between beginners and advanced students when it comes to dangerous practices. Some practices are almost exclusively meant for advanced students. More inexperienced practitioners in traditional martial arts systems are protected by default from strenuous activities until they overcome a critical threshold of performance (while they are permitted to participate in simplified forms of such practices).

A method to detect errors: after mastering a musical piece, the performer is instructed not to play the specific piece for a long period of time – a month maybe – after which she is called to play the piece in full speed one-out. The weak technical parts of the piece that were masked under somewhat massed practice are revealed and the performer may now identify the mistakes and plan her practice better according to their real needs (*cf.* delayed retention tests).

3.12. The sources matter

To the big disappointment of young piano students who expected to hear some exotic technical tips from the distinguished soloist in his master class, the latter went on to present the sources (for musical scores) throughout the day: which scores were better and why, which publishers were more reliable or had distinct characteristics in relation to others, which editions were better for distinct works, which editions were preferred by top performers etc. As the soloist explained, only the correct sources make any further discussion meaningful. And anyway, the soloist noted, one cannot actually make any technical modification in the short term, no matter how much students are impressed from such interventions. So why bother explaining technicalities to students for just one afternoon?

Aikido and jujutsu also depend heavily on sources. In aikido and jujutsu lessons we had to refer to the sources on our own and practice according to the traditional *curriculum* of the School. In aikido every discipline has its own unique sources; for Iwama Aikido for example an important part of our sources are the five volumes of M. Saito *Traditional Aikido* (1973–1976).

The source is not always tangible. In axiomatic method, the source is the conventions used as the starting point. These axioms are arbitrary, however they have been selected for consistency, lack of contradictions, systemic productivity and elegance.

3.13. Teachers-gurus

Gu-ru means the one who dissolves darkness. A Teacher in a great traditional School, apart from a guide to the various sources, is a source by himself/herself. A rare source indeed one may add, with experiences and information that are nowhere else to be found. Maybe great Teachers have not always been great leaders in the westernized sense of the word (enthusiastic people who motivate others); however, a great Teacher is definitely a good and unique source of knowledge, experience and grace. Another similar role of Teachers is to "save" students from the vast ocean of useless information which is oftentimes mixed with useful pieces of information. The learner cannot find and discriminate in time (within a lifetime) all the important parts of what she has to learn on her own.

D.E. Lekkas argues that mathematical knowledge, in striking contrast to the knowledge of the initiates of eastern (etc.) systems, can be derived – in its entirety – from anyone, using nothing but logic. This is considered to be one of the most important teachings of Classic Athens: a move away from mysticism. Even in this case, I cannot overlook the importance, at least initially, of a great Teacher (one may be able to resynthesize all mathematical knowledge on his own, but that could take centuries!). By the way, the development of dialectics does not mean that eastern mysticism is invalid; it is a specific tool even Spiritual Traditions have used and cannot live without (whereas dialectics have never used mysticism, and let that be their only difference, the priority of dialectics).

3.14. Education & Practice

In aikido and in music there is a vast variety of extra-curricular activities, i.e., activities that take place when one is not practicing the technique. From meditative practices to the study of sources, relevant literature and even community work (in aikido in the context of working for your Sensei, loving your neighbor etc.).

The educational activities as well as the training activities are structured in such a way that they lead to expertise only after many years of continuous everyday practice. Indeed, as Teachers of various disciplines say, from Zen to violin, it is important to study daily, even just a fraction of the usual time when there is a serious restriction of time. The notion of sudden massed practice is absent, in stark contrast to what movies claim where people get motivated or angry, try really-really hard for some weeks, and become world-class experts: wishful thinking at its best!

The progression of the individual to the highest level of expertise is described in several Schools. For example, in karate there is the concept of of *suhari* (International Karate-Do Federation):

- SU indicates that a beginner must correctly copy all karate techniques from her instructor.
- HA means that after a number of years of training, when the karateka has attained a high degree black belt, he is allowed to develop new techniques provided they are improvements. This applies to all movements with the exception of basic techniques.
- RI is the highest form. It means that after an even longer period of training than for HA, the Karateka must be able to perform all forms of karate automatically, not stopping to think about her moves.

3.15. Mental imagery

The positive effects of mental imagery have been well-demonstrated (Lotze, 2013; Weinberg, Daniel, 2015). Sports imagery consists of visualizing ourselves (either externally or internally) to execute the target-skill. All major spiritual traditions have as their central practice various forms of imagery, visualization, body-sensations, sensing and feeling various internal parts of the body (either the parts themselves or various kinds of e.g. energy movements among and among them). The higher Tantras employ the power of transformation (doing several types of meditations while being "transformed" into e.g. a specific Buddha. Contemplation (self-observing, or observing our so-called "True Nature") is also central.

A form of practice that is central in all Traditions but completely unheard of in sports science is anything related to dream yoga, lucid dreaming, astral projection and being aware while sleeping. A huge amount of knowledge has been accumulated through millennia about how to enter such states and what to do when there. Endless practices presuppose lucid-dreaming states (or are simply done more effectively when into those states). All these practices may offer a unique know-how and a novel perspective to sports scientists about the comparatively simple forms of sports imagery employed nowadays. Indeed, they could open new fields of research and change "training" as we know it today.

This is an unusual place to refer to breathing, however it is extremely rare to practice breathing techniques without any form of visualization. Even in yoga, breathing is usually coupled with various forms of visualization about projections of energy in the practitioner's body. Many practices in shamanism include breathing in any form imaginable and even in paths as high and esoteric as Kabbalah is, breathing practices are central. Remember that according to Christian Tradition, it was by breath that God created Man out of dust and the Historic Buddha Shakyamuni gave a breathing exercise as an enlightenment practice when he was first asked by his followers to provide a way to become Awake and realize their True Nature.

4. Conclusion

A selection of insights was presented here for the purpose of contributing to the model for expertise attainment called the Distal Method. Hopefully, sports scientists will appreciate the hidden treasures in systems such as the ones presented here.

All in all:

- Relaxation is a characteristic of performance that is central in School teachings and helps performers to not only avoid strain, but additionally, to reach high levels of virtuosity.
- Weighting factors should be attributed to exercises.
- Kihon/segmented study of techniques and the development of basic techniques is a prerequisite for every successful performer.
- Daydreaming (magical thinking) is highly unwanted, contrary to what people outside of Schools think about it. Instead, a good, i.e., unbiased, contact with reality is promoted.
- Dreaming, on the other hand, is a powerful tool, completely unknown to sports scientists.
- Creativity is fostered through the demand for innovation.

- Various feedback methods are to be used interchangeably.
- Contextual interference effect is to be utilized through the continuous change of the environment (change of training partners, variations, etc.).
- Perspective playing is a traditional way for self-priming/prompting.
- Motivation-rewards (symbolic and "internal") are central in Schools throughout the lifetime of individuals. Rewards are in the form of levels that acknowledge the progress of individuals and categorize them in a military-like hierarchy.
- Imagery and visualization techniques possibly have an even greater potential than the one currently practiced in sports. So does breathing.
- Sports psychology interventions do not suffice to address athletes' every need; Practitioners, trainers, all need to seriously self-develop, do psychotherapy.

The basic restriction of this study is that most of the practices that have been mentioned here require a Teacher; Tantra is not something taught or discussed at your local university. And while there are variations from tradition to tradition, there is a central core one can locate after years of practice with several Teachers, but as is the case with geometry ("there is no royal path to geometry"), here too, one needs to invest far more time to sufficiently understand these Traditions than what is required even for an undergraduate degree in Sports Science. As far as Classic Epistemology is concerned, westerners usually have access (in English) to the Roman interpretation of Classical Antiquity which simply is not good enough for someone to understand the original approach. The author and his team have tried to qualify Classic Epistemology in an ongoing series of papers in the Epistēmēs Metron Logos Journal as well as elsewhere.

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Published in the USA
European Journal of Physical Education and Sport
Has been issued since 2013.
E-ISSN: 2409-1952
2022. 10(1): 50-62

DOI: 10.13187/ejpe.2022.1.50
https://ejpes.cherkasgu.press

Body Composition and Intercorrelation Connection in Students: Cross-Sectional Study

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Abstract

It is widely presumed that young who study physical education at one of several universities of physical education (Sarajevo-BIH) could be characterized with proper physique and body composition (BC). Aim of the current study was to analyze the body composition of a male students Physical Education and Sport (PES), University in Sarajevo, by BIA and determine the significance of inter correlation coefficients (ICC).

In study the participants consist 38 male students of Faculty of Physical Education and Sport, University of Sarajevo, the III year of study (Body height = 181.07 ± 6.15 cm; Body weight = 82.41 ± 13.69 kg; BMI = 25.07 ± 3.32 kg/m^2).

Results of the study showed that the body composition is within the healthy (allowed) values recommended for this population of students (Body Fat = 13.23 kg or 15.28 %; Body Muscle = 65.28 kg or 79.21 %; Body Water = 50.70 %; BMR = 1864.24 kCal and segmental ...). ICC showed inverse and significantly high correlation (p = 0.000) between (ICC Fat-Muscle = -0.945), and while direct ICC was achieved (ICC Muscle vs. Water = 0.998; ICC Height vs. Muscle = 0.625; ICC Weight vs. Muscle = 0.919; ICC Weight vs. Water = 0.921; ICC Weight vs. Fat = 0.845).

The obtained results of the study defined the appropriate body composition of the students, which is a consequence of their adequate physical activity and well-designed curricula at the home faculty. In parameters of body composition, students of physical education and sports in Sarajevo had good results of body composition in comparison with similar research on the student population of some European countries, which is the result of their somatotype, way of learning, teaching and extracurricular physical activities.

Keywords: students PE, body composition (BC), bioelectric impedance analysis (BIA).

1. Introduction

In today's era of modern lifestyle, there is less and less physical activity (PA), resulting in many negative consequences for human health. At a younger age, numerous deformities of the locomotor system appear, while in the elderly population, various metabolic and cardiovascular diseases are present (Tanaka et al., 2002; Cho et al., 2009; Onisto et al., 2009; Gokulakrishnan et al., 2011; Chuang et al., 2012). According to Fiorese et al. (2019) an action of a body that is done through muscles and it is conducted repeatedly, planned, and structured is called as physical

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exercise, which is primary for the general psychophysical health of the individual. To increase strength, muscles perform body movements using energy. If it is done regularly, physical exercise has positive health impacts, includes the reduction and prevention of various cardiovascular illness, metabolic syndrome disorders (diabetes mellitus, hypertension, obesity), and osteoporosis (Pedersen, Hoffman-Goetz, 2000).

Low levels of physical activity are not only associated with the failure of health related physical fitness, but also inactivity correlates with the development of hypercholesterolemia, hypertension, metabolic syndrome, type 2 diabetes an increased risk of obesity and cardiovascular diseases, in both adults and children (Sacheck, Kuder, 2010; King et al., 2011). Physical activity (PA) has important health benefits for children, adolescents and adults, and is associated with more favorable biological cardiovascular diseases (lower blood pressure, more favorable serum lipids and lipoproteins, and reduced adiposity) than less active or fit individuals, improving their ability to perform everyday tasks (Hennessy et al., 2010; Pavlović, 2022). More generally, regular PA has been shown to effectively reduce various health risk factors, especially those related to cardiovascular disease and metabolic syndrome (Reimers et al., 2012; Wagner et al., 2012). Previous studies (Blumenthal et al., 2000; Hagberg et al., 2000; Hu, Tian, 2001; Whelton et al., 2002; Hu et al., 2003; Seals, 2003) confirmed that PA or aerobic exercise is inversely related to blood pressure. The American College of Sports Medicine recommends that adults engage in at least 150 min – wk–1 of moderate intensity cardiovascular exercise and at least 75 min wk–1 of vigorous intensity training, in order to maintain a sufficient level of cardio-respiratory fitness (Garber et al., 2011).

Certain effects of increased physical activity include changes in the body composition (BC) of each organism where level and magnitude of the observed changes depend on the type of physical activity or sport that the individual engages in as well as on his individual characteristics, abilities and predispositions (usually includes gender, age, somatotype and specific dynamics of one's metabolic process in the body), which is a prerequisite for the formation of an appropriate body composition (Hagerman et al., 2000; Burdukiewicz et al., 2010; Gremeaux et al., 2012; Stachon, Pietraszewska, 2013). Several methods are used to analyze and measure BC, and the most accurate measurement methods are magnetic resonance imaging and computed tomography. Unfortunately, these methods are expensive and are mainly used in medical diagnostics. However, the use of bioelectrical impedance analysis (BIA) is a relatively simple and non-invasive method for indirectly estimating overall body composition. BIA analysis is used in studies to assess body composition (e.g. total extracellular, intracellular water compartments, muscle mass, adipose tissue, body mass, resistance, basal metabolism) (Pavlović, 2022). Body composition assessment is used to monitor performance and training in the athletic community, and to verify the health status of the population in general (Zaccagni et al., 2014). The Body Mass Index (BMI) is often used to evaluate the weight status, even if it does not discriminate between different components of the overall body mass by definition (BMI = weight/height^2).

According De Lorenzo et al. (2013) the adoption of BMI as a predictor of adiposity and of consequent health risk should be used with caution, especially with physically active individuals, who usually have a higher body density and fat free mass (FFM) than the general population (Zaccagni et al., 2009; Barbieri et al., 2012; Klungland-Torstveit, Sundgot-Borgen, 2012). Its use is becoming increasingly popular because it is safe, fast, easy to use and suitable for laboratory, clinical and field assessments of the composition of the human body (Cerit et al., 2009). Due to its confirmed high repeatability, BIA is widely used in population studies as well as in replicating research (Kutáč, Gajda, 2011) to enable comparative analysis of study results in different populations. The obtained information on body structure is multifunctional and can be used in different cases and with different population groups, including the student population. With the transition to university, there are changes in the lifestyle of individuals, in terms of greater independence and increased social relations with peers, with many colleges becoming a sensitive population group in terms of diet and lifestyle (Carrascosa et al., 2013). Thus established new social relations and way of life most often shorten the time towards physical activity, reduce the quality of nutrition, which results in deterioration of physical composition and physical fitness of students during the school year (Martínez Roldán et al., 2005) show the findings of studies in several countries where poor activity, poor diet and smoking are serious health problems among students (Irwin, 2004).

According to Pavlović (2022) students of physical education and sports (PES) represent a special population of healthy young people for whom PA is primary, which is in line with the specifics of their study plans and programs. Physical activity is manifested through various forms of sports, most of which are included in the program of the Summer and Winter Olympic Games. In this regard, it is considered and expected that students of these faculties will have a different body composition compared to the population of the same chronological age, bearing in mind the continuity of their physical activities during their studies, also through various extracurricular activities (engagement in sports clubs and other types of recreation).

A study by Grima, Blay (2016) conducted in Spain showed that students of physical education and sports have a healthier lifestyle, better cardiovascular profile and less body fat than students of other faculties, which may be due to the curriculum, which promotes active and a healthy lifestyle, in addition to having practical classes in which students participate in PA. In this regard, some research on the population of students of physical education and sports (Almagià Flores et al., 2009; Smolarczyk et al., 2012; Stachon, Pietraszewska, 2013; Zaccagni et al., 2014; Zaccagni et al., 2014; Chacón-Cuberos et al., 2018; López-Sánchez et al., 2019; Pavlović, 2022) analyze issues of body composition, impact on motor manifestations, fitness index, correlation with physical activity of students, differences between students of different geographical regions, correlations between body composition with physical fitness, nutritional habits, fitness and anthropometric parameters, which leads to the conclusion that physical status is a variable category and is primarily dependent on adequate PA of the individual and their lifestyle. When enrolling at the faculty of physical education and sports, it is understood that future students have an adequate level of motor and functional potentials as well as an appropriate body composition that will, in the best possible way, enable them to realize planned PA during their studies. Almagià Flores et al. (2009) suggest that the body composition of the student is of vital importance because it will be an excellent profit in subjects that require physical effort. It is widely believed that young people studying at the faculty of physical education and sports at could be characterized by proper morphological structure, appropriate motor-functional potential and appropriate body composition. However, this assumption cannot be confirmed because so far there has been no research regarding the detection and analysis of physical status with students this faculty in Sarajevo. Due to this fact, it was considered useful to analyze and learn more about the physical development of these young people (students) who chose to study to become physical education teachers, sports coaches, instructors of recreational and sports activities or organizers of sports and recreation. Students of physical education are a priori considered to play on a regular basis, and with firm commitment, a variety of sports (sport games, martial arts, basic sport, individual sport, winter sport, ...). Therefore, it is frequently believed that, in examining their body weight, it is more important to determine the share of muscles mass within the total body mass rather than to compare the body weight to the population standards (Ružbarský et al., 2015).

The aim of this study is the analysis of body composition of male students at the Faculty of Physical Education and Sports, University of Sarajevo, using BIA. The study made it possible to identify the components of body composition that define and distinguish this physically active population from the physically less active population. There will also be information on the possibilities of students for the realization of practical classes at the faculty.

2. Materials and methods

Participants in study

The research carried out on of sample 38 male students, Faculty of Sport and Physical Education, University of Sarajevo (III year of study) (Body height = 181.07 ± 6.15 cm; Body weight = 82.41 ± 13.69 kg; BMI = 25.07 ± 3.32 kg/m^2. A total of 17 variables were measured to assess BC:

1. Body fat (kg),
2. Body fat (%),
3. Body muscle (kg),
4. Body muscle (%)
5. Body water (%),
6. Right arm muscle (kg)
7. Left arm muscle (kg)
8. Trunk muscle (kg)

9. Right leg muscle (kg)
10. Left leg muscle (kg)
11. Right arm fat (%)
12. Left arm fat (%)
13. Trunk fat (%)
14. Right leg fat (%)
15. Left leg fat (%)
16. Bones (kg)
17. Basal metabolic rate – BMR (kCal)

Experimental design

This study followed a cross-sectional design. The standard metric instruments were applied according to the methodology of the International Society for the Advancement of Kinanthropometry (ISAK). Body weight and Body composition (BC) were assessed with the Bioelectrical Impedance Analysis (BIA) using a professional body composition analyzer (In Body 370, Korea), in accordance with the measurement protocol (Abdollah et al., 2021). The participants were informed in about the nature of the study and investigational procedures, and all the participants have voluntarily given their consent to be the part of this study. The study was realized out with the approval of the Council of the Faculty, number 01-2067/22. The measurements were according to the procedures in the Helsinki declaration.

Data analysis

The central and dispersion parameters (Mean, SD, Min, Max, Range, CI ±95,00 %; CV %) were calculated for all variables and ICC. The statistical package Statistica, version 10.0 was used for data processing.

3. Results

The obtained results define the physical status of students of PES. More than 80 % of student respondents engage in extracurricular physical activities (sports clubs, gym, martial arts, fitness clubs, body building, ...). The presents the statistical parameters of the BC of the analyzed sample of male students (Table 1 and Figure 1). The results confirmed that mean body fat determines 15.28 ± 4.86 % (min-max, 6.49-25.71 %) of body composition, which is mean 13.23 ± 6.37 kg of fat mass (min-max, 5.19-8.24 kg). Of the total body mass of the sample (82.41 kg), muscle mass is contained in 79.21 ± 6.53 % or (min-max, 61.88-92.23 %), wich is mean 65.28 ± 8.43 kg (min-max, 51.00-93.40 kg), while bones as part of the skeleton and total body mass take part with 3.86 kg (min-max, 2.50-5.50 kg) which is an indicator of the appropriate mineral status of the bones of the organism, where is a higher body mass is a presumption of a higher bone mineral status. Students showed the greatest heterogeneity in body fat and they are more homogeneous in muscle mass. An identical relationship (CV %) is also evident in the segmental measures of students.

Table 1. Descriptive statistics Body composition

Parameters BC	Mean	Min	Max	SD	CI SD +95%	CV
Body fat (kg)	13.23	4.70	29.80	6.37	5.19-8.24	48.14
Body fat (%)	15.28	6.49	25.71	4.86	13.96-16.29	31.83
Body muscle (kg)	65.28	51.00	93.40	8.43	6.87-10.90	12.91
Body muscle (%)	79.21	61.88	92.23	7.34	4.98-8.93	9.26
Body water (%)	50.70	39.70	72.50	6.53	5.32-8.45	12.88
Bones (kg)	3.86	2.50	5.50	0.61	0.50-0.79	15.85

Right arm muscle (kg)	4.05	3.01	6.39	0.67	0.55-0.87	16.63
Left arm muscle (kg)	4.10	2.86	6.32	0.68	0.55-0.87	16.93
Trunk of muscle (kg)	35.33	24.10	43.90	3.89	3.17-5.03	12.79
Right leg muscle (kg)	10.94	8.82	14.26	1.15	0.94-1.49	10.69
Left leg muscle (kg)	10.86	8.72	14.12	1.16	0.94-1.49	10.83
Right arm muscle (%)	11.57	3.00	32.90	7.33	5.98-9.49	63.40
Left arm muscle (%)	12.03	3.00	36.00	7.70	6.28-9.96	63.98
Trunk fat (%)	17.00	4.60	32.30	6.74	5.50-8.72	39.67
Right leg fat (%)	14.27	7.30	26.80	4.19	3.41-5.42	29.34
Left leg fat (%)	14.22	7.30	27.00	4.20	3.42-5.43	29.55
BMR (kCal)	1864.24	1535.00	2507.00	193.92	158.09-250.88	10.40

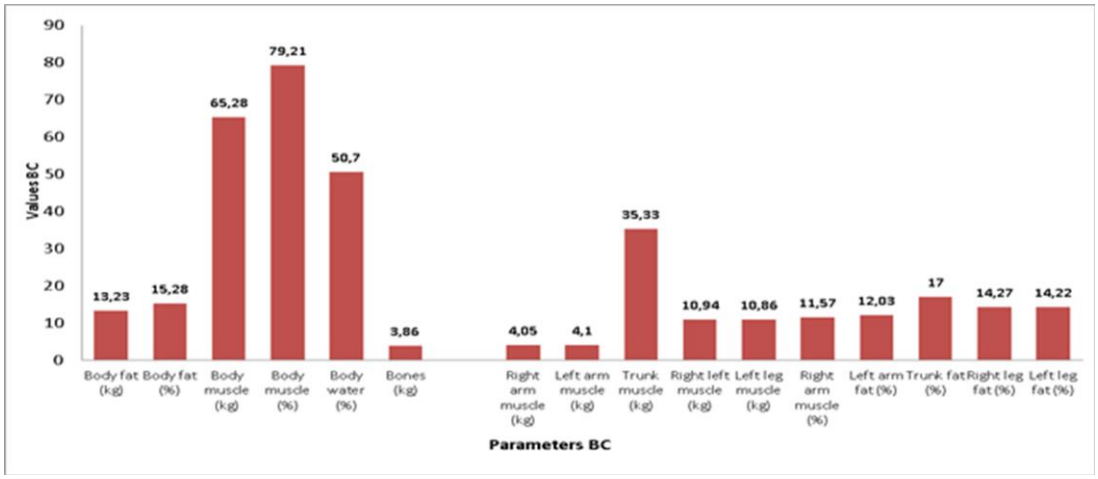

Fig. 1. Body composition of students Physical Education and Sport

It is evident that numerical analysis of segmental muscle status defines significant symmetry between the left and right sides of the cranial and caudal extremities. The right arm 4.05 kg (min-max 3.01-6.39 kg) contains identical mean muscle mass than the left arm 4.10 kg (2.86-6.32 kg). Right leg 10.94 kg (8.82-14.26 kg) contains slightly more in relation to the left leg 10.8 6 kg (8.72-14.12 kg). The largest muscle mass is present in the trunk muscle 35.33 kg (24.10-43.90 kg). Regarding the average representation of adipose tissue for trunk (17.00 %). differences between the

cranial and caudal extremities is evident (Table 1, Figure 1). They generally maintain an inverse relationship with muscle tissue and water values (water, 50.70 %) as expected. The right arm contains an average of 11.57 % adipose tissue (3.00-32.90 %) and is slightly less than the fat percentage of the left arm 12.03 % (min-max, 3.00-36.00 %). The proportion of adipose tissue in the caudal extremities recorded identical average values (right leg. 14.27 % vs. left leg 14.22 %) as well as ranges of min. and max. results. Trunk fat content contains close to 17 % (4.60-32.30 %), which is within healthy limits, without the possibility of amenorrhea with loss of minerals in the bone. Body composition reflects a slight heterogeneity within the sample for body fat (kg), which may be due to poorer selection when selecting biological differences, training process, extracurricular physical activities, acceleration growth, physical fitness, etc... Out of a total of five inter correlation coefficients (ICC) between anthropometric parameters (height, weight) with the amount of fat, muscle component and body water content, four showed a middle and very high statistical correlation (Figure 2-6). Body height records a positive correlation with muscle mass ($r = 0.625$; $p = 0.000$), that students with higher body weight also had a larger muscle component. In contrast to height, body weight is in a significant linear relationship with the amount of fat in the body ($r = 0.845$; $p = 0.001$), muscle component ($r = 0.919$; $p = 0.000$) and to the amount of water in the body ($r = 0.921$; $p = 0.000$). ICC body fat and muscle component content ($r = -0.945$; $p = 0.000$) is maintained a strong inverse relationship (Figure 6). This point to the fact that students who had a pronounced muscle component have more water and less fat in the body.

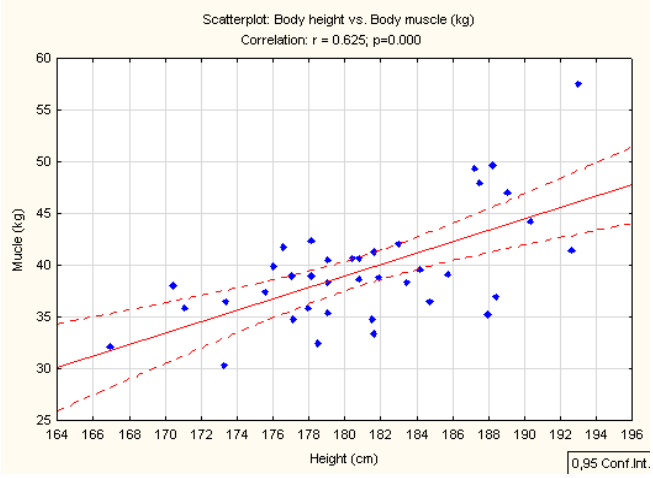

Fig. 2. Correlation Body height (cm) vs. Body muscle (kg)

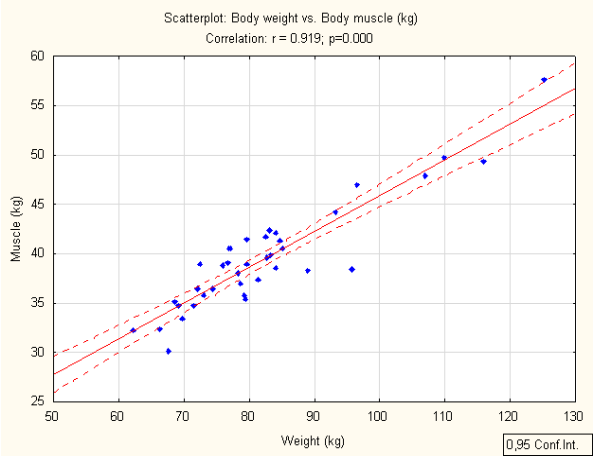

Fig. 3. Body weight (kg) vs. Body muscle (kg)

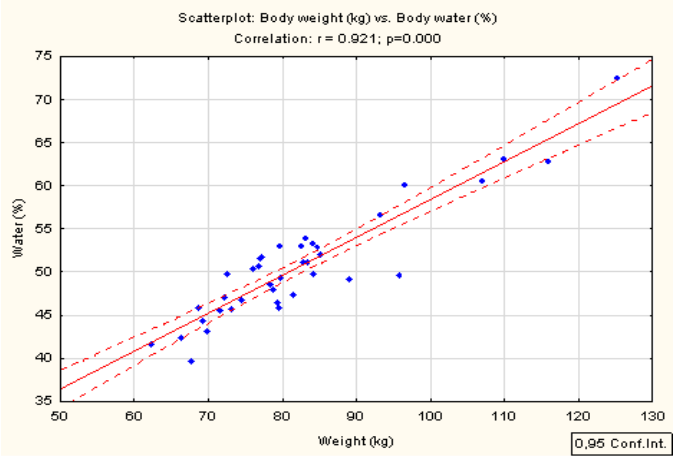

Fig. 4. Correlation Body weight (kg) vs. Body water (%)

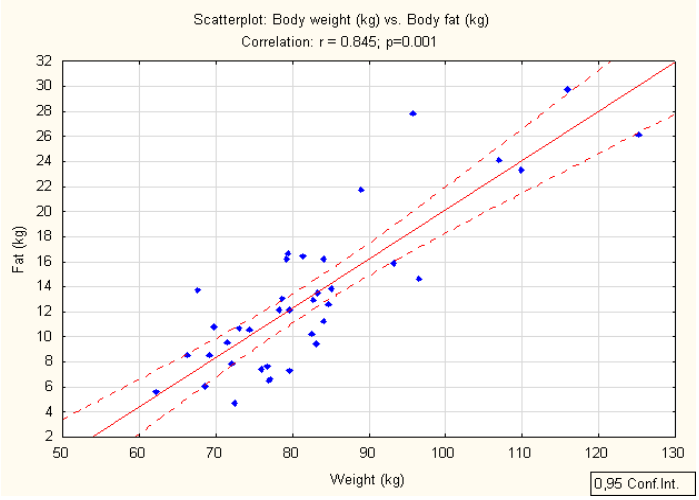

Fig. 5. Correlation Body weight (kg) vs. Body fat (kg)

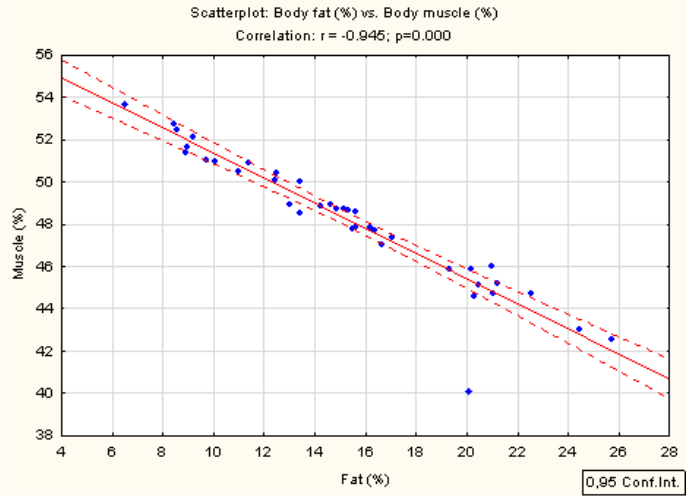

Fig. 6. Correlation Body fat (%) vs. Body muscle (%)

4. Discussion

The aim of the study was to detect and analyze the body composition of a group of 38 male students of Faculty PES at the University of Sarajevo. The analysis assessed 17 body composition

parameters and determined ICC. The obtained results confirm the positive numerical values of all parameters of body composition. From the health aspect, i.e. possible negative consequences for the health of our sample, these are good results, which define this population as physically healthy and working active. The values of body fat (15.28 %) and body muscle (around 80 %) are healthy norms so that their values were not detected as risk factors for some diseases and a negative factor in PA. Good body composition of individuals is a prerequisite for good realization of both motor and functional abilities. Body composition and aerobic capacity are important components of health-related physical fitness. Often scoring a low score on the field test estimates of aerobic capacity may be influenced by many factors including body composition (Lloyd et al., 2003). Excess amount of body fat negatively correlates with other fitness components, especially with aerobic fitness (Bovet et al., 2007; Laframboise, de Graauw, 2011; Razak et al., 2013). Several studies have shown that children with high cardiorespiratory fitness have lower overall and abdominal fatness and a healthier cardiovascular profile by meeting physical activity guidelines (Morrow et al., 2013; Ortega et al., 2013; Stigman et al., 2009). Physical fitness is known to be a powerful predictor of chronic disease morbidity and mortality. Prospective observational studies in adults have shown that low physical fitness is strongly associated with risk for developing coronary heart disease, hypertension (Laukkanen et al., 2004), and type 2 diabetes mellitus (Sawada et al., 2003), as well as mortality from cardiovascular disease (Church et al., 2005) and all causes of mortality (Lohman et al., 2008). According to Vehrs, Hager (2006) most body fat is deposited in fat cells (adipocytes) under the skin (subcutaneous fat) and around organs (visceral fat). Some fat (3-5 % in men; 8-12 % in women) is necessary for normal bodily functions, such as fat that is part of the nervous system or surrounding visceral organs in women (Kaminsky, Dwyer, 2006). Body fat has three important functions in the human body (serves as an insulator to preserve body heat. is a source of fuel for metabolic energy and as a basis for protection) but excess increases the risk of cardiovascular disease, type 2 diabetes, hypertension, hyperlipidemia, metabolic syndrome, coronary artery disease, intermittent claudication, stroke (Efstratopoulos et al., 2006). In the current study, significantly high ICC of anthropometric and body composition parameters of students are evident. Body height is directly related only to muscle mass, while body weight is directly related to the amount of fat and muscle in the body and water in the body. The measured impedance is related to the size and shape of the body and the amount of water in the body. Since a large part of skeletal muscle is only water, the measured impedance is used to estimate the total water content in the body (%), which in turn can be used to estimate FFM. Factors affecting the water content in FFM will affect the accuracy of predicting body fat percentage (% BF). The higher presence of fat in the body prevents the presence of water, especially in muscles (Vehrs, Hager, 2006). These changes are due to the positive effects of student physical activity during studies which supports the findings of some earlier studies (Hagerman et al., 2000; Gremeaux et al., 2012; Stachon, Pietraszewska, 2013).

The muscular component of our sample is dominant with about 80 % participation (65 kg) which is a good result and an indicator of a significant presence of student physical activity and different training loads. Increased calorie intake can be explained by the fact that in this population a better metabolic product is necessary, i.e. higher caloric consumption as a result of consumption in physical activity, which is in line with a study (Westerterp, Goran, 1997) that defines a negative correlation between physical activity, energy expenditure, and fat percentage in men. Men are more likely to engage in team sports (football, basketball, volleyball, handball) or in strength-related activities, e.g. body building, fitness, martial arts, athletics involving intense repetitive efforts, which are positively correlated with fat loss (Tremblay et al., 1994). It turns out that different adaptations of the organism can be related to the type of sport. Considering that they are students of physical education and sports, these results are therefore expected.

The results of our sample of students in terms of height. body weight and BMI are higher average values than the Italian sample of sports science students (Zaccagni et al., 2014) for values of height (181.07 cm vs. 177.60 cm), body weight (82.41 kg vs. 75.60 kg), while the parameters of body composition are small lower (Body Fat 15.28 % or 13.23 kg vs. 17.3 % or 13.3 kg) and muscle components (65.28 kg vs. 62.4 kg). There are also significantly higher anthropometric measures compared to Japanese students (Tanaka et al., 2002) while body composition is slightly lower in Japanese students (Body Fat 12.3 % or 7.9 kg, Body Muscle 55.4 kg). In relation to the research results (Pavlović, 2022), our sample recorded a slightly lower body height (181.07 vs. 182.40 cm),

higher body weight (82.41 vs. 80.06 kg) and more fat tissue in the body (15.28 % or 13.23 kg vs. 13.62 % or 10.90 kg). The average muscle mass of Sarajevo students is almost identical to the results of the study of the East Sarajevo sample (79.21 % or 65.28 kg vs. 82.40 % or 65.74 kg), while the amount of water is less by about 11 %. Authors López-Sánchez et al. (2019) analyze differences in body composition, physical activity, and diet between Polish and Spanish male sports science students. The results show that Polish students have better values of physical composition and physical activity, while Spanish students are defined by a healthier lifestyle. To avoid future risks of diseases such as obesity or diabetes. Polish physical education and sports curricula should include more lessons that promote an active and healthy lifestyle, while Spanish curricula require more physical activity and sport. Faculties of sports sciences should include more active practical classes in which students could improve their physical status and physical fitness through physical exercise. Compared to Polish sports students from Gdańsk (180 cm – 78.80 kg) our sample defines higher values of anthropometric parameters, body height and body weight, but also higher numerical values of the fat component which is smaler pronounced in Polish students (Body Fat 14.28 % - 11.69 kg) vs. our sample (Body fat 15.28 % or 13.23 kg). The percentage of water content is lower by 12 % in our sample. The muscle component recorded a higher value of Polish students (67.11 kg – 85.71 %) compared to our sample (65.28 kg – 79.21 %) but also an average higher BMR (Polish, 1995.03 vs. Sarajevo, 1864.24). Our sample of students compared to Spanish sports students from Murcia. It is primarily defined by bigger height (181.07cm vs. 178cm) and body weight (82.41 kg vs. 75.31 kg). They also have higher isolated adipose tissue in the body compared to the Spanish (Body fat 15.28 % – 13.23 kg vs. 14.73 % - 11.41 kg). The water content in the body is higher in the Spanish sample (62.8 2 %) compared to students in Sarajevo (50.70 %). The muscle component it is more dominant in the sample of our students compared to the Spanish (65.28 kg – 79.21 % vs. 63.92 kg 85.26 %) who also recorded a slightly higher BMR (1895.60). The lower fat content by about 2 kg (2 %) in physically active students compared to less active students is confirmed by the research of (Burdukiewicz et al., 2010; Ružbarský et al., 2015). Adipose tissue participates from 14.86-17 % while the muscle component occupies 44 kg of total body weight with 45 % water. The results confirm that the level of physical activity is not related to body height, body weight and absolute amounts of other studied components of body composition. Compared to the previous research, our sample defines a lower fat content a more dominant muscle component by almost 21 kg and more water by 6 %. The results of this study do not support the results of previous research, but are consistent with the results of (Grima, Blay, 2016; Pavlović, 2022) supporting the thesis on the impact of physical activity through the practical teaching of sports faculties on lower fats in the body of individuals. The results of the current study are in line with the conclusions of the research (Almagià Flores et al., 2009) which imply the negative impact of adipose tissue on the manifestations of motor skills from space speed, strength and aerobic endurance.

It can be assumed that the physical adaptation of students in Sarajevo is a positive response to the programmed physical activity that is associated with increasing muscle mass, reducing body fat and vice versa. Physical adaptation in response to a large amount of weekly physical activity through practical lectures and exercises can be correlated with a reduced percentage of fat and an increase in muscle mass and at the same time with the general health and cardiorespiratory fitness of the student. Acceptable levels of AN-AE capacity are associated with a reduced risk of high blood pressure, coronary heart disease, obesity, diabetes, some forms of cancer, and other health problems in students and adults. Increasing physical fitness in overweight children and adolescents may have many positive effects on health, including lower body fat levels (Ortega et al., 2013), which was confirmed by the research results.

5. Conclusion

The obtained results of the study defined the appropriate body composition of students of PES (Fat – 15.28 %; Muscle – 79.21 %; Water – 50.70 %; BMR = 1864.24 kCal ...) which is a consequence of their adequate PA at the home faculty and outside of teaching activities. The ICC results confirmed a highly inverse and statistically significant relationship between the amounts of fat in the body on the one hand and muscle mass and water content on the other. Students who had more muscle mass and more water also had less fat in their bodies. Compared to students from other countries, our sample of students in terms of anthropometric parameters (height, mass) is superior. In terms of body composition, students of PES in Sarajevo had a higher muscle

component and lower values of fat component, than students from other countries, which is a consequence of their somatotype, way of studying, curricular and extracurricular physical activities. These results are a good indicator of the structure of the student population that enrolls in the Faculty of Sports, which is a good prerequisite for the realization of sports activities that are expected of them during their studies.

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