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C O N T E N T S
С А Д Р Ж А Ј

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EDITORIAL

In this special edition of "Teme," we present an integrated narrative that traverses the realms of physical activity, sports science, and education, as well as legal and ethical considerations in sports, placing significant focus on the psychological dimensions of sports, particularly among youth, athletes, and students.

Our exploration begins in the educational sphere, highlighting the multifaceted impact of physical activities on elementary school students. A study showcasing structured activities during recess reveals improvements in physical fitness, optimism, and a reduction in peer violence, underscoring the importance of physical activity in early development for physical and mental well-being. Additionally, a study on active commuting to school among children further demonstrates how incorporating physical activity into daily routines positively affects children's physical fitness and overall health. In the same educational context, we delve into incorporating democratic competencies in physical and health education, advocating for a holistic approach that integrates not just the development of sports skills but also democratic values and inclusive practices. This theme is further enriched by a study on the self-efficacy of physical education teachers in inclusive environments, highlighting the need for supportive educational frameworks that enable effective and inclusive physical education. Moreover, a comprehensive overview of "physical literacy" within educational systems emphasizes its importance in physical education and the overall development of students, linking these diverse aspects of the educational impact of physical activity and sports.

Shifting to elite sports, we explore the physiological demands and adaptations in Serbian triathletes and rhythmic gymnasts, uncovering the intense physical requirements of these athletes. That is complemented by insights into the health benefits of strength training for older people, illustrating the importance of physical activity at all ages.

Exploring strategies for coping with stress among adolescent athletes in sports psychology provides insight into the mental challenges inherent in competitive sports. That is closely linked to the development of the MOP20 scale, which assesses general achievement motives, offering a broader view of the motivational factors that drive athletes. Another study examining the relationship between attitudes, motivation, and engagement in school sports further enriches our understanding of the psychological factors in sports, emphasizing the significance of positive attitudes and motivation in promoting sports engagement among students.

Expanding our perspective, we explore the social impacts of physical activity, including its influence on body image satisfaction and the challenges adolescents face in maintaining an active lifestyle. These studies highlight the role of physical activity in improving personal well-being and the need for targeted initiatives to promote regular physical activity.

In the legal and ethical dimension, studies on autonomous sports rules, corruption in sports, gender discrimination, and doping legislation provide a critical backdrop, emphasizing the need for ethical management and equality in sports and the complex interaction between legal frameworks and sports practice. Additionally, a special issue of "Teme" explores the perceptions and practices of physical education students in implementing gender-sensitive language, aligning with the broader theme of promoting inclusivity and respect in the sporting environment.

Technological advancements in sports science are also presented in an analysis of sports performance, showing the growing role of technology in this field. This research highlights how innovative tools can offer more affordable, cost-effective alternatives for measuring and improving athletic performance, potentially revolutionizing training and evaluation methods in sports.

Through these interconnected studies, this special edition of "Teme" paints a vivid picture of the dynamic nature of physical activity and sports. Each study contributes to a deeper understanding of how physical activity affects individual health, mental well-being, and social structures and is influenced by legal and ethical considerations, strengthening the extensive role of sports and physical activity in our lives. Together, they underscore the necessity of a multidisciplinary approach in addressing the challenges and opportunities within physical activity and sports. Moreover, this compilation of research serves as a vital resource for policymakers, educators, and practitioners, guiding future initiatives and strategies to enhance the role of physical and health education, sports, and physical activity in fostering a healthier, more inclusive, and ethically aware community.

Guest Editor
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THE RELATIONSHIP BETWEEN PHYSICAL ACTIVITY AND SATISFACTION WITH ONE'S PHYSICAL APPEARANCE

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Abstract

The main goal of this research is to determine to what degree people engaged in physical activity are actually satisfied with their physical appearance. The goal is also to investigate whether there are differences in the examined variables, concerning different demographic characteristics such as gender, age, education and income. The research was conducted online, using a Google questionnaire. The sample consists of 585 respondents. Data was processed in the SPSS programme. Due to the fact that the distribution of scores on the registered variables deviates statistically significantly from the norm, non-parametric techniques were applied. The results show that people who are most satisfied with their physical appearance are also the most physically active and committed to doing more intensive work on their body and appearance (ρ=0.473; $p<0.01$). Women (U=24470.500; $p<0.05$), people with higher incomes (χ^2=8.102; $p<0.05$), and younger people (χ^2=20.533; $p<0.01$) are the most physically active and committed to their physical appearance, while there are no statistically significant differences in scores when it comes to physical activity and commitment to physical appearance ($p>0.05$) between groups of people with different levels of education. The implications of this research lie in the identification of the part of the population which is not physically active enough, which may provide the state and its agencies the opportunity to more actively promote various types and aspects of physical activity, in order to raise awareness about importance of physical activity and the benefits it generally provides.

Key words: physical activity, satisfaction with physical appearance, commitment to physical appearance, basic demographic variables.

ОДНОС ИЗМЕЂУ ФИЗИЧКЕ АКТИВНОСТИ И ЗАДОВОЉСТВА ФИЗИЧКИМ ИЗГЛЕДОМ

Апстракт

Основни циљ овог истраживања је да утврди колико су људи који се баве физичком активношћу заправо задовољни својим физичким изгледом. Такође, истра-

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жује се да ли постоје разлике у испитиваним варијаблама у односу на демографске карактеристике као што су пол, старост, образовање и приход. Истраживање је спроведено онлајн помоћу Гугл упитника. Узорак се састоји од 585 испитаника. Подаци су обрађени у СПСС програму. С обзиром да дистрибуција скорова на мереним варијаблама статистички значајно одступа од норме, примењене су непараметријске технике: Спирманов коефицијент корелације, Ман-Витни У тест и Крускал-Волисова анализа варијансе. Резултати су показали да су особе најзадовољније својим физичким изгледом уједно и физички најактивније и посвећене свом физичком изгледу (ρ=0,473; p<0,01). Особе женског пола (U=24470.500; p<0.05), особе са вишим примањима (χ^2=8.102; p<0.05) и особе млађе животне доби (χ^2=20.533; p<0.01) су физички активније и посвећеније свом физичком изгледу, док се разлике у степену образовања нису показале статистички значајним када је физичка активност и посвећеност физичком изгледу у питању (p>0.05). Импликације истраживања се огледају у идентификацији дела становништва које није довољно физички активно, па се тиме пружа могућност активније промоције различитих видова физичке активности од стране државе и њених органа, са циљем подизања свести о важности физичке активности и вишеструке користи које она пружа.

Кључне речи: физичка активност, задовољство физичким изгледом, посвећеност физичком изгледу, основне демографске варијабле.

INTRODUCTION

Satisfaction with one's physical appearance has also drawn attention to and highlighted the fact that people need to lead a healthy lifestyle and get all the necessary nutrients, such as vitamins, minerals, and amino acids, in order to be more satisfied with their physical appearance and avoid the risks associated with leading an unhealthy lifestyle (Marinković & Galjak, 2021). In addition to proper nutrition, physical activity is necessary in order to improve or reflect good health, i.e. lead a healthy lifestyle. This is necessary for both children and young people, to whom physical activity in itself brings a certain kind of satisfaction, and for middle-aged people who are going through a specific kind of crisis associated with the aging process (Čolović, 2014; Čolović 2017; Čolović & Stojković, 2017; Čolović & Mitić, 2023a), as well as the elderly, in whose case it certainly contributes to better functioning on the mental, emotional, and psychophysical level, preventing various types of health problems and raising their functionality and quality of life. Physical activity of appropriate and adequate intensity and dynamics is recommended to everyone in general, regardless of age, because everyone can have benefit from it (Čolović et al., 2021).

Since satisfaction with one's physical appearance builds and changes throughout life, it is important to know in which period these changes are most intense and important for people in general, as well as whether there are differences between men and women. Thus, althought physical activity is good in general, it is specially recommended for children in order to develop properly and focus on a healthy lifestyle, and to prevent the development of chronic diseases (Hallal et al., 2006). Boys are

generally more physically active than girls, at 23.8% versus 15.4% (Guthold et al., 2010), and this trend remains with adolescents (Landis et al., 2007), and into old age.

There is ample scientific evidence that health improves in all aspects with a greater or lesser intensity of physical activity. Physical activity also enables bone strengthening and muscle development, and contributes to maintaining good physical health (Čolović & Mitić, 2022; Santos et al., 2017). In addition to physical health, physical activity is also very important for mental health, because it can reduce the symptoms of anxiety and depression (Saxena et al., 2009). Regular physical activity reduces the risk of chronic diseases and premature death by 20% to 30% (Warburton & Bredin, 2016). Thus, physical activity reduces the risk of diabetes, high blood pressure, heart disease, asthma and arthritis (Humphreys et al., 2013). Physical activity in women reduces the risk of cardiovascular disease from 28% to 58%, diabetes from 14% to 46%, and colon cancer from 31% to 46% (Brown et al., 2005).

Any physical activity, even if it is of the lowest intensity and scope, is better than physical inactivity and a passive lifestyle (Powell et al., 2011). Moderate physical activity is especially important and represents, as mentioned above, one of the optimal ways of coping and overcoming the crisis of middle age (Čolović, 2017; Čolović & Stojković, 2017; Čolović & Mitić, 2023a). According to the World Health Organization, in 2009, physical inactivity was identified as the fourth leading cause of mortality. Therefore, the World Health Organization recommends a minimum of 150 minutes of moderate physical activity, or 75 minutes of intense physical activity per week for adults (Romas & Sharma, 2017).

The main goal of this research is to determine to what degree people who are engaged in physical activity and are at the same time dedicated to their physical appearance are actually satisfied with their physical appearance. It is also investigates whether there are differences in the examined variables concerning demographic characteristics, such as gender, age, education, and income, in the different group of respondents. The basic hypothesis arising from this study is that people who are physically active and committed to their physical appearance are generally more satisfied with their physical appearance (X1). Based on the basic hypothesis, specific hypotheses were set too. It is assumed that there are differences in the level and commitment to physical activity, as well as satisfaction with physical appearance between people of different gender (X2), incomes (X3), level of education (X4), and age (X5).

Literature Review

Men spend more time on physical activity than women, according to research (Stamatakis & Chaudhury, 2008), which is contrasted with research in Australia, whose results show that women are more physically active and committed to their physical appearance (Vaughan et al., 2008),

along with female students (Booth et al., 2002). However, when it comes to walking as a type of physical activity, the results of research (Hansen et al., 2012) show that men and women walk approximately the same, and that the level of physical activity is constant over the years, while it slightly decreases after the age of 65. Walking, alongside cycling, is one of the forms of active transport due to which the inhabitants of Europe have less problems with obesity compared to the inhabitants of the USA, Canada and Australia (Bassett et al., 2008). Physical activity in leisure time is one of the key factors in the fight against obesity, according to research conducted in the United States (Harper & Lynch, 2007). Men who committed to at least one physical activity 3 to 5 times during the week significantly reduced their risk of becoming overweight and obese, and were more satisfied with their physical appearance than those who did not have any physical activity (Biernat & Tomaszewski, 2015). Older people need to be physically active in order to maintain their vitality for as long as possible and have more energy for the daily chores and responsibilities they perform. However, the results of a number of studies suggest that commitment to physical activity decreases with age (Hallal et al., 2012; Sullivan et al., 2011), although, on the other hand, daily physical activity undoubtedly contributes to a longer life and better health (Matthews et al., 2007).

According to research conducted in the United States (Ceña et al., 2011), socio-demographic characteristics such as older age, obesity, and poorer health are associated with reduced physical activity. In contrast, socio-demographic factors such as higher income, level of education, good health, and a job that requires good physical fitness are positively associated with a commitment to physical appearance and physical activity (Stamatakis & Chaudhury, 2008). However, the results of research conducted in Switzerland (Guessous et al., 2014), as well as in Cameroon (Assah et al., 2015), indicate that people with a lower level of education are more physically active compared to those with a higher level of education. Also, the results of research conducted in China indicate that incomes and range of education do not affect the level of physical activity and satisfaction with physical appearance (Chen et al., 2015). These results are not in line with some research, according to which education (Azagba & Sharaf, 2014; Borodulin et al., 2012;), and income (Cerin & Leslie, 2008; Ord et al., 2013) are very important factors for commitment to physical appearance, and higher level of physical activity in general. Another research conducted in Australia coincides with the aforementioned results of previous research, as in Australia people with lower levels of education and lower income are less committed to and satisfied with their physical appearance (Kavanagh et al., 2005).

It is interesting to note that people who do not buy organic food are generally obese compared to those who buy organic food. According to one research, 31% of people who do not buy organic foor are moderately obese, while 7% are overweight, compared to people who buy organic food, of whom only 10% moderately or excessively obese (Schifferstein &

Ophuis, 1998). People who are most physically active decide to buy organic food primarily because of better form, health (Čolović & Mitić, 2021; Mitić & Čolović, 2022a; Mitić & Čolović, 2022b; Mitić & Čolović, 2023b) and weight loss, and they are more satisfied with their physical appearance compared to those who do not buy organic food (Nie & Zepeda, 2011).

METHODOLOGY

This research was conducted online, using a Google questionnaire which has already been used, and whose metric characteristics have proven to be adequate in related research (Čolović and Mitić, 2021; Čolović et al., 2021). The authors of this questionnaire are also the authors of this paper. The Organic Food questionnaire was used. It consists of 10 multiple choise questions, and examines the presence and intensity of main factors influencing the decision to purchase organic food, and the biggest obstacles to buying it, as well as a certain number of items related to the intensity and frequency of physical activity and satisfaction with one's own physical appearance. Cronbach's alpha coefficient ranged between 0.71 and 0.89 in previous research, while its value in the current research was 0.82. The questionnaire was sent to the email addresses of 900 respondents. The criteria for the selection of respondents for this research from the existing database containing over 2000 respondents referred to the fact that the respondents were adults divided into 4 age categories, according to certain psychophysical developmental changes that are significant for different periods of life: early adulthood (ages 18 through 24), adult respondents (ages 25 through 39), middle-aged people (ages 40 through 64), older respondents (over 65 years of age). One part of the respondents did not answer, or did not fill in the questionnaire completely, so they were excluded from the sample being processed. A fully completed questionnaire was returned by 585 respondents, which equal 65% of the originally planned number of respondents, and represent the final sample in current research. Respondents have different socio-demographic characteristics such as gender, age, education and income. Data was processed in the SPSS programme. Due to the fact that the distribution of scores on the registered variables deviates statistically significantly from the norm, non-parametric techniques were applied. The obtained values of skunis (Sk=445), as a measure of the symmetry of distribution, and kurtosis (Ku=-733), as a measure of convexity, i.e. flatness of the distribution of scores, show that the distribution of scores on the registered variables is not normal. To test the hypotheses, the following were used in addition to descriptive statistics: Spearman's correlation coefficient, for determining the relationship between two variables; Mann-Whitney U test, in order to determine the differences between two groups of subjects; and the Kruskal-Wallis analysis of variances, in order to test the differences in scores in a larger number of groups of subjects.

RESULTS

This part of the paper presents the results of this research, which are discussed in more detail in the next section.

Table 1. Statistics of phisical activity and satisfaction with physical apperance

		Physical activity	Satisfaction with physical appearance
N	Valid	585	585
	Missing	0	0
AS		3.5761	2.4103
Median		4.0000	2.0000
SD		1.02274	1.18317
Variance		1.046	1.400
Skewness		-.592	.445
Std. Error of Skewness		.101	.101
Kurtosis		.061	-.733
Std. Error of Kurtosis		.202	.202
Range		4.00	4.00
Min.		1.00	1.00
Max.		5.00	5.00

Table 2. Descriptive statistics

	Frequency	Percent
Never	163	27.9
Once a month	163	27.9
Once a week	146	25.0
2-3 times a week	82	14.0
Daily	31	5.3
Total	585	100.0

Table 3. Correlations – relationship between commitment and satisfaction with physical appearance

		Commitment to physical appearance	Satisfaction with physical appearance
Commitment to physical appearance	*Ro*	1.000	.473**
	Sig.		.000
	N	585	585
Satisfaction with physical appearance	*Ro*	.473**	1.000
	Sig.	.000	
	N	585	585

Table 4. Result of Mann-Whitney U test - significance of gender differences

	Commitment to physical appearance	Satisfaction with physical appearance
Mann-Whitney U	24470.500	28041.500
Sig.	.010	.734

Table 5. Gender differences in commitment and satisfaction with physical appearance

	Gender	N	MR	∑R
Commitment to physical appearance	Male	124	259.84	32220.50
	Female	461	301.92	139184.50
	Total	585		
Satisfaction with physical appearance	Male	124	288.64	35791.50
	Female	461	294.17	135613.50
	Total	585		

Table 6. Result of Kruskal-Wallis test - significance of obtained differences

	Commitment to physical appearance	Satisfaction with physical appearance
χ^2	20.533	8.102
df	2	2
Sig.	.000	.017

Group variable: *Income*

Table 7. Income differences in commitment and satisfaction with physical appearance

	Income	N	MR
Commitment to physical appearance	Below average (lower than 500 euros)	45	196.66
	Average (between 500 and 1000 euros)	490	297.23
	Above average (above 1000 euros)	50	338.22
	Total	585	
Satisfaction with physical appearance	Below average (lower than 500 euros)	45	243.34
	Average (between 500 and 1000 euros)	490	293.03
	Above average (above 1000 euros)	50	337.41
	Total	585	

Table 8. Result of Kruskal-Wallis test – significance of obtained differences

	Commitment to physical appearance	Satisfaction with physical appearance
χ^2	2.052	5.164
df	4	4
Sig.	.726	.271

Group variable: *Education*

Table 9. Educational differences in commitment and satisfaction with physical appearance

	Education	N	MR
Commitment to physical appearance	Primary school	6	299.00
	High School	213	289.38
	High school/vocational studies	59	289.75
	Faculty/master studies	290	293.05
	PhD	17	346.79
	Total	585	
Satisfaction with physical appearance	Primary school	6	295.42
	High School	213	283.65
	High school/vocational studies	59	321.74
	Faculty/master studies	290	290.37
	PhD	17	354.44
	Total	585	

Table 10. Result of Kruskal-Wallis test – significance of obtained differences

	Commitment to physical appearance	Satisfaction with physical appearance
χ^2	10.160	9.349
df	4	4
Sig.	.039	.047

Group variable: *Age*

Table 11. Differences in commitment and satisfaction with physical appearance in relation to age of respondents

	Age	N	MR
Commitment to physical appearance	18 through 24	110	304.79
	25 through 39	284	294.98
	40 through 64	187	284.29
	Over 65 years	4	235.13
	Total	585	
Satisfaction with physical appearance	18 through 24	110	304.36
	25 through 39	284	290.64
	40 through 64	187	277.94
	Over 65 years	4	255.63
	Total	585	

DISCUSSION

Table 1 presents the descriptive statistics measures for major variables – *Physical activity* and *Satisfaction with physical appearance*, while Table 2 presents the registered frequency of *Phisical activity*.

The obtained results confirm our first hypothesis, and suggest that there is a moderate correlation between commitment and the intensity of physical activity with satisfaction with one's own physical appearance (Table 3). *Intensity of physical activity* is measured through the regisetred frequency in its performing, or more precisely: daily performance, performing two to three times a week, performing once a week, performing once a month, and never performing physical activity.

This means that people who are more physically active and more committed to their physical appearance are also more satisfied with it.

In the following text, the results of specific hypotheses are presented, i.e. the differences that exist in the main variables when different groups of respondents are taken into account.

The results show that people who are dedicated to their physical appearance are mostly or completely satisfied with their physical appearance. This means that people who spend more time on their physical activities are most satisfied with their physical appearance. This should not be a surprise due to the fact that physical activity, according to the results of some studies, contributes to general health (Humphreys, McLeod, & Ruseski, 2013), as well as to better physical appearance (Nie & Zepeda, 2011).

There are statistically significant differences in scores between men and women when it comes to the level of and commitment to physical appearance ($U = 24470.500$; $p < 0.01$), but not when it comes to satisfaction with physical appearance ($U = 28041.500$; $p > 0, 01$) (Table 4).

The data shows that women are more committed to physical appearance ($MR = 301.92$) compared to men ($MR = 259.84$). However, there were no statistically significant differences obtained in scores when it comes to satisfaction with physical appearance, i.e. there are no gender differences in satisfaction with physical looks (Table 5). This partially confirmed the second hypothesis.

The results of this study are consistent with the results of research conducted in Australia, according to which women are more committed and physically active than men (Booth et al., 2002; Vaughan et al., 2008). However, our results are not consistent with other research (Ceña et al., 2011; Hallal et al., 2012; Sullivan et al., 2011), according to which men are more physically active and committed to physical appearance in relation to women, or the research (Hansen et al., 2012) according to which both genders have approximately the same physical commitment.

When it comes to the differences that exist in the commitment and intensity of physical activity ($\chi^2 = 20.533$; $p < 0.01$), as well as satisfaction

with physical appearance ($\chi^2 = 8.102$; $p < 0.05$) between groups of respondents with different incomes, they were at a statistically significant level (Table 6).

The results show that both the commitment to physical appearance and the intensity of physical activity, as well as the satisfaction with one's own physical appearance increase with the increase in income. Thus, people with the highest income are most committed to physical appearance, and are, at the same time, most satisfied with their physical appearance (Table 7).

This can be explained by the fact that people with the highest income can set aside more money to buy healthier and better quality food, which is necessary for the body to receive all the necessary nutrients. Besides, for some physical activities, it is necessary to set aside a certain amount of money both for membership fees and for the purchase of appropriate equipment, and this is certainly easier for people with higher incomes.

The results are not in line with certain research results (Hallal et al., 2012), according to which people in the highest income countries are the least physically active, or with researchers (Chen et al., 2015) according to whom income has no effect on physical activity, but are consistent with the research (Borodulin et al., 2012; Cerin & Leslie, 2008; Ord et al., 2013; Stamatakis & Chaudhury, 2008) according to which people with higher incomes are more committed to their physical appearance.

The magnitude of the obtained differences, measured by the Kruskal-Walis test, were not statistically significant, neither in terms of intensity and commitment ($\chi^2 = 2.052$; $p > 0.05$) nor in terms of satisfaction with physical appearance, when it comes to the education of the respondents ($\chi^2 = 5.164$; $p > 0.05$) (Table 8).

The results show that education has no effect on the level of physical activity, i.e. commitment, or on one's satisfaction with physical appearance (Table 9). Thus, persons with higher and lower levels of education are approximately equally dedicated to and satisfied with their physical appearance.

The obtained results are consistent with some research (Chen et al., 2015; Vaughan et al., 2008), while not consistent with other research (Azagba & Sharaf, 2014; Borodulin et al., 2012), according to which a higher level of education is associated with greater commitment to and satisfaction with physical appearance. Also, the results are not in line with research (Assah et al., 2015; Guessous et al., 2014) according to which people with a lower level of education are more committed to and more satisfied with their physical appearance.

The size of the obtained differences in scores, measured by the Kruskal-Wallis test, was at a statistically significant level when it comes to commitment to physical activity ($\chi^2 = 10.160$; $p < 0.05$), as well as when it comes to satisfaction with physical appearance ($\chi^2 = 9.349$; $p < 0.05$) in relation to the age of the respondents (Table 10).

The results show that with age, commitment to physical appearance decreases (Table 11). The youngest respondents (ages 18 through 24) are most committed to their physical appearance. One of the reasons may be the fact that they have more free time compared to other groups of respondents, given that a large number of respondents of this age are not employed and not married. Also, a possible reason may be the tendency to achieve the best possible physical apperance or outlook in order to attract a better partner. The oldest people in the sample, i.e. respondents who are older than the age of 65, are the least dedicated to their physical appearance.

The results are consistent with research according to which physical activity and commitment to physical appearance, as well as one's satisfaction with it, decrease as age increases (Hallal et al., 2012; Sullivan et al., 2011; Vu et al., 2020), and partly in accordance with another study according to which physical activity and commitment significantly decrease only for those aged 65 or older (Hansen et al., 2012).

CONCLUSION

This research confirms that people who are most satisfied with their physical appearance are also the most physically active and committed to more intensive work on their body and appearance. Some specifics related to certain groups were identified during the analysis of the differences of various groups of respondents in relation to the level of physical activity and commitment to physical appearance, as well as one's satisfaction with physical appearance, according to certain socio-demographic variables.

Thus, it was shown that there are differences in the level of physical activity, and commitment to physical appearance and work on oneself, as well as in general satisfaction with one's physical appearance between groups of respondents of different ages and incomes. Also, women, higher-income earners, and younger adults (18-24 years) are more physically active and committed to their physical appearance. Women are generally more committed to self-employment and physical activity, while there are no differences when it comes to satisfaction with their physical appearance, as compared to men. On the other hand, no differences were obtained in scores between groups of respondents of different levels of education.

The results of this research can be useful for companies and entrepreneurs who provide a wide range of services to customers related to various types of physical activity, such as gyms, spas, fitness clubs, swimming pools, and the like, and can help them better adapt their offer to customers. Namely, based on basic and easily accessible socio-demographic characteristics, they can see which part of the population represents their target group and adequately focus their marketing activities and promotion on them.

It would be interesting to conduct a study that would include people from countries in the region, and would examine the extent to which neighbouring nations are committed to their physical appearance and which demographic characteristics have the greatest impact on commitment to physical appearance.

Some further research could also include other socio-demographic characteristics, in order to identify which other characteristics have an effect on physical activity or satisfaction with physical appearance in humans in general.

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ОДНОС ИЗМЕЂУ ФИЗИЧКЕ АКТИВНОСТИ И ЗАДОВОЉСТВА ФИЗИЧКИМ ИЗГЛЕДОМ

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Резиме

Пандемија Ковид-19 је утицала на то да све више људи почне да обраћа пажњу и увиђа значај здравог начина живота. То свакако није могуће без адекватне исхране и одговарајуће физичке активности. Наиме, за вођење здравог начина живота неопходно је конзумирати адекватну храну која у изобиљу садржи витамине, минерале и друге хранљиве материје. Осим тога, неопходна је и адекватна физичка активност ради постизања доброг здравственог стања и јачања имунитета. Велики број стручне и научне литературе указује на то да физичка активност представља најбољу превенцију од хроничних болести и превремене смрти. Стога не чуди да је препорука Светске здравствене организације да одрасли недељно имају најмање 75 минута интензивне, или 150 минута умерене физичке активности како би побољшали своје здравствено стање. У овом истраживању се испитује однос између посвећености физичком изгледу и задовољства сопственим физичким изгледом. Такође се испитује колико демографске карактеристике као што су пол, старосна доб, ниво образовања, висина прихода, и брачни и радни статус утичу на физичку активност. С обзиром на трајање актуелне пандемије Ковид-19, истраживање је спроведено online уз помоћ Гугл упитника који је конструисан и коришћен у више сродних истраживања од стране аутора. Упитник се састоји од 20 питања на седмостепеној Ликертовој скали чија се поузданост кретала од 0,75 до 0,85 Кронбахове алфе. Упитник је послат на имејл адресе 900 испитаника из целе Србије. Испитаници су различитог пола, старосне доби и других демографских карактеристика, како би узорак био што репрезентативнији. Упитник је комплетно попуњен од стране 585 испитаника, и за обраду узорка је коришћен СПСС програм. С обзиром да расподела скорова на регистрованим варијаблама значајно одступа од нормале, коришћене су непараметријске технике приликом обраде података. Поред дескриптивне статистике, коришћени су Спирманов коефицијент корелације, Ман-Витни У тест за одређивање разлике између две групе испитаника и Крускал-Волисов тест за анализу више група испитаника. Резултати су показали да су особе које су најзадовољније

својим физичким изгледом уједно и физички најактивније и посвећене свом физичком изгледу (ρ=0,473; p<0,01). Особе женског пола (U=24470,500; p<0,05), особе са вишим примањима (χ^2=8,102; p<0,05) и особе млађе животне доби (χ^2=20,533; p<0,01) су физички активније и посвећеније свом физичком изгледу, док се разлике у степену образовања нису показале статистички значајним када су физичка активност и посвећеност физичком изгледу у питању (p>0,05). Импликације истраживања се огледају у идентификацији дела становништва које није довољно физички активно, па се тиме пружа могућност активније промоције различитих видова физичке активности од стране државе и њених органа, са циљем подизања свести о важност физичке активности и вишеструке користи које она пружа. Самим тим би и држава остварила значајну уштеду финансијких средстава преко мањих трошкова здравственог система.

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THE BARRIERS TO ADOLESCENTS' PHYSICAL ACTIVITY

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Abstract

The habit of engaging in physical activity is one of the many life habits that are developed during adolescence. Due to a variety of barriers, many adolescents do not meet the daily physical activity recommendations. This study aimed to determine the barriers to engaging in physical activity among adolescents, i.e. whether there are differences in the barriers to physical activity between male and female adolescents, and whether these barriers differ depending on age. The sample of subjects included 1350 adolescents between the ages of 15 and 18 (672 boys, and 678 girls). The research utilised a customised questionnaire that was adapted from similar pre-existing questionnaires, and it contained a total of nine questions. All questions were of the close-ended type, and each question was rated on a four-point Likert scale. The Chi-square test was used to determine the differences according to gender and age. Based on the obtained results, it was determined that girls reported a higher number of barriers in comparison to boys, although there is no statistically significant difference, and that the highest number of barriers was reported at the age of 15 ($p < .05$).

Key words: adolescence, physical activity, health, sedentary behaviour, barriers.

БАРИЈЕРЕ КОЈЕ УТИЧУ НА ФИЗИЧКУ АКТИВНОСТ АДОЛЕСЦЕНАТА

Апстракт

Навика бављења физичком активношћу једна је од многих животних навика које се развијају током адолесценције. Велики број адолесцената не испуњава дневне норме физичке активности јер томе постоје разне баријере. Циљ ове студије био је да се утврде баријере које утичу на бављење физичком активношћу код адолесцената, односно да се утврди да ли постоје разлике у овим баријерама између адолесцената и адолесценткиња, као и да ли постоје разлике у претходно споменутим баријерама у зависности од година старости. Узорак испитаника чинило је укупно 1350 адолесцената узраста између 15 и 18 година, од чега је било 672 адолесцената и 678 адолесценткиња. За потребе истраживања примењен је анкетни упитник који је прилагођен

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из постојећих упитника, а који садржи укупно девет питања. Сва питања су затвореног селективног типа, а свако питање оцењено је на Ликертовој четворостепеној скали. Хи-квадрат тест је примењен за утврђивање полних и узрасних разлика. На основу добијених резултата утврђено је да су процентуално адолесценткиње пријавиле већи број баријера у односу на адолесценте, иако статистички значајне разлике изостају, као и да је највећи број баријера пријављен код испитаника узраста 15 година ($p< ,05$).

Кључне речи: адолесценција, физичка активност, здравље, седентарно понашање, баријере.

INTRODUCTION

Adolescence is the period between childhood (the beginning of puberty) and adulthood. This period begins between the ages of 11 and 13, and ends between the ages of 18 and 20 (Hugo, 2003), and is accompanied by the emergence of secondary sexual traits and dynamic physical development. Adolescence is characterised by significant changes in emotional, cognitive and social development. It is a very important phase of life during which different life habits are formed (Pandolfo, Minuzzi, Machado, Lopes, Azambuja, & Santos, 2016; Petrović, Momčilović & Pelemiš, 2023), and during which physical activity patterns are also established (Kalac, Gontarev, & Velickovska, 2014; Kumar, Robinson, & Till, 2015). Any skeletal muscle-produced motion that involves the expenditure of energy is referred to as physical activity (PA), and this includes motions made when working, playing, doing housework, travelling, and engaging in recreational activities (World Health Organization, 2018). Participating in physical activities and avoiding a sedentary lifestyle during this period has significant benefits in terms of physical and mental health, social relationships, and cognitive and other abilities of adolescents (Janssen & Leblanc, 2010), and forms the basis for their pattern of activity in adulthood (Padehban, Negarandeh, & Nikpeyma, 2018).

The World Health Organization (WHO) recommends that children and adolescents participate in moderate to vigorous physical activity for at least 60 minutes a day (WHO, 2010). However, the level of physical activity decreases with age, and the percentage of active individuals decreases particularly in the period of adolescence (Kumar et al., 2015; Vanhelst, Béghin, Duhamel, De Henauw, Ruiz, Kafatos et al., 2018). Namely, the recommendations of the WHO on daily physical activity in 2016, at the global level, were not met by 80% of adolescents ages 11 through 17. In other words, four out of five adolescents are not physically active (Guthold, Stevens, Riley, & Bull, 2020), whereby adolescent girls are less physically active than boys in every age range (Rosselli, Ermini, Tosi, Boddi, Stefani, Toncelli, & Modesti, 2020). Such findings are concerning given that physical activity levels tend to decrease in adulthood, as compared to adolescence (Wall, Carlson, Stein, Lee, & Fulton, 2011), which threatens the cur-

rent and future health of this population. Regular exercise helps maintain or improve physical health, reduces stress, anxiety, and depression (Bland, Melton, Bigham, & Velle, 2014), and enhances the mental health of the adolescent population (Rodriguez-Ayllon, Cadenas-Sánchez, Estévez-López, Muñoz, Mora-Gonzalez, Migueles et al., 2019). It also has a preventive effect on most chronic diseases, such as obesity, type 2 diabetes, cardiovascular diseases and certain types of cancer (Janssen & Leblanc, 2010).

But in contrast to the advantages of physical activity for adolescents' health, sedentary behaviour is becoming more prevalent among this population (Kracht, Beyl, Maher, Katzmarzyk, & Staiano, 2021). The decline in the level of physical activity at this age represents one of the biggest public health problems in many countries (Padehban et al., 2018), primarily because it is closely related to chronic diseases, high blood pressure, obesity, levels of lipoproteins in the blood, as well as an increased level of high-risk behaviour, which includes the consumption of tobacco and alcohol in this period of life (Kumar et al., 2015). Additionally, adolescents' inactivity is linked to a higher risk of premature death (Lee, Shiroma, Lobelo, Puska, Blair, & Katzmarzyk, 2012).

Although multiple studies have demonstrated the benefits of physical activity on adolescents' health (Janssen & Leblanc, 2010; Padehban et al., 2018; Rodriguez-Ayllon et al., 2019), there are numerous barriers to meeting the recommended daily levels of physical activity (Guthold et al., 2020; Prochnow, van Woudenberg, & Patterson, 2020; Manić, Zelenović, Stamenković, Čaprić, & Božić, 2021).

There are a large number of factors that influence participation in physical activities, and understanding these factors can help in creating a strategy to overcome them, so that physical activity becomes a part of people's lives, especially in adolescence. Factors that prevent people from engaging in physical activity can be personal, physiological, behavioural and psychological (Hardman, 2003). The aforementioned factors may have an impact on a person's decision to become physically active or inactive. Also, a population's level of activity is significantly affected by the influence of society. A sedentary lifestyle is gradually being promoted by many societal trends. According to data from a European study, the continuous decline in physical activity and exercise in the family, and then the wider social community, along with decreased opportunities for daily physical activity for children in schools are highlighted as some of the main reasons why a significant number of young people today are not physically active enough (Hardman, 2003).

According to studies that have examined barriers from a sociological perspective, these obstacles are built at the intra- and inter-personal levels of personality (Moore, Jilcott, Shores, Evenson, Brownson & Novick, 2010; Bauman, Reis, Sallis, Wells, Loos & Martin, 2012), and they represent predictors of physical activities (Fox, Mann, Ramos, Kleiman & Horowitz, 2012).

The results of previous studies have shown that barriers can be individual, i.e., internal, such as lack of self-confidence, motivation, and fear of injury during physical activity, and external, or related to environmental factors, access to facilities, work obligations, parental encouragement, etc. (Van der Horst, Paw, Twisk, & Van Mechelen, 2007; Jodkowska, Mazur, & Oblacińska, 2015). In particular, internal barriers are related to an individual's motivation, as opposed to external barriers, which are related to the community and environment's infrastructure (Lovell, Ansari, Parker, 2010). The most common and relevant barriers to physical activity are lack of time (external barrier) and lack of motivation (internal barrier) (Sharifi, Mahdavi, Ebrahimi-Mameghani, 2013). Adolescents, as well as people of other ages, are influenced by personal psychosocial factors when making decisions about their way of life and whether to engage in healthy or unhealthy behaviour. It has also been shown that personality traits are factors that are positively related to physical activity (Sallis & Owen, 2002)

Although perceived barriers are strongly associated with leisure-time physical activity, they differ by gender. The results of previous studies (Padehban et al., 2018; Rosselli et al., 2020) reveal that female adolescents experience more barriers to engaging in physical activity than males adolescents, with internal barriers predominating, while male adolescents report external barriers more often. Identifying these barriers is of great importance, because it would help in future interventions and when planning the increase of physical activity of the adolescent population, and the implementation of a health policy aimed at improving physical activity at school and community levels. For determining the critical period of the decrease in the physical activity level in adolescence, the adolescents' age that record the highest number of barriers for involvement in physical activity must be identified. Therefore, in order to determine differences in barriers to adolescents' physical activity, the objectives of this study were: (1) to determine whether there are differences in barriers to physical activity between male and female adolescents; and (2) to determine whether there are differences in barriers to physical activities depending on age.

METHODS

Sample of Respondents

The sample of respondents consisted of 1350 adolescents between the ages of 15 and 18, of which 672 are boys and 678 are girls (Table 1). All respondents were randomly selected from cities in the region of southeastern Serbia (Niš, Leskovac, Aleksinac, Pirot, Vranje, Vladičin Han, Prokuplje, Kuršumlija). The majority of the respondents (33.3%) were 15-year-old adolescents (450 respondents), and the smallest proportion of subjects were 16-year-olds (270 respondents).

Table 1. Sample of respondents according to gender and age

Age	Male (n=672)		Female (n=678)		Total (n=1350)	
	n	%	n	%	n	%
15	199	29.6	251	37.0	450	33.3
16	141	21.0	129	19.0	270	20.0
17	182	27.1	148	21.8	330	24.5
18	150	22.3	150	22.1	300	22.2

This research was conducted in accordance with the Declaration of Helsinki, and the recommendations for research involving human subjects (Christie, 2000). Prior to conducting the survey, written consent from the principals of the schools was requested. Additionally, each parent provided consent for their child to participate in the research before the start of the study. All of the potential respondents were invited to participate in the survey after receiving their parents' permission. The respondents had to be high school students, free of physical disabilities or chronic illnesses, enrolled in regular classes at their school, and not excused from physical education programmes in order to be included in the study. Exclusion criteria were the respondents' lack of desire to fill out the survey questionnaire, lack of consent from parents and/or guardians for participation in the study, as well as incompletely filled surveys.

The survey was carried out at school after physical education classes. Before the survey itself, the interviewers explained the procedure and the course of the survey itself to the respondents, so that the respondents were familiar with it. Respondents were informed that their participation in the survey was voluntary, that their answers would remain anonymous, and that the obtained data would be used only for research purposes. Respondents had the option to leave the survey at any time while it was still ongoing.

Sample of Measuring Instruments

The questionnaire used in this research was adapted from already-existing questionnaires (Mitić, Radisavljević-Janić, Milanović, Pantelić, Marković, Stanković et al., 2010; Santos, Fermino, Reis, Cassou, & Rodriguez-Añez, 2010; Santos, Wanderley Júnior, Barros, de Farias Júnior, & de Barros, 2010), and it contains a total of nine questions. All questions are of the close-ended type, and each question is rated on a four-point Likert scale. In order to identify what may be a barrier to physical activity, each question contains the following response options: 'strongly disagree', 'disagree', 'agree', and 'strongly agree'.

For data analysis, responses were classified according to the presence or absence of barriers, and were categorised into dichotomous variables. The answers of respondents who answered 'I agree' and 'I strongly

agree' were combined, and it was considered that certain barriers were 'present'. If the respondents answered 'I disagree' or 'I strongly disagree', it was considered that there are no barriers to physical activity (Becker, Fermino, Lima, Rech, Añez, & Reis, 2017).

Statistical Data Processing

The basic descriptive statistics of the parameters of both subsamples, as well as of the total sample, are presented as absolute and relative frequencies. For data analysis, respondents who were classified only according to the presence or absence of barriers were taken into account. Respondents who answered 'agree' and 'strongly agree' were considered to have some barriers to physical activity, and were included in the analysis. When the respondent's answer was 'disagree' or 'strongly disagree', it was considered that there were no barriers, and the results of those respondents were not analysed.

To determine the differences according to gender and age, the Chi-square non-parametric test was used. The level of significance was set at $p<0.05$. The results were processed with the Statistical Package for the Social Sciences for Windows, version 20.0 (IBM SPSS 20.0, SPSS Inc, Chicago, IL, USA).

RESULTS

Table 2 shows the results of the basic descriptive statistics of the parameters of established barriers in adolescent boys and girls, as well as the differences between them (Chi-square) in the total sample. The analysis of the obtained data showed that adolescents stated that the most common barriers to physical activity are: *Financial costs* (50.7%), *Misunderstanding of milieu* (49.89%), *Lack of time* (48.6%), and *Non-availability of sports facilities* (48.4%). Among adolescent girls, the most common barriers are *Misunderstanding of milieu* (63.5%), *Lack of habits* (53.1), *Lack of place to perform it* (52.8%) *Lack of organisers (of the physical activity)* (52.0%), *Non-availability of sports facilities* (51.5%), and *Lack of time* (51.4%). In general, adolescent girls have been found to have a greater number of barriers compared to adolescent boys.

The results of the Chi-square test showed that there are significant differences between male and female adolescents in whether they feel the need to exercise (47.3 vs. 42.6, retrospectively; Sig.= .029), as well as in whether they are bothered by not being understood by the milieu (49.8 vs. 63.5, retrospectively; Sig.= .007) (Table 2). No statistically significant differences were found for other barriers.

Table 2. Differences in barriers according to gender

Barriers to physical activity	n	M		F		M vs. F	
		n	%	n	%	Chi-square	Sig.
I don't feel the need	710	336	47.3	374	42.6	4.75	.029*
I lack habits	851	399	46.8	452	53.1	.81	.369
My age bothers me	269	137	50.9	132	49.0	.09	.760
I lack time	856	416	48.6	440	51.4	.67	.412
Financial costs are considerable	577	293	50.7	284	49.2	.14	.708
Misunderstanding of milieu bothers me	507	223	49.8	284	63.5	7.34	.007**
Sports facilities are not available	623	302	48.4	321	51.5	.58	.447
There is a lack of organisers (of PA)	720	345	47.9	375	52.0	1.25	.264
There is a lack of place to perform it	624	294	47.1	330	52.8	2.08	.150

Legend: n – number of respondents; PA – physical activity; M – male; F – female; % – percentage values; Chi-Square – Chi-square test, Sig – significance; * – significant at p< .05; ** – significant at p< .01

The results of the basic descriptive statistics of the established barriers in male and female adolescents depending on age, as well as the differences between ages (Chi-square) are shown in Table 3. Among male adolescents, except for *Lack of habits* (Sig.= .162) and *Lack of time* (Sig.= .052), there were significant differences in relation to age in all other established barriers to physical activity (p< .01 and p< .05). The percentage of perceived barriers decreases with age, and the highest percentage of barriers was observed in 15-years-old respondents. Male adolescents stated that the most common barriers to physical activity are: *Non-availability of sports facilities* (36.3%), *Misunderstanding of milieu* (35.4%), *Financial costs* (34.1%) and *Lack of place to perform it* (34.0%).

Significant differences in barriers to physical activity were also found in female adolescents depending on their age (p< .01 for all barriers). In contrast to male adolescents, the greatest number of barriers in girls was found at the age of 15 (*I don't feel the need* – 36.6%; *I lack habits* – 30.5%; *My age bothers me* – 45.4%; *I lack time* – 35.2%; *Financial costs are considerable* – 39.4%; *Misunderstanding of milieu bothers me* – 34.8%; *Sports facilities are not available* – 36.7%; *There is a lack of organisers* – 35.4%; *There is a lack of place to perform it* – 38.7%). Compared to male adolescents, adolescent girls were more likely to report a greater number of barriers to physical activity.

In the total sample, depending on age, statistically significant differences in barriers to physical activity were determined (p< .01 for all barriers except for Lack of habits: p< .05). In relation to age, it can be stated that adolescent boys and girls aged 15 reported the highest percentage of barriers (*I don't feel the need*, Sig.= .000; *I lack habits*, Sig.= .027; *My age bothers me*,

Sig.= .000; *I lack time*, Sig.= .000; *Financial costs are considerable*, Sig.= .000; *Sports facilities are not available*, Sig.= .000; *There is a lack of organisers*, Sig.= .000; *There is a lack of place to perform it*, Sig.= .000), and the number of barriers decreases with age (p< .01).

Table 3. Differences in barriers according to age

		M				F				M vs. F			
	Age	n	%	Chi-square	Sig.	n	%	Chi-square	Sig.	n	%	Chi-square	Sig.
I don't feel the need	15	95	28.2	16.14	**.001** **	137	36.6	35.98	**.000** **	232	32.6	44.78	**.000** **
	16	59	17.5			58	15.5			117	16.4		
	17	107	31.8			99	26.4			206	29.0		
	18	75	23.3			80	21.3			155	21.8		
I lack habits	15	94	23.5	5.14	.162	138	30.5	11.62	**.009** **	232	27.2	9.15	**.027** *
	16	90	22.5			87	19.2			177	20.8		
	17	119	29.8			111	24.5			230	27.0		
	18	96	24.0			116	25.6			212	24.9		
My age bothers me	15	50	36.5	37.14	**.000** **	60	45.4	49.27	**.000*** *	110	40.8	83.19	**.000** **
	16	26	18.9			22	16.6			48	17.8		
	17	52	37.9			43	32.5			95	35.3		
	18	9	2.9			7	5.3			16	5.9		
I lack time	15	106	25.4	7.63	.052	155	35.2	29.25	**.000*** *	261	30.4	22.42	**.000** **
	16	86	20.6			78	17.7			164	19.1		
	17	125	30.0			97	22.0			222	25.9		
	18	99	23.8			110	25.0			209	24.4		
Financial costs are considerable	15	80	27.3	18.87	**.000** **	112	39.4	37.73	**.000** **	192	33.2	43.73	**.000** **
	16	62	21.1			44	15.4			106	18.3		
	17	100	34.1			75	26.4			175	30.3		
	18	51	17.4			53	18.6			104	18.0		
Misunderstanding of milieu bothers me	15	64	28.7	29.00	**.000** **	99	34.8	34.53	**.000** **	163	32.1	57.01	**.000** **
	16	56	25.1			56	19.7			112	22.0		
	17	79	35.4			85	29.9			164	32.3		
	18	24	10.7			44	15.4			68	13.4		
Sports facilities are not available	15	83	25.7	26.09	**.000** **	118	36.7	22.18	**.000** **	201	32.2	34.79	**.000** **
	16	62	19.2			58	18.0			120	19.2		
	17	117	36.3			86	26.7			183	29.3		
	18	60	18.6			59	18.3			119	19.1		
There is a lack of organisers (of PA)	15	96	27.8	8.03	**.045** *	133	35.4	23.19	**.000** **	229	31.8	24.50	**.000** **
	16	89	25.8			83	22.1			172	23.8		
	17	96	27.8			87	23.2			183	25.4		
	18	64	17.6			72	19.2			136	18.8		
There is a lack of place to perform it	15	91	30.9	27.44	**.000** **	128	38.7	40.18	**.000** **	219	35.1	59.85	**.000*** *
	16	56	19.0			62	18.7			118	18.9		
	17	100	34.0			86	26.0			186	29.8		
	18	47	15.9			54	16.3			101	16.1		

Legend: n – number of respondents; PA – physical activity; M – male; F – female; % – percentage values; Chi-square – Chi-square test, Sig. – significance; * – significant at p< .05; ** – significant at p< .01

DISCUSSION

This research was conducted with the aim of determining the barriers to adolescent population's participation in physical activities, but also to determine possible differences in relation to gender and age. The obtained results indicate that adolescent girls reported a greater number of barriers compared to boys, although there are no statistically significant differences in the mentioned barriers (Table 2). It is observed that adolescent girls perceive a greater number of barriers compared to adolescent boys. Similar results were found in other studies (Padehban et al., 2018; Abdelghaffar, Hicham, Siham, Samira, & Youness, 2019; Portela-Pino, López-Castedo, Martínez-Patiño, Valverde-Esteve, & Domínguez-Alonso, 2020; Rosselli et al., 2020), wherein adolescent girls reported a lower level of physical activity, as well as a greater number of barriers to engaging in it. There are many reasons for this outcome in the mentioned studies. On the one hand, girls engage less in physical activities, they are less interested in them, they prefer activities of lower intensity, they spend their free time at home helping with household chores, but they are also ashamed to participate in outdoor physical activities. On the other hand, they are often underprivileged in engaging in physical activities compared to boys – boys tend to occupy places in the neighbourhood with sports activities, especially football (Abdelghaffar et al., 2019), and there is also a lack of a suitable place for girls that is safe for the realisation of physical activities and well monitored.

In our research, among adolescent girls, the biggest barrier is 'misunderstanding of milieu bothers them' and 'the lack of habits (for physical activity)', which indicates that the social environment in which they grow up can have a great influence on this behaviour. Above all, this refers to family relationships and parental support for physical activity (Sharara, Akik, Ghattas, & Makhlouf Obermeyer, 2018). Additionally, the social environment has an impact on how adolescents behave, particularly when considering the relationships that a child has at school (Hesketh, Lakshman, & van Sluijs, 2017). The barrier *Misunderstanding of milieu bothers me* for participating in physical activities was also highlighted by male adolescents, so in addition to the above, mutual interactions among this population can affect the motivation to engage in physical activities. This behaviour results from group interactions, and some studies have shown that friends in the same group have a similar level of physical activity (Lopes, Gabbard, & Rodrigues, 2016). Also, research shows that adolescents whose friends are physically active become physically active themselves (Fermino, Rech, Hino, Rodriguez-Anez, & Reis, 2010). This indicates that peers can be an incentive and a motivator for the involvement of their adolescent friends in various physical activities, but also a hindering factor.

When considering physical activity habits, the reason for taking part in physical activity can also be found in the behavioural patterns of the

parents – if the parents themselves are not physically active (Timperio et al., 2013), or have prejudices related to the child injuring themselves during exercise (Hesketh et al., 2017; Abdelghaffar et al., 2019). The lack of physical activity habits can be explained by insufficient information about the recommended levels of physical activity, as well as about the positive effects of it on health (Janssen & Leblanc, 2010). The study of Vanhelst et al. (2018) found that most adolescents, as well as their parents, do not know that it is necessary to have at least 60 minutes a day of moderate to vigorous physical activity in order to achieve health benefits. Significant differences in the reported barriers of male and female adolescents were found in the barriers *I don't feel the need* and *Misunderstanding of milieu bothers me*, and those are more dominant barriers among girls, while the dominant ones among boys are *Financial costs are considerable*, *Sports facilities are not available*, and *I lack time*. The results obtained in this way showed that there are gender differences in barriers between male and female adolescents, which is in line with other studies (Padehban et al., 2018; Abdelghaffar et al., 2019; Portela-Pino et al., 2020; Rosselli et al., 2020). The obtained data match the results of the review study of Manić et al. (2021), which stated that internal barriers are more prevalent in adolescent girls, while external ones are more dominant in adolescent boys. Also, the reason why adolescent girls report a greater number of barriers and are less physically active than adolescent boys may be due to the fact that their social environment is not physically active, and therefore even some adolescent girls who would be physically active have no one to practice physical activity with, which was confirmed by the studies conducted by Lazarowicz, O'Hara, Broder, Grunberg, & Gasevic (2021). In the aforementioned study, adolescent girls stated that their friends did not want to participate in physical activity, so they themselves did not participate either.

Male adolescents stated that the biggest barriers to physical activity were the financial expenses required for the conduction of some forms of physical activity, and that the sports facilities were either non-existent or far away. The obtained results are in line with the results of Ries, Gittelsohn, Voorhees, Roche, Clifton and Astone (2008), and Bélanger, Casey, Cormier, Laflamme Filion, Martin, Aubut and associates (2011). The results of these studies showed that adolescents from families of low economic status were less physically active, and that they reported barriers related to financial expenses.

The results of this research show that the largest number of barriers to engaging in physical activity were found at the age of 15, and the most frequent were: *I don't feel the need*, *I lack habits*, *My age bothers me*, *I lack time*, *Financial costs are considerable*, *Sports facilities are not available*, *There is a lack of organisers (of physical activity)*, and *The lack of place to perform it*. Similar barriers among the adolescent population were also determined in the study of Kalac et al. (2014). The authors stated that adoles-

cents in this age period (15 years) are the least physically active. The reason for the greater number of barriers at this age may be due to the fact that this is a period of transition from primary to secondary school, where students have a greater number of curricular and extracurricular activities, and have to spend more time preparing for the entrance exam, for example (Brodersen, Steptoe, Boniface, & Wardle, 2007; Kalac et al., 2014). Also, this can be explained by the fact that the awareness of the health-related benefits of physical activity comes in the later years of adolescence (Vanhelst et al., 2018). The aforementioned studies, which are in concordance with the results obtained in this study, indicated that the number of barriers in this population group decreases with age.

CONCLUSION

The aims of this study were to determine whether there are differences in barriers to performing physical activities between male and female adolescents, and to determine whether there are differences according to age. The study showed that adolescent girls reported a higher percentage of barriers than adolescent boys. Significant differences in the reported barriers between male and female adolescents were found in the barriers *I don't feel the need* and *Misunderstanding of milieu bothers me*, highlighting the fact that the mentioned barriers are more dominant in female adolescents, while the dominant barriers in male adolescents are *Financial costs are considerable*, *Sports facilities are not available*, and *I lack time*. Based on the aforementioned, it can be concluded that internal barriers are more prevalent in female adolescents, while external barriers are more dominant in male adolescents. The results of this research showed that the largest number of barriers to engaging in physical activity was found at the age of 15, and that the number of barriers decreases with age. Identifying barriers will help in planning and implementing certain programmes to increase the physical activity in this population group. It is necessary for the implementation of the health policy to pay more attention on the improvement of physical activity at the school and community level. In other words, the health policy should focus on promoting physical activity and its health benefits, both among children and their parents, and on providing better access to facilities for the realisation of physical activities.

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БАРИЈЕРЕ КОЈЕ УТИЧУ НА ФИЗИЧКУ АКТИВНОСТ АДОЛЕСЦЕНАТА

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Резиме

Адолесценција представља период између детињства и одраслог доба. Овај период почиње између једанаесте и тринаесте године, и завршава се између осамнаесте и двадесете године, а праћен је појавом секундарних полних карактеристика, односно динамичким физичким развојем. Адолесценцију карактеришу значајне промене у емоционалном, когнитивном и социјалном развоју. То је веома битна фаза живота у којој долази до формирања различитих животних навика. Навика бављења физичком активношћу једна је од многих животних навика које се развијају током адолесценције. Светска здравствена организација деци и адолесцентима препоручује учествовање у умереној до интезивној физичкој активности најмање 60 минута дневно. Велики број адолесцената не испуњава дневне норме физичке активности јер томе постоје разне баријере. Циљ ове студије био је да се утврде баријере које утичу на бављење физичком активношћу код адолесцената, односно да се утврди да ли постоје разлике у тим баријерама између адолесцената и адолесценткиња, као и да ли постоје разлике у претходно споменутим баријерама у зависности од година старости. Узорак испитаника чинило је укупно 1350 адолесцената узраста између 15 и 18 година, од чега је било 672 адолесцената и 678 адолесценткиња. За потребе истраживања примењен је анкетни упитник који је прилагођен из постојећих упитника, а који садржи укупно девет питања. Сва питања су затвореног селективног типа, а свако питање оцењено је на Ликертовој четворостепеној скали. Да би се идентификовало шта може представљати препреку за упражњавање физичке активности, свако питање је садржало следеће опције одговора: „уопште се не слажем", „не слажем се" „слажем се", и „у потпуности се слажем". Хи-квадрат тест је примењен за утврђивање полних и узрасних разлика. На основу добијених резултата утврђено је да су адолесценткиње процентуално пријавиле већи број баријера у односу на адолесценте, иако статистички значајне разлике изостају, као и да је највећи број баријера пријављен код испитаника узраста 15 година ($p < .05$). Код адолесценткиња, највећу баријеру представља то да им „Смета неразумевање околине" и да „Недостају навике за физичком активношћу", што указује да на овакво понашање велики утицај може имати окружење у коме адолесценткиња одраста. Адолесценти су као највеће баријере за физичку

активност навели следеће: „Материјални издаци коју захтева физичка активност“ и „Удаљеност терена“. Уочавање баријера помоћи ће у планирању и реализацији одређених програма за повећање физичке активности ове популационе групе. Потребно је већу пажњу посветити спровођењу здравствене политике о побољшању физичке активности на нивоу школе и заједнице, односно промовисању физичке активности и њених бенефита по здравље, како код деце тако и код њихових родитеља. Напослетку, потребно је омогућити повећани приступ местима за реализацију физичких активности.

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THE MORPHO-FUNCTIONAL CHARACTERISTICS OF THE RIGHT HEART IN ELITE SERBIAN TRIATHLETES

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Abstract

Many research papers show that the most intense cardiac remodelling can be seen in endurance athletes, but no studies have examined right heart remodelling in triathletes. The aim of the study is to examine the morphological and functional characteristics of the right heart in elite Serbian triathletes. To assess the morpho-functional characteristics of the right heart, cardiac ultrasounds were performed following current recommendations, using a Philips IE33 device and a 5.2-MHz probe. The right ventricular diameter (RVEDD) was measured from the parasternal cross-section, and the right atrial volume (RA_{vol}) and the right ventricular wall thickness (RVWT) were measured from the four-cavity cross-section. The M-mode method was used to measure the amplitude of the movement of the right ventricular tricuspid annulus (TAPSE). The sample consisted of two groups of men: experimental – elite triathlete seniors from Serbia (n=17; age: 35.88±11.27), and control – healthy untrained adults (n=20; age: 21.35±2.08). RVEDD, RA_{vol}, and RVWT were significantly higher in the experimental group compared to the control group ($p<0.01$), but no significant difference was observed in TAPSE ($p=0.653$). Also, RVEDD and RA_{vol} in the experimental group showed values higher than the reference values for the general population, while RVWT and TAPSE were within reference values. The obtained results indicate that there are signs of right heart remodeling in triathletes. Considering the growing number of persons involved in triathlon, it is necessary to draw the attention of all coaches and athletes to the importance of regularly monitoring the triathletes' hearts.

Key words: triathlon, endurance, training, cardiac remodeling, adaptation.

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МОРФОЛОШКЕ И ФУНКЦИОНАЛНЕ КАТАКТЕРИСТИКЕ ДЕСНОГ СРЦА КОД ЕЛИТНИХ ТРИАТЛОНАЦА ИЗ СРБИЈЕ

Апстракт

Многа истраживања показују да се најинтензивније ремоделовање срца може видети код спортиста издржљивости, али ниједно истраживање није испитало ремоделовање десног срца код триатлонаца. Циљ овог рада је да се испитају морфолошке и функционалне карактеристике десног срца код елитних триатлонаца из Србије. Да би се проценили морфо-функционалне карактеристике десног срца, урађен је ултразвук срца према актуелним препорукама, уз помоћ уређаја Philips IE33 и 5.2-MHz сонде. Дијаметар десне коморе (RVEDD) мерен је из попречног парастерналног пресека, а волумен десне преткоморе (RA_{vol}) и дебљина зида десне коморе (RVWT) из четворошупљинског пресека. M-мод метод је коришћен за мерење амплитуде покрета трикуспидног анулуса десне коморе (TAPSE). Узорак испитаника су чиниле две групе мушкараца: експериментална – елитни триатлонци сениори из Србије (n=17; старости: 35,88±11,27), и контролна – здраве нетренироване одрасле особе (n=20; старости: 21,35±2,08). RVEDD, RA_{vol} и RVWT били су значајно већи у експерименталној групи у поређењу са контролном групом ($p<0.01$), али није примећена значајна разлика у TAPSE варијабли ($p=0,653$). Такође, вредности RVEDD и RA_{vol} у експерименталној групи су биле веће од референтних вредности за општу популацију, док су RVWT и TAPSE били унутар референтних вредности. Добијени резултати указују да код особа које се баве триатлоном постоје знаци ремоделовања десног срца. С обзиром на растући број триалонаца, потребно је скренути пажњу свим тренерима и спортистима, на важност редовног праћења срца триатлонаца.

Кључне речи: триатлон, издржљивост, тренинг, ремоделовање срца, адаптација.

INTRODUCTION

In physically active persons, regular intense physical activity causes adaptive changes in cardiovascular parameters, both morphological and functional (Djelić et al., 2012). These changes in the cardiovascular system that develop over time under the influence of intense and continuous physical activity are included in the term ‘athlete’s heart’ (Bjerring et al., 2019; Sanz-de la Garza, Carro, & Caselli, 2020). The role of these changes is to deliver a sufficient amount of oxygen to the active muscles during repeated high-intensity efforts (Baggish & Wood, 2011).

Many research papers demonstrate that the key factor for all the changes in the heart is the time spent on a certain type and intensity of activity (Arbab-Zadeh et al., 2014; Lewicka-Potocka et al., 2021; Popovic et al., 2011; Weiner et al., 2015). Up to date, the majority of studies analysed left heart characteristics. However, recent data demonstrates the equal importance of the right heart contribution in overall training status (Arbab-Zadeh et al., 2014; D’Ascenzi et al., 2016, 2019; Elliott & La Gerche, 2015; Sanz-de la Garza et al., 2020).

Previous research demonstrates that there is a significant difference in right ventricular and right atrial remodelling between groups of players in different team sports. It seems that right heart adaptation is the most pronounced in soccer players, who also have the highest maximal oxygen consumption (Lazic et al., 2019). Also, many research papers show that the most intense changes can be seen in athletes who use large training volumes and spend a large amount of time training and competing (cyclists, biathletes and triathletes, cross-country skiers, etc.) (Arbab-Zadeh et al., 2014; Bjerring et al., 2019; D'Ascenzi et al., 2019). Commonly, the right ventricular volumes of well-trained athletes exceed the upper limits of international guidelines, and fulfill the minor volume criteria for arrhythmogenic cardiomyopathy (D'Ascenzi et al., 2019). Also, depending on sex, the right ventricular dimension in women is lower as compared to men, independent of training status (Sanz-de la Garza et al., 2020).

It is well known that athletes performing endurance sports have an increased left ventricular mass (Lewicka-Potocka et al., 2021). Research papers show that the type of training has an impact on the type of cardiac remodelling. For example, the results of the study conducted by Arbab-Zadeh et al. (Arbab-Zadeh et al., 2014) demonstrated that endurance training at low intensity led to an increase in left ventricular mass primarily due to the increase in wall thickness (concentric hypertrophy). Then, periods of higher-intensity interval endurance training and training of longer duration led to an increase in the volume of the left ventricle and almost established the initial ratio of mass and volume (eccentric hypertrophy). In contrast, the volume and mass of the right ventricle increased simultaneously, without disturbing the mass-volume ratio (eccentric hypertrophy). Also, depending on the sport, for example, elite swimmers have a primary eccentric remodelling driven by volume, while water polo players have a higher concentric geometry indicating pressure-driven remodelling (Coates, Cheung, Currie, King, Mountjoy, & Burr, 2022). Weiner et al. examined the pattern of left ventricular change in response to short-term endurance training, followed by a maintenance phase, among 12 rowing competitors. The increase in the mass of the left ventricle in the first phase occurred exclusively due to the increase in volume, without any changes in the wall thickness of the left ventricle. In the second phase, the mass of the left ventricle was increased largely due to the increase in wall thickness (Weiner et al., 2015).

Triathlon is an endurance sport that consists of swimming, cycling, and running. Triathlon enjoys increasing popularity among competitors and recreational athletes of all ages and both genders in Serbia, as well as in the world (Strelić, Ranisavljev, Ćosić, & Stojiljković, 2022). It is one of the most demanding endurance sports and belongs to the group of Olympic sports. The Olympic Games are the biggest sports event in the world, but also a social event that brings together people from the largest number of countries in the world, promoting multicultural communication and the

concept of global peace as important factors in preserving human civilization (Šiljak, Selaković & Vukašinović, 2017). At triathlon competitions, there are distances of different lengths, but they are all equal for women and men, which is in line with the modern trend that promotes gender equality in all spheres of life, including sports. However, according to previous research, equality between women and men in sports has not yet been achieved, but it should be strived for (Vujović, Mitrović, & Obradović, 2017).

A large part of the training process of triathlon athletes is aimed at developing aerobic endurance (Cejuela & Esteve-Lanao, 2011). Besides typical long-distance aerobic training, elite triathlon athletes also devote significant training volume to high-intensity training and speed endurance work, for the development of anaerobic capacity and strength (Clemente-Suárez, Delgado-Moreno, González, Ortega, & Ramos-Campo, 2019; Papai, Wilhelm, & Szakaly, 2022).

Studies demonstrating the phenotypical appearance of the right heart in different sports are still lacking, and there is a noted lack of studies that examine the morpho-functional changes in the right heart of endurance athletes. Since an 'athlete's heart' phenotypically resembles certain pathological conditions that can be masked by the image of an 'athlete's heart' (Haykowsky, Samuel, Nelson, & La Gerche, 2018; Nakamura & Sadoshima, 2018), it is noteworthy to assess this field in athletes who have a long record of endurance training and large training volumes, such as triathletes. Accordingly, the aim of the present study was to examine the morphological and functional characteristics of the right heart in elite Serbian triathlon athletes and to compare them with the control group and reference values for the general population.

METHODS

Participants

The sample consisted of two groups: experimental – triathletes, and control – untrained healthy persons. The sample of triathletes consisted of 17 elite seniors from Serbia. The inclusion criteria narrowed the sample to include participants with the following characteristics: (1.) men; (2.) older than 18 years; (3.) minimum 3 years of training experience in triathlon; (4.) minimum of 7 training hours per week (excluding strength training); and (5.) at least one placement among the first 25% placed in the absolute category, a placement in the first three places in their age category in domestic competition, or a placement in the first half of competitors in their age category in international competition, in the last 5 years.

The experimental group consisted of experienced triathlon competitors: medal winners at national championships; and participants and medal

winners at international competitions in Olympic and/or Long-distance triathlons. The control group consisted of 20 healthy untrained adult men.

Procedure

The measurement for this empirical research was performed at the University Clinical Center of Serbia, and it was conducted by a cardiology subspecialist, with the assistance of a senior nurse and sports expert. To assess the morpho-functional characteristics of the right ventricle, cardiac ultrasounds were performed following current recommendations (Lang et al., 2015; Rudski et al., 2010), using a Philips IE33 device and a 5.2-MHz probe (Philips Medical Systems, Andover, MA). The cardiac ultrasound is a safe method, which does not carry any risk of adverse events.

All procedures performed in the study were approved by the Ethics Committee of the University Clinical Center of Serbia, in accordance with the ethical standards of the Helsinki declaration of 1964 and its later amendments. Informed consent was obtained from all individual participants included in the study. All participants signed a statement that they were well informed and that they voluntarily participated in the research.

The right ventricular diameter was measured from the parasternal cross-section, and the right atrial volume and the right ventricular wall thickness were measured from the four-cavity cross-section. The M-mode method was used to measure the amplitude of the movement of the right ventricular tricuspid annulus.

Variables

The sample of variables is represented by indicators of morphological characteristics and systolic function of the right heart: right ventricle diameter in diastole – RVEDD; right ventricular wall thickness – RVWT; right atrial volume – RA_{vol}; and tricuspid annular amplitude of movement in systole – TAPSE.

Statistical Analysis

All variables are described by the arithmetic mean, standard deviation, minimum and maximum value, and coefficient of variation. Then, the normality of the data distribution was checked by the Kolmogorov-Smirnov and Shapiro-Wilk tests, and by visual observation of Normal Q-Q plots. The distribution of the observed data was quite normal. Due to the large difference between the average age of the experimental and control group, a one-way analysis of covariance (One-way ANCOVA) was used to explore differences between these two groups, while statistically controlling for the age variable (covariate). The non-parametric Quade's ANOVA test was performed only for the TAPSE variable, because the control group is not homogeneous (coefficient of variation 31.73%). All data

was processed in the software programmes SPSS 24 (SPSS Inc., Chicago, IL, USA) and Microsoft Office Excel 2016 (Microsoft Corporation, Redmond, WA, USA).

RESULTS

Table 1 shows the descriptive statistics of age, anthropometric variables, and the mean resting heart rate (HR) of the experimental and control groups.

Table 1. Descriptive statistics of the experimental (N=17) and control group (N=20)

Variables	Experimental group				Control group			
	Mean ± SD	MIN	MAX	CV	Mean ± SD	MIN	MAX	CV
AGE (years)	35.88±11.27	23	57	31.42	21.35± 2.08	18	26	9.76
BH (m)	1.77± 0.07	1.64	1.89	3.79	1.80± 0.05	1.71	1.9	2.81
BW (kg)	73.74± 7.61	61	86.3	10.32	78.07± 7.25	65.4	92.4	9.29
BMI (kg/m^2)	23.41± 2.27	20.14	28.55	9.71	24.14± 2.02	19.96	28.24	8.37
BF (%)	8.26± 3.55	2.4	17.9	43.03	12.80± 4.90	4	23.4	38.27
HR (bpm)	50.67± 7.04	37	64	13.89	76.65±11.01	58	108	14.37

Statistics: N – number of participants; Mean – average value; SD – standard deviation; MIN – minimum value; MAX – maximum value; CV – coefficient of variation. Variables: AGE – participants' age; BH – body height; BW – body weight; BMI – body mass index; BF – body fat; HR – resting heart rate.

Table 2 shows the One-way ANCOVA results for all variables (except for TAPSE, for which Quade's ANCOVA results are shown) of the morphological characteristics and systolic functions of the right heart, for both the experimental and control group.

Table 2. Comparison of the experimental and control group results

Variables	Experimental group		Control group		Reference value	F	*p*
	Mean ± SD	CV	Mean ± SD	CV			
RVEDD (cm)	2.89 ± 0.35	12.11	2.26 ± 0.32	14.16	<2.7	14.364*	0.001
RVWT (cm)	1.02 ± 0.10	9.8	0.82 ± 0.14	17.07	0.7-1.1	8.394*	0.007
RA_{vol} (ml)	130.91 ± 30.34	23.18	82.61 ± 24.72	29.92	63-103	12.538*	0.001
TAPSE (cm)	2.41 ± 0.35	14.52	2.08 ± 0.66	31.73	>1.8	0.206	0.653

Statistics: Mean – average value; SD – standard deviation; CV – coefficient of variation; Reference value – reference value for the general population; F – one-way ANCOVA test value and Quade's ANCOVA test value for TAPSE; * - statistical significance p<0,01. Variables: RVEDD – right ventricular end-diastolic diameter; RVWT – right ventricular wall thickness; RAvol – right atrial volume; TAPSE – tricuspid annular amplitude of movement in systole.

Based on the One-way ANCOVA results, it can be noticed that the right ventricle diameter in diastole (RVEDD) was significantly higher in

the experimental group compared to the control group (p=0.001), and RVWT was significantly thicker (p=0.007). RA_{vol} was also significantly higher in the experimental group compared to the control group (p=0.001). By applying Quade's ANCOVA test to the TAPSE variable, we realised that this was the only parameter lacking a significant difference between groups (p=0.653). RVEDD and RA_{vol} showed values higher than the reference values for the general population, while RVWT and TAPSE were within the reference values.

DISCUSSION

The present results indicate that RVEDD, RA_{vol}, and RVWT were higher in triathletes compared to the control group. TAPSE did not differ. However, it tended to be higher in triathletes. RVEDD and RA_{vol} showed values higher than the reference for the general population, while RVWT and TAPSE were within the reference values.

The variables with the highest level of difference are primary variables that describe the morphological characteristics of the right heart (RVEDD, RA_{vol}, and RVWT), while the variable describing the systolic function of the right heart did not indicate a significant difference between the experimental and control groups. These results coincide with the statements made by D'Ascenzi et al., who also noted that systolic function in well-trained athletes did not change in comparison to the general population, despite all the morphological changes characteristic of the 'athlete's heart' (D'Ascenzi et al., 2019).

The values of the RVWT indicate a significant difference between the experimental and control groups. Although the values did not go beyond the reference values for the general population, they were close to the upper normal limit. Thus, they did not exceed the limit that is considered pathological which would characterise hypertrophic cardiomyopathy (Nakamura & Sadoshima, 2018; Sanz-de la Garza et al., 2020).

The values of RVEDD in our study were 2.89cm ± 0.35cm, and it was significantly higher in the experimental group compared to the control group (p<0.01). In the research of Popović et al. (Popovic et al., 2011). values for this variable were 2.62cm ± 0.44cm for the water polo group, and 2.53cm ± 0.51cm for the wrestler group. When comparing the results of these two studies, it can be observed that the values of RVEDD in athletes who practice different types of training are different. This gradation of results indicates a more intensive remodelling of the right heart due to the increasing demands of endurance sports. In a study conducted by Popović et al. (Popovic et al., 2011), changes in morphology and heart function were examined by taking water polo players and wrestlers as experimental groups and comparing the values yielded by these groups with the values in the control group. The results indicated that changes in systolic function

occurred in both groups of athletes compared to the control group, but that the changes were more pronounced in wrestlers. The possible cause of this finding could be the greater explosive force of the entire musculature of the wrestler, which is also reflected in the adaptation of the heart muscle. This result supports the opinion that sports in which the volume of training load predominates can cause a slight decrease in right ventricular systolic function (primarily due to the reduced resting heart rate). Also, the same results show that the type and intensity of changes that occur in the heart depend on the type of physical activity.

Present results showed that the value of RVWT in triathletes was 1.02cm ± 0.1cm, and it was significantly higher than in the control group. The results of the study conducted by Yilmaz et al., where morphological and functional changes in the heart of male and female athletes (football, hockey, running, swimming, and gymnastics) were compared with the sedentary population, indicated that athletes have a greater wall thickness compared to untrained subjects (Yilmaz, Buyukakilli, Gurgul, & Rencuzogullari, 2013). In men, the values for this variable were 0.96cm ± 0.10cm, which is a lower value compared to the same variable in our study. This difference could be caused by the higher average volume of training performed by triathletes.

The results of the present study show that the average value of TAPSE was 2.41cm ± 0.35cm, and it was the only parameter where no significant difference was observed between the experimental and control group. Also, there were indications that the acute reaction to prolonged exercise was associated with a decrease in the systolic function of the right ventricle, while the left one had almost no changes (Elliott & La Gerche, 2015). In the meta-analysis of D'Ascenzi et al., the average value of the TAPSE variable was 2.5cm in athletes trained in both endurance and strength types, as well as combined (D'Ascenzi et al., 2017). We can assume that these values were higher than the values in our study probably because triathletes were exposed to a larger volume of training compared to the average athletes in endurance sports.

The average value of RA_{vol} in our study was 130.91ml ± 30.34ml, and it was significantly higher in the experimental group compared to the control group. Kawel-Boehm et al. reported values for the right atrial volume of healthy adults averaging 103ml ± 33ml (Kawel-Boehm et al., 2015). Compared to these values, our group of triathletes recorded almost 30% higher values, which confirms our hypothesis that significant signs of changes in the morphology of the right heart occur through endurance training.

Greater morphological and less functional changes of the right ventricle to the left ventricle in athletes may be attributed to greater resistance in the lung in comparison to systemic circulation (Milutinović et al., 2018). The intensity of morphological changes increases with training intensity (ibid.). Therefore, athletes who are engaged in endurance sports that require

a large volume and large intensity of training have the greatest morphological changes in the right heart (triathlon, cycling, mid/long distance running, rowing, etc.) (Adea et al., 2020; D'Ascenzi et al., 2019). All of the above show the fact that heart adaptation to chronically increased physical stress is an extremely complex process with a very narrow 'adaptive window' which increases work efficiency. All non-physiological stimuli in the training process (overtraining, dehydration, doping, etc.), further complicate these mechanisms and can very easily turn them in a pathological direction, with potentially fatal consequences (Milutinović et al., 2018; Vanova et al., 2022).

An 'athlete's heart' phenotypically resembles certain pathological conditions, that can be masked by the image of an 'athlete's heart', but the key difference is the reversibility of changes (Haykowsky et al., 2018; Nakamura & Sadoshima, 2018). In a simple deconditioning test, pathological changes will progress, whereas most of the changes in the 'athlete's heart' tend to return to baseline values, without progression to heart failure (Haykowsky et al., 2018; Nakamura & Sadoshima, 2018). Moreover, adaptation due to poorly programmed training, non-compliance with basic principles in the training process, use of illicit substances, among others, may turn physiological adaptation into a pathological condition (Levine, Baggish, Kovacs, Link, Maron, & Mitchell, 2015). Considering that the cause of sudden cardiac death of athletes was often diagnosed with hypertrophic cardiomyopathy (Cunningham, Spears, & Care, 2019; Kochi, Vettor, Dessanai, Pizzamiglio, & Tondo, 2021; Maron et al., 2019; Weissler-Snir et al., 2019), and most cardiac pathologies are silent (Mont et al., 2017), it is important to regularly monitor 'athlete's hearts' (Corrado et al., 2005; Mont et al., 2017; Vanova et al., 2022).

CONCLUSION

The obtained results indicate that there are signs of right heart remodelling in triathletes compared with the untrained population, and concerning reference values for the general population. Changes that have been observed appear as an adaptation to chronic exposure to long-term physical exertion, in order to increase cardiac work efficiency in stress conditions. As the number of people involved in triathlon is constantly growing, it is clear that the number of people affected by a certain degree of changes in the heart muscle is growing, especially since recreational athletes strive for almost the same training loads as professional athletes. Therefore, it is necessary to draw the attention of all coaches and athletes to the importance of the regular examination and monitoring of every 'athlete's heart'.

The results of this research can be used as an indicator of what morphological and functional changes can be expected as a result of long-term triathlon training. Moreover, these results may represent the first step towards establishing reference values of RVEDD and RA_{vol} in triathletes. To

establish these values, further research on a larger sample of participants is necessary. Reference values would make it easier for sports medicine doctors, coaches, and athletes to interpret specific right heart parameters in each triathlete.

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МОРФОЛОШКЕ И ФУНКЦИОНАЛНЕ КАТАКТЕРИСТИКЕ ДЕСНОГ СРЦА КОД ЕЛИТНИХ ТРИАТЛОНАЦА ИЗ СРБИЈЕ

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Резиме

Већина досадашњих истраживања анализирала је карактеристике леве срчане коморе код спортиста, али новији подаци показују једнак значај доприноса десног срца у укупном тренажном статусу. Многа истраживања показују да се најинтензивније ремоделовање срца („спортско срце“) може видети код спортиста који се баве спортовима издржљивости. Међутим, ниједно истраживање није испитало крактеристике десног срца код особа које се дужи временски период баве триатлоном. Триатлон је олимпијски спорт који ужива све већу популарност у Србији и у свету. Спада у групу спортова дуготрајне издржљивости, а састоји се из пливања, вожње бицикла и трчања на дистанцама различите дужине. Циљ овог рада је био да се испитају морфолошке и функционалне карактеристике десног срца код елитних триатлонаца из Србије. Да би се проценили морфо-функционалне карактеристике десног срца, урађен је ултразвук срца према актуелним препорукама, користећи уређај Philips IE33 и сонду од 5,2-MHz (Philips Medical Systems, Andover, MA). Дијаметар десне коморе (RVEDD) мерен је из попречног парастерналног пресека, а волумен десне преткоморе (RA_{vol}) и дебљина зида десне коморе (RVWT) из четворошупљинског пресека. M-мод метод је коришћен за мерење амплитуде покрета трикуспидног анулуса десне коморе (TAPSE). Узорак испитаника су чиниле две групе мушкараца: експериментална – елитни триатлонци сениори из Србије (n=17; старости: 35,88±11,27) и контролна – здраве

нетрениране одрасле особе (n=20; старости: 21,35±2,08). Једносмерна АНКОВА је коришћена за испитивање разлика између две групе, док је статистички контролисана варијабла старости. Само за TAPSE варијаблу је урађен непараметарски тест (Quade's ANOVA), јер контролна група није била хомогена. RVEDD, RVWT и RA_{vol} су били значајно већи ($p<0.01$) у експерименталној групи (2,89±0,35cm; 1,02±0,10cm; 130,91±30,34ml) у поређењу са контролном групом (2,26±0,32cm; 0,82±0,14cm; 82,61±24,72ml). Није примећена значајна разлика ($p=0,653$) између TAPSE варијабле у експерименталној (2,41±0,35cm) и контролној групи (2,08±0,66cm). Такође, RVEDD и RA_{vol} код експерименталне групе, показују вредности веће од референтних вредности за општу популацију, док су RVWT и TAPSE унутар референтних вредности. Добијени резултати указују да код особа које се баве триатлоном постоје знаци ремоделовања десног срца у односу на нетрениране особе и референтне вредности за општу популацију. Наиме, највећу разлику између експерименталне и контролне групе у нашем истраживању су имале варијабле које описују морфолошке карактеристике десног срца (RVEDD, RA_{vol} и RVWT), док код варијабле која описује систолну функцију (TAPSE) није било значајне разлике. Добијени резултати су у складу са резултатима претходних истраживања у којима је такође забележено да је код утренираних спортиста у спортовима издржљивости дошло до значајних морфолошких промена карактеристичних за „спортско срце", док се систолна функција није значајно променила у односу на општу популацију. С обзиром да број људи који се баве триатлоном константно расте, а патолошко стање срца може бити прикривено иза „спортског срца", потребно је скренути пажњу свим тренерима и спортистима, на важност редовног праћења срца сваког триатлонца. Резултати овог истраживања могу представљати први корак ка успостављању референтних вредности варијабли RVEDD и RA_{vol} код триатлонаца. Да би се ове вредности дефинисале, потребна су даља истраживања на већем узорку испитаника.

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THE BALANCE ABILITY OF TOP-LEVEL FEMALE RHYTHMIC GYMNASTS: DOES IT PREDICT THEIR PERFORMANCE SCORES?

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Abstract

Rhythmic gymnastics (RG) is an extremely demanding sport that has a positive effect on the exerciser's motor status. However, in order to be able to acquire RG contents, the existence of certain minimally developed motor skills, including the ability of postural control and body stabilisation during dynamic movements, is of vital importance. The main objective of this study is to assess the role, contribution and influence of balance ability on performance scores in RG. The sample consisted of 126 international-level female rhythmic gymnasts (RGs), divided into five age categories (15 seniors, 25 juniors, 26 advanced-level RGs, 38 intermediate-level RGs, and 22 beginners). Their baseline characteristics (age, body height and mass, body mass index) were established, along with their balance abilities (balance on toes (left/right leg) test, single leg (left/right) balance test – eyes closed, double pivot in *passé* test). The data was analysed (descriptive statistics, Kolmogorov-Smirnov test, multivariate and univariate regression analysis) using SPSS 21.0. The results of the multivariate regression analysis indicate the existence of a statistically significant influence of the balance ability of advanced-level RGs, as well as the RGs comprising the rest of the sample, on their performance scores (p=0.01 and p=0.00, respectively), with statistically significant individual contributions of the balance on toes test – right leg (advanced-level RGs: p=0.01, total sample: p=0.02), and dynamic balance (total sample: p=0.00). The final conclusion is that balance ability is a significant predictive factor of RGs' performance scores, with a variance explanation of 35% (advanced-level RGs), i.e. 24% (entire sample).

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Key words: rhythmic gymnastics, static balance, dynamic balance, age categories, success.

СПОСОБНОСТ РАВНОТЕЖЕ ВРХУНСКИХ РИТМИЧКИХ ГИМНАСТИЧАРКИ: ДА ЛИ ПРЕДВИЂА РЕЗУЛТАТЕ ЊИХОВИХ ПЕРФОРМАНСИ?

Апстракт

Ритмичка гимнастика (РГ) је изузетно захтеван спорт који позитивно утиче на моторички статус вежбача. Међутим, да би се уопште могло приступити усвајању РГ садржаја, неопходно је постојање одређеног минимума развијености свих моторичких способности, међу којима су постурална контрола и способност стабилизовања тела током динамичних кретњи од виталног значаја. Основни циљ овог истраживања је да утврди значај, допринос и утицај способности равнотеже на успех у ритмичкој гимнастици. Узорак испитаника чинило је 126 ритмичких гимнастичарки, распоређених у пет узрасних категорија (15 сениорки, 25 јуниорки, 26 кадеткиња, 38 пионирки, и 22 млађе пионирке). Утврђене су њихове основне карактеристике (узраст, телесна висина и маса, индекс телесне масе), као и статус способности равнотеже (тест равнотеже на прстима (лева/десна) нога, тест равнотеже на једној нози (лева/десна нога) – затворене очи, дупли окрет у *passé* позицији). Подаци су анализирани (дескриптивна статистика, тест Колмогоров-Смирнов, мултиваријантна и униваријантна регресиона анализа) применом SPSS 21.0. Резултати мултиваријантне регресионе анализе указали су на постојање статистички значајног утицаја способности равнотеже кадеткиња, као и укупног узорка, на успех у РГ ($p=0.027$ и $p=0.00$, редом), при чему су утврђени статистички значајни појединачни доприноси успеху у РГ код равнотеже на прстима на десној нози (кадеткиње: $p=0.01$, укупан узорак: $p=0.02$) и код динамичке равнотеже (укупан узорак: $p=0.00$). Крајњи закључак је да је способност равнотеже значајан предиктивни фактор перформанси у РГ, са објашњењем варијансе од 35% (код кадеткиња), односно 24% (укупан узорак).

Кључне речи: ритмичка гимнастика, статичка равнотежа, динамичка равнотежа, узрасне категорије, успех.

INTRODUCTION

Although it is widely acknowledged that talent is indispensable for top-level performance, the position and role of abilities (cognitive, perceptual and motor) in the actualisation of motor skills have long been established (Giannitsopoulou et al., 2003). Motor balance is the ability of keeping the body in a stable position, and it implies the involvement of neuromuscular structures. We distinguish between static balance (the ability of maintaining the stable position of a body that is not in motion) and dynamic balance (the ability of maintaining a stable position in conditions of movement). Vestibular, kinesthetic, tactile and optical analysers play a significant role in achieving a balanced position (Penčić, 2014), but the most important factors in maintaining balance are: genetic determination (the he-

reditary coefficient of this ability is very high, which makes the work on developing balance rather complex, specific and difficult (Кукољ, 2006)), the condition of the vestibular apparatus, age (young healthy people have better balance ability results compared to children), support surface, the height of the body's center of gravity, the position of free body parts, training, strength, coordination, flexibility, emotional state (Kayapnar, 2011), fatigue (Wilkins et al., 2004; Pau et al., 2020), and even the time of day (di Cagno et al., 2014). Balance ability is one of the fundamental aspects of movement-coordination qualities, and it has a direct bearing on learning and applying new abilities. It is also a prerequisite for success in sports activities, and essential for the development of fundamental motor skills and for injury prevention (Fotios et al., 2013). Sports training enhances joint strength, range of motion, and neuromuscular coordination, all of which contribute to an improvement in balance ability (Kesilmiş et al., 2017).

When it comes to the complexity of the required abilities, rhythmic gymnastics (RG) represents an extremely demanding aesthetic and artistic sports discipline – a rhythmic gymnast has the task of coordinating body technique with a technique of handling one of the five RG apparatuses (ball, hoop, rope, ribbon and clubs), while simultaneously demonstrating an extreme flexibility of all parts of the body, and an excellent sense of rhythm, space and time. It is a sport that imposes high demands on body size, build and composition, as well as the motor skills of performers, especially high-level performers (Пуреновић-Ивановић, 2017). Research conducted with the aim of identifying the predictors of success in RG showed that it is necessary for almost all motor skills to be well pronounced in order to attain great achievements in this sport, but given the fact that a competition routine in RG consists of complex motor elements (jumps/leaps, balances, rotations/pivots/turns, pre-acrobatic elements, dance steps, full body waves), the performance of which requires a well-developed balance ability (Vuillerme et al., 2001; Tincea, 2020), both static and dynamic (Gateva, 2016), it is quite clear that this motor ability occupies a very important place in the physical preparation of rhythmic gymnasts (RGs). In recent years, balances as body difficulties have occupied an increasingly important place in the performance of RG routines – during a minute and a half, which is how long an individual routine lasts, a rhythmic gymnast realises as many as twenty to twenty-two elements of static and dynamic balance (Poliszczuk et al., 2012). It is important to emphasise that this motor ability is one of the elements that RG judges evaluate very strictly, and its loss during a routine performance affects the final score. Therefore, the ability of RGs to hold well-defined balance positions and maintain them for a minimum period of time so that judges can make an adequate assessment of them is a decisive factor for success in this sport (Palomares et al., 2019). That is why it is very important to develop this motor ability, especially in girls of younger school age, when the pace of balance development is the most intense (Penčić, 2014; Dobrijević et al., 2016). In

addition, numerous studies have compared balance ability among athletes in different sports, and the highest level of this ability was recorded precisely in RGs (Bressel et al., 2007; Hrysomallis, 2011; Shahheidari et al., 2012), which is not a surprise considering that a significant part of training in RG derives from classical ballet exercises, and ballet is 'crowned' with supreme balance (Prochazkova et al., 2014).

It has been repeatedly proven through examination that RG has a good impact on the performer's body, particularly on their motor status – RG training enables the development of motor skills, and the improvement of abilities such as flexibility, balance, coordination, and strength (Miletić et al., 2004; Pavlova, 2011; Poliszczuk et al., 2012; Fotios et al., 2013; Penčić, 2014). However, a certain minimum level of development of all motor skills is necessary in order to be able to acquire RG content at all, among which postural control (Scursatone et al., 2015) and an ability to stabilise the body during dynamic movements are of vital importance (Kesilmiş et al, 2017). Thus, having in mind that the important abilities needed to succeed in some tasks vary with the athletes' age (Fleishman, 1972; according to Kioumourtzoglou et al., 1997), and that the necessity of monitoring balance ability in RGs is evident, the aim of this research is to determine the influence of balance ability on the performance scores of high-level female RGs of different age categories.

METHODS

Participants

The sample of examinees used in this research is comprised of international-level female RGs. The research included 126 female participants – individual competitors of all age categories, and only those female RGs who had previously voluntarily agreed to participate in this research (those 18 years of age, or older), or those underaged female participants whose parents gave written consent for their participation.

Ethical Considerations

The study protocol was approved by the local ethics committee (No. 04-610), and testing was performed in accordance with the ethical standards of the Declaration of Helsinki (WMA, 2013). Consent was given by the Gymnastics Federations and/or Expert committees for RG, club coaches, and by RGs' parents, i.e. personally by the adult participants in this study.

Measures and Procedures

Measuring was carried out using the same instruments, by the same measurer, according to the International Biological Program (Weiner & Lourie, 1969), in an adequately lit room with optimal climatic conditions, and

with the participants in their underwear. The basic characteristics of the participants comprising the sample were defined by the following variables: age (Age), in 0.1 years; body height (Height), in 0.1 cm; body mass (Weight), in 0.1 kg; and body mass index (BMI), in 0.1 kg/m^2. By interviewing the RGs, we collected data on their age (date of birth). The Martin anthropometer was used to obtain the RGs' body height, while body mass and body mass index were assessed with a tetrapolar bioelectrical impedance device – *Omron BF511* (Kyoto, Japan), after entering the data on participants' age, gender and body height. Finally, the testing of the static and dynamic balance ability of the RGs was undertaken, and only a stopwatch was used as equipment for its realisation. Namely, for the estimation of balance abilities, the tests proposed by Jastrjembskaia & Titov (1998, pp. 139–141) were used. These three instruments (the first two of which are paired tests, and the third and fourth require the participant's eyes to be closed) are intended to monitor the level of balance ability of RGs: balance on toes – left leg /BTOE-L/ in 0.1 s, and balance on toes – right leg /BTOE-R/ in 0.1 s; single leg balance – left leg /B1LEG-L/ in 0.1 s, and single leg balance – right leg /B1LEG-R/ in 0.1 s; and double turn in *passé* /2TUR/ in the number of successful attempts (turns). The criterion variable in this research was the participants' competitive/performance scores, i.e. final score /FINS/ in points, and, considering the fact that in RG there are inevitable differences between competitors of different age and competition programme categories, it was necessary to 'equalise' the participants in terms of their final score. Therefore, in order to optimally define the criterion variable, the mean value of the total points achieved in the competition was taken (final points divided by the number of routines performed in the competition) for the final score of each study participant.

Statistical Analysis

The descriptive statistics [average value (Mean), Standard Deviation (SD), Minimum (Min), Maximum (Max)] were summarised for all variables and for each of the five age categories, as well as for the entirety of the sample. Normality was tested using the one-sample Kolmogorov-Smirnov test (K-S). In order to determine the significance and the strength of the linear relationship between balance ability and performance scores, a Pearson's correlation coefficient (r) was applied for normally distributed variables, and Spearman's correlation coefficient was applied for variables with statistically significant deviations from normal data distribution. Multiple regression analysis (R – multiple correlation coefficient, R^2 – coefficient of determination of multiple correlation, Adjusted R^2 – adjusted coefficient of determination of multiple correlation[1], F – F-test value, p – significance of multiple regression) was performed with the aim of determining the amount of variance in balance ability's influ-

[1] When dealing with the small sample of study participants, the value of R^2 is "an overly optimistic estimate of an actual value of coefficient of determination" (Pallant, 2010, p. 160), so the interpretation of Adjusted R^2, which gives a better estimate, is recommended.

ence on the success rate of RGs' performance, and for the purpose of determining the independent contributions of each of the independent variables to the prediction of the dependent variable, i.e. FINS. Afterwards, univariate regression analysis was performed (r – correlation coefficient, Part r – coefficient of partial correlation, b – standardised regression coefficient, Std.Err. of b – standardised error of regression coefficient, t – vector of standardised regression coefficient, *p* – significance of beta coefficient). The level of significance was set at $p<0.05$, and the data was analysed using the Statistical Package for the Social Sciences, version 21.0 (IBM SPSS 21.0, SPSS Inc, Chicago, USA).

RESULTS AND DISCUSSION

The baseline characteristics of the entire sample and the sub-samples (age categories) are presented in Table 1, and the descriptive statistics data of the assessed balance ability is presented in Table 2.

Inspecting Table 1, and based on the BMI cut-off points for girls of different ages (CDC, 2000), it can be stated that the BMI value of most of the RGs (n=115, or 91.27%) is within the normal range; only a few of them are below the recommended values (n=10, or 7.94%), and one RG from the beginners category has a BMI of 18.7 kg/m^2, with the upper limit for a normal BMI for a girl of her age is 17 kg/m^2.

Table 1. Baseline characteristics of the study participants

Age categories	Variables	Age (yrs)	Height (cm)	Weight (kg)	BMI (kg/m^2)	FINS (pts)
Seniors (n=15)	*Mean±SD*	17.53±1.37	164.56±6.83	55.51±4.91	20.48±1.16	9.29±1.91
	Min – Max	16.16 – 20.34	150.0 – 178.2	47.4 – 67.0	19.0 – 23.3	5.53 – 11.83
Juniors (n=25)	*Mean±SD*	14.53±0.74	162.94±7.05	48.61±6.16	18.23±1.4	9.34±1.54
	Min – Max	13.3 – 15.82	146.1 – 176.7	31.0 – 62.7	14.5 – 20.4	6.06 – 11.38
Advanced-level RGs (n=26)	*Mean±SD*	12.25±0.89	151.31±8.72	38.99±8.01	16.83±1.94	7.86±1.58
	Min – Max	10.57 – 13.8	136.0 – 164.4	25.5 – 53.2	13.8 – 21.4	4.3 – 10.45
Intermediate-level RGs (n=38)	*Mean±SD*	10.12±0.8	139.93±5.96	29.96±4.31	15.24±1.28	7.92±1.47
	Min – Max	8.71 – 12.02	125.1 – 151.4	22.6 – 40.2	12.7 – 18.9	4.4 – 10.38
Beginners (n=22)	*Mean±SD*	8.04±0.75	128.39±5.73	25.28±2.85	15.31±1.03	7.18±1.15
	Min – Max	6.67 – 9.08	120.1 – 139.3	20.8 – 30.8	13.6 – 18.7	4.55 – 8.75
Total sample (N=126)	*Mean±SD*	11.95±3.09	147.76±14.61	37.75±11.72	16.79±2.26	8.22±1.69
	Min – Max	6.67 – 20.34	120.1 – 178.2	20.8 – 67.0	12.7 – 23.3	4.3 – 11.83

Legend: n, N – number of study participants, RGs – rhythmic gymnasts, Mean – average value, SD – standard deviation, Min – minimum, Max – maximum, BMI – body mass index, FINS – final score, yrs – years, pts – points.

In addition to flexibility, explosive power in the lower extremities, and coordination, the ideal motor base for the successful execution of RG-specific content also includes a highly developed ability to balance. In RG balances belong to body difficulties (in addition to jumps and turns), and

in every routine, with or without an apparatus, a rhythmic gymnast must demonstrate a mastery of complex balance difficulties as a characteristic structural group. Both types of balance prevail and are manifested in the execution of waves, dance steps, elements of rotation (turns and pivots), or the maintaining of single leg balance on tip-toes (most often on the so-called *relevé* – high rise of heel, less often than on a full foot), with simultaneous or additional work of the free leg and other body parts, synchronised with apparatus handling (Sanader, 2005). The status of the study participants' balance ability is presented in Table 2. What is noticeable is a statistically significant absence of a normal distribution of data (Sig.=.04) for the balance test performed with eyes closed (B1LEG-L and B1LEG-R) in intermediate-level RGs and beginners. A comparison with the rating scale (Jastrjembskaia & Titov, 1998, 140), where a high percentage of insufficient results was recorded in these tests (over 60% of RGs of all age categories achieved insufficient results on these tests), confirms that balance with eyes closed was a difficult task for the study's participants. In this case, this outcome is not unexpected considering that RG is a highly visual sport (Potgieter, 2007), not in terms of the aesthetics of RG movements and appearance, but rather in terms of how crucial eyesight is for the successful execution of coordinated movements and RG apparatus technique. The fact that vision is best equipped to stabilise extremely low frequencies of sway could be another explanation for the poor results on the static balance tests conducted with eyes closed. The integration of information from the vestibular, proprioceptive, and visual sensory systems, each of which has a unique but overlapping working frequency range that affects its impact on postural control in different settings (Redfern et al., 2001), is particularly important for postural control. Sensory conflicts, which typically happen when proprioceptive and/or visual cues diverge from vestibular information, pose a challenge to the posture control system. This kind of situation can cause worry and anxiety, and those emotional reactions can have an impact on how effectively a person achieves and performs in a number of daily activities (Ristić & Zlatković, 2021).

The intercorrelation matrices of each of the five sub-samples are not shown, but what is noticeable is that both the strength of correlations between the variables and the number of statistically significant intercorrelations increase as the age of the RGs decreases. Observing the intercorrelations of variables of the total sample of RGs (Table 3) shows that all predictor variables have a statistically significant correlation with the performance score in RG, but they are weak (B1LEG-L: $r=0.21$, $p<0.05$; B1LEG-R: $r=0.23$, $p<0.05$; BTOE-L: $r=0.36$, $p<0.01$) to moderate (BTOE-R: $r=0.42$, $p<0.01$; 2TUR: $r=0.45$, $p<0.01$). Also, all predictor variables correlate statistically significantly with each other, and the intercorrelations are mostly of medium strength (a strong correlation was recorded in the case of the static balance test – BTOE).

Table 2. Balance ability in RGs of different age categories

Age categories	Variables	BTOE		B1LEG		2TUR
		L	R	L	R	
Seniors (n=15)	Mean±SD	17.01±9.14	16.81±9.19	9.37±6.73	11.81±9.78	24.87±16.47
	Min–Max	2.74 – 33.04	6.37 – 36.28	2.31 – 30.98	3.19 – 32.0	8.0 – 53.0
	K-S (Sig.)	.991	.597	.279	.325	.267
Juniors (n=25)	Mean±SD	17.73±10.36	16.06±11.87	11.21±10.39	13.36±11.57	19.68±16.77
	Min–Max	3.2 – 46.69	2.26 – 55.06	2.69 – 39.25	2.08 – 46.86	2.0 – 70.0
	K-S (Sig.)	.851	.395	.175	.076	.347
Advanced-level RGs (n=26)	Mean±SD	20.56±18.07	21.99±17.09	9.45±5.68	11.47±10.04	16.96±18.06
	Min–Max	1.67 – 62.77	1.6 – 60.38	3.03 – 24.44	1.59 – 37.88	1.0 – 70.0
	K-S (Sig.)	.353	.557	.262	.259	.137
Intermediate-level RGs (n=38)	Mean±SD	14.71±14.31	13.84±10.88	11.54±11.16	12.30±10.82	10.53±10.45
	Min–Max	1.54 – 70.73	1.71 – 40.66	2.36 – 51.81	1.95 – 44.41	0.0 – 50.0
	K-S (Sig.)	.155	.303	.040*	.080	.236
Beginners (n=22)	Mean±SD	7.06±9.72	5.36±5.75	6.77±4.35	10.17±11.76	7.23±7.61
	Min–Max	1.17 – 47.69	1.19 – 25.24	1.48 – 15.84	1.29 – 44.15	0.0 – 23.0
	K-S (Sig.)	.077	.179	.576	.040*	.124
Total sample (N=126)	Mean±SD	15.45±13.83	14.84±12.77	9.95±8.67	11.91±10.75	14.80±15.01
	Min–Max	1.17 – 70.73	1.19 – 60.38	1.48 – 51.81	1.29 – 46.86	0.0 – 70.0
	K-S (Sig.)	.007*	.008*	.000*	.000*	.000*

Legend: n, N – number of study participants, RGs – rhythmic gymnasts, Mean – average value, SD – standard deviation, Min – minimum, Max – maximum, K-S – Kolmogorov-Smirnov test, Sig. – significance, L – left leg, R – right leg, BTOE – balance on toes, B1LEG – single leg balance, 2TUR – double turn in *passé*.
Note: All measures are in times, i.e. number of consecutive successful attempts (the third test).
*Absence of normal distribution ($p < 0.05$)

Table 3. Intercorrelation matrix of all predictor variables and criterion variable: Total sample (N=126)

Variables	BTOE-L	BTOE-R	B1LEG-L	B1LEG-R	2TUR	FINS
BTOE-L	1.00					
BTOE-R	0.72**	1.00				
B1LEG-L	0.36**	0.34**	1.00			
B1LEG-R	0.37**	0.44**	0.34**	1.00		
2TUR	0.31**	0.35**	0.35**	0.29**	1.00	
FINS	0.36**	0.42**	0.21*	0.23*	0.45**	1.00

Legend: BTOE-L – balance on toes (left leg), BTOE-R – balance on toes (right leg), B1LEG-L – single leg balance (left leg), B1LEG-R – single leg balance (right leg), 2TUR – double turn in *passé*, FINS – final score.
*significant at p<0.05, **significant at p<0.01

The results of the multivariate regression analysis indicate a statistically significant influence of balance ability on success (FINS) in RG among advanced-level RGs [R=0.69, R^2=0.48, Adjusted R^2=0.35, F(5,20)=3.65, p=0.02], and in the entirety of the sample [R=0.52, R^2=0.27, Adjusted R^2=0.24, F(5,120)=8.82, p=0.00], where balance ability explained success in RG with 48% (R^2=0.48) and 35% (Adjusted R^2=0.35) in the advanced-level group (Table 4a), and with 27% (R^2=0.27) and 24% (Adjusted R^2=0.24) in relation

to the entire sample (Table 4b). Of all age categories, why is the statistically significant influence of balance ability on performance score in RG recorded only in the sub-sample of advanced-level RGs? A possible explanation may be that children between the ages of 11 and 13 are able to apply strategies that strongly resemble those used by adults to maintain a balanced position in static or dynamic conditions (Müller et al., 1992; Hatzitaki et al., 2002; Calavalle et al., 2008). On the other hand, this concerns a very specific age that is part of a non-linear maturation process, which differs for everyone and affects their ability to learn and master particular motor skills (Ricotti, 2011). In the case of seniors [F(5,9)=0.41, p=0.83] and juniors [F(5,19)=1.12, p=0.38], as well as intermediate-level RGs [F(5,32)=2.02, p=0.10] and beginners [F(5,16)=1.52, p=0.24], the statistically significant influence of balance ability on performance score in RG was not confirmed. This result can be explained by the fact that it is premature to expect an enviable level of balance ability in the youngest age categories, because it requires training experience associated with improved neuromuscular coordination, and greater joint strength and range of motion, which are mechanisms for balance improvement (di Cagno et al., 2014). On the other hand, although senior and junior RGs, who are older age categories, have training experience, there is no statistically significant influence of balance ability on performance scores. This does not imply that balance abilities are not a key predictor of RG success, but rather that there are other, more relevant characteristics that differentiate successful from less successful RGs in older age categories (Пуреновић-Ивановић, 2017).

Table 4. The influence of balance ability on performance score in RG

a) Advanced-level RGs (n=26)						
R= .69, R^2= .48, Adjusted R^2= .35, F(5,20)=3.65, **p= .02**						
Variables	r	Part r	b	Std.Err. – of b	t(20)	p-value
BTOE-L	0.39	-0.03	-0.01	0.02	-0.14	0.89
BTOE-R	0.56	0.55	0.06	0.02	290.53	0.01
B1LEG-L	0.48	0.28	0.08	0.06	130.28	0.21
B1LEG-R	0.25	-0.25	-0.05	0.04	-113.94	0.27
2TUR	0.23	0.22	0.02	0.02	101.02	0.32
b) Total sample (N=126)						
R= .52, R^2= .27, Adjusted R^2= .24, F(5,120)=8.82, p= .00						
Variables	r	Part r	b	Std.Err. – of b	t(20)	p-value
BTOE-L	0.31	0.04	0.01	0.01	0.39	0.69
BTOE-R	0.36	0.21	0.03	0.02	228.88	0.02
B1LEG-L	0.12	0.00	0.00	0.02	0.01	0.99
B1LEG-R	0.25	0.07	0.01	0.01	0.81	0.42
2TUR	0.41	0.37	0.04	0.01	437.47	0.00

Legend: n, N – number of study participants, R – multiple correlation coefficient, R^2 – coefficient of determination of multiple correlation, Adjusted R^2 – adjusted coefficient of determination of multiple correlation, F – F-test value, p – significance of multiple regression, r – correlation coefficient, Part r – coefficient of partial correlation, b – standardized regression coefficient, Std.Err. of b – standardized error of regression coefficient, t – vector of standardized regression coefficient, p-value – significance of beta coefficient, BTOE-L – balance on toes (left leg), BTOE-R – balance on toes (right leg), B1LEG-L – single leg balance (left leg), B1LEG-R – single leg balance (right leg), 2TUR – double turn in *passé*.

At the univariate level, regression analysis indicated a statistically significant, individual contribution of the BTOE-R variable to the prediction of success in RG in the advanced-level RGs (p=0.01; Table 4a), and in relation to the entirety of the sample (p=0.02; Table 4b), with a positive relationship between this predictor and the criterion variable (b=0.06 and b=0.03, retrospectively). This outcome is not a surprise considering that most of the exercises in RG require an above-average ability to maintain balance on one leg (full foot or *relevé* position), while the other leg is in various demanding positions (Sobera & Rutkowska-Kucharska, 2019). The reason for the absence of a statistically significant individual contribution of the BTOE-L variable in a sample of advanced-level RGs containing RGs whose left leg is the dominant leg may lie in the consideration of the results of some studies (Shigaki et al., 2013; Frutuoso et al., 2016), which recorded a better stability of the non-dominant leg – the preferred limb is used for dynamic activities, thus reducing its role in balance control (in this particular case, the advanced-level RGs' left leg is used for maneuvering, and the right leg is used for stabilisation and balancing). Although the asymmetry of the RGs' lower limbs was not the subject of this research, and differences between the left and right sides were not examined, this result shows exactly how the preference of one side of the body causes bilateral differences, both functional and morphological (Frutuoso et al., 2016). In addition to the BTOE-R variable, a statistically significant individual contribution of the 2TUR variable to the prediction of performance score in RG was recorded in relation to the entirety of the sample (p=0.00; Table 4b), with a positive relationship between this predictor and the criterion variable (b=0.04). Of all applied tests, in relation to the entire sample of participants, only the B1LEG test did not show a statistically significant individual contribution to success in RG, and this is the single leg test which is performed with weight placed on the entire length of the foot and with eyes closed. Namely, due to the fact that the RG Code of Points (FIG, 2022) values balance difficulties performed on tip-toes more, it is in RGs' best interest that such balance difficulties prevail; also, vision does not play a significant role in balance maintaining when it comes to RG (Potgieter, 2007; Calavalle et al., 2008).

CONCLUSION

The goal of this research was to determine the influence of balance ability on the performance scores of high-level female RGs of different age categories. Accordingly, we analysed a factor which has previously been shown to be a very important segment of RG, and which is essential for success in this sport. Firstly, the status of static and dynamic balance abilities of RGs of all age categories was established; secondly, the relationships of all predictor variables with each other, and with the criterion variable,

were examined; finally, the influence of balance ability on performance scores in this sports discipline was examined. Given that a statistically significant influence of this segment of motor skills on success in this sport was established (at the multivariate level for advanced-level RGs and the entire sample, and at the univariate level for static balance on the tip-toes of the right leg and for the dynamic balance test), the results of this research can help RG coaches to better understand and to properly direct the training processes in relation to the balance ability of RGs of different ages, which would certainly lead to the improvement of their sports results, i.e. performance scores. This type of profiling can generate a useful database against which talented groups may be compared, although the balance ability assessment of the growing and developing individual is fraught with difficulties because of a range of issues. Unfortunately, given the fact that the results obtained from one specific age category cannot be generalised to apply to all age categories or skill levels, we can conclude that the results only apply to the specified age categories. Also, by carrying out a longitudinal research with a larger sample of examinees, we could gain even better insight into this segment of the motor status of RGs. Besides, this one-dimensional approach lacks the wider viewpoint necessary to account for the multidimensional nature of overall performance in RG.

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СПОСОБНОСТ РАВНОТЕЖЕ ВРХУНСКИХ РИТМИЧКИХ ГИМНАСТИЧАРКИ: ДА ЛИ ПРЕДВИЂА РЕЗУЛТАТЕ ЊИХОВИХ ПЕРФОРМАНСИ?

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Резиме

Ритмичка гимнастика (РГ) представља веома захтевну естетско-уметничку спортску дисциплину када је реч о комплексности неопходних вештина. Ритмичка гимнастичарка има задатак да координира технику тела са техником рада једним од укупно пет РГ реквизита (лопта, обруч, вијача, трака и чуњеви), истовремено демонстрирајући екстремно изражену флексибилност свих делова тела, те одличан осећај за ритам, простор и време. То је дисциплина која намеће високе захтеве по питању величине тела, грађе и састава, али и моторике извођача, нарочито оних врхунских. Међутим, да би се уопште могло приступити усвајању РГ садржаја, неопходно је постојање одређеног минимума развијености свих мо-

торичких способности, међу којима су постурална контрола и способност стабилизовања тела током динамичних кретњи од виталног значаја. У овој спортској дисциплини, равнотеже припадају тежинама телом (поред скокова и окрета), и у сваком саставу, са или без реквизита, ритмичка гимнастичарка мора да покаже владање сложеним равнотежама као карактеристичном структурном групом. Заступљене су обе врсте равнотежа које се испољавају у извођењу таласа, плесних корака, елемената ротације (окрети и пивоти) или издржаја у високом успону на једној нози (најчешће на тзв. relevé – успон на полупрстима, ређе него на пуном стопалу), уз истовремени или додатни рад слободне ноге и осталих делова тела, синхронизовано са радом реквизитом. Основни циљ овог истраживања је да утврди значај, допринос и утицај способности равнотеже на успех у ритмичкој гимнастици. Сто двадесет шест ритмичких гимнастичарки, распоређених у пет узрасних категорија (15 сениорки, узраста 16 година и више; 25 јуниорки, узраста 14–16 година; 26 кадеткиња, узраста 12–14 година; 38 пионирки, узраста 9–12 година; и 22 млађе пионирке, узраста 7–9 година) добровољно је учествовало у истраживању. Утврђене су њихове основне карактеристике (узраст, телесна висина и маса, индекс телесне масе), као и статус способности равнотеже, и то тестом равнотеже на прстима (лева/десна нога), тестом равнотеже на једној нози (лева/десна нога) – затворене очи, и посматрањем дуплих окрета у passé позицији. Подаци су анализирани (дескриптивна статистика, тест Колмогоров-Смирнов, мултиваријантна и униваријантна регресиона анализа) применом програма SPSS 21.0. Резултати мултиваријантне регресионе анализе указали су на постојање статистички значајног утицаја способности равнотеже кадеткиња, као и укупног узорка ритмичких гимнастичарки на успех у РГ ($p=0.02$ и $p=0.00$, редом), са објашњењем варијансе од 35% (код кадеткиња), одн. 24% (на укупном узорку), при чему су утврђени статистички значајни појединачни доприноси успеху у РГ код равнотеже на прстима на десној нози (кадеткиње: $p=0.01$, укупан узорак: $p=0.02$) и код динамичке равнотеже (укупан узорак: $p=0.00$). Код сениорки и јуниорки, као и пионирки и млађих пионирки, није утврђен статистички значајан утицај способбности равнотеже на успех у РГ. Овакав резултат се може објаснити чињеницом да је код најмлађих узрасних категорија још рано говорити о завидном нивоу ове моторичке способности, јер је за то неопходно тренажно искуство које са собом носи побољшану нервно-мишићну координацију, те већу снагу зглобова и обим покрета, који представљају механизме за побољшање способности равнотеже. Са друге стране, ту су старије узрасне категорије – сениорке и јуниорке, којима не мањка тренажног искуства, а опет изостаје статистички значајан утицај способности равнотеже на успех у РГ. То не значи да способност равнотеже није значајан фактор успеха у РГ, већ пре указује на постојање битнијих фактора који дискриминишу успешне од мање успешних ритмичких гимнастичарки у старијим такмичарским категоријама.

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MOTIVATING THE YOUTH: UNCOVERING THE ATTITUDES AND MOTIVATION BEHIND SCHOOL SPORTS ENGAGEMENT

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Abstract

This study aimed to investigate the relationship between attitudes, motivation, and school sports engagement frequency, using the newly constructed Attitudes and Motivation Toward School Sports Questionnaire (AMTSSQ) inventory as a tool for assessment. The study found a significant effect of attitudes ($F = 11.96$, $p < .001$, $n_p^2 = 0.02$) and motivation ($F = 19.63$, $p < .001$, $n_p^2 = 0.03$) with strong positive correlation coefficients ($r = 0.71$) between attitudes, motivation, and school sports engagement frequency. However, Bayesian analyses supported the null hypothesis with moderate to strong evidence (Bayes Factor < 0.33), and credible intervals for effect size and R^2 were relatively narrow. Additionally, school sports engagement frequency is not significantly related to motivation ($b = -0.08$ to 0.03, $p > .05$), and the highest order unconditional interaction of school sports engagement frequency and attitudes was not significant ($F = 1.18$, $p = .315$). However, attitudes were strongly related to motivation ($R^2 = .99$), suggesting that students who viewed school sports as important and developed had higher motivation toward school sports. Hence, we can conclude that the AMTSSQ reliably and validly assesses students' attitudes and motivation toward school sports, and we found positive associations between attitudes and motivation. The findings suggest that attitudes towards school sports, like the perceived importance and developmental benefits, are significant predictors of motivation and may influence engagement in school sports. However, school sports engagement frequency did not moderate the relationship between attitudes and motivation. These findings have implications for promoting physical activity and student-school sports participation.

Key words: attitudes, motivation, school sports, engagement frequency, physical activity.

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МОТИВИСАЊЕ МЛАДИХ: ОТКРИВАЊЕ СТАВОВА И МОТИВАЦИЈЕ КОЈИ СТОЈЕ ИЗА ШКОЛСКОГ СПОРТСКОГ АНГАЖОВАЊА

Апстракт

Ова студија је имала за циљ да истражи однос између ставова, мотивације и учесталости ангажовања у школском спорту, користећи новоконструисани Упитник о ставовима и мотивацији ученика према школском спорту (УСМПШС) као алат за процену. Студија је открила значајан ефекат (F = 11.96, p < .001, n_p^2 = 0.02) и мотивације (F = 19.63, p < .001, n_p^2 = 0.03) са јаким позитивним коефицијентима корелације (p = 0,71) између ставова, мотивација и учесталост школског спортског ангажовања. Међутим, Бајесове анализе су подржале нулту хипотезу са умереним до јаким доказима (Бајесов фактор < 0,33), а веродостојни интервали за величину ефекта и R^2 били су релативно уски. Поред тога, учесталост ангажовања у школском спорту није значајно повезана са мотивацијом (b = -0.08 до 0.03, p > .05), а безусловна интеракција највишег реда учесталости ангажовања у школском спорту и ставова није била значајна (F = 1.18, p = .315). Међутим, ставови су били снажно повезани са мотивацијом (R^2= .99), што сугерише да су ученици који су школски спорт сматрали важним и развијеним имали већу мотивацију за школски спорт. Дакле, можемо закључити да УСМПШС поуздано и ваљано процењује ставове и мотивацију ученика према школском спорту, а утврдили смо позитивне везе између ставова и мотивације. Налази сугеришу да су ставови према школском спорту, као што су значај и развијеност, значајни предиктори мотивације и могу утицати на бављење школским спортом. Међутим, учесталост ангажовања у школском спорту није била значајан модератор у реалцији између ставова и мотивације. Ови налази имају импликације на промовисање физичке активности и учешћа ученика у школском спорту.

Кључне речи: ставови, мотивација, школски спорт, учесталост ангажовања, физичка активност.

INTRODUCTION

Regular physical activity and sports engagement have been widely recognised as essential components of a healthy lifestyle, providing various benefits (Bursnall, 2014; Eime, Young, Harvey, Charity, & Payne, 2013). However, rising concerns about the lack of physical activity and sports participation tendencies might explain various adverse health outcomes, such as obesity, cardiovascular disease, and diabetes (Kohl et al., 2012). Therefore, school-based programmes and activities could effectively promote students' physical activity and sports participation (Bursnall, 2014; Eccles & Barber, 1999; Fraser-Thomas et al., 2005; Lonsdale et al., 2013). These programmes allow students to engage in physical activity, develop new skills, and build peer relationships (Bryan & Solmon, 2012). By recognizing physical education (PE) as a vital component of the school curriculum, educators might embrace its capacity to promote lifelong physical activity and overall well-being in children and adolescents (Fairclough, Stratton, & Baldwin, 2002; Sallis et al., 1997).

Some evidence also suggests that self-esteem, reduced stress, and better social skills in children and adolescents might improve during regular physical activity (Eime et al., 2013; Gould & Carson, 2008). Enjoyment of physical education class (Barr-Anderson et al., 2008), relatedness perceptions, motivation, and affective responses from peers and teachers (Cox et al., 2009), motivational climate (Trbojević, 2017) and social support (Duncan & McAuley, 1993) can influence students' attitudes and motivation toward sports. Rhodes and Courneya (2003) addressed that planned and past behavior model student motivation in physical education and engagement in physical activity. Therefore, school-based physical education programmes might contribute to lifetime physical activity (Fairclough et al., 2002) and promote psychological and social benefits for children and adolescents, including life skills development (Gould & Carson, 2008).

Additionally, PE engagement might significantly shape students' attitudes and motivation toward sports (Eccles & Barber, 1999; Fraser-Thomas, Côté, & Deakin, 2005). However, despite the essential benefits, students struggle to meet daily physical activity recommendations and, surprisingly, despite the potential benefits of PE, children and adolescents report a lack of enjoyment and engagement in PE classes, which can gradually decay physical activity (Barr-Anderson et al., 2008; Bryan & Solmon, 2012). Therefore, researchers and practitioners tend to identify factors explaining students' motivation, enjoyment, and engagement in PE (Bryan & Solmon, 2012; Cox, Duncheon, & McDavid, 2009; Lonsdale et al., 2013). Few studies explored factors that might influence students' motivation, enjoyment, and participation in Physical Education (PE), including social support from peers and teachers (Cox et al., 2009; Duncan & McAuley, 1993), intrinsic motivation (Hagger & Chatzisarantis, 2005; Markland & Hardy, 1997; Pelletier et al., 1995), and perceived competence (Lonsdale et al., 2013).

Looking back on previous arguments, some authors have applied several theoretical frameworks to understand the determinants that underpin students' motivation and PE engagement. One such framework is Self-determination theory (SDT), which points out that individuals are more likely to engage in an activity if it supports their competence, autonomy, and relatedness (Ryan & Deci, 2000). Social cognitive theory (SCT) also proposes that personal, behavioral, and environmental factors might influence a cognitive process to shape positive behavior (Schunk, 1989). Lastly, the planned behavior theory (TPB) suggests that a personal attitude toward a particular behavior, subjective norms, and perceived behavioral control influences their intention to embrace the behavior (Rhodes & Courneya, 2003).

To address this specific problem, the exercise Motivation Questionnaire (Markland & Hardy, 1997), the Physical Activity Enjoyment Scale (Kendzierski & DeCarlo, 1991), and the Sport Motivation Scale (SMS) (Pelletier et al., 1995) are a few respected examples of inventories established to investigate motivation and attitudes toward physical activities and sports.

Literature has extensively used these inventories to explore the factors influencing motivation and attitudes toward physical activity and sports.

However, while these inventories are helpful, they often focus on general attitudes toward physical activity and sports rather than attitudes specifically toward school sports. Existing inventories tend to focus on individual-level factors such as personal interest, enjoyment, and perceived competence but often fail to capture the unique characteristics of school sports, such as team dynamics, school pride, and the role of teachers and administrators. As a result, we need a more thorough understanding of students' attitudes and motivation toward school sports to support the development of effective sports programmes and policies that promote physical activity and well-being among youth. Developing a new inventory is necessary to fill the gap in the literature regarding attitudes toward school sports. Existing inventories do not comprehensively measure attitudes and motivation toward school sports. It might be a significant gap in the literature because school sports have unique characteristics compared to other forms of physical activity or sports participation. Therefore, we constructed a novel inventory, The Attitudes and Motivation Toward School Sports Questionnaire (AMTSSQ), to exclusively assess students' attitudes and motivation toward school sports.

The AMTSSQ includes attitudes towards sports not currently addressed in other inventories. For example, the AMTSSQ addresses aspects of engagement in school sports, such as academic performance, conduct, physical development, self-discipline, and hygiene habits. These factors might be essential for comprehensively measuring attitudes and motivation toward school sports. Thus, the AMTSSQ can provide researchers and educators with a more nuanced understanding of students' attitudes toward school sports and their motivation to participate.

The AMTSSQ is also designed specifically for use in school settings, making it a valuable tool for assessing the effectiveness of school sports programmes and interventions. The inventory assesses intrinsic and extrinsic motivators, including enjoyment, interest, personal growth, competition, social connections, and recognition. These factors are consistent with the self-determination theory of motivation, which posits that individuals are motivated to engage in activities that fulfill their basic psychological needs for autonomy, competence, and relatedness (Ryan & Deci, 2020).

Therefore, the purpose of this study was to investigate the relationship between attitudes, motivation, and school sports engagement frequency to explore the factors that contribute to students' engagement in school sports using the AMTSSQ as a tool for assessment. We hypothesised that students who perceive school sports as important and developed would have higher levels of motivation (both intrinsic and extrinsic) toward engagement in school sports. Additionally, we hypothesised that students who engaged in school sports more frequently would have higher attitudes and motivation scores than those who engaged less frequently. By

understanding the factors influencing students' attitudes and motivation toward school sports, we hope to provide practical insights to promote physical activity and school sports participation among students.

METHODS

Study Design and Procedures

This cross-sectional study aimed to explore the attitudes and motivation of elementary and secondary school students toward engagement in school sports in Serbia. In May 2022, the authors conducted the study as a part of a national initiative to develop school sports in Serbia. The Ministry of Education approved the selection of a representative sample from all administrative districts in Serbia. The study employed a self-reported questionnaire to assess attitudes and motivation toward school sports.

We performed apriori analysis to determine the sample size before the study to ensure statistical power and representativeness of the target population. Respondents were given specific instructions to avoid misleading and inaccurate responses and were informed about the goal and importance of the study to improve the quality of school sports in Serbia. For example, we provided information that school sports include organised extracurricular sports activities in and outside the school, within the Physical and Health Education subject, including sports sections, school sports competitions (within the school and between schools), school sports week, and all sports activities following the School Programme and Annual school work plan.

The questionnaire was designed explicitly for this study, and explored the construct of attitudes and motivation toward school sports engagement. The study explored how attitudes and motivation may differ when accounting for engagement in school sports, including more than two times a week, one to two times a week, one to two times a month, and a few times a year. Additionally, the study explored the moderating role of engagement in school sports in the association between attitudes and students' motivation.

The questionnaire was administered electronically (Google Forms) and forwarded to official school email addresses across Serbia for efficiency. We did not limit the time to complete the questionnaire and informed respondents that responses would remain anonymous and be used only for research purposes. We did not include incompletely administered responses with ambiguous outcomes in the analysis.

We conducted the study procedures according to the Declaration of Helsinki, which outlines ethical principles for research involving human subjects. The authors improved the study design and procedures for scientific publication by providing a more detailed description of the statistical analyses performed, such as the specific methods used to assess differences in attitudes and motivation across levels of engagement in school sports. Additionally, we emphasised the potential study's limitations, such as self-reported measures bias, which might enhance the scientific rigor of the study.

Participants

The study enrolled participants from primary (fifth through eighth grade) and secondary (first through fourth grade) schools in Serbia. A total of 11,381 students participated in the study, of which 2,941 (25.8%) were from secondary school and 8,440 (74.2%) were from primary school. The majority of the participants (74.1%) reported engaging in school sports more than twice a week, while 12.6% reported engaging in sports one to two times a month, 5.8% reported engaging in sports one to two times a week, and 7.5% reported engaging in sports only a few times a year. Among the participants, 5,438 (47.8%) were male, and 5,943 (52.2%) were female.

We recruited participants via email sent by their school administrators. The inclusion criteria for the study were students who participated in school sports, and we enrolled participants from all administrative districts and municipalities of Serbia to ensure a representative sample. All participants or their parents or legal guardians for students under 18 provided informed consent.

Measures

The Attitudes and Motivation Toward School Sports Questionnaire (AMTSSQ). The present study used a newly constructed AMTSSQ inventory. The AMTSSQ assesses students' attitudes and motivation toward school sports. Initially, this questionnaire comprised 45 items, divided into two subscales: Attitudes (20) and Motivation (25). The attitudes subscale involved items measuring the importance (8 items) and development (12 items) of school sports, while the motivation subscale explored intrinsic (11) and extrinsic motivation (14). We consider intrinsic motivation from several vital aspects. For example, motivation towards learning and epistemic need towards knowledge and understanding, achievement, and experiencing stimulation (see Appendix A for questionnaire items). Likewise, external regulation, introjection, and identification signify external motivation. We evaluated participants' responses using a five-point Likert scale, which reflects their degree of agreement (Strongly Disagree, Disagree, Neither agree nor disagree, Agree and Strongly Agree, see Appendix A). In addition to individual item analysis, we summed relevant items for each variable to form composite scores that we included in the comparative (school sports engagement frequency) and moderation analyses. For example, we provided the unique composite score for each subscale (attitudes and motivation) by summing all item responses for each participant.

We extracted two distinct factors using the explorative factor analysis (EFA). The factor analysis using a diagonally weighted least squares (DWLS) estimator with direct oblimin rotation proved that each item corresponds to theoretically assumed factors (attitudes and motivation). Based on the results, most items have high communalities, with most values above .7, indicating that they share a substantial variance with other items

in the dataset. Items with higher commonalities are generally considered more reliable and can be used to provide a more accurate representation of the underlying construct. However, a few items have relatively low communalities (A17, M27, M28, M29, M38), particularly for the extraction method. Therefore, we excluded the underlined items from further analyses (see Figure 1). These results may indicate that these items are less reliable and may not fit the underlying construct well. Factor loadings for this scale were clear, with moderate to high (ranging from .68 to .92 and .71 to .95 on the two factors, respectively) and minimal cross-factor loadings (no more than .17). The KMO was 0.99.

Moreover, we evaluated the model's fit. The results of the confirmatory factor analysis (CFA) indicated an excellent fit (SRMR = .028; CFI = .998, RMSEA = .027; TLI = .998) (see Fig. 1). The internal consistency in this study for the scale proved to be excellent (Cronbach alpha was .98 and .99 for attitudes and motivation, respectively). Finally, average inter-item correlations were .71 and .79 for attitudes and motivation, respectively.

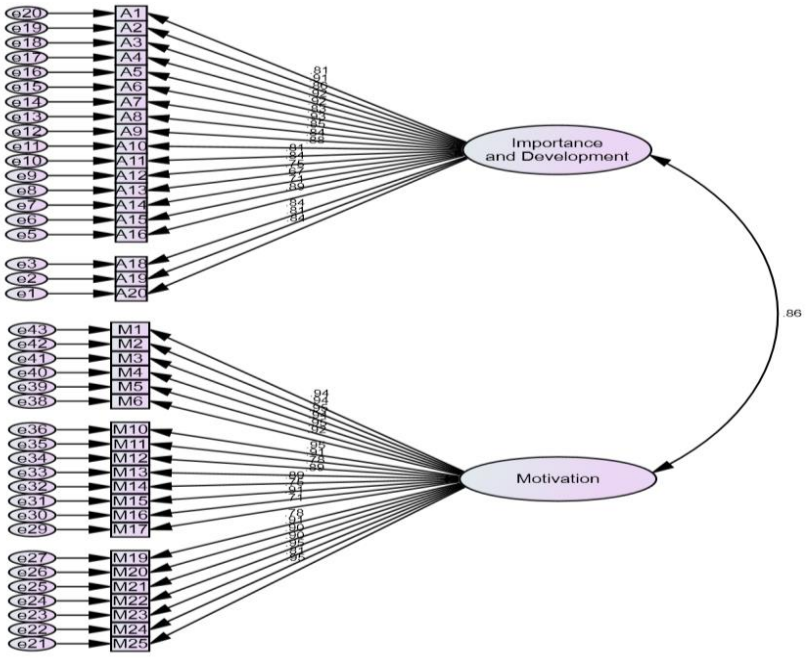

Figure 1. The figure displays the confirmatory factor analysis (CFA) results for the measurement model of the latent construct. The CFA model had an excellent fit to the data with a comparative fit index (CFI) of 0.998, and we displayed each indicator's standardised regression weights and corresponding significance levels. The circles represent the error variances for each indicator. A rectangle depicts the manifest variables, and ovals represent the latent variables.

Sample Size Calculation

We conducted an a priori multiple regression power analysis using G*Power (Faul, Erdfelder, Buchner, & Lang, 2009) for the moderation analysis with seven predictors (attitudes, >2 weekly, 1-2 weekly, 1-2 monthly, and >2 weekly*attitudes, 1-2 weekly*attitudes, 1-2 monthly*attitudes, interactions) as the input parameters. By using the values of alpha (0.05), power (0.95), and the expected small effect size ($f = 0.01$), we attempted to determine an appropriate sample size. Based on these assumptions, the desired sample size for this study was 2191 participants.

Data analyses

RStudio was used to process the data (version 2022.07.0.548, Spotted Wakerobin, Boston, MA). When applicable, means, medians, and standard deviations were estimated to characterise categorical and continuous variables for the whole sample. We used analysis of variance (ANOVA) with post hoc pairwise comparisons with Games-Howell and Holm adjustment to determine whether there was a significant difference in attitudes (importance and development of school sports) among the different levels of school sports engagement. Additionally, we performed Bayesian analysis using Bayes Factor and R^2 posterior Bayesian to provide additional evidence supporting the observed effect. Finally, the moderation model (model 1) was also employed to determine if school sports engagement frequency moderates the relationship between attitudes and motivation. We evaluated the moderating effect using a customised R script (Hayes, 2022). The QuantPsyc package centeres on variables and explores the interaction between attitudes and motivation, with motivation as the dependent and importance as the independent variable. A bootstrapping approach was applied (with 5000 resamples). We established the threshold of significance at 0.05.

RESULTS

The analysis of variance (ANOVA) indicates a significant difference in the attitudes (importance and development of school sports) between groups ($F = 11.96$; $p < .001$). The effect size ($n_p^2 = 0.02$; *Cl95%* [0.01, 1.00])) was small, indicating that the tested variable explained only a small proportion of the variability observed in the data. The results of the Games-Howell pairwise test with Holm adjustment proved that the group with the highest level of school sports engagement (engaging in sports activities more than twice a week) had significantly higher scores than the other groups (see Figure 2). The mean score difference between other groups was not significant. These findings suggest that a higher frequency of school sports engagement may be associated with higher scores on attitudes.

However, the Bayesian analysis could not support the observed effect. The Bayes Factor ($log_e (BF_{01})$ = -8.97) suggests moderate to strong evidence in favor of the null hypothesis (no effect), meaning that the data provide evidence against the alternative hypothesis (there is an effect) and support the idea that there is no meaningful relationship between school sports engagement frequency and the relationship between attitudes and motivation. The R^2 posterior Bayesian (0.003) indicates that the tested variable explains a small proportion of the variability observed in the data. The 95% interval for the R^2 posterior Bayesian (*CI* [0.002, 0.006]) provides a range of plausible values for the actual R^2 value.

Finally, the Cauchy test for the correlation coefficient 0.71 provides evidence supporting a moderate correlation between the variables. Overall, the results suggest that the school sports engagement frequency has a small and insignificant effect on attitudes (importance and development) by supporting null hypotheses.

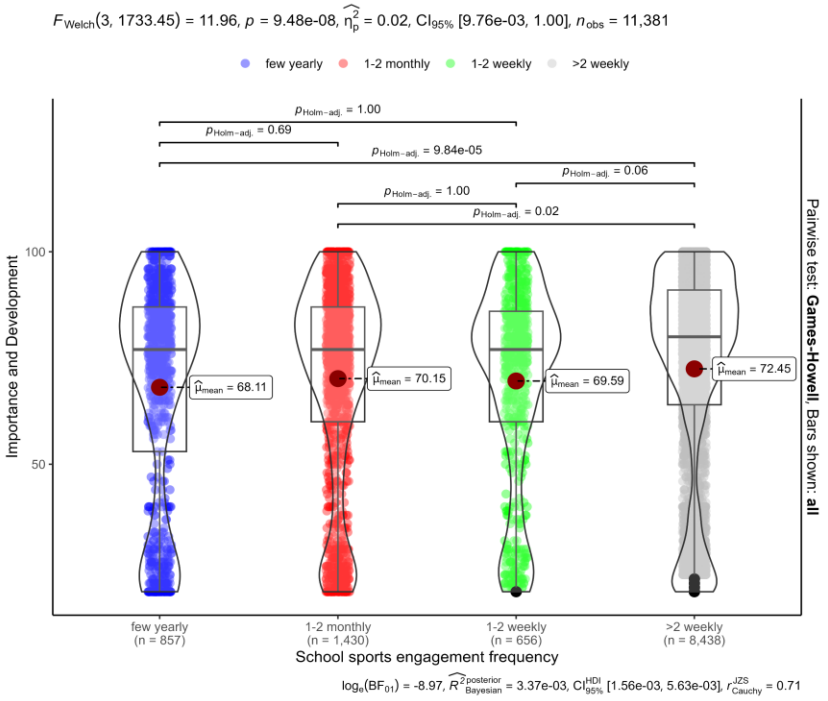

Figure 2. *The figure displays a combined box, and violin plot generated using the ggbetweenstats function in R. The plot shows the distribution of a continuous variable across four groups. The x-axis represents the school sports engagement frequency, the y-axis represents the motivation, the boxes represent the interquartile range, and the whiskers show the extent of the data. The violin plot displays the probability density of the data. The colors of the boxes and violins correspond to the group variable.*

The analysis of variance (ANOVA) also showed a significant difference in motivation (intrinsic and extrinsic) between groups (F = 19.63; p < .001). The effect size (n_p^2 = 0.03; *95% CI* [0.02, 1.00]) was small, indicating that the tested variable explained only a small proportion of the variability observed in the data. The results of the Games-Howell pairwise test with Holm adjustment proved that the group with the highest level of school sports engagement (engaging in sports activities more than twice a week) had significantly higher scores than the other groups (see Figure 3). The mean score difference between other groups was not significant. These findings suggest that a higher frequency of school sports engagement may be associated with higher scores on motivation.

However, the Bayesian analysis provides further evidence in support of the observed effect. The Bayes Factor ($log_e (BF_{01})$ = -20.17) suggests moderate to strong evidence in favor of the null hypothesis (no effect), meaning that the data provide evidence against the alternative hypothesis (there is an effect) and support the idea that there is no meaningful relationship between school sports engagement frequency and the relationship between attitudes and motivation. The R^2 posterior Bayesian (0.005; *95% CI* [0.003, 0.008]) indicates that the tested variable explains a small proportion of the variability observed in the data.

Finally, the Cauchy test for the correlation coefficient 0.71 provides evidence supporting a moderate correlation between the variables. Overall, the results suggest that the school sports engagement frequency has a small and insignificant effect on motivation (intrinsic and extrinsic) by supporting null hypotheses.

The previous results suggest that we could explain only a small amount of the variance. Therefore, we conducted a moderation analysis to determine whether school sports engagement frequency would modify or strengthen the relationship between the variables. The goal was to determine whether the relationship between the variables previously observed is consistent across different levels of the moderator variable. We used the QuantPsyc package to center variables and analyze the interaction between attitudes (importance and development) and school sports engagement frequency, predicting motivation towards school sports. We checked the data for outliers and regression assumptions and found no violations.

The moderation analysis examined the relationship between motivation and predictors, including the importance and frequency of school sports engagement. The results suggest that the interactions of the highest unconditional order that the moderating influence of the school sports engagement frequency (F = 1.18, p = .315) was not significant and accounts for 0 % of the variance. Similarly, school sports engagement frequency (1-2 monthly: b = -0.08, p > .05, *95% CI* [-0.18, 0.03]; 1-2 weekly: b = 0.03, p > .05, *95% CI* [-0.10, 0.15]; >2 weekly: b = 0.01, p > .05, *95% CI* [-0.08, 0.10]) did not significantly affect motivation.

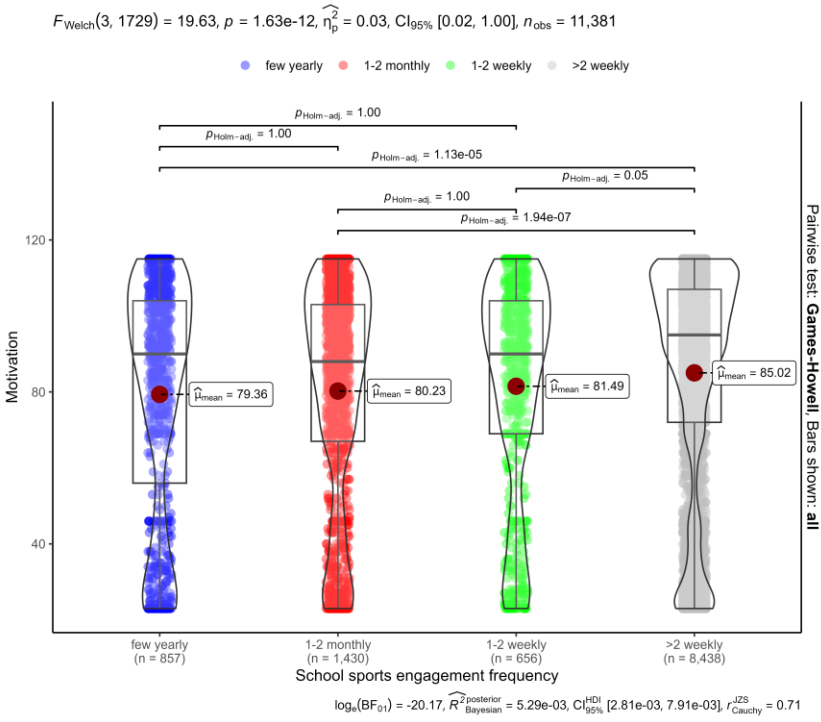

Figure 3. The figure displays a combined box and violin plot generated using the ggbetweenstats function in R. The plot shows the distribution of a continuous variable across four groups. The x-axis represents the school sports engagement frequency, the y-axis represents the motivation, the boxes represent the interquartile range, and the whiskers show the extent of the data. The violin plot displays the probability density of the data. The colors of the boxes and violins correspond to the group variable.

The interaction effects were not significant, indicating that the relationship between the attitudes and motivation did not vary significantly across the school sports engagement frequency (1-2 monthly: b = -0.00, p > .05, *95% CI* [-0.00, 0.00]; 1-2 weekly: b = 0.00, p > .05, *95% CI* [-0.00, 0.01]; >2 weekly: b = 0.00, p > .05, *95% CI* [-0.00, 0.00]).

Additionally, we emphasise that the main effect of school sports engagement frequency was also insignificant, indicating that the school sports engagement frequency did not have a significant association with motivation (1-2 monthly: b = -0.08, p > .05, *95% CI* [-0.18, 0.03]; 1-2 weekly: b = 0.03, p > .05, *95% CI* [-0.10, 0.15]; >2 weekly: b = 0.01, p > .05, *95% CI* [-0.08, 0.10]).

Table 1. Regression results using motivation as the criterion

Predictor	*b*	*b* 95% CI [LL, UL]	sr^2	sr^2 95% CI [LL, UL]	Fit
(Intercept)	72.23**	[72.15, 72.32]			
Attitudes	0.86**	[0.86, 0.86]	.08	[.08, .09]	
1-2 Monthly	-0.08	[-0.18, 0.03]	.00	[-.00, .00]	
1-2 weekly	0.03	[-0.10, 0.15]	.00	[-.00, .00]	
>2 weekly	0.01	[-0.08, 0.10]	.00	[-.00, .00]	
Attitudes: 1-2 Monthly	-0.00	[-0.00, 0.00]	.00	[-.00, .00]	
Attitudes: 1-2 weekly	0.00	[-0.00, 0.01]	.00	[-.00, .00]	
Attitudes: >2 weekly	0.00	[-0.00, 0.00]	.00	[-.00, .00]	
					R^2 = .998** 95% CI [1.00,1.00]

Note: A significant *b*-weight indicates that the semi-partial correlation is also significant. b represents unstandardised regression weights. sr^2 represents the semi-partial correlation squared. LL and UL indicate a confidence interval's lower and upper limits, respectively. * indicates $p < .05$. ** indicates $p < .01$. 1-2 Monthly, 1-2 weekly, and >2 weekly represent school sports engagement frequency.

Therefore, in this sample, no evidence suggests that engagement frequency moderates the relationship between importance and motivation, as shown in Figure 4. We can observe that the regression slopes were similar. These findings suggest that the frequency of school sports engagement may not significantly predict motivation, regardless of the importance placed on this activity.

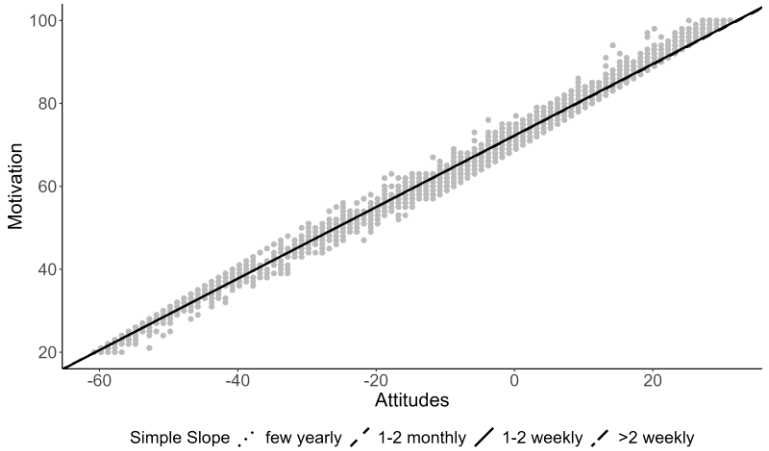

Figure 4. *Moderation plot of the relationship between Attitudes (centered) and motivation moderated by school sports engagement frequency. The dotted, dashed, and solid lines indicate simple slopes of a few yearly, 1-2 monthly, 1-2 weekly, and >2 weekly slopes, respectively.*

DISCUSSION

The present study utilised a newly constructed inventory, the Attitudes and Motivation Toward School Sports Questionnaire (AMTSSQ), to assess students' attitudes and motivation toward school sports. The authors of this questionnaire aimed to capture two distinct factors, attitudes and motivation, and further divided them into subcategories. The Attitudes subscale measured importance and development, while the Motivation subscale explored intrinsic and extrinsic motivation.

We evaluated the AMTSSQ using exploratory and confirmatory factor analyses to ensure that the items corresponded to the theoretically assumed factors. The factor loadings for the scale were clear, with most items having high communalities, indicating that they share a substantial variance with other items in the dataset. The confirmatory factor analysis results indicated a good fit of the model, and the scale's internal consistency was excellent, as evidenced by the high Cronbach alpha values for both Attitudes and Motivation subscales. Other authors designed valuable inventory to assess motivation. For example, the Exercise Motivation Inventory (EMI) (Markland & Hardy, 1997) inventory assesses motivation toward physical activity. The EMI consists of six subscales: enjoyment, social recognition, affiliation, competence, health and fitness, and appearance. Another inventory, the Physical Activity Enjoyment Scale (PACES), assesses the enjoyment of physical activity (Kendzierski & DeCarlo, 1991). The PACES consists of 18 items measuring the pleasure and enjoyment of a physical activity.

Additionally, the Sport Motivation Scale (SMS) (Pelletier et al., 1995) has a similar construct to ours to assess motivation toward sports. The SMS consists of three subscales: intrinsic motivation, identified regulation, and external regulation. However, we hypothesised that the student's attitudes regarding the importance and development of school sports might influence students' motivation to engage in school sports. Therefore, the AMTSSQ's focus on the importance and development of school sports makes it a unique and valuable tool for researchers and practitioners interested in promoting physical activity and student-school sports participation.

Based on our novel inventory, the results of this study suggest that school sports engagement frequency is significantly associated with attitudes (importance and development) and motivation (intrinsic and extrinsic). Specifically, participants who engaged in school sports activities more than twice a week had higher attitudes and motivation scores than those who engaged in school sports less frequently.

These findings follow previous research demonstrating that regular participation in sports is associated with positive outcomes such as improved physical health, academic achievement, and social development (Bursnall, 2014; Eime et al., 2013). It is possible that engaging in school

sports activities more frequently may lead to increased opportunities for social interaction, skill development, and personal growth, which in turn may contribute to more positive attitudes and motivation toward sports.

However, we explored the results more deeply and found that school sports engagement frequency did not significantly affect attitudes or motivation toward school sports. This result suggests that while participating in school sports may benefit physical health, it may not significantly impact students' attitudes or motivation toward sports. Although there were pairwise differences in favor of the most frequently engaged group, the Bayesian analysis provides further evidence supporting the null hypothesis that there is no meaningful relationship between school sports engagement frequency and the relationship between attitudes and motivation. This finding is important because promoting school sports engagement frequency may not necessarily improve students' attitudes or motivation toward sports.

Additionally, since the explained variance was slight, we explored the moderating role of school sports engagement frequency in the relationship between attitudes (importance and development) and motivation (intrinsic and extrinsic). The results showed that the interaction effects were insignificant, indicating that the relationship between the importance of school sports engagement and motivation did not vary significantly by frequency of engagement. Furthermore, the main effect of engagement in school sports was also insignificant, suggesting that the frequency of school sports engagement did not have a significant association with motivation.

These findings follow previous research suggesting that the frequency of school sports engagement may not significantly predict motivation. For instance, a study by Lonsdale, Hodge, and Rose (2008) found that participation frequency was not significantly associated with motivation among young athletes. This study suggests that while engagement frequency may be necessary for other outcomes, such as skill development or physical health, it may not be a critical factor in predicting motivation toward school sports.

The present study also found no evidence for the moderating role of engagement frequency in the relationship between attitudes and motivation. This finding is consistent with a meta-analysis by Rhodes and Courneya (2003), which found that the effect sizes of attitude-behavior relationships did not differ significantly based on participation frequency. Therefore, these findings suggest that the moderating role of school sports engagement frequency may depend on specific attitudes and behaviors.

Researchers have found that several attitudes contribute to more frequent engagement in school sports. For instance, research has shown that positive attitudes towards physical activity, such as enjoyment and self-efficacy, are associated with higher levels of engagement in sports among adolescents (Lubans, Foster, & Biddle, 2008; Standage, Duda, &

Ntoumanis, 2003). Additionally, perceived social support for physical activity, such as encouragement from friends and family, is positively associated with engagement in school sports (Duncan & McAuley, 1993). Another crucial attitude that may contribute to engagement in school sports is perceived importance or value. A study by Fredricks and Eccles (2004) found that adolescents who perceived physical activity as necessary were likelier to engage in sports activities.

Similarly, Fraser-Thomas et al. (2005) found that the perceived importance of physical activity was positively associated with sport participation among young athletes. Research has also shown that attitudes toward the developmental benefits of sports, such as skill acquisition and personal growth, are positively associated with engagement in sports (Eccles & Barber, 1999; Gould & Carson, 2008). For instance, a study by Weiss and Petlichkoff (1989) found that the perception of skill development significantly predicted sports participation among high school students.

Although attitudes are not interchangeable with motivation, they might influence motivation by shaping an individual's beliefs and perceptions about the behavior, impacting their motivation to engage in it (Ryan & Deci, 2000). Therefore, positive attitudes towards physical activity, social support for physical activity, the perceived importance or value of physical activity, and attitudes towards the developmental benefits of sports are all associated with higher levels of engagement in school sports among adolescents. Barr-Anderson et al. (2008) argue that students who believe in the positive benefits of physical activity, such as improved physical health and reduced stress, are more likely to engage in school sports. Previous arguments may suggest that attitudes toward physical activity may contribute to more frequent engagement in school sports.

Furthermore, studies have shown that enjoyment and intrinsic motivation are strong predictors of continued participation in sports (Vazou, Ntoumanis, & Duda, 2005). Students who enjoy the sport and find it interesting are likelier to continue participating, while those who feel pressure or are motivated by external rewards are less likely to continue (Ryan & Deci, 2000). Previous findings highlight the importance of promoting enjoyment and intrinsic motivation in school sports programmes to encourage continued engagement.

Several studies have suggested that extrinsic factors like schools and physical education teachers promote physical activity and develop students' motivation toward school sports (Cox et al., 2009; Standage et al., 2003). The teachers' enthusiasm and support for physical activity are associated with the students' engagement in physical activity (Fairclough et al., 2002). The school environment, including the availability of sports facilities and equipment, can also influence students' physical activity and motivation toward school sports (Sallis et al., 1997).

In addition, the teachers' use of motivational strategies, such as goal setting and feedback, has enhanced students' motivation and engagement in physical activity (Hagger & Chatzisarantis, 2005). Teachers can also promote enjoyment and positive experiences in physical activity, which can contribute to students' long-term engagement in physical activity (Lonsdale et al., 2013). Likewise, creating opportunities for student involvement in the decision-making process related to school sports can enhance their motivation and commitment to physical activity (Bryan & Solmon, 2012; Standage et al., 2003). Therefore, schools, physical education teachers, and other teachers can contribute significantly to developing students' motivation towards school sports by creating a supportive environment, using motivational strategies, and promoting enjoyment and positive experiences in physical activity.

In general, attitudes towards school sports and motivation may contribute to more frequent engagement in school sports. Educators must consider these attitudes when promoting and developing school sports programs. By understanding and addressing these factors, schools may be able to increase student participation and promote lifelong physical activity habits.

The present study contributes to understanding the factors influencing motivation toward school sports. The findings suggest that while attitudes toward school sports engagement are essential for motivation, the school sports engagement frequency may not be a critical factor. Future research could explore other potential moderators of the relationship between attitudes and motivation, such as gender, age, athletic ability, social support, school environmental factors, and cultural background. Additionally, the researchers could examine the longitudinal effects of attitudes and engagement frequency on motivation and related outcomes, such as academic achievement or physical health.

We should note that the present study has limitations. Firstly, the self-reported measures of attitudes, engagement frequency, and motivation may provide concerns about response bias and social desirability bias. Participants may have been reluctant to report negative attitudes or low levels of engagement. Secondly, our study examined attitudes (importance and development) and engagement frequency as only predictors of motivation, and there may be other important variables that we did not consider. Thirdly, Cross-sectional design may not have the utility to establish causal relationships between the variables of interest. Longitudinal studies would be needed to establish causality more confidently. Fourthly, the study may have limited generalizability to other populations beyond the specific sample studied as being limited to a particular geographic region.

CONCLUSION

Our findings suggest that students who engage in school sports activities more frequently (more than twice a week) have higher attitudes and motivation, but the engagement frequency does not significantly affect attitudes or motivation toward school sports. Interestingly, we found no evidence for the moderating role of school sports engagement frequency in the relationship between attitudes and motivation. Our study also suggests that the perceived importance or value of physical activity and attitudes toward sports' developmental benefits may contribute to school sports engagement. These findings have important implications for promoting school sports and physical activity among students. However, we should note that our cross-sectional data could not provide sufficient evidence to support our findings, so upcoming research should investigate this topic more profoundly. Future studies should focus on exploring different strategies in extracurricular sports that may improve attitudes and motivation and ultimately lead to increased engagement in school sports.

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МОТИВИСАЊЕ МЛАДИХ: ОТКРИВАЊЕ СТАВОВА И МОТИВАЦИЈЕ КОЈИ СТОЈЕ ИЗА ШКОЛСКОГ СПОРТСКОГ АНГАЖОВАЊА

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Резиме

Ова студија говори о значају физичке активности и бављења школским спортом у промовисању здравог начина живота и изазовима са којима се појединци суочавају у укључивању физичке активности и спорта у свој свакодневни живот. Такође, студија наглашава улогу физичког васпитања у промовисању целоживотне физичке активности и општег здравља и благостања код деце и адолесцената. Неколико теоријских оквира, укључујући Теорију самоопредељења, Друштвену когнитивну теорију и Теорију планираног понашања, коришћено је за разумевање детерминанти мотивације и ангажовања ученика у физичком васпитању и школском спорту. Поједине студије су идентификовале неколико фактора који утичу на мотивацију ученика, уживање и учешће у физичком васпитању и спорту, укључујући друштвену подршку вршњака и наставника, унутрашњу мотивацију, перципирану компетенцију и ваннаставно укључивање у спорт. Школски програми и активности могу ефикасно да промовишу физичку активност ученика и учешће у школском спорту, а поједини истраживачи су развили неколико мерних инструмената за процену мотивације и ставова према физичкој активности и спорту. Међутим, ниједан није, у потпуности, сагледао проблематику школског спорта,

који је по својој структури специфичан у односу на остале облике физичке активности. Са тим у вези, у сврху ове студије постојала је потреба конструисати нови упитник „Упитник о ставовима и мотивацији ученика према школском спорту (УСМПШС),“ који је укључивао 40 ставку подељену у две субскале: ставови и мотивација. Упитник је констрисан да експлицитно испита однос између ставова, мотивације и учесталости ангажовања у школском спорту као потенцијалних фактора који би могли ближе да појасне појаве које утичу на агажовање.

Студија је обухватила репрезентативни узорак од 11.381 ученика из свих управних округа у Србији који се баве школским спортом. Већина ученика је изјавила да се бави школским спортом више од два пута недељно. Студија је истраживала разлике у ставовима и мотивацији у односу на ниво ангажовања у школском спорту, као и његове модерирајућа улоге у релацији између ставова и мотивације.

Статистичка анализа је открила значајну разлику у ставовима и мотивацији између група, али је величина ефекта била мала, што сугерише да тестиране варијабле објашњавају само мали део варијансе уочене у подацима. Међутим, Бајесова анализа је пружила доказе у прилог нулте хипотезе, сугеришући да нема значајне везе између учесталости у ангажовању у школском спорту и ставова и мотивације према школском спорту. Регресиона анализа је показала да је модерирајући утицај учесталости школског спортског ангажовања био безначајан и чинио 0% варијансе. Све у свему, резултати сугеришу да учесталост ангажовања у школском спорту има мали утицај на ставове и мотивацију према школском спорту, а корелација између тестираних варијабли је умерена.

У закључку, упитник о ставовима и мотивацији према школском спорту (УСМПШС) је поуздан и валидан алат за процену ставова и мотивације ученика према школском спорту. Ученици који се чешће баве школским спортским активностима имају позитивније ставове и мотивацију од оних који се ређе њима баве, али учесталост ангажовања у школском спорту не утиче значајно на ставове или мотивацију. Студија такође сугерише да уочени значај или вредност физичке активности и ставови према значају и развијености школског спорта могу допринети његовом развоју. Ови налази имају важне импликације за промовисање школског спорта и физичке активности међу ученицима.

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THE APPLICATION OF CROSS-CURRICULAR COMPETENCES IN THE TEACHING OF PHYSICAL AND HEALTH EDUCATION SUBJECTS IN THE CONTEXT OF EXTERNAL EVALUATION OF SCHOOLS

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Abstract

The aim of this work is to direct advocacy activities in the field of education for the application of the Reference Framework of Competences for Democratic Culture (RFCDC) in teaching and extracurricular activities, especially in the subject of Physical and Health Education. The problem discussed in the paper is under-researched in literature worldwide, although it is relevant for all stakeholders involved in formal and informal education, including decision-makers, teachers, teacher education experts, and experts in the development of teaching and learning programmes. The authors opted to review materials and manuals in order to reflect on democratic competences and their application in the teaching of the subject Physical and Health Education, through the method of analysing the results of external evaluation. We expect this paper to be the basis for further professional and scientific analysis, so that the subject of Physical and Health Education may be given a role that makes it comprehensive and significant not only in the educational process but also in the process of educating children and students.

Key words: Reference framework of competences for democratic culture (RFCDC), external evaluation, physical and health education.

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ПРИМЕНА МЕЂУПРЕДМЕТНИХ КОМПЕТЕНЦИЈА У НАСТАВИ ПРЕДМЕТА ФИЗИЧКО И ЗДРАВСТВЕНО ВАСПИТАЊЕ У КОНТЕКСТУ СПОЉАШЊЕГ ВРЕДНОВАЊА ШКОЛА

Апстракт

Рад има за циљ усмеравање заговарачких активности у области образовања за примену Референтног оквира компетенција за демократску културу (РОКДК) у наставним и ваннаставним активностима, а посебно у предмету Физичко и здравствено васпитање. Проблем који се разматра у раду је недовољно истражен у светској литератури иако је релевантан за све заинтересоване стране укључене у формално и неформално образовање, укључујући доносиоце одлука, наставнике, стручњаке за образовање наставника и стручњаке за развој програма наставе и учења. Аутори су се определили за прегледе материјала и приручника ради промишљања демократских компетенција и њихове примене у настави предмета Физичко и здравствено васпитање, кроз метод анализе резултата спољашњег вредновања. Очекујемо да овај рад буде основа за даље стручне и научне анализе како би предмет Физичко и здравствено васпитање добио улогу која га чини свеобухватним и значајним не само у процесу образовања већ и у процесу васпитања деце и ученика.

Кључне речи: спољашње вредновање, физичко и здравствено васпитање.

INTRODUCTION

Knowledge and development are inseparable, and knowledge becomes a key personal and economic resource, as well as a condition for achieving and realising the quality of life of a worthy person in a democratic modern society. The new economy is increasingly becoming an economy of knowledge, which means that education is accepted as a driver of social changes, and their realisation has confirmed the importance of the potential in educational activity. In the 21st century, we look for individuals with a changed structure of consciousness who will be able to tackle challenges, enter into the process of learning and solving problems, in order to successfully meet set criteria in a short time and reach a satisfactory solution. That is why the concept of competence was introduced into educational policies at the end of the last century, and it is linked to the document *European Reference Framework of Key Competences*[1], which was a key reference for the further development of education, training, and learning focused on competences in many European countries.

Key competences are relevant for all individuals: they are transversal because they enable successful inclusion in all spheres of personal, professional, and social life; they correspond to both economic and social purposes (from better health, and parenthood to social activism); and they

[1] The European Reference Framework of Key Competences (2006);

promote common values, imply the ability to cope with changes, learn from experience and act with a critical attitude.

Competences represent a complex construct that includes **knowledge, skills, abilities, attitudes, traits** (they are made up of some innate predispositions, but also components that are acquired through experience and learning). From the point of view of individual development, competences can be seen as an **indicator of personal development in different domains** (cognitive, motor, social-emotional). Competences are manifested as the ability to perform a certain type of activity on some content.

Nowadays, competence requirements have changed due to the significant automation of jobs. Technologies play an increasing role in all spheres of work and life, and entrepreneurial, social, and civic competences are becoming more relevant to ensure the ability to adapt to increasingly rapid changes in the world.

At the same time, the international surveys conducted by the Organisation for Economic Cooperation and Development (OECD), such as the Programme for International Student Assessment (PISA) or the Programme for International Assessment of Adult Competences (PIAAC), indicate a constantly high percentage of youth and adults with insufficient basic life skills. Consequently, investing in basic skills has become more relevant than ever.

Therefore, the initial document on competences from 2006 was improved in 2018, taking into account the time we live in and the new needs developed by contemporary society and the economy. Table 1 shows a side-by-side comparison of the two documents on key competences for lifelong learning.

Table 1. Key competences 2006 and 2018

2006. *Recommendation of the European Parliament and the Council on Key Competences for Lifelong Learning* Official Journal of the European Union L394/10 (2006)	2018. *Council Recommendation of 22 May 2018 on key competence for lifelong learning*, Official Journal of the European Union, Volume 61, 4 June 2018.
Communication in the mother tongue	Literacy as a competence
Communication in foreign languages	Communication in foreign languages
Mathematical competence and basic competence in natural sciences and technology	Mathematical competence and competence in natural sciences, technology, and engineering
IT competence	Digital competence
Learning ability	Personal, social competence and learning how to learn
Interpersonal, intercultural, social, and civic competence	Civil competence
Entrepreneurship	Competence of entrepreneurship
Cultural awareness and expression	Competence of cultural awareness and expression

In the Republic of Serbia, in addition to key competences for lifelong learning, the Law[2] also recognises Cross-curricular competences, which are based on key competences that are developed through the teaching of all subjects.

In order to build competences, it is necessary to have experience that involves participation in learning situations that trigger the appropriate activity in the learner. Cross-curricular competences prescribed by educational laws are: (1) Learning competence; (2) Responsible participation in a democratic society; (3) Aesthetic competence; (4) Communication; (5) Responsible attitude towards the environment; (6) Responsible attitude towards health; (7) Entrepreneurship and orientation towards entrepreneurship; (8) Work with data and information; (9) Problem-solving; (10) Cooperation; and (11) Digital competences.

In order to build these competences, it is necessary to have experience that involves participation in learning situations that trigger the appropriate activity in the learner.

Learning is the basis of key competences for lifelong learning, and is a process that never ends because it covers a significantly longer period of life compared to formal education, through which subjects, along with the officialisation of diplomas, are educated and guided for performing tasks and for a specific status in the world of work. As such, learning is superior to all other processes and speaks of the fact that the individual is in the very philosophy of lifelong learning (Milutinović, 2008), and its realisation largely depends on his ability to take care of his own learning.

The Reference Framework of Competences for Democratic Culture (RFCDC)[3] presents a new model of competences that includes values, attitudes, skills and knowledge, and critical understanding, which citizens need to actively participate in a democratic and culturally diverse society, and to contribute to the development of democratic culture. In the final declaration adopted by the Permanent Conference of Ministers of Education of the Council of Europe in April 2016 in Brussels, the ministers called on the Council of Europe to continue the development of the RFCDC, and to assist member states in examining and implementing the framework in their national education systems, in dialogue with the educational community. The real-life challenges that we encounter in modern society are, among others, intolerance, discrimination, lack of empathy,

[2] The Law on the Fundamentals of the Education System, "Official Gazette" no. 88/17, Article 12;

[3] The project "Quality Education for All" (implemented within the Joint Program of the European Union and the Council of Europe "Horizontal Fund for the Western Balkans and Turkey" 2019-2025), included 59 schools and prepared materials and manuals dedicated to the improvement of competences for democratic culture, which available to teachers, parents and students;

and prejudice towards minority ethnic and religious groups, peer violence, domestic violence, low voter turnout in elections, increased distrust in politicians, a large level of hate crimes, hate speech, and support for violent extremism. According to the assumed obligation, the Council of Europe continued to promote the RFCDC model, which consists of 20 competences (Figure 1) that apply the values of democracy in schools and in everyday life. Knowledge, skills, values, attitudes, and critical thinking are defined in this framework.

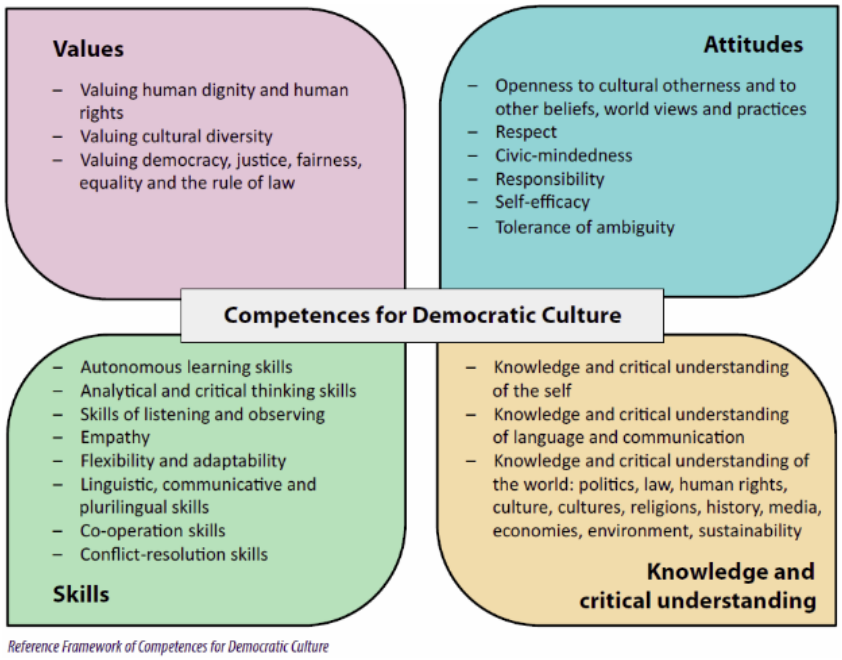

Figure 1. Image of a butterfly representing the Competence Reference Framework for a Democratic Culture with 20 competences

Knowledge is defined as a set of information possessed by a person, and understanding is the understanding and evaluation of meaning. The term critical understanding is used to emphasise the need to understand and value meaning in the context of democratic processes and intercultural dialogue in order to involve active thinking and critical evaluation of what is understood and interpreted (as opposed to automatic, habitual, and unreflective interpretation)[4]. Skill is defined as[5] the ability to perform complex, well-organised patterns of thinking or behaviour in

[4] RFCDC, 2018a: 52;
[5] RFCDC, 2018a: 46;

an adaptive way, in order to achieve a certain result or goal. There are eight sets of skills that are important for a democratic culture.

Based on the above, teams of 60 selected schools were established in Serbia, composed of teachers, pedagogues, psychologists, and principals. They developed examples of good practice and piloted them in teaching and extracurricular activities, including the wider local community in the project. In addition, the schools organised a large number of diverse activities, with pedagogical approaches suitable for the development of competences for democratic culture and the creation of a more pleasant, interesting, and safe school environment, simultaneously strengthening their capacities to eliminate violent, discriminatory and anti-democratic activities in the school and the school environment, and improving ethos.

The basic change in the orientation towards general and cross-curricular competences represents a more dynamic combination of knowledge, skills, and attitudes, putting students in a situation where methods of achieving subject and cross-curricular competences, research activities, and project learning are applied; through specific activities, students go beyond the scope of the subject and connect knowledge.

In this paper, the following data will be further analysed: (1) data on how the competences for democratic culture (CDC) are reflected in educational policies; and (2) data on the quality of schoolwork, which is reflected in the results of external evaluation and the possibilities of application in teaching.

THE DEVELOPMENT OF ATTITUDES AND VALUES IN EDUCATION

When we observe an attitude in the process of education, we define it as the overall mental orientation that an individual adopts toward someone or something (for example, a person, group, institution, problem, event, or symbol). Attitudes typically consist of four components: beliefs or opinions about the object of the attitude; emotions or feelings toward the object; evaluations (either positive or negative) of the object; and the tendency to behave in a certain way toward that object[6].Values motivate activities and serve as guiding principles for deciding how to act. Values offer standards or criteria for evaluating activities, both one's own and those of others, justifying opinions, attitudes, and behaviour, deciding on alternatives, planning behaviour, and trying to influence others, and skills viewed through learning outcomes.

[6] RFCDC, 2018a: 41;

Teachers from 60 schools who participated in the implementation of the KDK (competences for democratic culture) project discussed topics and questions such as: whether skills be acquired without having any prior or underlying knowledge, the nature of the relationship between attitudes and values, whether an example of a connection between an attitude and a skill can be found, and attempts to determine what dominates Serbian teaching and learning programmes, bearing in mind the so-called 'butterfly' model (Figure 1).

The conclusion they reached is that school subjects can contribute to the development of competences for democratic culture. In certain situations (during learning, but also in a real-life situation), participants use a set of competences and this is called a cluster of competences. Different clusters of competences will even be needed at different moments within the same situation. Clusters are related to situations, not school subjects, but each subject can contribute to the development of any of the 20 elements of the competence model for democratic culture.

THE RESULTS OF THE ANALYSIS OF THE EXTERNAL EVALUATION OF PHYSICAL AND HEALTH EDUCATION

The school quality standards[7] represent measures for evaluating the quality of work of schools in the Republic of Serbia.

The Ministry of Education and the Institute for Evaluation of the Quality of Education and Training carry out an external evaluation of institutions by checking 24 standards and 124 indicators found in six areas of quality: the field of Programming, Planning, and Reporting contains 3 standards and 16 indicators; the Teaching and Learning area contains 5 standards and 28 indicators; the field of Educational Achievements contains 2 standards and 15 indicators; the Student Support area contains 3 standards and 16 indicators; the Ethos area contains 5 standards and 22 indicators; and the area of School Work Organisation, and Human and Material Resource Management contains 6 standards and 27 indicators.

Many standards can be used to check 'school conditions' for the development of competences for democratic culture. Compliance with a standard is assessed through the presence of a set of indicators that describe it. Each indicator is evaluated on a scale ranging between one and four.

In this research, conducted in the first semester of the 2022/2023 school year, focus was placed on the Teaching and Learning area, and the results of the external evaluation of Physical and Health Education were analysed. They were obtained during visits to 191 classes in 143 schools

[7] Rulebook on quality standards of the institution "Official Gazette of RS - Educational Gazette", no. 14/18;

in the following school administrations: (45), the Leskovac school administration (24), the Niš school administration (22), the Čačak school administration (4), the Novi Sad school administration (5), and the Jagodina school administration, in the first and second cycle of primary education and secondary education[8].

The degree of fulfilment of the following standards was considered: 2.1. - the teacher shall efficiently manage the learning process in the classroom; 2.2. - the teacher shall tailor the activity in the classroom to the educational needs of students; 2.3. - the students shall acquire knowledge, adopt values, and develop skills and competences in class; and 2.5. - every student shall have the opportunity to be successful.

Standard 2.1. (Figure 2) refers to the effectiveness of managing the learning process in the class. This standard is checked via the following indicators: 2.1.1. - the students shall clearly understand the objectives/learning outcomes of the school class and why they need to learn the planned content; 2.1.2. - the student shall understand the explanations, instructions, and key terms; 2.1.3. - the teacher shall successfully structure and connect parts of the class using different methods (forms of activity, techniques, procedures...), or implement training for a vocation/profile, in line with the specific requirements of the work process; 2.1.4. - the teacher shall gradually ask questions/set assignments/requirements of varying levels of complexity; 2.1.5. - the teacher shall channel the interaction between students so that it serves the purpose of learning (i.e. he/she shall use questions, ideas, student comments, and encourage peer learning); and 2.1.6. - the teacher shall make functional use of existing resources and sources of information available to students.

Standard 2.1. has a mean score of 3.31, which indicates that there is a functional use of teaching aids and available sources of knowledge, and that teachers use high-quality explanations and instructions, apply the sequence of requirements, and connect activities in the Physical and Health Education classes.

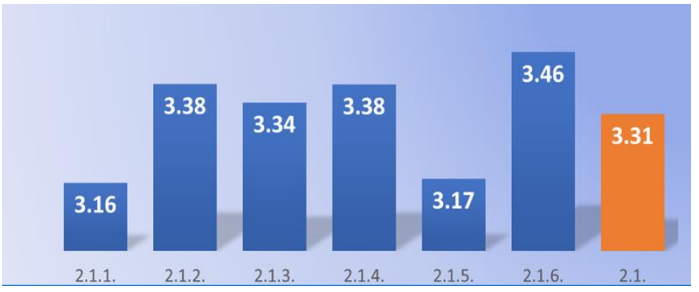

Figure 2. Effective management of the learning process in class

[8] Archives of the Ministry of Education of the RS: www. mpn.gov.rs.

Standard 2.2. refers to the adaptation of classwork to the needs of students. The standard is checked through the following indicators: 2.2.1. - the teacher shall tailor requirements to the abilities of each student; 2.2.2. - the teacher shall adjust working methods and teaching materials to the individual characteristics of each student; 2.2.3. - the teacher shall dedicate time and attention to each student in line with his educational needs; 2.2.4. - the teacher shall use specific tasks/activities/materials based on the Individual Educational Plan (IEP) and individualization plan; 2.2.5. - students who need extra support shall participate in joint activities that encourage their progress and interaction with other students; and 2.2.6. - the teacher shall tailor the activity pace to the different educational needs of students.

The average fulfilment of the standard is 3.06 (Figure 3). The assessment of the standard that determines the adaptation of the work in the class to the educational needs of the students is noticeable, but not complete, because it was determined that the methods and materials were insufficiently adapted to the needs of certain students (Figure 3), as was the application of quality activities concerning planning individualisation of work with students and work according to individual student educational plans (IEP).

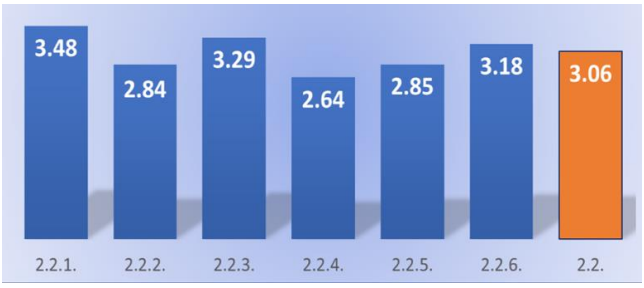

Figure 3. Adjusting the work in the Physical and Health Education class

Standard 2.3. determines whether teaching ensures learning, and competence development is assessed through the following indicators: 2.3.1. - the students' activities/schoolwork shall demonstrate that they have understood the subject of study in class, that they can apply the lessons learned, and explain how they arrived to the solution; 2.3.2. - the students shall make connections between the subject of study in class and previously learned matter in various fields, vocational practice, and daily life; 2.3.3. - the students shall collect, critically evaluate, and analyse ideas, answers, and solutions; 2.3.4. - the students shall present their ideas and share original and creative solutions; 2.3.5. - the students shall use feedback to solve a task/improve learning; and 2.3.6. - the students shall plan, implement, and evaluate a project in class independently or with the help of the teacher.

The standard that assesses whether and how learning progresses and students' competences are developed was rated the lowest in this analysis, and is 2.88 (Figure 4). Based on the obtained result, it can be concluded that there is a lack of student independence, and acceptance of student initiatives and originality, and there is no space for the development of critical reasoning, values, attitudes, and skills even though this subject is ideal for the development of competences for democratic culture. Although there is teacher feedback, there is no interaction to improve Health Education competences and discussions.

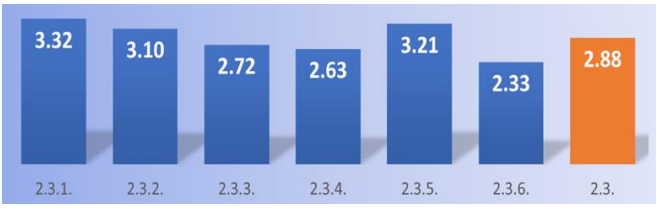

Figure 4. Acquisition of competences in class

Standard 2.5., which checks whether the class work enables students to be successful, is evaluated through the following indicators: 2.5.1. - the teacher/practical training instructor and students shall maintain a relationship of mutual respect, the teacher/practical training instructor shall encourage students to respect each other and constructively establish and maintain discipline following agreed rules; 2.5.2. - the teacher shall use a variety of procedures to motivate students, taking into account their diversity and previous achievements; 2.5.3. - the teacher shall encourage intellectual curiosity and free expression of opinions; 2.5.4. - the student shall be allowed to choose the approach to a topic, the form of activity or the material; and 2.5.5. - the teacher shall demonstrate trust in the abilities of the students and have positive expectations of success.

The average achievement of this standard is 3.12. The analysis indicates that there is support for student development and participation, but that there is a need to encourage the students' free expression of opinions and ideas, and to allow students to influence the content, the form of work, or the means (Figure 5).

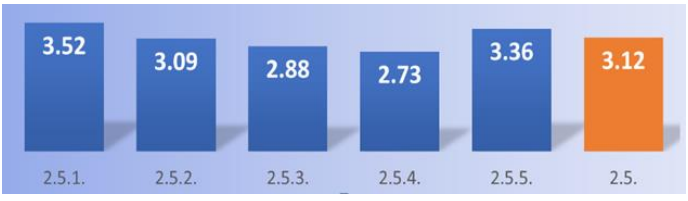

Figure 5. Display of individual student performance standards

DISCUSSION

The results of the programme analysis in Serbia indicate that most competences for democratic culture are already included in teaching and learning programmes as cross-curricular educational goals, or within certain subjects, such as civic education and social subjects. The education system of Serbia, like most other countries, has experience in using 'student-oriented learning', in the application of interactive methods, which are inspired by the materials of the Council of Europe on Education for Democratic Citizenship and Human Rights, on the one hand, and Education for Democratic Culture on the other, and in implementation of the Citizen Project. Teaching and learning programmes and teaching practice often focus more on knowledge and value statements and less on the actual development of values, attitudes, skills, and critical understanding. The sequence of competences is shown in the bottom-top direction and corresponds to the way teaching and learning programmes are structured in Serbia. The cognitive domain is not the only important one in learning and teaching, and it is the task of the school to devote equal attention to learning values, attitudes, skills, knowledge, and critical understanding. In the teaching of the Physical and Health Education subject, we expect cross-curricular competences and competences for democratic culture (CDC) to be implemented through the experience of schools, with a coherent approach of the whole school to this issue. There is a common practice in many schools that indicates that questions related to the competences for democratic culture are left to the teaching of courses belonging to social sciences and the humanities. Competences for Democratic Culture (CDC) are necessary in the educational space as much as they are needed in the real world. The same values, attitudes, skills, knowledge and critical understanding are necessary to interact positively with other individuals, participate in groups and make sense of the information and ideas students receive. The goal of the education system is for students to develop their CDC through school activities, and not just to have knowledge about CDC or to recognise them. However, in this paper, we recognise that, in the learning process for CDC, we start with knowledge, so that students in the later stages of work would be brought to a situation in which they can conclude that learning and development are not only based on knowledge and skills but also on values and attitudes. For this, an example of heuristic conversation and learning can be used in class, which leads participants to independent insight. What follows is a short pedagogical review of the standards emphasised in this article.

Standard 2.1. indicates that the teacher's knowledge for the subject they teach is not questionable and it is shown in results. They understand and can explain how to successfully make exercises and to achieve goals. They are willing to assist in order to prevent students' injuries, which is good and in ordinance to the teaching profession.

Standard 2.2. and its indicators are more questionable, not for a lack of willingness among teachers to fulfil it, but for the knowledge of the methods of tailoring the activity in the classroom for each and every students. Teachers, as every other humans, are afraid of the unknown. But on the other hand, they are professionally determined to work with children and should support every single child in the classroom. Since the process of inclusion has officially existed for over 13 years and is regulated by law, it is very well known that individual educational plans for students are the last level of content and methods adaptation (Velišek-Braško, 2015). Some other methods of support and assessment should be implemented earlier. Inclusion exists even without individual educational plans (Muškinja, Lazić & Rista, 2011).

Standard 2.3., which refers to students acquiring knowledge, adopting values, and developing skills and competences in class, showed that students show a huge gap between knowledge (for exams), and understanding values and competences as life values, and the significance of their implementation, which has also been found in some previous studies (Vranješević, Cicvarić, Cicvarić-Žunić & Jovanović, 2022; Zair, Bensassi, 2022). There is a lack of student understanding of the methodology of learning, a lack of awareness of change(s), and difficulties in finding points which have been changed the most. They do not have opportunities to try them out and train, and they are not aware of their importance for further life. In classes, they are taught to follow and to obey rules which are quite often far removed from them. Consequently, students are not in a position to make their own rules, to learn, to understand, to evaluate or to assess. Because of that, students are often unaware of the connection between skills, competences, knowledge and values, and their significance as resources for life. They should have more time and opportunities to experience life in school, to implement knowledge and competences, and to find and assess values in everyday life, in order to be familiar with the changes and growth they are undergoing. As Vranješević and associates showed (2022), teachers also exhibit a kind of absence of awareness of the aforementioned issues, which is very worrying.

Standard 2.5. states that every student should have the opportunity to be successful. This standard is quite connected to the *Convention on the Rights of the Child* (1989) and asks teachers to believe in the child's potentials. It is connected to a child's right to participate, which is a right often harmed, often not implemented in a good way, and infrequently believed in. The lack of knowledge among teachers about children's rights and their realization (Vranješević et al, 2022), especially when it comes to participation as one of its principles, represents the cause of the lack of student participation. Teachers often feel very insecure, and believe that they lack the necessary knowledge, skills and competences to over-

come situations in the classroom. As a consequence, they often give up. Pedagogically speaking, this should not surprise us, since the regular choice between cooperation and integrity, or between something teachers have to or chose to do, is quite a regular dilemma. In order to maintain their wellbeing and avoid burn-out, teachers chose to keep their integrity (Jul & Jensen, 2014). The consequence is the fact that there is no one to cooperate with children and manage the class, and there is no possibility for students to be successful, especially when it comes to every student.

It is important to note that, in the *Guidelines for the Integration of the Reference Framework of Competences for Democratic Culture in Selected Teaching and Learning Programs*, there are examples of the implementation of KDK in the primary and secondary school teaching of the following subjects: the Serbian language/Serbian language and literature, mathematics, the world around us/nature and society, foreign language, history, geography, physics, chemistry, psychology and civic education. There are no examples of specific activities in the Physical and Health Education subject, where it is possible to adopt competencies that represent attitudes of respect, tolerance for ambiguity, self-efficacy, empathy skills, cooperation skills, conflict resolution skills, and valuing justice, human rights and dignity. Aside from the subject of Physical and Health Education, it is possible to use sports in school to realise the process of educating young people (Randjelovic and Savić, 2016). Among other things, these authors state that the task of school sports is to have an educational and health impact on the individual through programmed and organised school competitions and contests. It develops initiative, persistence, perseverance, determination, accuracy, precision, boldness, courage, discipline, conscientiousness, and more, all of which are excellent aides in achieving healthy communication, and fostering solidarity, cooperation, a sense of responsibility towards oneself and others, honesty and principledness. This fosters the culture of behaviour, and special attention is paid to the teacher and his qualities. They believe that for the school, as a social institution, to act educationally in a modern democratic spirit, it should, first of all, ensure the possibility of carrying out school sports programmes as one of the its democratic values, and this can also be said for the subject of Physical and Health Education.

CONCLUSION

This paper, and the analysis of the results of the external evaluation represent a confirmation of the fact that, in the teaching of Physical and Health Education, learning flows from the cognitive to the value-related. This means that a child/student who learns about healthy lifestyles at school – learns about them and lives them, will adopt patterns of life skills and knowledge that he will be able to apply further, without major

temptations. Regardless of the fact that external evaluation of schools was the start point, and that Physical and Health Education teachers were the primary topic, the results show the presence of competences, as the main point, and the existence of some space for their improvement. Teachers should be encouraged to be involved in tricky questions that intrude into the core values of their being and shake them. As their core is touched and shaken by these questions, it is certain that the students' cores will be shaken too – they reflect the state of adults. Relational competence is in the centre of the communication process, and should be accomplished by valuing and assessment. Through this competence, teachers and students can be in a position to see and understand each other, to grow together, and to cherish empathy. Through this process, they can fully understand and value each other.

Generally speaking, some areas need to be expanded in terms of a more complete understanding of competences for democratic culture (CDC), among which the opportunity for the authenticity of each student and the possibility for that authenticity to be seen and noticed by the teacher stand out. On the other hand, it is clear that learning for the application of CDC starts from the cognitive dimension, that is, from knowledge, so that the students would later make an impression and be in a position to conclude by themselves that learning and development are not only based on knowledge and skills but also on values and attitudes. If the educational process is not focused solely on accumulating previously acquired knowledge, but on developing competences and supporting students' lives, development and learning in a world in which they feel welcome, students will be able to build their understanding of the world, based on appreciation and acceptance of authenticity. This further means that the educational process should be especially related to the students' life experiences. As a mini-community with the principles of democratic management, the school offers students the opportunity to participate, and apply the basic postulates of an active child and young person, i.e. a citizen who knows how to recognise and define a problem situation, knows who to turn to, and is able to take care of themself. This is first possible in classes of Physical and Health Education. This further means that the school, as an institution of clearly defined formal education, provides valuable opportunities for informal learning, gaining life experience, and creating a personal frame of reference. This process is reversible and affects both students and teachers.

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ПРИМЕНА МЕЂУПРЕДМЕТНИХ КОМПЕТЕНЦИЈА У НАСТАВИ ПРЕДМЕТА ФИЗИЧКО И ЗДРАВСТВЕНО ВАСПИТАЊЕ У КОНТЕКСТУ СПОЉАШЊЕГ ВРЕДНОВАЊА ШКОЛА

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Резиме

Рад има за циљ усмеравање заговарачких активности у области образовања за примену Референтног оквира компетенција за демократску културу (РОКДК) у наставним и ванннаставним активностима, а посебно у предмету Физичко и здравствено васпитање. Аутори су се определили за прегледе и промишљања демократских компетенција и њихове примене у настави предмета Физичко и здравствено васпитање, кроз метод анализе резултата спољашњег вредновања. Овај нови модел компетенција укључује вредности, ставове, вештине и знања, и критичко разумевање, који су грађанима потребни како би активно учествовали у демократском и културолошки разноликом друштву, те како би допринели развоју демократске културе. У раду су анализирани подаци (1) о начину на који се компетенције за демократску културу (КДК) одражавају у образовним политикама, (2) као и у квалитету рада школа, који се огледа у резултатима спољашњег вредновања и могућностима примене у настави. Наставници из 59 школа, који су учествовали у пројекту имплементације КДК (компетенција за демократску културу), су разматрали одређена питања, покушавајући да утврде шта доминира у српским програмима наставе и учења, имајући у виду модел КДК (компетенција за демократску културу). Закључак до кога су дошли јесте да сви школски предмети могу допринети развоју компетенција за демократску културу. У анализи спољашњег вредновања школа истраживана је област „Настава и учење“ и анализирани су резултати спољашњег вредновања наставе Физичког и здравственог васпитања (ФиЗ) који су добијени посетом 191 часа у 143 школе. Овај рад и анализа резултата спољашњег вредновања представљају потврду да у настави Физичког и здравственог васпитања учење тече од когнитивног ка вредносном и односном, али постоје подручја која је потребно проширити ради потпунијег разумевања КДК (компетенција за демократску културу). Закључак је да образовни процес не треба да се фокусира само на акумулацију претходно стеченог знања, већ на развијање компетенција и пружање животне подршке ученицима, те на пружање подршке ученицима при развоју и учењу у свету у ком се осећају добродошло. Овим ће ученици бити у стању да изграде сопствено схватање света, засновано на уважавању и прихватању аутентичности. То даље значи да би образовни процес требало нарочито да буде у вези са животним искуствима ученика, што је најпре могуће у настави Физичког и здравственог васпитања.

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PHYSICAL LITERACY IN EDUCATIONAL SYSTEMS WORLDWIDE: CONCEPT, DEFINITION, AND EVALUATION

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Abstract

The term 'physical literacy' (PL) is generally understood as an individual's ability to lead a physically active lifestyle. Although various forms of physical activity (physical education, sport, recreation, activities of daily living) have the potential to develop children's PL, many authors believe that the education system plays a crucial role, and physical education in particular has been identified as one of the most suitable environments for its development. The aim of this paper is to provide a comprehensive overview of the concept of PL, with a focus on defining and assessing PL within educational systems worldwide, that is, within physical education classes worldwide. Through a literature review undergone using an inductive approach, the most common and significant studies on PL published in peer-reviewed journals were analysed. Three areas important for a better understanding of PL in the context of physical education were identified and analysed: the definition of PL, various PL models, and existing tools for assessing PL. Regarding these areas, it can be concluded that there is no universally accepted model or instrument for assessing PL because of different cultures and systems, that is, the specifics of a certain region. In order to better understand these areas in the context of physical education, it is suggested that researchers provide a framework that contains clear and concise information, along with specific examples that would enable teachers to effectively work within the school.

Key words: physical education, assessment tools, students, components, teachers.

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ПОЈАМ, ДЕФИНИСАЊЕ И ВРЕДНОВАЊЕ ФИЗИЧКЕ ПИСМЕНОСТИ У ОБРАЗОВНИМ СИСТЕМИМА У СВЕТУ

Апстракт

Термин „физичка писменост“ (ФП) се генерално схвата као способност појединца да води физички активан начин живота. Иако различити облици физичке активности (физичко васпитање, спорт, рекреација, активности из свакодневног живота) имају потенцијал да развију ФП деце, према многим ауторима, образовни систем у овом процесу игра кључну улогу, а посебно је предмет физичко васпитање идентификован као једно од најприкладнијих окружења за развој физичке писмености. Циљ овог рада је да пружи свеобухватан преглед концепта ФП, са фокусом на дефинисање и процену ФП у оквиру образовних система у свету, односно у оквиру наставе физичког васпитања. Кроз преглед литературе за који је коришћен индуктивни приступ, анализирани су најчешћи и најзначајнији радови у објављеним рецензираним часописима, са фокусом на ФП. Идентификоване су и анализиране три области важне за боље разумевање ФП у контексту физичког васпитања: дефинисање ФП, различити модели ФП, и постојећи инструменти за процену ФП. Што се тиче ових области, може се закључити да не постоји универзално прихваћен модел или инструмент за процену ФП због различитих култура и система, односно специфичности одређених региона. Да би се боље разумела ова подручја у контексту физичког образовања, предлаже се да истраживачи обезбеде оквир који садржи јасне и сажете информације, заједно са специфичним примерима који би омогућили наставницима да ефикасно раде у школи.

Кључне речи: физичко васпитање, инструменти за процену, ученици, компоненте, наставници.

INTRODUCTION

Early definitions of ‘literacy’ referred only to the ability to read and write. Meanwhile, the term ‘literacy’ has evolved, and it now includes lifelong learning, and the acquisition of knowledge and skills that culminates in deep understanding (Chrisomalis, 2009). Due to the developing and changing definition, a significant number of subject areas have adopted the suffix ‘literacy’, thus recognising computer, technical, digital, nutritional, scientific, musical, health, and physical literacy.

The term ‘physical literacy’ (PL) is generally understood as an individual’s ability to lead a physically active lifestyle (Longmuir & Tremblay, 2016). Although there are different definitions of PL, a significant number of them include the integration of physical, psychosocial, and cognitive processes that contribute to the healthy development of the whole person (Edwards, Bryant, Keegan, Morgan, & Jones, 2017). In this way, PL is presented as a holistic concept composed of interconnected elements that develop over time to enable an individual to participate in physical activity throughout their life. Various sources suggest that physically literate individuals are confident, competent, and motivated with the

knowledge, skills, and attitudes needed to engage in physical activity (Silverman & Mercier, 2015).

The significance of PL has been increasingly recognised in recent years, as it has been associated with improved health outcomes (Fortnum, Furzer, Reid, Jackson, & Elliott, 2018), increased participation in physical activities (Belanger et al., 2018), and healthier body weight status (Comeau et al., 2017). Given the existing problem of physical inactivity in most countries, proponents of the concept believe that PL is the missing link that has the potential to solve this problem (Corbin, 2016). Considering its importance, promoting physical literacy is important throughout life, and some authors believe that the optimal time for its development is during childhood (Mandigo, Francis, Lodewyk, & Lopez, 2009; Whitehead, 2010). For example, in Canada, the goal is for every child to be physically literate by the age of 12 (Balyi, Way, & Higgs, 2013), and in the United States, the goal of physical education has shifted from creating a 'physically educated person' to creating a 'physically literate individual' (SHAPE America, 2013). Accordingly, Whitehead (2013) believes that physical education is the only place where every child is guaranteed to experience purposeful physical activities and, therefore, physical education represents perhaps the only opportunity for every young person to build a lifelong commitment to, and enjoyment of, physical activity. Talbot (2014) states that the outcome of physical education should be a physically literate young person, who has the skills, confidence and understanding to continue participating in physical activities throughout their lifespan. Furthermore, PL is a justification for physical education through which physical education will gain academic credibility (Tremblay & Lloyd, 2010), and will be placed on a more level playing field with other subject areas such as health, math, and science, which have adopted the term literacy (Roetert & MacDonald, 2015).

There are a few studies on the development of PL in younger age groups (Silverman et al., 2015; Allan, Turnnidge & Côté, 2017). Although various forms of physical activity (physical education, sport, recreation, activities of daily living) have the potential to develop children's PL (Whitehead, 2013b), many authors (Whitehead, 2013; Liu & Chen, 2021) believe that the education system plays a crucial role, and physical education, in particular, has been identified as one of the most suitable environments for its development. Therefore, Whitehead (2013b) emphasises the importance of physical education teachers in developing and promoting PL in the school environment. In general, teachers play an important role in planning and implementing educational activities, motivating students, developing their interest in learning, as well as in achieving quality communication and interaction between teachers and students (Vučinić & Antonijević, 2020). However, some studies indicate that there is confusion among physical education teachers about how they under-

stand the concept of PL and how they should implement it in the teaching process (Stoddart & Humbert, 2017), and they generally cannot conceptualise PL adequately (Robinson, Randall & Barrett, 2018). Specifically, teachers generally misunderstand the concept, and the majority of them are unable to define PL (Stoddart & Humbert, 2021). Equating fundamental movement skills with PL is another problem that is perhaps one of the most potentially damaging misunderstandings of the concept (Robinson et al., 2018). Some teachers do not see the difference between PL and physical education (Robinson et al., 2018). The teachers' lack of understanding of the concept is concerning, considering that an increasing number of national physical education curricula aim at developing children's PL. Confusion is certainly caused by the differences in defining and understanding the concept, which often differ from author to author, and the different approaches to assessing PL. In this regard, understanding what PL is, what it consists of, and how it is assessed is crucial for its development and promotion.

The aim of this paper is to provide a comprehensive overview of the concept of PL, with a focus on defining and assessing PL within educational systems worldwide, that is, within physical education classes worldwide. By reviewing the current literature, we will explore the various components of PL and consider different instruments for its assessment. In addition, the importance of PL in promoting the participation in physical activities will be discussed.

METHODS

Through a literature review undergone using an inductive approach, the most common and significant studies on PL published in peer-reviewed journals were analysed. A comprehensive literature search was conducted using the keyword 'physical literacy' in specific scientific databases (PubMed, ScienceDirect, Google Scholar). Inverted commas were inserted around the term 'physical literacy' to ensure searches would find papers in relation to PL. Additionally, using Boolean search operators, the search terms included were: 'definition'; 'construct' or 'concept'; 'components' or 'elements'; and 'assessment'. The focus was on studies published between January 2001 and February 2023, i.e., studies published after Margaret Whitehead introduced the concept of PL. The research was based on original research articles and review papers, and the search included online books and doctoral dissertations. The search mainly focused on mapping the existing literature on the definitions and components of PL, as well as on instruments for assessing PL, which was the criterion for including studies in the analysis. In accordance with the PRISMA procedures, all duplicate papers were removed (Figure 1). After the duplicates were removed, papers were screened

based on title and abstract, and were considered either suitable or unsuitable following the inclusion criteria. A total of 48 studies were identified and assessed for eligibility. The articles were carefully reviewed for analysis and refinement, after which 21 articles were excluded from the study due to the fact that the information presented in the articles either was not relevant to the research questions' aims and objectives or did not relate to school-aged children. In the next phase, a detailed analysis of each study was conducted. On this occasion, the papers were extracted into a Microsoft Excel spreadsheet according to the author's name, year of publication, title, and main content/findings.

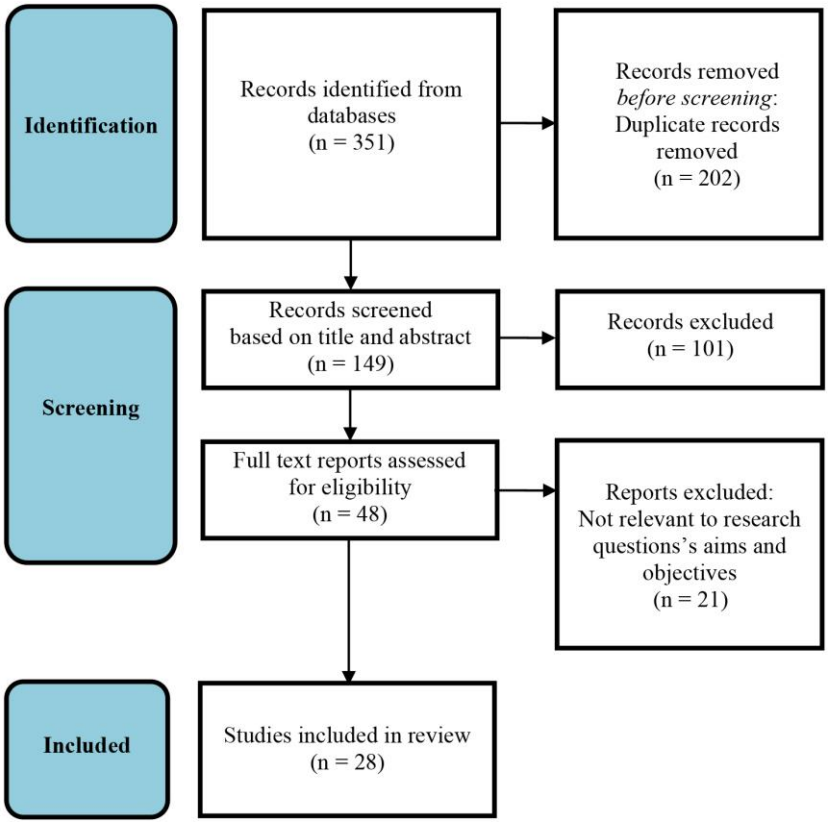

Figure 1. PRISMA flow diagram showing the process of study identification and selection

RESULTS AND DISCUSSION

Through a literature review, various approaches to understanding, conceptualising, and assessing PL were considered. Three areas important for a better understanding of PL in the context of physical education were identified and analysed in detail in the following text. Firstly, there is a need to clearly present the definition of PL, given that there are different interpretations and approaches to defining the concept. In addition, we presented various PL models that clearly indicate the components that are important for an individual to be physically literate. Thirdly, the existing tools for assessing PL, applicable to school-aged children within the framework of physical education, were analysed.

The Definition of Physical Literacy

A number of researchers have provided definitions of PL that refer to lifelong participation in physical activity (Higgs, Balyi, Way, Cardinal, Norris, & Bluechardt, 2008; Mandigo, et al., 2009; Leidl, 2013; Macdonald & Enright, 2013), but Whitehead (2013b) emphasised the importance of distinguishing PL from physical activity and offered a definition that states: "Physical literacy can be described as the motivation, confidence, physical competence, knowledge and understanding to value and take responsibility for maintaining purposeful physical activities throughout the lifecourse" (Whitehead, 2013b, p. 28). This definition was the result of a ten-year systematic analysis of the concept and several previously proposed definitions. It is one of the most commonly used and widely accepted definitions, but there are a number of other definitions and interpretations of the concept of PL tailored to the specific needs of different programmes, cultures, and countries.

From this definition, it can be concluded that PL is a multidimensional construct that consists of areas that are traditionally studied separately. Instead, PL is presented as a holistic concept that integrates certain components, and is focused on the development of the whole person, where the mind and body are one (Whitehead, 2010). It is necessary to note that PL encompasses not only physical competence and fitness, but also the motivation, knowledge, understanding, and attitudes necessary to engage in physical activity throughout life.

The problem is that teachers are aware of the physical aspect of PL, but they are less aware of its affective or cognitive components (Robinson et al., 2018). This is not surprising, given that many available documents and scientific papers largely focus on the physical aspect of PL and the acquisition of skills in different environments (Robinson et al., 2018). One of the motives that influenced Whitehead to develop the concept of PL was the fact that physical education classes put too much emphasis on physical performance, sports, and elitism (Whitehead, 2010).

This aligns with the current understanding of teachers who equate fundamental motor skills with PL, whereas these skills should only be seen as one part of PL (Robinson et al., 2018).

A few researchers have investigated the relationship between PL and physical education (Lundvall, 2015, Corbin, 2016). Some of these studies have shown that teachers are unable to adequately explain the relationship between PL and physical education (Stoddart et al., 2017; Stoddart et al., 2021). Whitehead resolved this confusion that arose among researchers and teachers regarding the relationship between PL and physical education by stating that "PL is not an alternative to physical education, nor is it competition for physical education" (Whitehead, 2013b, p. 32). In addition, she emphasised that physical education is a subject in the school curriculum, and that PL should be a goal of physical education, through which the intrinsic value of physical activity would be revealed (Whitehead, 2013b). Viewing PL as an individual journey, Whitehead notes that PL is not only relevant to education, but can be developed in various environments, and all those who are in a position to influence that process have a role to play. Also, she notes that physical education teachers have a crucial role in creating physically literate individuals, as they are the only qualified experts who have contact with every young person (Whitehead, 2013b).

It is necessary to emphasise how teachers should act within the physical education classes to contribute to the development of PL. Almond (2013) identifies two dimensions of understanding PL in the context of physical education. One relates to what is expected for students to understand as they progress on their journey of PL, while the other is the understanding required by the teacher regarding how they can develop PL in students. Regarding the second dimension, it should be noted that teachers do not teach PL, but rather plan, direct, and support student involvement in experiences that are meaningful to them and that develop self-esteem and confidence (Almond, 2013). They have a key role in promoting PL in students. To provide students with experiences that enable them to appreciate the impact of physical activity on health and well-being, teachers should highlight the effects of exercise on the body and discuss the various health benefits of exercise. Topics such as eating habits and the importance of sleep should also be addressed as needed. Since PL is not a programme, the teacher does not teach PL. The teacher can choose appropriate content and pedagogical methods that provide opportunities for PL to develop in students. Many elements of PL, such as confidence or motivation, cannot be learned directly, but are developed and nurtured.

Confusion around the understanding of PL was also contributed to by different approaches to its definition. With the increase in popularity and interest in PL in different countries, disciplines, and organisations, the number of definitions and interpretations of this concept has also increased (Shearer et al., 2018). Although a globally accepted definition is desirable, Whitehead (2010) noted that different approaches to the concept of PL can be expected. Some countries and organisations have had the need to adapt the existing definitions to reflect their own culture and systems. Given the discussion about the influence of culture and the specificity of a certain area when defining PL, Whitehead emphasised that if alternative definitions are used, they must identify the main long-term goal of PL, which is engagement in physical activity throughout life (Spengler, 2015).

The definition of PL also depends on how someone understands and approaches the concept of PL, so one can discuss a holistic approach, as opposed to an approach focused on sports performance (Allan et al., 2017). The problem also lies in the fact that some definitions only refer to the development of fundamental motor skills or certain components of PL. Certain definitions (Higgs et al., 2008; Delaney, Donnelly, News, & Haughey, 2008; Balyi et al., 2013) emphasise the importance of fundamental motor skills in the development of PL, which is certainly not in line with Whitehead's original concept. As a result, some believe that this diversity in definitions has created a level of inconsistency and a confusing situation, and some have moved away from the central principles of PL (Tremblay et al., 2010; Jurbala, 2015). While physical competencies are one domain of PL, the concept itself encompasses much more than just the development of motor skills (Cairney, Dudley, Kwan, Bulten, & Kriellaars, 2019). It is necessary to emphasise that each domain is equally important, and that, without the development of all domains, it is unlikely that PL and lifelong engagement in physical activity will be achieved (Whitehead, 2013b).

The Components of Physical Literacy

In order to better understand PL, certain models have been constructed that allow for a better visualisation and understanding of the theoretical background of PL. Table 1 presents the existing models of PL, which are intended for use in the educational system. The components that make up these models can be observed – that is, the characteristics that are needed for an individual to be physically literate can be observed.

Table 1. Models and components of physical literacy

No.	Title/reference	Domains	Components
1.	Whitehead (2010)	Physical	Physical competence
		Affective	Motivation; confidence
		Cognitive	Knowledge and understanding
2.	International Physical Literacy Association (2015)	Physical	Physical competence
		Affective	Motivation; confidence
		Cognitive	Knowledge and understanding
		Behavioural	Engagement in physical activities for life
3.	Australian Physical Literacy Framework (Sport Australia, 2019)	Physical	Physical fitness and movement skills
		Psychological	Engagement & enjoyment, confidence; motivation; self-perception; self-regulation (emotions); self-regulation (physical)
		Social	Relationships; collaboration; ethics; society & culture
		Cognitive	Content knowledge; safety & risk; rules; reasoning; strategy & planning; tactics; perceptual awareness
4.	Chinese Assessment and Evaluation of Physical Literacy (Chen et al., 2020)	The intention of physical activity	The intention of physical education lesson; the intention of participation in physical activity out of school time; the intention of active play
		Knowledge of physical activity	Kinesiology (basic); nutrition for physical activity and exercise; health promotion and physical activity; safety/injury/damage of sport and exercise
		Motor/sport skill	Fundamental motor skill (for primary school-aged children); specific sport skill (for middle and high school-aged children)
		The behavior of physical activity	Physical activity and exercise; experience of sports games/events
		Physical fitness	Physical function; strength; power; cardiorespiratory fitness; flexibility
5.	Farren et al. (2021)	Physical	Physical fitness and motor skill competence
		Affective	Self-efficacy; motivation; self-esteem
		Cognitive	Knowledge and understanding

For the purposes of comparison, the fundamental model of Whitehead (2010) is also presented, which consists of three domains (affective, physical, and cognitive), or four subdomains (motivation, confidence, physical competence, knowledge and understanding). Whitehead (2010) described that the affective domain refers to aspects of motivation, confidence, self-esteem, and positive self-perception, while the physical do-

main is focused on the development of physical competencies, including the development and refinement of motor skills within different environments (e.g., land, water, indoor and outdoor spaces). The cognitive domain relates to the knowledge and understanding of fitness and health, including exercise, nutrition, and sleep, as well as the understanding of movement, and the application of creativity and imagination in different environments (Whitehead, 2010). Although most models contain some elements from the affective, physical, and cognitive domains, some of them have certain specificities. In the Australian framework of PL (Sport Australia, 2019), the specific is the social domain, which contains elements that are important for a person's interaction with others in relation to movement. Based on Table 1, it can be concluded that this is one of the most complex models when it comes to the number of elements that make up each domain. In recent years, the concept of PL has been receiving increasing attention in China, where a five-dimensional model with certain specificities has been presented (Chen, Tang, Chen, & Liu, 2020). This model presents characteristics that Chinese authors consider important for children to be physically literate in China (Chen et al., 2020). In Canada, a four-dimensional PL model has been developed based on the definition of the International Physical Literacy Association (Tremblay et al., 2018). The basic difference compared to Whitehead's model is the behavioural domain, which refers to engagement in physical activities throughout life. Considering that physical activity should be viewed as the ultimate goal of PL, the question arises as to whether this domain should be an integral part of the physical literacy process, as presented in this model. Some authors have analysed the existing literature in detail in order to identify the most common components of PL (Corbin, 2016; Edwards et al., 2017), which served as the foundation for the development of certain models. Thus, in the United States, Farren, Yeatts, and Price (2021) proposed a PL model based on the research of Whitehead (2010), and Edwards et al. (2017). In terms of domains, the concept is in line with Whitehead's, while certain differences are observed in the identified subdomains, to which elements of self-efficacy, self-esteem, and physical fitness have been added.

Based on the presented models and components of PL, it is important for teachers to understand that physical education is not just about being active, but that it is a time for skill development, and the development of important elements such as confidence and motivation to participate in physical activity. In order to achieve this, it is desirable for researchers to provide physical education teachers with a framework for implementing PL education in students, which would be partly influenced by the educational and cultural context. In other words, in addition to the existing scientific literature which analyses PL, certain actions or projects that would offer a general framework, giving guidelines to teachers in

their work, are desirable. This framework should contain clear and concise information, along with specific examples that would enable teachers to work effectively throughout the school year, with the aim of fostering PL in children. Of course, at the level of individual education systems, the framework could be adapted according to the specificities of the educational system and the cultural characteristics of the area.

The Assessment Tools for Physical Literacy

As for the assessment tools for PL, some authors (Robinson & Randall, 2017) have suggested that PL may not need to be measured at all because, in that way, we actually move away from the inherent value of the concept. Other authors (Liu et al., 2021) believe that the concept is more valuable for scientific research if it is measurable.

However, given the essential role of assessment in operationalizing PL, several assessment tools have been developed under different conceptual models of PL (Corbin, 2016). Two approaches have emerged regarding how someone understands the concept of PL and, thus, approaches its assessment.

These approaches have been characterised as idealistic and pragmatic (Edwards, Bryant, Keegan, Morgan, Cooper, & Jones, 2018). Edwards and colleagues (2018) further state that the idealistic approach argues that PL is a holistic concept and that any separate measurement of its domains would contradict the holistic and philosophical foundation of the concept. Accordingly, idealists are more likely to explore the concept through qualitative research methods, such as interviews and observations. On the other hand, some researchers have adopted a more pragmatic approach to assess the level of PL. Pragmatists argue that practical approaches to the concept of PL are needed. As a result, they may choose a range of research methods, including both qualitative and quantitative methods.

Table 2 presents the instruments for assessing PL that can be applied in physical education. There are similarities and differences among these instruments in terms of the age group for which they are intended, the domains/components they assess, the methods they use, and the time required to conduct the assessment. Most of them use a pragmatic approach to assess the level of PL. In this group, the most well-known instruments are those applied in Canada. *The Canadian Assessment of Physical Literacy* (CAPL) is an instrument constructed by the Canadian organization *Healthy Active Living and Obesity Research Institute* to assess PL in children ages 8 through 12, both in the educational system and in sports organisations. Then, there is the *Physical Literacy Assessment for Youth* (PLAY), which was constructed by Kriellaars (CS4L, 2013) for the organisation *Sport for Life Society*, which operates within national sports organisations and emphasises the importance of incorporating PL components into the long-term development of athletes (Green, Roberts, Sheehan, & Keegan, 2018).

Table 2. Assessment tools for physical literacy

Assessment tool name	Age	Assessment duration (in relation to one class and hour)	Categories they assess	Methods for assessment
CAPL	8-12	4 school hours	Physical competence	PACER Shuttle Run; Plank; CAMSA test
			Motivation, confidence	Questionnaire - Children's Self-Perceptions of Adequacy in and Predilection for Physical Activity (Hay, 1992)
			Knowledge and understanding	Questionnaire (5 items)
			Daily behavior	Average daily step count (pedometer); Questionnaire (1 item)
PLAY (PLAYfun)	7+	4 school hours	Physical competence	18 fundamental skills/tasks
			Comprehension	A four-point scale for monitoring the child's knowledge of each task
			Confidence	A three-point scale for assessing confidence when performing each task
Passport for Life	8-14	3 school hours	Fitness Skills	4-station circuit; lateral bound movement; plank
			Movement Skills	Running, throwing, and kicking
			Active Participation	Online questionnaire
			Living Skills (feelings, thinking, Interacting)	Online questionnaire
Farren, et al. (2021)	11-12	3 school hours	Physical fitness	FitnessGram battery test
			Motor skill competence	PE Metrics
			Self-efficacy	PE self-efficacy questionnaire
			Motivation	Intrinsic motivation subscale from "Perceived Locus of Causality scale"
			Self-esteem	"Global Self-esteem Scale" from "Self-perceptions Profile for Children questionnaire"
			Knowledge & understanding	Questionnaire took from the CAPL assessment tool

CAEPL	6-18	/	The intention of physical activity	Originally constructed questionnaire with 20 items
			Knowledge of physical activity	Originally constructed questionnaire
			Motor/sport skill	Test for Gross Motor Development-3
			The behavior of physical activity	Accelerometer or pedometer; IPAQ Questionnaire
			Physical fitness	Handgrip strength; standing long jump; sit-ups for 30 seconds; sit and reach; 50m run; 20m shuttle run
PPLI	11+	8-10 minutes	Knowledge and understanding	An originally constructed questionnaire with 9 items
			Sense of self and self-confidence	
			Self-expression and communication with others	
PPLA	15-18	27 minutes for questionnaires	Physical	FITescola battery of tests; motor skills in accordance with the curriculum
			Psychological	Originally constructed questionnaire (46 items)
			Social	Originally constructed questionnaire (43 items)
			Cognitive	Originally constructed questionnaire (10 items)
PLAQ	8-12	/	Physical competence	Originally constructed questionnaire (9 items)
			Affective domain	Originally constructed questionnaire (13 items)
			Knowledge and understanding	Originally constructed questionnaire (11 items)
			The behavior of physical activity	Originally constructed questionnaire (11 items)
FMS assessment tool- 60 minutesKids Club	0-11	/	Fundamental motor skills	Assessment of the level of adoption of motor skills on a four-level scale

Legend: CAPL - Canadian Assessment of Physical Literacy; PLAY - Physical Literacy Assessment for Youth; CAEPL - Chinese Assessment and Evaluation of Physical Literacy; PPLI - Perceived physical literacy instrument; PPLA - Portuguese Physical Literacy Assessment; PLAQ - Physical Literacy Self-Assessment Questionnaire

Recently, attention has also been drawn to the *Portuguese Physical Literacy Assessment* (PPLA; Mota, Martins, & Onofre, 2021), which is based on the Portuguese curriculum and the *Australian Physical Literacy Framework*, as well as the *Chinese Assessment and evaluation of physical literacy* (CAEPL), which was developed by researchers from the Shanghai University of Sport (Chen et al., 2020). Most of these assessment tools use certain tests or protocols to assess each domain individually, after which the individual scores are added up to obtain an overall score or level of the PL of the individual.

The problems highlighted in relation to these assessment tools are the time required to collect results. For some instruments (CAPL, PLAYfun, Passport for Life), it takes three to four school hours to administer or test one school class. Assuming that physical literacy is assessed only at the beginning and end of the school year, we come up with a number of six to eight hours, which takes away a significant amount of time from the curriculum. Furthermore, some instruments (CAPL, Passport for Life) recommend two assessors, which is difficult to implement in school practice. Additionally, some of them require expensive equipment such as accelerometers or pedometers, which are available only to a few. *Passport for Life* uses tablets in classes through which children's motor skills are assessed in relation to the model, which is a significant investment in less developed countries. Robinson and Randall (2017) critically analysed and compared Canadian instruments, and they concluded that the *Canadian Assessment of Physical Literacy* is the most reliable and valid, while *Passport for Life* has the least evidence of metric characteristics. However, when looking at usability, which refers to the practical applicability of the instrument, the authors consider *Passport for Life* to be the most the most practical. Furthermore, *Passport for Life* was also rated the best in terms of the degree to which the instruments are aligned with Whitehead's concept.

Some assessment tools use a holistic approach to assess PL. Most commonly, questionnaires are used to assess all components through self-assessment. Sum and colleagues (2018) created such an instrument in China, the *Perceived Physical Literacy Instrument* (PPLI). Currently, there are versions of the PPLI instrument for adolescents, the student population, physical education teachers, and older adults, while the adolescent version can be used in schools. The PPLI is probably the most practical assessment tool because it consists of only 9 items. However, the question immediately arises as to how precisely it can assess the 3 domains of PL through these 9 items. *The Physical Literacy Self-Assessment Questionnaire* (PLAQ) is another instrument constructed in China (YongKang & QianQian, 2022). The PLAQ is a valid and reliable self-assessment questionnaire for PL intended for children ages 8 through 12.

The problem with indirect measurement arises from the fact that self-assessment is usually not a valid indicator of the actual level of achievement, because it depends on several personal factors (ability to assess one's own competencies, tendency to give socially desirable responses, gender, etc.), especially when it comes to younger participants. The advantage of this group of assessment tools is certainly the time required to collect information, which ranges between ten and fifteen minutes.

There are assessment tools that are linked to PL by their name or purpose. However, they assess only one domain of PL, and mostly the physical domain. One such instrument is the *FMS assessment tool*, which assesses fundamental motor skills and is presented by the organisation *60 minutes Kids Club* (60MKC), based in Canada (Thermou & Riga, 2020). Since each domain is equally important, and given the fact that, without the development of all domains, it is unlikely that PL will be achieved, assessment tools like this one do not reflect the essence of PL.

Regardless of all existing instruments, none of them are universally accepted, meaning that there is no standardised solution. It will probably take some time to arrive at the most valid and reliable instrument for assessing PL. However, in the future, there will likely continue to be divided opinions on whether it is even possible to accurately assess physical literacy due to its complexity. Yet, some believe that the development of standardised assessment instruments may constitute an important step in intensifying PL activities, because valid and reliable assessment tools represent good opportunities to familiarise stakeholders with the holistic framework of the concept (Carl et al., 2022).

CONCLUSION

This paper has identified the current research on the definitions, components, and assessments of PL focused on children and adolescents. Teachers play a crucial and fundamental role in helping children develop the skills, confidence, and motivation necessary to take responsibility for engaging in physical activities throughout their lives. Clarifying the concepts of PL and providing clear guidance and information to teachers will enable them to act more effectively. In this direction, one of the goals was to present and explain the definition of PL. We emphasised the fact that PL is a complex, multidimensional concept that is defined, interpreted, and operationalised in many ways around the world and in different areas (e.g., education, sports, and public health). An adequate definition would need to identify the fundamental long-term goal of PL, which is engaging in physical activity throughout one's life. Additionally, we presented various PL models that clearly indicate the components important for an individual to be physically literate. In order for teachers to understand how to develop these components, it is suggested that researchers provide a

framework that contains clear and concise information, along with specific examples that would enable teachers to work effectively throughout the school year. Thirdly, existing PL assessment tools applicable in the context of physical education were analysed. Although some assessment tools are useful, none of them are universally accepted, and it will probably take some time to arrive at the best solution.

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ПОЈАМ, ДЕФИНИСАЊЕ И ВРЕДНОВАЊЕ ФИЗИЧКЕ ПИСМЕНОСТИ У ОБРАЗОВНИМ СИСТЕМИМА У СВЕТУ

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Резиме

Концепт „физичке писмености“ (ФП) званично је представила Маргарет Вајтхед 2001. године, а као основне мотиве за развој овог концепта навела је све већи постотак физички неактивне деце и одраслих, те давање превелике пажње искључиво физичким компонентама појединца. Уместо тога, ФП је представљена као холистички концепт који је усмерен на развој целе личности, где су ум и тело једно, а главни циљ ФП је физичка активност и промовисање важности бављења физичком активношћу током живота (Whitehead, 2010). Потребно је указати на то да ФП обухвата не само моторичке вештине и способности, већ и мотивацију, знање, разумевање и ставове неопходне за бављење физичком активношћу током целог живота, што се може закључити и из најприхваћеније дефиниције ФП, која гласи: „Физичка писменост се може описати као мотивација, самопоуздање, физичке компетенције, знање и разумевање да се вреднује и доживотно бави физичком активношћу“.

ФП као концепт је последњих година привукла пажњу научне заједнице, али и практичара из области физичке културе, а посебно се истиче њен потенцијал за подстицање физичке активности деце и младих (Silverman & Mercier, 2015; Allan, Turnnidge & Côté, 2017). У том смеру, предмет физичко васпитање је идентификован као једно од најприкладнијих окружења за развој ФП код деце и младих, а посебно је наглашена важност наставника физичког васпитања у циљу развоја и промовисања ФП у школском окружењу.

С обзиром да се ради о новијем концепту, одређени радови указују да постоји конфузија код наставника физичког васпитања о томе како они схватају концепт ФП, и како треба да га имплементирају у наставни процес, те углавном не могу адекватно да концептуализују ФП. Појашњавање концепата ФП и пружање јасних смерница и информација наставницима омогућиће њихово квалитетније деловање. У том смеру, циљ овог рада је да пружи свеобухватан преглед концепта ФП, са фокусом на дефинисање и процену ФП у оквиру образовних система у свету, односно у оквиру наставе физичког васпитања.

У овом раду, јасно је представљена дефиниција ФП, с обзиром да постоје различита схватања и различити приступи тумачењу овог концепта. Поред тога, представљени су различити модели ФП који јасно упућују на одређене компоненте које су према тим моделима важне да би појединац био физички писмен. Такође, анализирани су и постојећи инструменти за процену ФП, као и различити приступи процени ФП, те су идентификоване њихове предности и недостаци.

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A SHORTENED VERSION OF THE ACHIEVEMENT MOTIVE SCALE – MOP-20

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Abstract

This research was focused on reducing the scale measuring the general achievement motive MOP2002. The initial version of the instrument MOP2002 contains 55 items and is in the Likert- type scale format. The starting point of this research was based on the assumption about a four-factor structure of the general achievement motive established in our previous research. Both quantitative and qualitative studies were applied in the process of reduction. Each of these studies was conducted on a separate sample – exploratory factor analysis N = 2846, and confirmatory factor analysis N = 294 – and four focus groups, each including 15 respondents. Based on the obtained results, 20 items were selected, and they comprise a shortened version of the scale called MOP20. Designed in this way, the scale can also take the form of the observation protocol while assessing the general achievement motive. It was ascertained that the instrument had a unique object of measurement. The factor analyses results showed the stability of the four-factor structure of the achievement motive. The parameters of representativeness, reliability and homogeneity indicate that MOP20 possesses satisfactory psychometric properties. Instrument validity was checked by means of correlational analysis of the general achievement motive and dimensions of time perspective, self-efficacy and locus of control. The obtained correlation coefficients indicate a satisfactory validity of the scale MOP20, and are highly interpretable when explaining and considering the psychological space of the factors significant for achieving success in activities such as sports and entrepreneurship.

Key words: general achievement motive, MOP20 measuring instrument, factor analysis, successfulness, sports, entrepreneurship.

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СКРАЋЕНА ВЕРЗИЈА СКАЛЕ МОТИВА ПОСТИГНУЋА - МОП-20

Апстракт

Истраживање је посвећено редукцији скале за мерење општег мотива постигнућа МОП 2002. Почетна верзија инструмента МОП2002 садржи 55 ајтема и има форму скале Ликертовог типа. Пошло се од претпоставке о четворофакторској структури мотива општег постигнућа утврђеној у нашим ранијим истраживањима. У поступку редукције примењене су квантитативне и квалитативне студије. Свака од ових студија спроведена је на посебном узорку – експлоративна факторска анализа N = 2846, и конфирмативна факторска анализа N = 294 – и четири фокус групе од по 15 испитаника. На основу добијених резултата издвојено је 20 ајтема који чине скраћену верзију скале названу МОП20. Овако конципирана скала може имати и форму протокола посматрања при процени општег мотива постигнућа. Утврђено је да инструмент има јединствени предмет мерења. Резултати факторских анализа показали су стабилност четворофакторске структуре мотива постигнућа. Параметри репрезентативности, поузданости и хомогености указују да МОП20 има задовољавајуће психометријске карактеристике. Ваљаност инструмента проверавана је путем корелационе анализе мотива општег постигнућа и димензија временске перспективе, самоефикасности и локуса контроле. Добијени коефицијенти корелација указују на задовољавајућу ваљаност скале МОП20 и веома су интерпретабилни при објашњењу и сагледавању психолошког простора фактора значајних за постизање успеха у активностима као што су спорт и предузетништво.

Кључне речи: мотив општег постигнућа, мерни инструмент МОП20, факторска анализа, успешност, спорт, предузетништво.

INTRODUCTION

This paper represents a continuation to the research of the stability of the achievement motive as a construct, and the ways in which it is measured. A broader theoretical elaboration, the rationale for defining the achievement motive, and research results covering the period of 15 years in which the initial version of the instrument MOP2002 was used, are presented in the research of Franceško, Nedeljković, and Kosanović (2019).

The achievement motive is defined as a complex social motive directed at achieving success, determined either by achieving one's own goals or/and standing out in front of others.

Numerous methods and instruments for measuring the achievement motive are mentioned in literature (Murreay, 1943; Atkinson, 1957; McClelland, 1961; Schmalt, 1999; Franceško, Nedeljković, & Kosanović, 2019). Some authors (Smith, 2015) point out the necessity for perfecting the methods for assessing motivation for achievement. Some modification guidelines can be regarded as general, while some stem from the specific areas in which the achievement motive is treated as a potential factor or predictor of successfulness. In this paper, the authors attempt to construct a scale of the achievement motive with a limited number of items, which will at the same time retain the complex structure of separate factors de-

termined in our previous research (Franceško, Mihić, & Bala, 2002; Franceško, Kodžopeljić, & Mihić, 2002; Franceško, Nedeljković, & Kosanović, 2019), accompanied by the check of psychometric parameters. The MOP scale is of a general type, which means that its content is applicable in various areas of social life. Additional motivation for the authors to modify the initial MOP2002 instrument was provided by the fact that it was widely used in the research conducted in different areas in the region of former Yugoslavia. For example, it was applied in the research about the personality structure of adolescents and students (Bubulj, Arsenijević, & Simić, 2011), and the psychological foundations of entrepreneurship and characteristics of athletes (Franceško, Nedeljković, & Kosanović, 2019; Sindik, 2010; Ivanišević, Vlašić, & Čolakhodžić, 2017).

Studying the achievement motive has a particular significance for those social activities which are explicitly based on successfulness, such as sports and entrepreneurship. Researching the factors of these phenomena includes a number of psychological, social and economic predictors of successfulness, which inevitably imposes the necessity to apply the test battery. As a result, the authors' effort to create shorter versions of the instrument with satisfactory psychometric properties represents a certain kind of inevitability, and a specific research challenge.

The benefit of using the MOP2002 scale in the context of physical activity, sports in particular, is based on multiple assumptions. Certain authors (Franceško, Nedeljković, & Kosanović, 2019) think that, although it is not a sports-specific instrument, it can be used to monitor motivation in active athletes. But, due to the connection between the general and sports-related achievement motive (Havelka & Lazarević, 1981), it can also be used to monitor motivation for achievement in former athletes who have finished their sports careers and have started careers outside of sports. Previous research has confirmed these assumptions. In the context of using the MOP2002 scale to establish a connection between successful motoric performance and the achievement motive, research results indicate that there is a correlation between perseverance as an achievement motive component and successfulness in performing gymnastic elements (Srdić, Jovanović, & Mrđa, 2018), while the component of competition with others is associated with sports success in bowlers (Sindik, 2008). As for the possible indirect effect of the achievement motive on success in sports, by using this scale, it was determined that all achievement motive components on the subsample of less successful athletes were connected with avoidance strategies and emotion-focused stress coping strategies, whereas such a connection was not observed in more successful athletes (Mitić, 2016). The same research determined that the connection between the prominence of achievement motive and stress coping was the same in athletes and non-athletes. Furthermore, when it comes to the difference between athletes achieving different levels of success, it has been shown that all achievement motive components measured by MOP2002, except

for orientation towards planning, are more prominent in professional athletes than in amateur athletes (Vlašić & Ivanušević, 2022). The prominence of the achievement motive is connected with the choice of sport as well. Thus, research showed that athletes who opted for team sports possess a more prominent orientation towards competition compared to those who practise individual sports (Vlašić & Ivanušević, 2022). Researching the differences in the prominence of the achievement motive among athletes and non-athletes, different authors discovered that athletes possess more prominent achievement motivation compared to non-athletes as concerns a sample of people comprising the student population (Ivanišević, Vlašić, & Čolakhodžić, 2017), and a sample of people comprising the population of young footballers and non-athletes (Jelić, 2018).

Studying the differences in the prominence of the achievement motive and its domains on subsamples of students talented in various areas, statistically significant differences were found between students talented in sports, on the one hand, and students talented in arts and mathematics, on the other hand. These differences are in favour of athletes, especially regarding their competitiveness (Lungulov, 2020). Studies conducted on the population of female students showed that the female students of the Faculty of Sports and Physical Education have a more prominent achievement motive compared to the female students of the Teacher Training Faculty (Trebješanin & Lazarević, 2008).

Entrepreneurship is the second social-economic-psychological activity which we use as an example, and whose main traits are permeated with the significance of achieving success. The achievement motive is regarded as one of the psychological potentials necessary for successful entrepreneurship (Franceško, Nedeljković, & Njegomir, 2022). This assumption is based on the analogy between the nature of entrepreneurship and a separate achievement motive structure. Entrepreneurship involves setting goals, competing in the market, making business plans, and persevering in overcoming the problems and obstacles on the road to success.

METHOD

The aim of this paper was to construct and validate a shortened version of the achievement motive scale. The initial basis was the MOP2002 instrument (Franceško, Mihić, & Bala, 2002), which contains 55 items. Starting from the aforementioned aim, three studies were conducted, the results of which formed the basis for selecting the items comprising a shortened scale called MOP20. Also, the aim was to check the validity of the shortened version of the instrument, or MOP20, by means of correlations with relevant psychological constructs – time perspective, self-efficacy (Kostić and Nedeljković, 2012), and locus of control.

Sample

The research created in this way required analyses on three different samples of respondents.

The first study sample consisted of 2,846 respondents of both genders, of which 36.3% are male, and 63.75% are female. The respondents were ages 17 through 44, with the average age being around 30 years. Of that, 25% of the respondents are from Vojvodina, 21% of the respondents are from Montenegro, and 54% of the respondents are from Central Serbia. As for their educational structure, 47% of the respondents finished elementary or secondary school, and 53% had a higher, or a university education. Of the total sample, 75% of the respondents are of Serbian nationality.

The second study was conducted on the data obtained on a sample of 294 respondents, all of whom are athletes. The average age was 24.30 years. The research was carried out in 2015 in Niš, Novi Sad, and Belgrade.

The data in the third study was collected within several focus groups consisting of senior students of Psychology in Novi Sad. Each of the four focus groups consisted of 15 members, whose task was to select four items which they considered the most relevant indicators of each of the four factors of MOP2002.

Instruments

The data was collected and analysed using the self-assessment scale MOP2002, which is a Likert-type scale and consists of 55 items. The task of the respondents was to indicate to what extent the statements applied to them. The offered answers were: 5 – completely true; 4 – mostly true; 3 – not sure; 2 – mostly false; and 1 – completely false.

The four-factor structure of MOP consists of: (1) **competition with others**; (2) **attainment of goals as a source of satisfaction**; (3) **perseverance in goal accomplishment;** and (4) **orientation towards planning**.

MOP 2002 measures the general achievement motive applicable in different spheres of life and work.

The following tests were used in the studies examining the connection between the achievement motive and certain psychological constructs: time perspective, self-efficacy, and locus of control in adolescents.

Time perspective was operationalised by means of a shortened version of the Zimbardo Time Perspective Inventory (Košťál, Klicperová-Baker, Lukavská, & Lukavský, 2016). The shorter version has 18 items measuring six time perspective dimensions – *Positive and Negative Past, Hedonistic and Fatalistic Present, and Positive and Negative Future*.

Self-efficacy was measured using the General Self-Efficacy Scale (SGSE; Schwarzer & Jerusalem, 1995). The questionnaire is uni-factorial and has 10 items expressed by a five-point response scale.

Locus of control in adolescents was measured by the Croatian adapted version (LKA; Ljubotina, 2018) of the Multidimensional Locus of Control Scale (IPC, 1973). The scale consists of 3 independent dimensions. The dimension of internal locus (I – *Internal*), the dimension of belief in the power of the importance of other people (P – *Power of Others*), and the dimension of belief in chance, fate or God (C – *Chance*). Additionally, higher scores on the overall value of the locus of control indicate a higher internal locus, whereas lower values indicate external locus of control.

Statistical Data Processing

Different procedures were carried out in the process of shortening the scale: exploratory factor analysis (EFA) N = 2.846; confirmatory factor analysis (CFA) N = 292; selection based on the frequency of item choice within the focus groups; content (qualitative) analysis of items; comparison of items isolated in three studies, conducted in order to choose the final shortened version correlation analysis, in order to check the validity of MOP20.

Also, the measures of reliability, representativeness and homogeneity of the instrument were checked.

THE FIRST STUDY – THE RESULTS OF EXPLORATORY FACTOR ANALYSIS (EFA)

Within the first study, explorative factor analysis with Promax factor rotation was conducted on the previously standardised and normalised data, assuming that the factors correlate with each other. The parameter value of sample adequacy (KMO = .90) and a significant Bartlett's sphericity test ($\chi^2(190) = 17902.31$; $p<.01$) indicate the factorability of the intercorrelation matrix.

Based on the Guttman-Kaiser Criterion, a total of four factors with a characteristic square root higher than 1 were isolated. These factors account for 55.79% of the total system variability, with the first factor accounting for 29.06% of the total variance (Table 1).

In the continuation of the analysis, five items with the highest correlations with each factor were retained. Correlations of manifest items with the isolated factors are shown in Table 2.

Table 1. Values of characteristic square roots and percentage of the variance accounted for

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	
F1 - Competition	5.81	29.06	29.06	5.81	29.06	29.06	3.46
F2 - Planning	2.38	11.90	40.95	2.38	11.90	40.95	4.09
F3 - Perseverance	1.66	8.31	49.26	1.66	8.31	49.26	3.99
F4 - Goal	1.30	6.52	**55.79**	1.30	6.52	55.79	4.06

Table 2. Matrix of the factor structure of the MOP20 scale

Items	F1 – Competition	F2 – Planning	F3 – Perseverance	F4 – Goal
Mop31	0.80			
Mop30	0.80			
Mop6	0.73			
Mop24	0.72			
Mop25	0.71			
Mop33		0.82		
Mop35		0.77		
Mop11		0.76		
Mop27		0.70		
Mop39		0.66		
Mop4			0.76	
Mop1			0.74	
Mop22			0.72	
Mop32			0.76	
Mop45			0.65	
Mop50				0.63
Mop13				0.68
Mop17				0.72
Mop 42				0.73
Mop 26				0.67

By looking into the content of the items grouped around the first factor, such as *I invest a lot of energy to stand out in front of others* and *I strive to be ahead of others in everything*, we defined this factor as **orientation towards COMPETITION with other people**.

The second factor, defined as **orientation towards PLANNING**, consists of items such as *I plan every activity of mine,* and *Every activity needs to be well-planned beforehand*.

PERSEVERANCE in achieving goals is the name of the third factor, which is composed of highly correlated items such as: *Even when things are not going easy for me, I finish the job,* and *If I do something difficult, I usually persevere*.

The fourth factor, defined as **orientation towards ACHIEVING GOALS**, groups items such as: *The mere thought of achieving a goal brings positive feelings to me*, and *At any given moment, one should have a clearly defined goal*.

By cross-correlating the isolated factors (Table 3), it was found, in accordance with the initial assumption, that all factors are correlated – coefficients are significant and positive, and correlations range between r=.20 and r=.50. The highest degree of correlation (r=.50) was registered between the factors of **perseverance** and **orientation towards achieving goals**.

Table 3. Cross-correlations of the isolated factors

Factors	F1 Competition	F2 Planning	F3 Perseverance	F4 Goal
F1 – Competition	1.00	.32	.20	.25
F2 – Planning		1.00	.40	.40
F3 – Perseverance			1.00	.50
F4 – Goal				1.00

The internal consistency of the scale, measured by Cronbach's alpha coefficient, is .86, so it can be concluded that the MOP20 scale has a very good reliability (Table 4). Looking at the coefficients for individual dimensions (Table 5), we can notice that they range between .62 and .72, which, given the number of items (5), can be considered acceptable or satisfactory.

Table 4. Cronbach's alpha coefficient of the MOP20 scale

Cronbach's Alpha	N of Items
.86	20

Table 5. Cronbach's alpha coefficients of the individual dimensions of the MOP20 scale

	Cronbach's alpha	N of Items
F1 – Competition	.68	5
F2 – Planning	.72	5
F3 – Perseverance	.62	5
F4 – Goal	.67	5

Also, the measures of reliability, representativeness and homogeneity of the instrument were checked, and they are presented in Table 6.

Table 6. Measures of reliability, representativeness and homogeneity of the instrument

	MOP20
Measures of test representativeness:	
Kaiser, Mayer, Olkin, representativeness measure, PSI 1	.96
Kaiser, Rice, representativeness measure, PSI 2	.97
Relaibility measures in classic summational model:	
Spearman-Brown-Kuder-Richardson-Guttman-Cronbach, ALFA	.86
Reliabilty measures of the first main component:	
Lord-Kaiser-Caffrey, BETA	.87
Momirovic-Dobric-Gredelj, lower reliability limit, BETA 1	.68
Momirovic-Dobric-Gredelj, upper reliability limit, BETA 2	.97
Reliability measures in Guttman measurement model	
Guttman-Nicewander, RHO	.89
Momirovic-Dobric, lower reliability limit, RHO 1	.80
Zakrajsek-Momirovic-Dobric, upper reliability limit, RHO 2	.99
Measures of test homogeniety:	
Average correlation of variables, H 1	.24
Momirovic, measure of homogeneity, H 2	.65

All indicators can be regarded as satisfactory considering the number of items and the fact that the scale's number of constituents was reduced by 60%.

THE SECOND STUDY – THE RESULTS OF CONFIRMATORY FACTOR ANALYSIS (CFA)

Two models were tested in the second study. The basic assumption in the first model was that there was a correlation between factors, while the initial assumption in the second model was that the factors were not correlated. The models with the best fit indices depending on the basic assumptions are presented in the results.

Model 1

The first model consisted of four mutually correlated factors, and CFA identified 19 items that met the necessary criteria for model fitting and factor saturation. The CFA results identified the following factors with corresponding items: **competition** – items 6 (.65), 20 (.66), 21 (.79), 24 (.68), 25 (.61) and 28 (.64); **persistence** – items 1 (.68), 2 (.65), 40 (.67) and 41 (.73); **goal** – items 17 (.63), 23 (.70), 42 (.63), 50 (.63) and 51 (.62); and **planning** – items 11 (.78), 27 (.67), 33 (.90) and 35 (.76). It was also found that there were positively directed correlations between all factors, ranging in intensity from weak (.28) to very strong (.84) connections. Besides this, modification indices suggested that items 6 and 20, as

well as items 50 and 51 were in a certain relation, of a statistically very weak and weak intensity, respectively. Item analysis showed that these statements were very similar in content. For this reason, the modification index suggestion was adopted. Figure 1 (*Model with mutually correlated factors*) graphically shows the factor saturation of all items, as well as the values of the mutual correlations of all four factors.

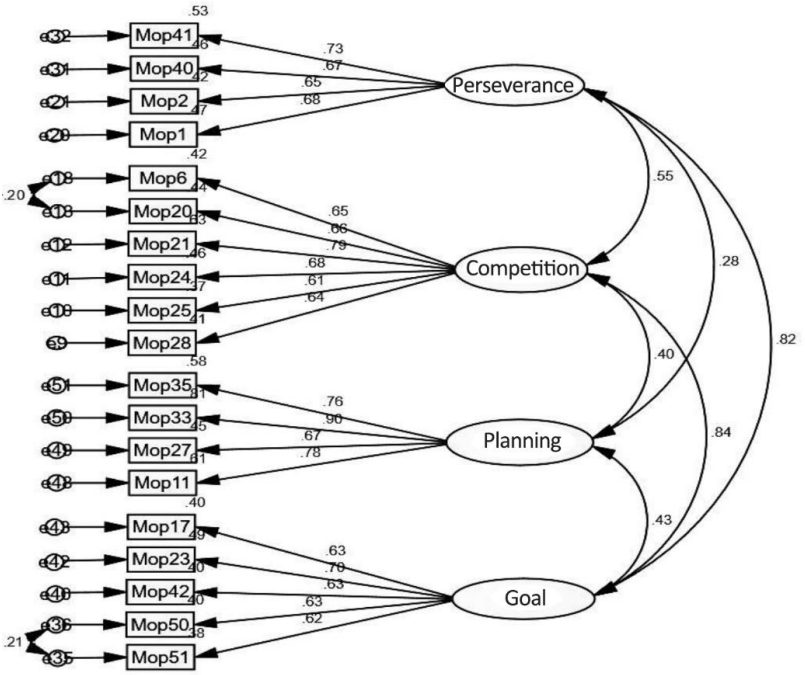

Figure 1. Model with mutually correlated factors

The continuation of the analysis focused on testing the fit of the proposed model. The value of the basic parameter – chi-square was $\chi 2$ (144, N = 292) = 314.991, and the data showed that such a value of chi-square was statistically significant (p = .000), which did not indicate a good fit. However, the value of the ratio of chi-square and the number of freedom degrees indicated that there was a basis for stating a good fit of the model (χ^2 / df = 2.187). The fit indices were then checked. The values of GFI (.90), CFI (.92), IFI (.92), and TLI (.91) indicated a good fit of the model, as did the values of RMR (.04), SRMR (.05), and RMSEA (.06, with confidence intervals of .05 and .07). The fit indices that did not indicate an ideal fit were NFI (.87), which did not meet the criterion > .90, and PCFI (.78), whose desirable value is > .80. The aforementioned data is also presented in Tables 7 and 8. Taking into account all the conditions and characteristics of this research, such as the fit indices, factor saturations and sample size, it can be stated that the proposed model fits the collected data.

Table 7. Value χ^2 and χ^2/df in the model with correlated factors

χ^2	df	P	χ^2/df
314.991	144	.000	.000

Table 8. Fit indices in the model with correlated factors

GFI	IFI	TLI	CFI	PCFI	NFI	RMSEA	LO90	HI90	RMR	SRMR
.90	.92	.91	.92	.78	.87	.06	.05	.07	.04	.05

Model 2

The second examined model also consisted of four factors. However, in this case, the factors were not inter correlated, and CFA showed that the model with 16 items was the best solution. The CFA results identified the following factors with their respective items: **competition** – items 6 (.67), 21 (.79), 24 (.69), and 25 (.64); **perseverance** – items 1 (.66), 2 (.61), 40 (.68), and 41 (.78); **goal** – items 12 (.60), 17 (.62), 23 (.74), and 26 (.74); and **planning** – items 11 (.77), 27 (.66), 33 (.91), and 35 (.76). Figure 2 (*Model with factors that are not inter-correlated*) graphically shows the factor saturations of all items.

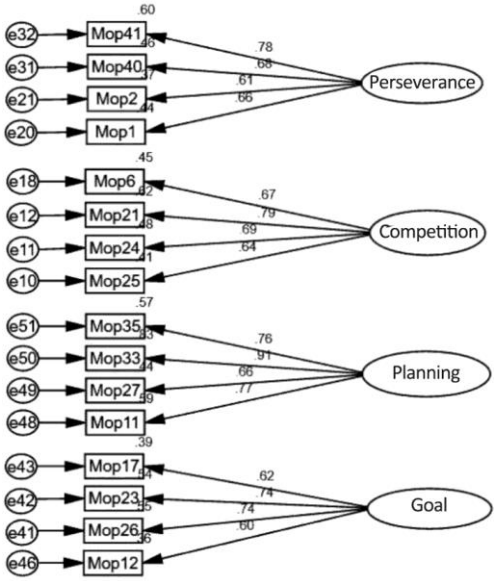

Figure 2. Model with factors that are not inter-correlated

The continuation of the analysis focused on testing the fit of the proposed model, whose factors were not interrelated. The value of the basic parameter – chi-square, was χ^2 (*104,* N = 292) = 535.216, and the data showed that such a value of chi-square was statistically significant ($p = .000$), which did not indicate a good fit. Also, the value of the ratio of chi-square

and the number of freedom degrees did not indicate that there was a basis for stating a good fit of the model (χ^2 / *df = 5.146*). The fit indices were then checked. The values of GFI (*.80*), CFI (*.77*), IFI (*.77*), TLI (*.73*), NFI (*.73*), and PCFI (*.67*) did not indicate a good fit of the model, nor did the values of RMR (*.20*), SRMR (*.24*), and RMSEA (*.12*, with confidence intervals of *.11* and *.13*). The aforementioned data is presented in Tables 9 and 10. Taking into account these parameters, it can be stated that the proposed model with factors that are not inter-related does not fit the collected data.

Table 9. Value χ^2 and χ^2/df in the model with non-correlated factors

χ^2	df	P	χ^2/df
535.216	104	.000	5.146

Table 10. Fit indices in the model with non-correlated factors

GFI	IFI	TLI	CFI	PCFI	NFI	RMSEA	LO90	HI90	RMR	SRMR
.80	.77	.73	.77	.67	.73	.12	.11	.13	.20	.24

THE THIRD STUDY – SELECTION BASED ON THE FREQUENCY OF ITEM CHOICE WITHIN THE FOCUS GROUPS

The third study involved the assessment of the content of items within the MOP2002 as indicators of individual factors. The results of this qualitative assessment are presented in Table 11.

Table 11. The numbers of items selected based on the highest frequency

Factors	Items			
F1 – Competition	6	24	25	31
F2 – Planning	11	27	33	35
F3 – Perseverance	1	4	32	41
F4 – Goal	17	23	42	5

The results of the three studies opened up the possibility of comparing the isolated items for each factor from the MOP2002 scale, which is an additional indicator of the justification for the method of item selection for the shortened version. Table 12 provides a summary of the item numbers isolated from each study.

Table 12. Comparison of the isolated items in the three conducted studies with a view to selecting items for the final shortened version

	E	F	A			C	F	A			F	O	C	U	S
F1 – Competition	6	24	25	30	31	6	20	21	24	25	6	24	25	31	
F2 – Planning	11	27	33	35	39	11	27	33	35		11	27	33	35	
F3 – Perseverance	1	4	22	32	45	1	2	40	41		1	4	32	41	
F4 – Goal	13	17	26	42	50	17	23	42	50	51	17	23	42	50	

Based on the results of all three studies, from the collection of 55 items comprising MOP2002, the following items were retained for the shortened version of the instrument: 1, 4, 6, 11, 13, 17, 22, 24, 25, 26, 27, 30, 31, 32, 33, 35, 39, 42, 45, and 50. Therefore, the majority of the items that overlap in all three studies were isolated.

THE CORRELATION BETWEEN THE ACHIEVEMENT MOTIVE AND OTHER PSYCHOLOGICAL CONSTRUCTS

In order to test the construct validity of the scale, correlations between achievement motive and certain psychological variables were determined, including time perspective, self-efficacy and locus of control (Table 13).

Table 13. Correlation of achievement motive with time perspective, self-efficacy and locus of control

		P	C	PL	G	MOP
PP	Pearson correlation	.153	.079	.098	.215	.173
	Sig. (2-tailed)	.000	.049	.014	.000	.000
	N	624	624	623	623	622
FP	Pearson correlation	.394	.298	.713	.402	.619
	Sig. (2-tailed)	.000	.000	.000	.000	.000
	N	624	624	623	623	622
PH	Pearson correlation	.144	.258	.079	.212	.230
	Sig. (2-tailed)	.000	.000	.000	.000	.000
	N	624	624	623	623	622
PF	Pearson correlation	-.017	-.013	-.087	-.019	-.049
	Sig. (2-tailed)	.678	.740	.030	.640	.226
	N	624	624	623	623	622
PN	Pearson correlation	-.125	.006	-.089	-.047	-.087
	Sig. (2-tailed)	.002	.888	.026	.246	.029
	N	624	624	623	623	622
FN	Pearson correlation	-.267	-.112	-.112	-.236	-.238
	Sig. (2-tailed)	.000	.005	.005	.000	.000
	N	621	621	620	620	619
SGSE	Pearson correlation	.525	.383	.168	.422	.490
	Sig. (2-tailed)	.000	.000	.000	.000	.000
	N	624	624	623	623	622
LCA	Pearson correlation	.456	.317	.165	.420	.443
	Sig. (2-tailed)	.000	.000	.000	.000	.000
	N	624	624	623	623	622

Note: P – perseverance; C – competition; PL – planning; G – goal achievement; MOP – general achievement motive; PP – past positive; FP – future positive; PH – present hedonistic; PF – present fatalistic; FN – future negative; SGSE – General self-efficacy; LCA – locus of control

Most of the correlations are statistically significant. When interpreting them, the sample size effect should not be ignored. Therefore, on-

ly high correlations (> .30) will be commented on. **Perseverance** is highly positively correlated with the dimension of self-efficacy and internal locus of control. **Planning** is in a high positive correlation with the dimension of positive future. **Goals** are highly positively correlated with positive future, self-efficacy and internal locus of control. **Competition** positively correlates with self-efficacy and internal locus of control. The overall general achievement motive is highly positively correlated with positive future, self-efficacy and locus of control.

Based on the entire range of the obtained correlations, from low to high, it can be assumed that the MOP20 scale possesses a satisfactory level of validity.

CONCLUDING REMARKS

The aim of this paper was to reduce the MOP2002 scale used to measure the general achievement motive. The reduction process was based on several models that encompassed quantitative and qualitative analyses, which strengthens the objectivity of the obtained results. The application of both quantitative and qualitative analyses is still rare. This paper is an attempt to integrate them in the construction of psychological measurement instruments.

Using this approach as a starting point, three different studies were conducted in order to reduce and select items. Besides this, psychometric checks of the shortened version called MOP20 were carried out. All the obtained results indicate that the shortened version of MOP20 retained full in formativeness, and that it has satisfactory psychometric properties. Furthermore, a clear and stable four-factor structure of the achievement motive was determined. The aforementioned results can be considered a confirmation of the theoretical framework elaborated in previous studies (Franceško, Nedeljković, and Kosanović, 2019), based on McClelland's definition of the achievement motive.

The four isolated factors, in our opinion, provide sufficient frameworks for perceiving the characteristics of an individual's achievement motive as complex, cognitive and social motivational characteristics. This once again confirms the justification for diagnosing the way in which an individual's success is defined (competition with others, and/or setting and achieving one's own goals), along with psychological mechanisms or instrumental forms of response in achievement situations (perseverance and orientation towards planning). The results of exploratory and confirmatory factor analysis indicate that the scale has a unique subject of measurement, but also that there is justification to isolate four components of this complex motivational disposition. In support of this, significant parameters were obtained in those analyses that assume the correlation between potential factors.

The modification of the instrument also involved the content direction of the respondents in the self-assessment process. The Likert scale used in MOP2002 was modified into an assessment scale with a clear continuity in the degree of presence and absence of the formulation *I neither agree nor disagree.* The continuum in the shortened version of the MOP20 scale contains five points, and represents a self-assessment of whether and to what extent a certain way of responding *does not apply to you at all* or *applies to you completely*.

The shortened version enables data collection with a lower level of respondent engagement while maintaining the same level of informativeness. The shortened version can also be used as a protocol for observing the prominence of motivation in an individual over a longer period of time and in different social situations. This opens up the possibility of comparison of the data obtained through an individual's self-assessment and the data resulting from observation, which we consider to be another significant criterion for the objectivity of measurement.

Testing the constructive validity and stability of the factor structure of the achievement motive measured by the MOP2002 and MOP20 scales opens up the possibility of analysing the characteristic profiles of this complex motivational disposition in the following steps. This means isolating typical constellations in the degree of prominence of all four components, assuming their outcomes on efficiency in certain activities (individual success). A psychological analysis of the isolated profiles would also indicate the existence of a certain degree of incongruence as one of the significant factors of inefficiency (failure). Furthermore, this implies perceiving the basis for designing psychological interventions aimed at overcoming a specific problem within the structure of the achievement motive. In addition to immediate intervention, such findings could be a significant content of socialisation in the fields of sports and entrepreneurship, as activities based on achieving success.

In this paper, a correlation analysis of the achievement motive measured by the shortened MOP20 scale was conducted with several psychological constructs: time perspective, self-efficacy, and locus of control. Although the main function of this correlation analysis was the psychometric validation check, the obtained correlation coefficients can also be viewed as a confirmation of some theoretical perspectives on the nature of this motivational characteristic. For example, significant positive correlations with all dimensions of time perspective were found, with the highest degree of correlation being found with orientation towards positive future, and significant negative correlations with orientation towards negative future. Also, significant correlations were found between almost all dimensions of the achievement motive and internal locus of control, i.e. readiness to accept personal responsibility. The connection with time perspective and locus of control can be treated as a confirmation of the cognitive aspects of the achievement motive. The results

showed a positive correlation between the achievement motive and self-efficacy, which means that, in order to understand individual success factors, it is desirable to include other personality traits as well.

The shortened MOP20 scale also opens up the possibility of determining the standards for assessing this motivational disposition. The categories for standardisation can include different age and gender groups of respondents, categories of athletes and non-athletes, and those who engage in sports as amateurs and professionally. In the field of entrepreneurship, in addition to the age and gender categories, when standardising, it is important to separate categories of those who come from entrepreneurial families and those who did not have such a form of entrepreneurial socialisation.

The shortened MOP20 scale also provides an opportunity to apply it in the examination of a set of predictor variables for sports success and entrepreneurial orientation, since such research designs always use a complex and extensive test battery.

The limitations of this research will be the subject of further elaboration in designing future research endeavours in which it will be applied.

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СКРАЋЕНА ВЕРЗИЈА СКАЛЕ МОТИВА ПОСТИГНУЋА – МОП-20

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Резиме

Главни циљ рада је да прикаже процедуре редукције скале за мерење општег мотива постигнућа МОП2002. Мотив постигнућа одређује се као сложени социјални мотив усмерен ка постизању успеха, било да је тај успех дефинисан остваривањем

властитих циљева и/или истицањем пред другим људима. Структуру мотива постигнућа, поред одреднице успеха, чине и инструментални облици понашања при постизању успеха, и то истрајност и тенденција ка планирању. Наведени сегменти представљају четири фактора мотива постигнућа, а њихова комбинација у погледу степена израженості, указује на профил ове мотивационе диспозиције. Одређење профила на основу ове четири компоненте отвара могућност анализе и објашњења успешности, односно неефикасности појединаца. Примарна, дуго коришћена верзија скале МОП2002, показала је стабилност психометријских параметара током времена на различитим узорцима истраживања. Из тог разлога, са циљем да се задовољи критеријум економичности и не наруше психометријске карактеристике скале, спроведена је сложена квантитативно-квлаитативна анализа података добијених применом оригиналне скале МОП2002. Почетна верзија инструмента МОП2002 садржи 55 ајтема и има форму скале Ликертовог типа. За конструкцију скале пошло се од претпоставке о четворофакторској структури мотива општег постигнућа: такмичење са другима, остваривање циљева као извор задовољства, истрајност у реализацији циљева и оријентација ка планирању. У поступку редукције примењене су квантитативне и квалитативне студије. Свака од ових студија спроведена је на посебном узорку – експлоративна факторка анализа N = 2846, и конфирмативна факторска анализа N = 294 – и четири фокус групе по 15 испитаника. На основу добијених резултата издвојено је 20 ајтема који чине скраћену верзију скале названу МОП20 и која има форму петостпене скале самопроцене. Овако конципирана скала може имати и форму протокола посматрања при процени општег мотива постигнућа. Утврђено је да инструмент има јединствени предмет мерења. Резултати факторских анализа показали су стабилност четворофакторске структуре мотива постигнућа. Параметри репрезентативности, поузданости и хомогености указују да МОП20 има задовољавајуће психометријске карактеристике. Ваљаност инструмента проверавана је путем корелационе анализе мотива општег постигнућа и димензија временске перспективе, самоефикасности, и локуса контроле. Добијени коефицијенти корелација указују на задовољавајућу ваљаност скале МОП20 и веома су интерпретабилни при објашњењу и сагледавању психолошког простора фактора значајних за постизање успеха у активностима као што су спорт и предузетништво. Такође, утврђена је јасна и стабилна четворофакторска структура мотива постигнућа. Наведени резултати могу се третирати као потврда теоријског полазишта заснованог на Меклилендовом одређењу мотива постигнућа. Кратка верзија инструмента отвара и могућност одређења норми за процену ове мотивационе диспозиције. Категорије за нормирање могу обухватити различите узрасте и пол испитаника, категорије спортиста и неспортиста, оних који се баве спортом аматерски и професионално. У области предузетништва поред узрасних и полних категорија, при нормирању значајно је издвојити категорије оних који су из предузетничких породица и оних који нису имали овакав вид предузетничке социјализације. Скраћена скала МОП20 отвара и могућност примене у испитивању сета предикторских варијабли спортске успешности и предузетничке оријентације, будући да се у оваквом дизајну истраживања увек примењује сложена и обимна батерија мерних инструмената.

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ACTIVE COMMUTING TO SCHOOL, BMI, AND HEALTH-RELATED FITNESS OF PRIMARY SCHOOL STUDENTS

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Abstract

Active commuting is considered one of the many forms of physical activity that could increase the level of physical activity among school children. The aim of the current study was to examine the differences between the health-related fitness of school children who engage in active and passive commuting to school, and to explore the associations between active commuting to school and the health-related physical fitness of school children. A total of 152 children (58 girls and 94 boys), aged 12, from four primary schools in the Kraljevo area participated in this study. Basic anthropometric measures were taken along with eight physical fitness tests. Boys who actively commute had greater upper body muscular endurance and cardiorespiratory fitness, and girls who were active school commuters had better results in flexibility, explosive power, upper body muscular endurance, and cardiorespiratory fitness. Linear regression analysis revealed significant associations between active commuting, and abdominal strength and cardiorespiratory fitness for boys, and flexibility and upper body muscular endurance for girls. Considering these positive findings, it is recommended that future studies be conducted on a larger sample and that they include intensive educational campaigning to encourage Serbian schoolchildren to practice active commuting to and from school is likewise recommended.

Key words: school children, physical activity, motor abilities.

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АКТИВНИ ТРАНСПОРТ ДО ШКОЛЕ, БМИ И ЗДРАВСТВЕНО УСМЕРЕНИ ФИТНЕС УЧЕНИКА ОСНОВНЕ ШКОЛЕ

Апстракт

Активни транспорт се сматра једном од многих форми физичке активности које могу да повећају ниво физичке активности код школске деце. Циљ овог истраживања био је да се испитају разлике између ученика који користе активни и пасивни транспорт до школе у нивоу здравствено усмереног фитнеса, као и да се истраже везе између активног транспорта до школе и здравствено усмереног фитнеса код ученика основне школе. Истраживањем је обухваћено укупно 152 ученика (58 девојчица и 94 дечака), старости 12 година из четири основне школе са подручја града Краљева. Измерене су основне антропометријске мере и примењено је осам тестова за процену физичке спремности. Дошло се до сазнања да су дечаци који практикују активни транспорт имали већу мишићну издржљивост горњег дела тела и виши ниво кардиореспираторне спремности, а да су девојчице које активно путују до школе и назад имају бољу флексибилност, експлозивну снагу ногу, мишићну издржљивост горњег дела тела и кардиореспираторну спремност. Резултати линеарне регресионе анализе су показали значајну повезаност између активног транспорта, снаге мишића абдомена и кардиореспираторног фитнеса код дечака, те флексибилности и мишићне издржљивости горњег дела тела код девојчица. Имајући у виду позитивне резултате овог истраживања, препоручује се да будућа истраживања обухвате већи узорак и интензивне образовне кампање, како би се школска деца у нашој земљи подстакла да у већој мери практикују активни транспорт до и из школе.

Кључне речи: школска деца, физичка активност, моторичке способности.

INTRODUCTION

Decreased levels of physical activity, a sedentary lifestyle, and an epidemic of childhood obesity represent public health crises on a global level (Villa-González, Barranco-Ruiz, and Evenson, 2018). Since an overweight status during childhood and adolescence is associated with increased morbidity and mortality in later life (Dietz, 1994; Must et al., 1999), the World Health Organization (WHO) has published recommendations on physical activity and sedentary behaviour for children and adolescents. These recommendations state that children should accumulate at least 60 minutes of moderate-to-vigorous physical activity daily (WHO, 2010). Apart from well the documented changes in the motor behaviour of young children, it has been suggested that the positive self-image that younger primary school pupils have about themselves is a good prerequisite of an effective physical education class (Buišić, Cvejić, and Pejović, 2019). Some authors consider active commuting to school an important and missed opportunity for physical activity, because most children commute to and from school 5 days per week during the school year (Davison, Werder, and Lawson, 2008; Chillón et al., 2011).

Active commuting, in the forms of walking or cycling, followed the overall trend of physical activity decrease, and has consistently been declining over the last 30 years (Mendoza & Liu, 2014). Some authors suggest that various interventions are needed to reverse this trend (Villa-González et al. 2018). While increases in children's weight have coincided with declines in active commuting to and from school (Salmon, Timperio, Cleland, & Venn, 2005), several systematic reviews reported positive associations between active commuting to school and cardiorespiratory fitness in youth (Larouche et al., 2014; Lubans, et al., 2011). The association between active commuting to school and health-related physical fitness has been studied in adolescents (Madsen et al., 2009; Meron et al., 2011) and in children (Cooper et al., 2008; Ostergaard et al., 2013). The majority of the studies that reported associations between active commuting to school and the health-related physical fitness of schoolchildren primarily focused on cardiorespiratory fitness. One of the few studies that explored associations between active commuting to school and the health-related physical fitness of schoolchildren reported that active commuting to school was significantly associated with higher levels of both speed-agility and lower body muscular fitness in boys and girls, respectively (Villa-González, Ruiz, and Chillón, 2015). Interestingly, these authors stated that there were no significant associations between active commuting to school and cardiorespiratory fitness. Every effort to increase physical activity among youth should be considered an essential component of the extended strategy needed to hinder the global obesity epidemic. Many forms of physical activity could be targeted, including regular physical education classes, extracurricular physical activities, various forms of sports, and active commuting.

Considering the lack of literature on associations between active commuting to school and the health-related physical fitness of schoolchildren, especially in Serbia, the purpose of the study was twofold: (1) to examine differences in the health-related physical fitness between schoolchildren who engage in active and passive commuting to school; and (2) to explore the associations between active commuting to school and both aspects of health-related physical fitness of schoolchildren – cardiorespiratory and muscular fitness, respectively. We agree with the notion that school, with its teachers, institutional role, and authority can contribute to the promotion of healthy habits among schoolchildren (Petrović, Momčilović, and Pelemiš, 2022), and that our findings will be a valuable addition to the current knowledge on the matter.

METHODOLOGY

Sample

A total of 152 school children participated in the study. The sample consists of 58 girls and 94 boys. The mean age for the girls was 12.43 (SD 0.50), and the mean age for the boys was 12.21 (SD 0.41). The sample includes children from four schools (urban and suburban) in a wide range of socio-economic backgrounds, and reflects the population of children attending schools in the Kraljevo area.

Measures

The physical fitness of schoolchildren was assessed through eight tests: (1) the single leg stance; (2) hand tapping; (3) leg tapping; (4) forward bend; (5) standing broad jump; (6) sit-ups; (7) bent arm hang, and (8) 6 min lap run (reduced Cooper test). The first seven tests were selected from the test battery of Kurelić et al. (1975). The reduced Cooper test was used as a recommended test of the cardiorespiratory fitness of children (Fjørtoft, Pedersen, Sigmundsson, & Vereijken, 2011). The anthropometric measures taken include height, weight, and BMI, which was calculated using the standard equation (BMI = weight (kg)/height (m2)). Commuting to school was measured through a supervised questionnaire at school. Active commuting was assessed through responses to the question: "How do you typically get to and from school?" Participants had only the option of selecting one main mode, meaning that information on multimode trips, such as walking to or from public transport hubs, was not obtained. This variable was used to derive a two-category exposure variable for the purposes of this study: (1) passive transport (private car, taxi/minicab, motorcycle/moped/scooter, bus); and (2) active transport (walking or cycling). Measurements were taken during the last week of May, before the end of the academic year. The description of the participants is presented in Table 1.

Table 1. Descriptive statistics of participants

Characteristics	Boys	Girls
Number of active commuters (%)	60 (63.8)	34 (58.6)
Number of passive commuters (%)	34 (36.7)	24 (41.3)
Age (years), Mean (SD)	12.21 (0.41)	12.43 (0.50)
N	94	58

Data Analysis

The normality of the variables was assessed using the Kolmogorov-Smirnov test. Differences between participants that use active and passive transport of non-normal variables were tested by using the non-

parametric Mann-Whitney U-test. The Student's t-test was used for normal variables. For the statistical processing of the results of using active transport to and from school, linear regression analysis was conducted in the statistical programme IBM SPSS v.23. The dependent variable was the type of transport to and from school (1 = walking or cycling; 0 = private car, taxi/minicab, motorcycle/moped/scooter, bus). Independent variables were the eight fitness tests (the single leg stance, hand tapping, leg tapping, forward bend, standing broad jump, sit-ups, bent arm hang, and 6 min lap run (reduced Cooper test), along with BMI.

RESULTS

The male participants' characteristics and mean differences can be found in Table 2. The mean values for BMI indicate that boys who commute actively and passively all fall into the category of a healthy weight for their age and sex, with BMI cut-off points ranging between 15.47 and 21.37 (Cole & Lobstein, 2012). The results of the Mann-Whitney U-test and the Student's t-test revealed differences between boys who commute actively and passively, and these differences are reflected in weight, height, and BMI ($p<0.01$). Boys who commute passively were significantly heavier, taller, and had a higher BMI. Among the physical fitness tests, significant differences were found in the bent arm hang, and the reduced Cooper test, on which boys who commute actively had better results ($p<0.05$).

Table 2. Descriptive characteristics (mean ± sd) of the study sample variables stratified by means of commuting for boys (AC – active commuting; PC – passive commuting)

Variable	AC Boys Mean (SD)		PC Boys Mean (SD)		p
Weight (kg)	48.25	(8.83)	55.25	(11.88)	**0.01****
Height (cm)	156.38	(6.75)	160.60	(7.37)	**0.01***
BMI (kg/m2)	19.63	(2.77)	21.30	(3.63)	**0.01***
Single leg stance	18.39	(13.49)	16.70	(9.30)	0.84
Hand tapping	35.78	(3.77)	36.59	(4.65)	0.36
Leg tapping	29.40	(2.99)	29.41	(3.17)	0.74
Forward bend	34.56	(6.93)	32.19	(6.93)	0.11
Standing broad jump	166.20	(23.21)	162.13	(27.88)	0.81
Sit-ups	21.67	(4.34)	18.79	(7.15)	0.09
Bent arm hang	28.51	(19.21)	21.58	(15.28)	**0.05****
Reduced Cooper test	1077.67	(126.33)	1016.18	(161.09)	**0.05***

*Significant difference between active and passive commuters Mann–Whitney U-test, $p<0.05$.

**Significant difference between active and passive commuters Student's t-test, $p<0.05$.

The female participants' characteristics and mean differences are presented in Table 3. The mean values for BMI indicate that girls who commute actively and passively all fit in the category of a healthy weight for their age and sex, with BMI cut-off points ranging between 15.86 and 21.97 (Cole & Lobstein, 2012). No significant differences existed in weight, height, and BMI between girls who commute actively and passively. Significant differences in three physical fitness tests were found between girls who commute actively and passively. Girls who commute actively had better results in the forward bend, standing broad jump, bent arm hang, and the reduced Cooper test ($p<0.05$ in all four tests).

Table 3. Descriptive characteristics (mean ± sd) of the study sample variables stratified by means of commuting for girls (AC – active commuting; PC – passive commuting)

Variable	AC Girls Mean (SD)		PC Girls Mean (SD)		p
Weight (kg)	50.26	(8.35)	50.34	(9.65)	0.97
Height (cm)	159.35	(6.38)	158.56	(8.39)	0.68
BMI (kg/m2)	19.75	(2.66)	19.9	(2.52)	0.83
Single leg stance	26.78	(17.61)	20.90	(11.83)	0.32
Hand tapping	35.65	(4.05)	36.54	(5.50)	0.42
Leg tapping	29.15	(3.46)	30.33	(4.20)	0.25
Forward bend	40.41	(7.21)	36.50	(8.06)	**0.05***
Standing broad jump	152.67	(17.60)	142.68	(20.50)	**0.05****
Sit-ups	18.88	(4.47)	18.29	(3.66)	0.94
Bent arm hang	17.29	(10.50)	12.44	(6.38)	**0.05***
Reduced Cooper test	991.18	(102.53)	927.08	(127.02)	**0.05****

*Significant difference between active and passive commuters Mann–Whitney U-test, $p<0.05$/

**Significant difference between active and passive commuters Student's t-test, $p<0.05$.

Table 4. Results of linear regression analysis for active commuting, BMI and physical fitness tests of boys and girls

Variable	Active commuting					
	Boys			Girls		
	ß	SE	p	ß	SE	p
BMI	0.03	0.02	0.32	0.03	0.03	0.51
Single leg stance	-0.03	0.02	0.23	-0.07	0.02	**0.01**
Hand tapping	0.06	0.07	0.43	-0.05	0.18	0.64
Leg tapping	0.18	0.10	0.08	0.21	0.13	0.11
Forward bend	0.01	0.04	0.98	0.06	0.06	0.33
Standing broad jump	-0.03	0.01	0.06	0.05	0.03	0.20
Sit-ups	-0.21	0.06	**0.01**	0.10	0.10	0.32
Bent arm hang	-0.01	0.02	0.93	-0.12	0.05	**0.03**
Reduced Cooper test	-0.01	0.01	**0.05**	-0.01	0.01	0.82

Furthermore, higher scores in the single leg stance (ß = -0.07; $p<0.01$) and bent arm hang (ß = -0.12; $p<0.03$) were detected in girls. The results remained consistent when an analysis excluding BMI was performed.

The associations between active commuting to school, BMI, and health-related physical fitness are shown in Table 4. Active commuting to school was associated with abdominal muscle strength (Sit-ups; ß = -0.21; $p<0.01$), and cardiorespiratory fitness (Reduced Cooper test; ß = -0.01; $p<0.05$) in boys.

DISCUSSION

The primary aim of this study was to explore the differences between school children who commute actively and passively. Boys and girls who are active school commuters had better results in several physical fitness tests. Boys who are active commuters showed greater shoulder girdle muscular endurance (bent arm hang) and cardiorespiratory fitness (reduced Cooper test), while girls who are active commuters outperformed their less active peers in flexibility (forward bend), explosive power (standing broad jump), shoulder girdle muscular endurance (bent arm hang), and cardiorespiratory fitness (reduced Cooper test). These findings are similar to the results of the study conducted by Villa-González, Ruiz, and Chillón (2015), which note that boys and girls who commute actively had greater speed-agility (although a slight difference) and muscle strength of the lower body, respectively, than boys and girls who were less active school commuters. Basic anthropometric measures (height, weight, and BMI) were significantly higher in boys who are passive commuters, and that can be a plausible explanation for the better results in muscular endurance and cardiorespiratory fitness of boys who are active commuters. That is in agreement with literature showing that subjects (7–12 years old) with a higher BMI and body mass had lower performances on all tests requiring propulsion, or lifting of the body mass, and endurance (Casajús, Leiva, Villarroya, Legaz, & Moreno, 2007). Similar to the results of this study, the findings of another study confirmed significant differences between girls who are active and passive commuters in the following: standing broad jump, bent arm hang, 10×5 m sprint, plate tapping, sit-ups, and 20-m shuttle run (Van de Kop, Toussaint, Janssen, Busch, & Verhoeff, 2021).

Furthermore, the present study found more differences in favour of active commuters in relation to cardiorespiratory fitness (Reduced Cooper test) for both boys and girls, which is in concordance with the study conducted on a sample of Danish and Norwegian children who were active commuters and cycled to school (Cooper et al., 2006; Ostergaard, Kolle, Steene-Johannessen, Anderssen, & Andersen, 2013). These findings support the notion that incorporating more walking into the daily routine should be seen as an important goal in the long-term maintenance of the initial increases in physical activity (Ekblom & Astrand, 2000; Owen, Leslie, Salmon, & Fotheringham, 2000).

The second intent of this study was to explore the associations between active commuting to school and health-related physical fitness (cardiorespiratory and muscular fitness) of schoolchildren. A significant association was detected between active commuting to school, and abdominal muscle strength and cardiorespiratory fitness in boys, which is consistent with other studies (Chillón et al., 2010; Sandercock & Ogunleye, 2012). The results of the study showed that a significant association exists between active commuting to school, and balance (Single leg stance) and shoulder girdle muscular endurance (Bent arm hang) in girls. Other authors found significant correlations between physical fitness, measured by eight physical fitness tests, and the overall level of physical activity, objectively measured with the accelerometer (57,1% active commuters) in girls ages 11 and 12 (Đurić, Bogataj, Zovko & Sember, 2021).

A strong point of this study is the fact that the sample included children from four schools (urban and suburban), from a wide range of socio-economic backgrounds and, thus, reflected the population of children attending schools in the Kraljevo area. However, there are several limitations that should be considered when interpreting the findings of this study. The first limitation is the relatively small sample of participants. The cross-sectional nature of the study design limits causal inferences. Active commuting was not assessed and analysed separately (walking, cycling), but categorically (active or passive commuters). Other studies have found smaller effects for walking than for cycling (Flint & Cummins, 2016). Data from this study did not include the separate body weight status of the participants (underweight, healthy weight, overweight and obese). Further studies, those with more objective measures, should be considered.

CONCLUSION

The present study indicates that boys and girls who are active commuters have an advantage in several health-related fitness parameters over their peers who are passive commuters. The most apparent advantage was in cardiorespiratory fitness, in both boys and girls. It is a fact that children have to travel to and from school in some manner every day, and that should be viewed as an opportunity to gain multiple benefits from physical activity. To the best of our knowledge, no organised educational campaign in our country encourages active commuting to and from school. Considering its low-cost, high-gain potential, that should be a priority for our educational authorities.

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АКТИВНИ ТРАНСПОРТ ДО ШКОЛЕ, БМИ И ЗДРАВСТВЕНО УСМЕРЕНИ ФИТНЕС УЧЕНИКА ОСНОВНЕ ШКОЛЕ

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Резиме

Активни транспорт до школе, поред редовних часова физичког васпитања, ваннаставних физичких активности и разних облика спорта, сматра се једним од многих облика физичке активности који би могли бити усмерени ка циљу повећања нивоа физичке активности школске деце. Циљ овог истраживања био је да се испитају разлике између школске деце која користе активни или пасивни транспорт у здравствено усмереном физичком фитнесу, као и да се испита повезаност између активног транспорта са оба аспекта здравствено усмереног физичког фитнеса – кардиореспираторног и мишићног - код ученика основне школе. У истраживању је учествовало укупно 152 деце (58 девојчица и 94 дечака) узраста од 12 година из четири основне школе са подручја Краљева. Измерене су основне антропометријске мере (висина, тежина, БМИ) и осам тестова физичког фитнеса (стајање на једној нози, тапинг руком, тапинг ногом, дубоки претклон, скок у даљ, подизање трупа, издржај у згибу и редуковани Куперов тест (трчање у круг од 6 минута). Дошло се до сазнања да су дечаци, који су користили активан транспорт, имали бољу мишићну издржљивост раменог појаса и кардиореспираторни фитнес, а да су девојчице које су користиле активни транспорт биле боље у флексибилности, експлозивној снази, мишићној издржљивости раменог појаса и кардиореспираторном фитнесу. Резултати линеарне регресије за активни транспорт до школе, БМИ и тестове физичког фитнеса дечака и девојчица потврдили су статистички значајну повезаност између активног транспорта и снаге трбушне мускулатуре и кардиореспираторног фитнеса код дечака, као и везу истог са флексибилности и издржљивости мишића раменог појаса код девојчица. Узимајући у обзир ове позитивне резултате, препоручују се будуће студије са објективнијим мерењима и организованом образовном кампањом за подстицање активног путовања до и од школе у нашој земљи.

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THE SELF-EFFICACY OF TEACHERS IN THE PROCESS OF INCLUSION IN PHYSICAL EDUCATION CLASSES

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Abstract

One of the more important preconditions for successful inclusion is the teachers' high level of self-efficacy. Therefore, the aim of this pilot study was to determine the self-efficacy of physical education teachers in the process of inclusion of children with physical disabilities, intellectual disabilities, and visual impairment. The study was carried out on a sample of 38 physical education teachers, aged 50.89 ± 10.56 years, working in elementary schools on the territory of the city of Niš. To evaluate self-efficacy, the Serbian version of the *Situational-specific Self-efficacy and Inclusion Students with Disabilities in Physical Education* questionnaire was used. The results indicated that physical education teachers have moderate levels of self-efficacy (3.70). Based on types of disability, the greatest degree of self-efficacy was noted for intellectual disability (3.77), followed by physical disability (3.71), and visual impairment (3.60). The results of the Friedman test showed that the obtained differences were not statistically significant (p= 0.76). The results of the Mann-Whitney U-test showed that gender (p=0.189) and teaching experience (p=0.970) do not lead to statistically significant differences in the self-efficacy of physical education teachers. This pilot study represents a foundation for future studies, which would include a greater number of respondents. In addition, it is necessary to study other factors which can impact self-efficacy, such as direct teaching experience involving children with disabilities, private acquaintance with children with disabilities, the level of academic education in the field of adaptive physical exercise, and attendance of additional workshops.

Key words: students, disabilities, self-efficacy, adapted physical education.

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САМОЕФИКАСНОСТ НАСТАВНИКА У ПРИМЕНИ ИНКЛУЗИЈЕ НА ЧАСОВИМА ФИЗИЧКОГ ВАСПИТАЊА

Апстракт

Један од битних услова за успешно спровођење инклузије јесте висок ниво самоефикасности наставника. С тим у вези, циљ овог пилот истраживања је да утврди самоефикасност наставника физичког васпитања приликом инклузији деце са физичким, интелектуалним и визуелним инвалидитетима. Истраживање је спроведено на узорку од 38 наставника физичког васпитања оба пола, старости 50.89 ± 10.56 година, који раде у основним школама на територији града Ниша. За процену самоефикасности коришћена је српска верзија упитника Ситуациона самоефикасност и инклузија ученика са инвалидитетом у физичком васпитању. Добијени резултати су показали да наставници физичког васпитања имају умерену самоефикасност (3.70). У односу на врсту инвалидитета, највећу самоефикаснот су показали код интелектуалног инвалидитета (3.77), те код физичког инвалидитета (3.71), док је најмања самоефикасност забележена код визуелног инвалидитета (3.60). Резултати Фридмановог теста су показали да добијене разлике нису биле и статистички значајне (p= 0.76). Резултати Мен-Витнијевог теста су показали да пол (p=0.189) и радни стаж (p=0.970) не доводе до статистички значајних разлика у самоефикасности наставника физичког васпитања. Спроведено пилот истраживање представља основу за нова истраживања, са већим бројем испитаника. Такође, потребно је истражити и друге факторе који могу имати утицај на самоефикасност, као на пример искуство у раду и познаство са децом са инвалидитетима, академско образовање из адаптивног физичког вежбања и додатни семинари.

Кључне речи: ученици, инвалидитет, самоефикасност, адаптирано физичко васпитање.

INTRODUCTION

The aim of inclusive education is to transform education systems to suit the needs of a diverse group of learners. It makes provisions for the equal participation of individuals with disabilities (physical, social, and/or emotional) in various learning environments, but does not exclude personal choice, special assistance, and specialised facilities for such individuals (UNESCO, 2005). Simply placing a child with a disability into a group of other children is not inclusion (Block, 2016; Tindall, Culhane & Foley, 2016). Inclusion requires the psychological and social acceptance of children with disabilities and developmental issues. Successful inclusion must be beneficial for all the factors which are a part of it, and that includes children with disabilities, their typically developed peers, teachers, and the parents of both groups of children (Hutzler, Zach & Gafni, 2005)

Inclusion in physical activity should enable all individuals, irrespective of their ability, to take part in physical activity in the same environment as their peers, with individualised support and attention. There

are five different types of inclusion in physical activity which make up the inclusion spectrum. This includes the following types: Adapted activities, Parallel activities, Open activity, Reverse integration, Separate activities (Rouse, 2009).

Successful inclusion in a learning environment and, thus, in physical education depends on a large number of factors, such as the material-technical conditions in the school needed for proper inclusion, the physical education (PE) teachers' attitudes toward inclusion, and other factors in the educational system. One of the more important conditions for successful inclusion is the creation of positive attitudes towards it, and the increase in the self-efficacy of teachers (Block & Crause, 2010; Yada, Leskinen, Savolainen, & Schwab, 2022).

Self-efficacy (SE) represents one of the basic concepts of the social-cognitive theory of Albert Bandura. He conceptually determined self-efficacy to be the belief of a person regarding their own abilities of organising and realising certain activities needed to fulfil a desired goal. SE reflects how certain an individual is that they possess the personal capacities which allow them to control the outcomes of set aims, despite obstructive events, difficulties, and obstacles (Bandura, 1997). According to Sharma, Loreman, and Forlin (2011), SE in inclusive education represents the belief of teachers that they possess suitable capacities, as well as knowledge, and the possibility of developing their inclusive practice. The SE of teachers and, thus, of PE teachers is defined as the evaluation of one's own abilities to plan, organise, and perform activities which are needed to achieve the set aims of education (Skaalvik & Skaalvik, 2007).

There is a high association between the perceived SE of PE teachers and their attitudes toward inclusion. Therefore, based on the results of several studies (Hutzler, Meier, Reuker, & Zitomer, 2019), teachers who feel they are competent enough to teach in an inclusive environment have more positive attitudes, or favour inclusion. When it comes to inclusion in the learning environment and the attitudes of PE teachers towards including children with disabilities in the regular learning environment, according to an extensive study (Hutzler et al., 2019), which included 75 studies, the SE of PE teachers could be influenced by factors such as experience in teaching children with disabilities, or other forms of contact with them in the family or in the community. Furthermore, both practical and theoretical knowledge obtained from teaching physical education to children with various forms of disabilities could have a significant impact. In addition, individual factors, such as gender and age, could also have an impact. In addition to these factors, the type and level of disability could also have an impact on the SE of PE teachers. What kind of effect the factors have on SE, among other things, also depends on the country in which the testing is being carried out, due to existing cultural, and other differences. As a result, it is necessary to carry out studies in each country

individually. The significant impact of some of the aforementioned factors on the attitudes and SE of PE teachers, as well as on successful inclusion, was determined in numerous studies (Hutzler et al., 2005; Ozer et al., 2013; Taliaferro, Hammond, & Wyant, 2015; Reina, Hemmelmayr, & Marroquin, 2016; Hutzler, & Daniel-Shama, 2017a; Selickaite, Hutzler, Pukenas, Block and Reklaitiene, 2019; Antala, Pružek, & Popluharova, 2022).

The SE of teachers toward inclusion in physical education first started receiving attention some 20 years ago, and has in particular been the focus of study for the past 10 years (Reina et al., 2016; Hutzler & Daniel-Shama, 2017a; Hutzler & Barak, 2017b; Selickaitė, Hutzler, Pukėnas, Block, & Rėklaitienė, 2018; Reina, Ferriz, & Roldan, 2019; Selickaitė et al., 2019; Alhumaid, 2021; Teng, Yeo, Lee, & Chin, 2021; Antala et al., 2022). In addition to the studies of the SE of teachers in the process of inclusion already underway in schools, studies were also carried out for the evaluation of the SE of physical education students (Hutzler, et al., 2005; Block, Hutzler, Barak, & Klavina, 2013; Jovanović, Kudláček, Block, & Djordjević, 2014; Taliaferro et al., 2015; Baloun, Kudlaček, Sklenaríkova, Ješina, & Migdauova, 2016; Tindall et al., 2016; Wang, Liu, Wei, & Block, 2020; Alhumaid, Khoo, & Bastos, 2020;).

In Serbia, a certain number of studies focus on the evaluation of the SE of teachers in the process of inclusion and teaching children with various forms of disabilities (Tubić, & Đorđić, 2012; Fazlagić, & Kolić, 2018; Radić-Šestić, Šešum, & Karić, 2020). However, there are very few studies that focus on SE and the attitudes of PE teachers in inclusive educational settings. Only a few such studies were found in existing databases (Đorđić, & Tubić, 2012; Jovanović et al., 2014; Đorđić, Tubić, & Protić-Gava, 2014). Among them, only Jovanović et al. (2014) focused on SE, but among students of sport and physical education in Serbia, and not among PE teachers who already have teaching experience. The two remaining studies focus on attitudes, and SE was included in only one item in the questionnaire. Considering that SE represents an important predictor for successful inclusion, there is a need to determine the SE of PE teachers working in schools in Serbia, due to the constant increase in the number of children with disabilities and developmental issues who attend regular schools. A study of each individual country is also needed, due to the specific nature of the educational process of PE teachers when it comes to adaptive physical education, as well as the different cultural views of individuals with disabilities. An evaluation of SE is important so that teachers could have the option of developing it through the organisation of various seminars from the field of adapted physical activity and inclusion. Therefore, the aim of this pilot study is to determine the SE of PE teachers in the process of inclusion of children with physical disabilities, intellectual disabilities, and visual impairment in Niš.

METHODS

The Sample of Participants

The study included 38 PE teachers of both genders, working in elementary schools on the territory of the city of Niš. The youngest teacher was 28, and the oldest was sixty-four-years-old. Their average age was 50.89 ± 10.56 years. When it comes to their teaching experience, it ranged between at least 2 and 36 years of experience, at most.

The Sample of Measuring Instruments

To evaluate SE, the *Situational-specific Self-Efficacy and Physical Educators Scale* was used, developed by Block et al. (2013). Exploratory factor analyses' item loadings range between 0.53 and 0.91. Also, the scale has a high Cronbach's alpha reliability, for ID (0.86), for PD (0.90), and for VI (0.92). The quality of this questionnaire is reflected in the option of viewing the SE of PE teachers when working with children with various forms of disabilities, that is, physical disability (PD), intellectual disability (ID), and visual impairment (VI).

The translated Serbian version of this questionnaire was already used in the study of Jovanović et al. (2014). The translation of the questionnaire from English into Serbian was achieved using the back-translation technique (Brislin, 1986).

The questionnaire begins with general instructions, and an explanation of the theory of SE and the way the answers should be given. It consists of four parts. The first part consists of a description of the questions related to the adaptation of schoolchildren with ID who attend physical education classes, and has 11 questions. The second part refers to PD, and consists of 12 items, referrede third part refers to school children with VI, and consists of 10 questions. The questionnaire ends with a fourth part which includes demographic questions, based on which certain comparisons can be made. The scale used for rating each question ranges from 1 to 5: 1 = no confidence; 2 = low confidence; 3 = moderate confidence; 4 = high confidence; and 5 = complete confidence.

Statistical Analysis

For the obtained results of the descriptive statistic parameters, the following was calculated: the mean value (Mean), standard deviation (SD), the minimum result (Min), and the maximum result (Max). To determine the statistically significant difference in the SE of the teachers based on the type of disability, the Friedman test was used. To determine the difference in SE based on gender and teaching experience, the Mann-Whitney U-test was used. The statistical significance was set at $p < 0.05$.

The data was processed in the statistical analysis program of the IBM Corp., released in 2010 (IBM SPSS Statistics for Windows, Version 19.0. Armonk, NY: IBM Corp.).

RESULTS

Descriptive statistics for the evaluation of SE in relation to the type of disability, and the results of the Friedman test are shown in Table 1. The total mean value for the SE of the teachers was 3.70. By analysing the results based on the type of disability, the values of the arithmetic means indicate that PE teachers have the highest perception of their SE in the case of ID (3.77), while they are least sure of their SE when it comes to the inclusion of students with VI in physical education (3.60).

Table 1. The descriptive statistics and the results of the Friedman test for the differences in SE in relation to the type of disability

Subscale	Mean	SD	Min	Max
ID	3.77	0.76	1.82	4.82
PD	3.71	0.81	1.83	4.83
VI	3.60	0.72	2.00	4.70
Overall	3.70	0.70	1.94	4.67
Chi-Square=0.55, df=2, p = 0.76				

Legend: ID - Intellectual disability; PD - Physical disability; VI – visual impairment

The results indicate that the difference obtained in the evaluation of the SE of the PE teachers in relation to the type of disability was not statistically significant (p = 0.76).

The means of the responses relating to the evaluation of SE (Table 2) indicate that teachers have a moderate SE regardless of gender, although the value is slightly higher for men. The SE of the group of male PE teachers has a value of 3.81, while SE's value for the group of female PE teachers is 3.36.

Table 2. The descriptive statistics and results of the Mann-Whitney U test for the differences in SE in relation to the gender of the PE teachers

	Men				Women					
Subscale	Mean	SD	Min	Max	Mean	SD	Min	Max	Z	P
ID	3.86	0.65	1.82	4.82	3.43	1.07	2.18	4.82	-0.764	0.445
PD	3.88	0.68	2.00	4.83	3.15	1.08	1.83	4.67	-1.871	0.061
VI	3.66	0.66	2.00	4.60	3.54	0.82	2.40	4.70	-0.459	0.646
Overall	3.81	0.60	1.94	4.58	3.36	0.94	2.12	4.67	-1.314	0.189

Legend: ID - Intellectual disability; PD - Physical disability; VI – visual impairment

By analysing the results in relation to the type of disability, the male PE teachers also had higher results compared to the female ones. The results of the Mann-Whitney U-test (Table 2) indicate that the noted difference in SE in relation to the gender of the PE teachers is not statistically significant ($p = 0.189$).

Both groups of PE teachers, divided based on their teaching experience (Table 3), have moderate SE. For the group with a teaching experience of less than 20 years, SE is 3.72, while it is 3.68 for the group with a teaching experience greater than 21 years. An analysis based on the subscales for ID, PD, and VI also determined that both groups have moderate SE.

Table 3. The descriptive statistics and the results of the Mann-Whitney U test for the differences in SE in relation to teaching experience

	Teaching experience < 20 years				Teaching experience > 21					
Subscale	Mean	SD	Min	Max	Mean	SD	Min	Max	Z	P
ID	3.78	0.72	2.27	4.82	3.78	0.86	1.82	4.82	-0.133	0.894
PD	3.64	0.82	1.83	4.83	3.77	0.87	1.83	4.83	-0.550	0.582
VI	3.77	0.68	2.40	4.70	3.47	0.72	2.00	4.40	-1.214	0.225
Overall	3.72	0.68	2.15	4.67	3.68	0.77	1.94	4.55	-0.38	0.970

Legend: ID - Intellectual disability; PD - Physical disability; VI – visual impairment

The results of the Mann-Whitney U-test indicate that there is no statistically significant difference in SE in relation to the duration of teaching experience (Table 3), as regards the overall results of the questionnaire ($p = 0.970$), or the subscale for the type of disability.

DISCUSSION

The study aimed to determine the SE of PE teachers toward the inclusion of children with PD, ID, and VI in Niš.

The obtained mean value for the teachers' SE (Table 1) is 3.70, which indicates a moderate level of SE of the tested elementary school PE teachers in Niš. The same level of SE of the PE teachers (3.03 and 3.09) was noted in studies (Reina et al., 2019; Selickaite et al., 2019) carried out in Spain and Lithuania, which also involved elementary school PE teachers. In addition, a moderate SE was noted in the study of Reina et al. (2016). When it comes to studies where SE was evaluated among students of various study programmes at faculties of sport and physical education, the obtained average values for the evaluation of SE were also moderate (Jovanović et al., 2014; Taliaferro et al., 2015; Alhumaid et al., 2020; Wang et al., 2020), and the values were similar to those obtained in our study.

By analysing the values obtained based on the type of disability (Table 1), PE teachers showed a higher level of SE, or certainty in their theoretical and practical knowledge, as well as their ability to successfully incorporate inclusion into their physical education programme for children with ID (3.77), followed by PD (3.71), and finally VI (3.60). The differences obtained are not statistically significant, which is indicated by the results of the Friedman test ($p = 0.76$). These results coincide with the results determined in other studies (Reina et al., 2019; Selickaite et al., 2019). In the aforementioned studies, PE teachers also had the lowest evaluation of their SE when it comes to VI. Contrary to our study, where the mean value for the subscale of VI was 3.60, which indicates a moderate SE; in the previous 2 studies it had a value of 2.84 and 2.86, respectively. In a study conducted by Antala et al. (2022), the lowest SE was also determined for VI (3.15), whereby this difference in SE in relation to the type of disability was also statistically significant. The results of Reina et al. (2016) indicate that, irrespective of whether PE teachers had previous training experiences in physical activities and/or sports for people with disabilities, the lowest SE was noted for VI (3.1 and 28), while the highest scores for SE were determined for ID (3.6 and 3.1). In addition, irrespective of whether PE teachers had previous contact with people with disabilities, the lowest result for SE was noted for VI (3.0 and 2.7).

Even though statistically significant differences were not noted, based on the obtained results, it can clearly be seen that the teachers exhibit the lowest SE when it comes to organising classes of PE for children with VI. One of the possible reasons is that there are few children with VI, especially those who attend regular schools. This has a negative impact on the experience and knowledge of teachers regarding the way in which to demonstrate a movement or exercise to children with VI. This also includes adapting exercises for a child who does not have visual perception. However, this can change by organising seminars or courses during which teachers would learn techniques for teaching children with VI motor tasks, such as tactile modelling and physical guidance (Jorgić, Aleksandrović, Mirić, Čolović & Dimitrijević, 2020).

Differences in SE in Relation to Gender

In this study, based on the results obtained, the male PE teachers indicated a higher level of SE compared to the female PE teachers as regards the total results of the questionnaire (3.81 vs. 3.36, respectively). Furthermore, they also indicated higher results as regards the subscales for all three types of disability: ID (3.86 vs. 3.43), PD (3.88 vs. 3.15), and VI (3.66 vs. 3.54). The results obtained were not statistically significant. In terms of SE, the greatest difference was noted for PD, in favour of the male PE teachers. A possible reason for this is the lower trust that female PE teachers have in their physical strength in case they need to move (lift

or lower) parts of the bodies (arms, legs or the entire body) of children with PD during physical education classes, when performing exercises, or when testing motor skills. The results obtained at the level of Serbia as a country can be compared only to the study of Jovanović et al. (2014). In that study, no differences were noted for SE in relation to gender when it comes to the overall sample of students of the three largest faculties of sports and physical education in Serbia.

By comparing our results with those of other studies which also focused on PE teachers, it could be said that the results differ in relation to gender. Results that coincide with those of our study were obtained by Teng et al. (2021), who also determined that the gender of teachers has no impact on SE. Contrary to the findings of our and the aforementioned study, Alhumaid (2021) determined that male PE teachers do have a statistically higher level of SE by analysing the differences in SE in relation to gender in the case of the inclusion of children with autism spectrum disorders. When explaining these results, he claimed that the reason could be found in the fact that female PE teachers have less experience teaching inclusive PE classes in Saudi Arabia. Contrary to his study, Hutzler et al. (2017a) determined that female PE teachers have a statistically greater SE compared to male PE teachers. The differences were determined for all three disabilities: ID (3.61 vs. 2.95), PD (3.71 vs. 2.92), and VI (3.31 vs. 2.37). The authors explained these results by the fact that male PE teachers are more conservative and more authoritative, which represents a problem when it comes to including a child with a disability into regular physical education classes. Still, the results of a greater number of studies, when it comes to the impact of gender on SE, point to a lack of differences in SE both between male and female PE teachers and male and female PE students (Hutzler, et al., 2005; Jovanović et al., 2014; Wang, & Liu, 2017; Wang et al., 2020; Teng et al., 2021).

Differences in SE in Relation to Teaching Experience

In the current study, it was determined that PE teachers, irrespective of their teaching experience, have a moderate SE, whereby teachers with a teaching experience shorter than 20 years have somewhat higher values (3.72) compared to teachers with a longer teaching experience (3.68). When the results were analysed, based on the type of disability and in the case of ID, both groups of teachers were found to have the same level of SE (3.78). Teachers with lower levels of teaching experience have better results when it comes to VI (3.77 vs. 3.47). In the case of PD, the situation is reversed. In other words, better results were noted for teachers with more teaching experience (3.77 vs. 3.64). As regards both the total result for the entire scale and the subscales, based on type of disability, there are no statistically significant differences in relation to

teaching experience. Similar to the results obtained in our study, Antala et al. (2022) also did not determine statistically significant differences in the evaluation of SE in relation to teaching experience as regards ID, PD, and VI. Furthermore, the impact of teaching experience on SE was not determined even in the case of the inclusion of children with autism (Alhumaid, 2021). Hutzler et al. (2017a) determined that there were differences in the evaluation of SE in relation to teaching experience. In their study, this difference was noted between PE teachers with a teaching experience of less than 5 years and the other teachers, who were divided into groups based on the duration of their teaching experience. If we are to compare this with the results of our study, we can conclude that no difference can be noted between teachers with a teaching experience greater than 21 years, and those with a teaching experience of fewer than 20 years. The development of inclusion in Serbia officially began, or was regulated by the Law on the Fundamentals of Education, in 2009 (Rončević, & Antić, 2018). In that sense, future studies should divide teaching experience into a period which would begin with the very beginning of the introduction of inclusion and end with the moment of the study's realisation, with the aim of obtaining most precise results. However, by analysing the results obtained in the aforementioned studies, it can be assumed that teaching experience does not have a significant impact on the SE of PE teachers. Factors which are more specifically determined when it comes to adaptive physical activity and inclusion in physical education classes may have a more important impact. This certainly refers to factors such as completed courses in adaptive physical exercise, followed by courses related to adaptive physical activity taken during regular study at university, teaching experience involving students with disabilities, and so on. This is congruent with the findings of other studies (Hutzler et al., 2017a; Alhumaid, 2021; Antala et al., 2022) which determined that previous teaching experience involving children with disabilities, and completed academic or additional courses in adaptive physical exercise have a positive effect on increasing the level of SE.

CONCLUSION

Based on the analysis of the existing literature, this study is among the first to analyse the SE of PE teachers in the inclusive education setting for children with ID, PD, and VI from Niš. The results obtained indicate that PE teachers in elementary schools on the territory of the city of Niš have moderate SE in the process of inclusion of children with disabilities in regular physical education classes (3.70). In addition, moderate values of SE were also noted in relation to the type of disability: ID = 3.77, PD = 3.71, and VI = 3.60. Of the factors which can impact SE, gender and teaching experience were also studied. The obtained results showed that

these two factors do not impact the level of SE among PE teachers. Considering the fact that this was a pilot study, there are limiting factors to be considered. They primarily refer to the fact that future studies need to increase the size of the sample so that it also includes PE teachers from other parts of Serbia, not only from Niš. In addition, future studies will also need to study other factors which could impact SE, such as teaching experience involving children with disabilities, private relationships with individuals and children with disabilities, attending courses on the physical exercise of children and individuals with disabilities, such as adaptive physical activity, during their education, along with attending additional seminars, and practice in the field of adaptive physical exercise. Based on the obtained results and their analysis, it can be assumed that it is possible to successfully carry out inclusion in physical education classes, at least when we take into consideration the evaluation of SE of PE teachers.

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САМОЕФИКАСНОСТ НАСТАВНИКА У ПРИМЕНИ ИНКЛУЗИЈЕ НА ЧАСОВИМА ФИЗИЧКОГ ВАСПИТАЊА

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Резиме

Инклузија у физичким активностима треба да омогући свим појединцима, без обзира на њихове способности, да учествују у физичким активностима у истом окружењу као њихови вршњаци, уз индивидуализовану подршку и пажњу.

Самоефикасност представља важан предиктор за успешно спровођење инклузивне наставе. Због тога постоји потреба за њено утврђивање код наставника физичког васпитања у Србији с обзиром на повећање броја деце са инвалидитетом у редовној настави. С тим у вези, циљ овог пилот истраживања је да утврди самоефикасност наставника физичког васпитања у примени инклузије код деце са физичким, интелектуалним и визуелним инвалидитетом у Нишу. Истраживање је спроведено на узорку од 38 наставника физичког васпитања који раде у основним школама у Нишу. Њихова просечна старост је износила 50.89 ± 10.56 година. За процену самоефикасности коришћена је српска верзија упитника Ситуациона самоефикасност и инклузија ученика са инвалидитетом у физичком васпитању. За утврђивање статистички значајне разлике у самоефикасности наставника у односу на врсту инвалидитета коришћен је Фридманов тест. За утврђивање разлике у самоефикасности у односу на пол и радни стаж коришћен је Мен-Витнијев тест. Добијени резултат за самоефикасност наставника за цео упитник је износио 3.70. Посматрајући добијене вредности у односу на врсту инвалидитета, наставници су показали највећи ниво сигурности у своја знања и способност у спровођењу инклузије у настави физичког васпитања код деце са интелектуалним инвалидитетом (3,77), затим код деце са физичким инвалидитетом (3,71), и на крају код деце са визуелним инвалидитетом (3,60). Добијене разлике нису биле и статистички значајне (п = 0.76). Посматрајући резултате у односу на пол, наставници су показали већи ниво самоефикасности у односу на наставнице у укупном резултату упитника (3.81 у насупрот 3.36). Такође, више резултате су имали и када су у питању подскале за сва три облика инвалидитета: интелектуални (3.86 насупрот 3.43), физички (3.88 насупрот 3.15) и визуелни (3.66 насупрот 3.54). Добијене разлике нису биле и статистички значајне. Наставници физичког васпитања, без обзира на радни стаж, имају умерену самоефикасност, при чему наставници са радним стажом краћим од 20 година имају нешто веће вредности (3.72 насупрот 3.68). Посматрајући резултате посебно, по врсти инвалидитета, код интелектуалног инвалидитета и једна и друга група наставника има исти ниво самоефикасноти (3.78). Наставници са мањим радним стажом имају боље резултате када је у питању визуелни инвалидитет (3.77 насупрот 3.47), док код физичког инвалидитета боље резултате имају наставници са више радног искуства (3.77 напротив 3.64). Као и код укупног резултата за целу скалу, тако и код подскала у односу на врсту инвалидитета нема статистички значајних разлика у односу на радни стаж. С обзиром да се ради о пилот истраживању, за наредно истраживање потребно је повећати број испитаника како би се обухватили наставници не само из Ниша већ и из осталих крајева Србије. Поред тога потребно је истражити и друге факторе који могу имати утицај на самоефикасност, као што су познанство и искуство у раду са децом са инвалидитетом, формално образовање из области адаптираног физичког вежбања, и додатни семинари и пракса, такође из ове области. На основу добијених резултата и њихове анализе, може се претпоставити да је могуће успешно спроводити инклузију у настави физичког васпитања, барем када се узме у обзир процена самоефикасности наставника физичког васпитања.

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THE EFFECTS OF RESISTANCE TRAINING ON IMPROVING THE QUALITY OF LIFE OF INSTITUTIONALISED OLDER ADULTS

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Abstract

The aging of the population represents one of the biggest challenges that modern society is facing, which has resulted in the world's scientific community showing increasing interest in health and quality of life. The aim of this research was to determine the effects of resistance training with elastic bands on improving the quality of life of institutionalised older adults. The study included 22 older adults who were divided into two groups: the experimental group (n=13), and the control group (n=9). The research results indicate that programmed resistance training with elastic bands is an effective tool in improving and advancing the quality of life of institutionalised persons, specifically in relation to physical functioning, energy/fatigue, emotional well-being, social functioning, pain, and general health, in favour of the experimental group of subjects.

Key words: effects of resistance training, elastic bands, quality of life, older adults, gerontological centre.

ЕФЕКТИ ТРЕНИНГА СНАГЕ СА ОПТЕРЕЋЕЊЕМ НА УНАПРЕЂЕЊЕ КВАЛИТЕТА ЖИВОТА КОД ИНСТИТУЦИОНАЛИЗОВАНИХ ОСОБА ТРЕЋЕГ ЖИВОТНОГ ДОБА

Апстракт

Старење становништва представља један од највећих изазова са којим се савремено друштво сусреће, што као последицу има и све чешћа интересовања светске научне заједнице за здравље и квалитет живота. Циљ овог истраживања је да утврди ефекте тренинга снаге са еластичним тракама на унапређење квали-

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тета живота институционализованих особа трећег животног доба. У истраживању је учествовало 22 старијих испитаника подељених у две групе: експерименталну (н=13) и контролну (н=9). Резултати истраживања указују да је програмиран тренинг снаге са оптерећењем са еластичним тракама ефикасно средство у побољшању и унапређењу квалитета живота код институционализованих особа трећег животног доба, посебно у димензијама: физичко функционисање, енергија/умор, емоционално благостање, социјално функционисање, и бол и генерално здравље, у корист експерименталне групе испитаника.

Кључне речи: ефекти тренинга снаге са оптерећењем, еластичне траке, квалитет живота, особе трећег животног доба, геронтолошки центар.

INTRODUCTION

Quality of life has become one of the central topics for understanding the impact of chronic diseases, and for monitoring general well-being in the elderly population. Quality of life refers to a multidimensional construct that includes the physical, emotional, and social components of life (Rejeski & Mihalko, 2001; Drljan, Vuković, Dragaš Latas & Mihajlović, 2021). Health-related quality of life is based on the World Health Organization's definition of health as a state of complete physical, mental, and social well-being, and not merely the absence of disease or infirmity (WHO Constitution, 1948). Health-related quality of life refers to a person's overall psychological, social, and spiritual state, including physical and social functioning, emotional well-being, activity, and individual perception of health (Acree, Longfors, Fjeldstad, S., Fjeldstad, C., Schank, Nickel, Montgomery & Gardner, 2006). In older adults, many factors (family ties, social contacts and activities, functional abilities, and health status) are taken into account when assessing the quality of life (Farquhar, 1995). Research (Wanderley, Silva, Marques, Oliveira, Mota, & Carvalho, 2011) recorded that 41.4% of people over 65 years characterised their health condition and quality of life as bad, or even very bad. In the same research, it is noted that 46.9% of the elderly population experience a reduction or loss of functional abilities. Quality of life is considered a significant indicator of subjective health and well-being assessment, and represents a significant supplement to biomedical health status parameters. The subjective experience of health and quality of life generates significant health information, both for the individual and in general, and represents a significant predictor of mortality, especially in regards to the elderly population (Lima, Barros, César, Goldbaum, Carandina & Ciconelli, 2009). Most of the research on the relationship between physical activity and quality of life has focused on activities aimed at improving endurance and cardiorespiratory fitness rather than strength training. However, the importance of strength training is emphasised in most global guidelines, which recommend strength training for adults twice a week to improve their quality of life and health (Chodzko-Zajko, Proctor, Fiata-

rone, Minson, Nigg, Salem, & Skinner, 2009). Research that dealt with this topic, conducted on a sample of older adults, showed that resistance training has significant benefits for the quality of life (Yasunaga, Watanabe, Park, Shepard, & Aoyagi, 2006; Bize, Johnson & Plotnikoff, 2007; Revnic, C., Nica & Revnic, F., 2007). Resistance strength training is associated with quality of life in older adults by improving physiological and psychological functioning (Sillanpaa, Hakkinen, K., Holviala & Hakkinen, A., 2012; Cassilhas, Viana, Grassmann, Santos, T., Santos, F., Tufik & Mello, 2007). The authors of a systematic review that focused on physical activity and quality of life stated the need for more research on the quality of life of older people and on different types of physical activity, especially the connection between physical activity and each of the different fields of quality of life (Bize et al, 2007). There is a specific need for more research, especially on resistance training and quality of life, because understanding how resistance training generally and specifically affects the various parameters of quality of life is an important indicator for promoting the health of third age people. Healthy aging, or active aging, is a term that describes the importance of the quality of life in the older population, and all the necessary elements that contribute to quality living, and not mere survival in the third age (Rowe & Kahn, 1987; Spirduso, 1995). The active life span in third age people can be defined as a life span without disability affecting the activities of daily life (Spirduso, 1995). The mechanisms of active aging include preservation of normal functioning through physical activity, and appropriate nutrition, but also various interventions aimed at compensating weakened functions, avoiding risky behaviour, and permanently strengthening social support. Today, the focus of science is on delaying the aging process, slowing down the loss of abilities, preserving abilities while performing work activities, and preserving independence and self-sufficiency in the daily activities of older adults, with projections of maintaining such a trend in the coming decades. A decrease in muscle strength and skeletal muscle mass during the process of aging are the two most common, significant changes of this process, so maintaining muscle mass and strength is considered to be the basic component of health, functional autonomy, and quality of life in old age (Manini & Clark, 2012). During the last few decades, numerous studies have been conducted on the effects of different strength training modalities on the health status and functionality parameters. Resistance exercise has been shown to increase strength and, consequently, improve age-related dysfunctions in terms of functional capacity and quality of life (Frontera, Meredith, O'Reilly, Knuttgen & Evans, 1988; Ades, Savage, Brochu, Tischler, Lee Poehlman, 2005; Bautmans, Njemin, Vasseur, Chabert, Moens, Demanet, & Mets, 2005; Binder, Yarasheski, Steger-May, Sinacore, Brown, Schechtman & Holloszy, 2005; Ribeiro, Schoenfeld, Fleck, Pina, Nascimento & Cyrino, 2017). External

resistance training and balance exercises benefit older adults; however, only resistance training results in gaining muscle strength and muscle mass (Lloyd & Faigenbaum, 2016). Resistance training with elastic bands has been widely accepted by older adults (Fahlman, Mcnerin, Boardley & Morgan, 2011), and has been shown to provide significant beneficial effects in the parameters of functionality and quality of life (Martins, Safons, Bottaro, Blasczyk, Diniz, Fonseca, Bonini-Rocha & de Oliveira, 2015), which is proven through research (Liao, Tsauo, Huang, Ku, Hsiao & Liou, 2018; Rieping, Furtado, Letieri, Uba-Chupel, Colado & Hogervorts, 2019). Therefore, resistance training with elastic bands represents the easiest and safest way for older adults to exercise for several reasons: it is highly applicable; it offers a wide variety of exercises; it is safe to use; it is cheap; and it is very practical.

METHOD

Sample

The sample of respondents included 22 people aged over 65 from the gerontological centre in Novi Sad (Autonomous province of Vojvodina, Serbia). The subjects were divided into two groups: the experimental group (n=13) and the control group (n=9). The experimental group was subjected to resistance training with elastic bands for 12 weeks, while the control group had a normal lifestyle without programmed physical activity. All subjects were healthy and voluntarily participated in the research. The structure of the sample in relation to gender and group affiliation is shown in Table 1.

Table 1. The structure of the sample in relation to gender and group affiliation

Gender	Group		Total
	Experimental	Control	
Male	2	2	4
Female	11	7	18
Total	13	9	22

Questionnaire

The SF-36 questionnaire represents a theoretically based and scientifically proven operationalisation of two general components that describe the concept of health – physical

health (physical functioning, role limitations due to physical functioning, pain, general health), and mental health (energy vs. fatigue, social functioning, role limitation due to emotional problems and emotional

well-being) (Ware & Sherbourne, 1992). Each answer should be recalculated according to the scoring instructions, on a numbering scale from 0 to 100. After that, the rescaled responses are summed according to the key to obtain scores on the questionnaire subscales.

Training

The experimental group underwent resistance training with elastic bands for 12 weeks. The training sessions consisted of five to ten minutes of warm-up with stretching, 35 to 40 minutes of working with an elastic band, and about ten minutes of cooling down, which included breathing and mobility exercises. The structured resistance training programme consisted of standardised volume (12 to 15 repetitions of two sets), rest between sets (1 min), frequency (2 times per week), and tempo of exercise performance (2:0 in an eccentric, and 2:0 concentric mode of work). The order of the exercises was changed every week in order to maintain the motivation level of the subjects. General resistance training recommendations for older adults are shown in Table 2.

Table 2. General resistance training recommendations for older adults

Program variable	Recommendation	Details
Sets	1-3 sets per exercise, per muscle group	1 set for beginner older adults with an increase to more sets (2 set) per exercise. Rest between sets 1 min.
Volume	12-15	Perform 12-15 repetitions with a relative load in healthy and fit older adults.
Intensity	70-85 % od 1RM	Start with a low load with a progressive increase to 70-85% of 1 RM. Low loads are recommended for beginners, that is, individuals or for people with special conditions such as cardiovascular diseases and osteoporosis. Exercises should be performed in the intensity zone where repetition is possible while avoiding fatigue in order to reduce the load on the wrists.
Exercises	8-10 different exercise	Engage major muscle groups through targeted different wrists (eg. exercises for shoulders, triceps extension, biceps curl, lower back extension, sit-ups, leg curl, lifting on toes)
Modality	With elastic bands	For beginner older adults or those with functional limitation, elastic band exercises and isometric exercises can be beneficial.
Frequency	2 times per week	Exercising 2 non-consecutive days a week
Functional exercise	Exercises imitating everyday life activities	Older adults benefit from performing dynamic movements/exercises

Data Processing Methods

The effects of resistance training with elastic bands on improving the quality of life of institutionalised older adults were tested using split-plot ANOVA (mixed design analysis of variance). The measurement point was a within-group factor, while group membership was a between-group factor. The dependent variables were scores on the eight dimensions of the SF-36 questionnaire. The effects of the interactions between the measurement point and the group were tested for the effects of training. The statistical data analysis was done within the SPSS 20 statistical software for data processing.

RESULTS

The results are presented as the mean ± standard deviation. Each variable was tested for normality of distribution with the Shapiro-Wilk test, and, as all variables were normally distributed, parametric statistics were used.

Table 3 shows the average values of body mass and height, as well as the body mass index to describe the sample. Also shown are the differences in the effects of resistance training on improving the quality of life of institutionalised older adults, in relation to body composition indicators, body height, body weight, and body mass index, as regards the group and the initial and final measurements. The interaction effect of the group and measurement point was tested with the F test. The value of the F test is shown together with statistical significance in Table 3. Based on the obtained results, it can be seen that the average observed values of the experimental and control groups do not deviate from normal values. However, according to the classification of the World Health Organization, in terms of the body mass index, both groups are in the pre-obese category (Consultation, W. H. O., 2000). Also, the results show that the values for body mass index and body mass increased statistically significantly after the experimental programme, in favour of the control group of

Table 3. Anthropometric characteristics and the effects of interactions between the measurement point and group membership

Variable	Experimental		Control		Interaction	
	Baseline M ± SD	Final M ± SD	Baseline M ± SD	Final M ± SD	*F*	*p*
Height	157.5 ± 8.1	/	155.6 ± 7.9	/	0.24	0.53
Weight	67.82 ± 11.2	67.3 ±11.5	69.8 ± 18.5	71.0 ± 18.8	5.45	**0.03**
BMI	27.5 ± 5.2	27.3 ± 5.4	28.8 ± 7.3	29.3 ± 7.5	5.79	**0.03**

Notes: F – f test for interaction of training groups and measurement points; p – significance; M – mean; SD – standard deviation; BMI – body mass index

subjects who did not exercise. It can be said that this risk factor was controlled in the experimental group, whose members exercised regularly. An applied programme of resistance training in institutionalised older adults can significantly affect the maintenance, control, and reduction of body mass and the body mass index in the observed sample of respondents.

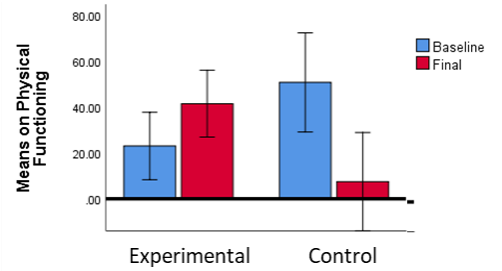
Table 3 shows the descriptive indicators of values for all dimensions for the experimental group and control groups in relation to the initial and final measurement points. The interaction effect of the group and the measurement point was tested using the F test. The value of this test is shown together with the statistical significance in Table 3. It is eminent that the interaction effects are statistically significant for almost all measured dimensions, except for the dimensions related to the assessment of work limitations due to physical dysfunction and emotional problems. In order to see the trend of changes in each of the groups, group interactions and measurement points are shown in Graphs 1 through 8.

Graph 1 shows the differences in the effects of strength training with a load on improving the quality of life of the control and experimental groups *in relation to the dimension of physical functioning,* as regards the group and the point of measurement. It can be seen that, although, initially, the control group had a higher dimension value, it had significantly lower values of the self-assessment of physical functioning at the final measurement. Also, the experimental group evaluated their physical functioning better at the final measurement. The interaction effect is statistically significant, as shown in Table 4.

Table 4. Effects of resistance training on the quality of life indicators assessed by the SF-36 questionnaire in institutionalised older adults

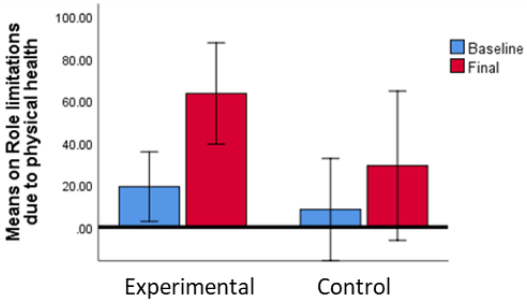
Variable	Experimental		Control		Interaction	
	Baseline M ± SD	Final M ± SD	Baseline M ± SD	Final M ± SD	*F*	*p*
SF-36 dimensions						
Physical functioning	23.1 ± 28.0	41.5 ± 29.1	50.8 ± 16.3	7.5 ± 8.8	32.50	**0.000**
Role limitations due to physical health	19.2 ± 32.5	63.5 ± 39.0	8.3 ± 12.9	29.2 ± 45.9	1.03	0.324
Role limitations due to emotional problems	18.0 ± 32.3	82.1 ± 32.3	0 ± 0	44.4 ± 50.2	0.75	0.398
Emotions/fatigue	43.1 ± 16.1	61.5 ± 17.0	47.5 ± 6.9	31.7 ± 12.9	17.32	**0.001**
Emotional well-being	59.7 ± 17.6	74.8 ± 12.8	62.0 ± 14.3	46.7 ± 10.9	15.20	**0.001**
Social functioning	40.4 ± 19.9	76.0 ± 14.8	58.3 ± 18.8	47.9 ± 14.6	13.79	**0.002**
Pain	50.0 ± 20.8	75.2 ± 15.4	68.3 ± 15.9	55.4 ± 13.5	10.71	**0.004**
General Health	47.3 ± 15.1	57.7 ± 11.5	58.3 ± 7.5	25.0 ± 12.3	25.14	**0.000**

Notes: N – number of participants; F – f test for interaction of training groups and measurement points ; p – significance; M – mean; SD – standard deviation; Experimental – experimental group; Control – control group;

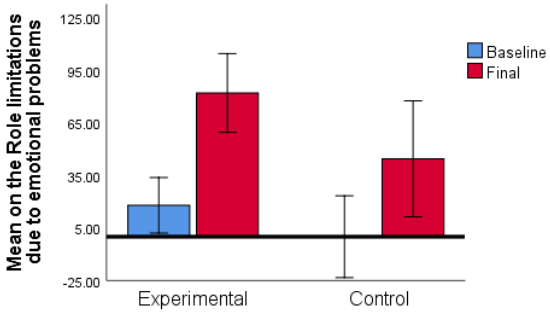


Graph 1. Arithmetic means of Physical functioning in relation to measurement points and group membership

As regards the dimensions of *work limitations due to physical dysfunction and due to emotional problems*, the interaction of group and measurement point was not statistically significant (Table 3). The arithmetic means on these dimensions are shown on Graphs 2 and 3, and it can be seen that both groups rated themselves better at the final measurement. Although the difference between the two measurements was always higher in the experimental group, it was not statistically significant.

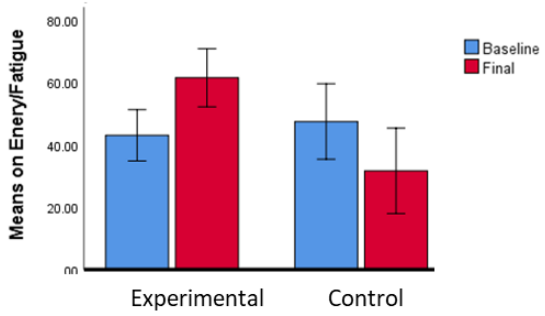


Graph 2. Arithmetic means of Limitations due to physical health in relation to the measurement point and group membership



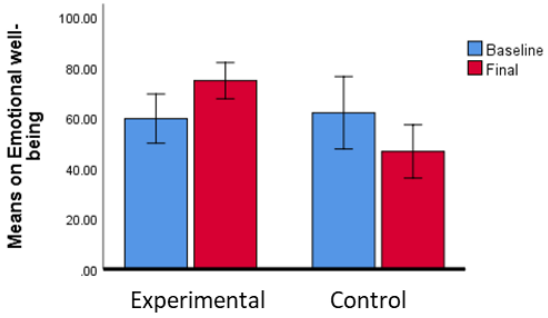
Graph 3. Arithmetic means of Limitations due to emotional problems in relation to the measurement point and group membership

When it comes to assessing how much energy the subjects feel, i.e. how much fatigue they feel, the subjects from the experimental group at the final measurement achieved higher values compared to the control group, which is shown in Graph 4. The interaction of the group in the measurement points is statistically significant, which can be seen in Table 4. Statistically significant findings reveal that the exercise group experienced enhanced well-being, including increased energy levels and reduced fatigue, in comparison to the control group.



Graph 4. Arithmetic means of the Energy/Fatigue dimension in relations to the measurement point and group membership

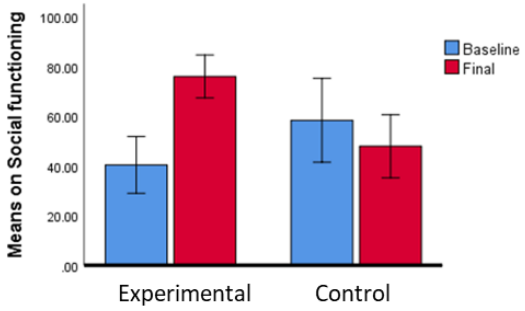
The mean values for emotional well-being are presented in Graph 5. It is noted that subjects from the experimental group were in a better emotional state after strength training, while lower values in this dimension were recorded in the control group. This difference is statistically significant (Table 4).



Graph 5. Arithmetic means of Emotional well-being in relation to the measurement point and group membership

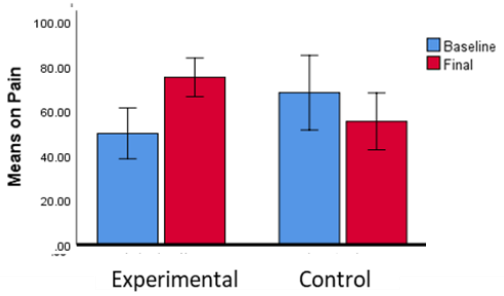
When assessing social functioning, subjects from the experimental group again assessed that they functioned better than the control group. The control group again had lower values on this dimension at the final

measurement. The interaction of the group and the measurement point was statistically significant, which is shown in Table 4. This result indicates that the subjects from the experimental group, feel more emotionally stable and have more energy, and therefore achieve a greater number of social contacts, due to better physical functioning.



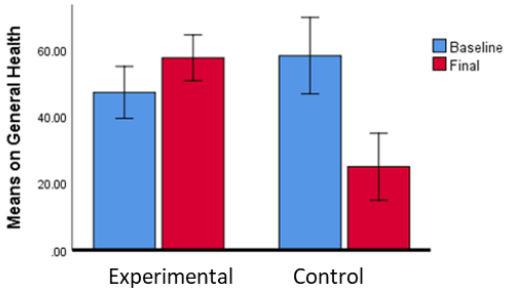
Graph 6. Arithmetic means of Social functioning in relation to the measurement point and group membership

When assessing how much pain they felt, and how much it hindered them in their daily functioning, Graph 7 shows that the experimental group felt significantly better compared to the initial measurement, but also compared to the control group. This group and measurement point interaction is also statistically significant (Table 4).



Graph 7. Arithmetic means of the Pain dimension in relation to the measurement point and group membership

Finally, on the dimension of general health, a statistically significant interaction of group and measurement point was again recorded (Table 4), whereby respondents from the experimental group assessed their general health better than the control group at the final measurement. Graph 8 shows that the subjects in the control group evaluated their health significantly worse at the final measurement.



Graph 8. Arithmetic means of General health in relation to the measurement point and group membership

DISCUSSION

The generally accepted point of view in the professional and scientific community is that the application of strength training with resistance on a sample of third age people has many benefits, and that it significantly improves the general health and physical independence of older adults, but also leads to improvements in a wide range of attributes classified under the term 'quality life' (Liu & Latham, 2009). Physical activity plays a significant role in healthy aging and the promotion of quality of life (Puciato, Borysiuk, & Rozpara 2017; Langhammer, Bergland & Rydwik, 2018). Quality of life is defined in professional and scientific literature as a relevant indicator of the subjective experience of health and well-being, and is considered an important additional tool that, along with traditional biomedical indicators, defines an individual's health status. Quality of life is generally conceptualised as a multidimensional construct that includes individuals' subjective assessments of their physical, psychological, sociological, and functional status (Fayers, Hopwood, Harvey, Girling, Machin & Stephens, 1997). Research has shown that regular exercise significantly improves the quality of life, including dimensions such as physical functioning and emotional well-being (Bize et al, 2007; Mikkelsen, Stojanovska, Polenakovic, Bosevski & Apostopoulos 2017; Brãndao S., Oliveira F., Brãndao S., Silva, Sampaio, Urbano, Soares, Newton Santos Faia, Pasqualotto, Oliveira E., Oliveira R., Pires-Oliveira & Camelier, 2018; Kell & Rula, 2019; Shams, Nobari, Afonso, Abbasi, Mainer-Pardos, Pérez-Gómez, Bayati, Bahrami & Carneiro, 2021). When it comes to the dimensions of psychophysical well-being tested using the SF-36 questionnaire for the assessment of the health-related quality of life, the effects of exercise were checked in relation to self-assessment of physical functioning, work limitations due to physical non-functioning, pain, general health, energy versus fatigue, social functioning, work performance limitations due to emotional problems, and emotional well-

being. Over a period of eight months, a randomised study conducted on a sample of fifty participants tested the effects of strength training and aerobic training on the health-related quality of life, and on body composition and function in older adults. After the study, the score of the *physical role*, and *the general and mental health* HRQoL domains improved compared to the control group. In addition, resistance training effectively reduces body fat and improves older adults' functionality and physical functioning (Wanderley, Oliveira, Marques, Moreira, Oliveira, & Carvalho, 2015). A study conducted between 2008 and 2017 (Hart & Buck, 2019), which analysed these effects in a meta-analysis of the application of RT training, supports the promotion of RT in improving HRQOL in older adults in all domains (physical health, pain, emotional role functions, social functions, physical role functions). The study results showed that, after 12 weeks of resistance training in older men, two dimensions increased significantly during the intervention period: physical role and general health (Haraldstad, Rohde, Stea, Lohne-Seiler, Hetlelid, Paulsen, & Berntsen, 2017). The results of this study indicate the effect of a regular application of RT (resistance training) on the components of quality of life, especially on Physical Functioning, Role Physical, General Health, Vitality, and Mental Health. Even after one year of detraining in older adults who practiced RT earlier, these components decline slower (Inaba, Obuchi, Arai, Satake, & Takahira, 2008). Based on the recent studies mentioned above, which included using RT in older adults, it can be concluded that this type of resistance training with elastic bands significantly affects the components of physical functioning and mental health, which our study confirmed. The shortcomings of the conducted study indicate that a possibly larger sample of subjects is needed, along with a more extended period of RT application, the introduction of some additional experimental programme, such as aerobics, and further measurements related to body fat alterations, if one is to accurately elicit the effects of resistance training and confirm, once again, its effects on the components of health-related quality of life. Therefore, it is recommended that further studies improve the protocol and have a more extended intervention period.

CONCLUSION

After analysing the effects of strength training with resistance on the quality of life of older adults, it can be concluded that the effects of training significantly influenced the improvement of results in favour of the experimental group compared to the control group, which did not exercise. The paper demonstrates that improved physical functioning not only led to enhanced mental well-being but was also supported by the respondents' own experiences. Resistance training with load improved six of the eight life quality dimensions – physical functioning, pain, general

health, energy versus fatigue, social functioning, and emotional well-being, while no statistically significant differences were observed in two dimensions – physical limitations and emotional limitations. In other words, the frequency of physical activity significantly determines the quality of life of older adults. To conclude, this type of resistance training is highly beneficial for older adults, taking into account all the parameters of quality of life, and is highly recommended for all people in this age group.

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ЕФЕКТИ ТРЕНИНГА СНАГЕ СА ОПТЕРЕЋЕЊЕМ НА УНАПРЕЂЕЊЕ КВАЛИТЕТА ЖИВОТА КОД ИНСТИТУЦИОНАЛИЗОВАНИХ ОСОБА ТРЕЋЕГ ЖИВОТНОГ ДОБА

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Резиме

Двадесети век је окарактерисан као век пораста светског становништва, а 21. век је окарактерисан као век старења. Према пројекцијама Уједињених нација, број особа преко 60 година старости биће и више него удвостручен до 2050. године, са садашњих 840 милиона на преко 2 милијарде људи. Управо тај процес старења становништва представљаће један од највећих изазова са којим се савремено друштво сусреће, што последично у жижу светске заједнице ставља и питања у вези са квалитетом живота и функционалношћу ове растуће популације. Још је у доба античке Грчке Хипократ, отац савремене медицине, често истицао у својој лекарској пракси да сваки телесни сегмент који је физички активан остаје здрав, развијен и спорије стари. Гледајући хронолошки, од најранијих периода до данас, постоји велики број препорука и темељних научних доказа да редовна физичка активност доприноси целокупној популацији на очувању и побољшању здравља и квалитета живота. Стога, главна сврха овог истраживања било је управо укључивање особа трећег животног доба у тренинг снаге са оптерећењем у циљу побољшавања квалитета живота. Узорак испитаника обухватао је 22 особе старије од 65 година из Геронтолошког центра у Новом Саду (Војводина, Србија). Испитаници су били подељени у две групе: експерименталну и контролну. Експериментална група била је подвргнута тренингу снаге са еластичним тракама у трајању од 12 недеља, док је контролна група имала уобичајени начин живота, без програмиране физичке активности. Сви испитаници су били здрави и добровољно су учествовали у истраживању. У истраживању је коришћен стандардизовани упитник SF-36, који представља теоријски утемељену и научно проверену операционализацију две генералне компоненте које описују концепт здравља и квалитет живота – физичко здравље (физичко функционисање, ограничења обављања послова услед физичког нефункционисања, бол, генерално здравље) и ментално здравље (енергија наспрам замора, социјално функционисање, ограничење обављања послова услед емоционалних проблема и емоционално благостање. Анализирајући утицај тренинга снаге на квалитет живота, у овом истраживању је утврђено да је примена тренинга снаге са оптерећењем произвела значајне позитивне ефекте на шест од осам димензија квалитета живота, и то на физичко функционисање, бол, генерално здравље, енергију наспрам замора, социјално функционисање и емоционално благостање, док у свега две димензије квалитета живота – ограничења при обављању послова услед физичког нефункционисања и ограничење при обављању послова услед емоционалних проблема – нисмо добили статистички значајну разлику, што и доказују резултати ове наше студије. На крају, може се свеукупно констатовати да је тренинг снаге са оптерећењем на популацији институционализованих особа трећег животног доба, изузетно ефикасан и доводи до значајног пораста и побољшања у димензијама које детерминишу квалитет живота.

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THE PREDICTIVE RELATIONSHIP BETWEEN COPING MECHANISMS AND SELF-EFFICACY IN ADOLESCENT ATHLETES

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Abstract

In sport psychology, coping with challenges is critical to the success and well-being of athletes. Self-efficacy, as one of the most important features of successful athletes, plays a significant role in designing their training and development programmes. The goal of this exploratory research was to examine and determine whether and how coping strategies for stressful situations can be used as predictors of the psychological factor of self-efficacy in adolescent athletes. The total sample of participants in this study consists of 167 adolescent athletes, that is, 90 boys and 77 girls. Variables in the research were operationalised using appropriate instruments. Statistical techniques for data processing used in this research were the Pearson correlation coefficient and multiple regression. The most important findings of the study include a statistically significant model that can explain 28.6% of the variance for the criterion in the sample of respondents. Task- and emotion-oriented coping mechanisms were identified as statistically significant predictors. Self-efficacy was higher in athletes with higher task orientation, and lower in those with emotion orientation.

Key words: young athletes, performance, anticipating self-efficacy, coping skills.

ПРЕДИКТИВНИ ОДНОС КОПИНГ МЕХАНИЗАМА И САМОЕФИКАСНОСТИ КОД СПОРТИСТА АДОЛЕСЦЕНАТА

Апстракт

У психологији спорта, управљање изазовима је од кључног значаја за успех и благостање спортиста. Самоефикасност, као један од најважнијих карактеристика успешних спортиста, важан је фактор стратегија у креирању обука и тренинга за развој вештина. Циљ овог експлоративног истраживања је да испита и утврди да ли, и како, стратегије превладавања стресних ситуација предвиђају

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психолошки фактор самоефикасности код спротиста адолесцената. Укупан број испитаника који су учествовали у истраживању износи 167 спортиста адолесцената, од којих је 90 мушког, а 77 женског пола. Варијабле истраживања су операционализоване адекватним инструментима. Статистичке технике за обраду података коришћене у истраживању су Пирсонов коефицијент корелације и вишеструка регресиона анализа. Најважнији закључци који проистичу из резултата истраживања укључују статистички значајан модел којим је могуће предвидети 28.6% варијансе у критеријуму на узорку испитаника. Као статистички значајни предиктори издвојили су се копинг механизми усмерени на задатак и на емоције. Самоефикасност је већа код спортиста са вишим усмерењем на задатак, а мања код усмерености на емоције.

Кључне речи: млади атлетичари, перформансе, предвиђање самоефикасности, вештине превазилажења.

INTRODUCTION

The skill level of an athlete at a specific point of time depends on a number of factors. In addition to physical fitness, determined by age at which training begins, staying committed to training and competition, and certain psychological differences among athletes that can be used to predict performance have been shown by research to be important factors (Daroglou, 2011). Success in high performance sports requires the continuous handling of ever-changing challenges that can interfere with an athlete's pursuit of excellence, as well as his or her general physical and psychological well-being (Mellalieu & Hanton, 2015). Some of the challenges athletes can encounter include tough opponents, injuries, performance plateaus, performance declines, problems in the coach-athlete relationship, constant media attention, personal and social over-expectations, and organisational policy (Hanton et al., 2005; Mosevich et al., 2013; Nicholls and Polman, 2007). Other agents, such as personal background, cultural context, private life, social relations, and present conditions should not be ignored, because they are also likely to have an impact on the current capacities and resources of an individual and, thus, on the perception and handling of stressful situations. The incapacity of an athlete to cope with stressors is an important determinant that can result in failure and performance decline (Lazarus, 2000). However, experiencing success in coping and self-efficacy can result in a positive impact of stress on performance. Research in stress neurobiology has shown that, though hormones and other physiological agents that contribute to stress effects on the body can have short protective and adaptive effects and can increase the capability of the body to respond to a stressful situation by providing fast, almost instant responses, and by allowing the body to select a proper strategy and restore homeostasis, they can still increase pathophysiology where they are abundant or poorly regulated (Godoy, Rossignoli, Delfino-Pereira, Garcia- Cairasco & de Lima Umeoka, 2018). Some players and

coaches are capable of coping with stressful situations better than others because stress effects on performance depend on athletes' individual differences (Sivrikaya, 2018). Jones (Jones, 1995; after Mitić, 2016) argues that neither positive nor negative effects of stress-induced anxiety are primarily dependent on the intensity of the stressor or the symptoms of anxiety, but on the perception of control over one's own skills and conditions in the environment. One of the key aspects of sport psychology deals with understanding and interpreting the relationship between psychological factors and physical activity, and the success of athletes (Tubić, 2014; Lazarević, 2001; after Mitić, 2016).

It is common knowledge that self-efficacy is one of the primary psychological factors of success. Self-efficacy influences every single aspect of the human endeavour, and is one of the most important features of a successful athlete. The way people perceive their own capabilities of handling various situations has a strong impact on their actual strength in competent coping with challenges and choices. Self-efficacy implies a sense of competence, relevance and capability to cope with life challenges, and it is defined by one's confidence in the ability to perform a successful practical action, or to accomplish a specified result in the case of athletes (Sivrikaya, 2018). Bandura defines self-efficacy as an individual's belief in his or her capacity to execute behaviours necessary to produce specific performance attainments. It is a self-evaluation construct, and a key component of the self-system comprised of the attitudes, abilities and cognitive skills of an individual. High self-efficacy increases the possibility of the successful accomplishment of the given task (Bandura, 1982). Research in sport in general has demonstrated a positive relationship between perceived self-efficacy and sport performance (Mueller, 1992; Weigand & Stockham, 2000; after Mitić, 2016), and indicated its important role in understanding individual differences in the perception of anxiety and stress in athletes (Wittig, Duncan & Schurr, 1987; after Mitić, 2016). Self-efficacy facilitates coping with stress, but also has an impact on the cognitive assessment of the stressful situation (Jerusalem & Schwarzer, 1992; after Mitić, 2016). According to Bandura, the most effective way to strengthen self-efficacy is to witness the improved performance and development of the coping capacity for use in future situations (Bandura, 1977), whereas mastery experiences gained in one situation can help infer our capabilities in other situations (Bandura, Adams, Hardy & Howells, 1980). According to Bandura, self-efficacy affects the decision to initiate a behaviour, the choice of effort, and persistence once the behaviour has been initiated. Bandura and Cervone (1983) argue that self-efficacy most likely affects performance in situations with performance feedback because, in an experiment designed to test this hypothesis, they observed consistent relations between self-efficacy and performance only where knowledge of performance was present. However, further research

has provided support for Garland's cognitive mediation theory (1985) to explain the links between individual task goals and performance, where high performance expectancy can result in higher self-efficacy through various mechanisms (Garland, H., Weinberg, R., Bruya, L. & Jackson, A., 1988). Individuals who set high goals can develop performance strategies that facilitate the accomplishment of higher performance levels (Locke, Shav, Saari & Latham, 1981). Higher goals can lead to higher self-efficacy through wishful thinking (Jones, 1977), where individuals expect what they hope to accomplish. If the task goal is a picture, then it is cognitively available and can serve as an anchor (Tverski & Kahneman, 1974), which results in expectations of higher performance among individuals with higher goals (Garland, H., Weinberg, R., Bruya, L. & Jackson, A., 1988). Therefore, task goals have an influence on task performance, partially through their impact on self-efficacy. Lessening anxiety is also related to increased self-efficacy (Smith, 1989). In general, skills and strategies that maximise self-efficacy expectations should be taken into account in creating coaching and training programmes for athletes.

It has been determined that coping skills, together with self-efficacy, are a strong predictor of performance (Daroglou, G., 2011), and are of the utmost importance in designing personal athletic development programmes, with the purpose of increasing motivation, engagement, resistance to failure and, indirectly, sport performance and the balance between personal and professional life (Cosma, G., Chiracu, A., Stepan, R., Cosma A., Nanu, C. & Păunescu, C., 2020). In sports, common coping strategies include increased effort, search for social support, avoidance, wishful thinking, change in tactics, problem solving, confrontation, arousal and relaxation control, and planning. These and other coping strategies are an integral part of an athlete's overall array of self-regulating actions that facilitate successful adaptation in high performance sport (Mellalieu, S. & Hanton, S., 2015).

Coping is a part of a complex process needed for successful adaptation, and it requires efficient cognitive, behavioural and emotional skills of self-regulation. Lazarus defined coping as constantly changing cognitive and behavioural efforts to manage specific external and/or internal demands that are appraised as taxing or exceeding the resources of the person (Lazarus, 2000; after Cosma, Chiracu, Stepan, Cosma, Nanu & Păunescu, 2020). One critical aspect of the self-regulation process is coping. Although Carver, Scheier and Weintraub argue that "people do not approach each coping context anew, but rather bring to bear a preferred set of coping strategies that remains relatively fixed across time and circumstances" (Carver, Scheier & Weintraub, 1989, p. 270), according to the view of other authors, this includes volitional decisions and actions to cope with demanding situations (Lazarus, 1999; Skinner and Zimmer-Gembeck, 2007; after Mellalieu & Hanton, 2015). In sport psychology, the most outstanding descriptions and definitions of coping include views of features, where they are classi-

fied according to their permanent coping styles (Penley, Tomaka & Wiebe, 2002; after Nicholls & Polman, 2007) and the process (transactional approach) that incorporates interactions between the internal and external demands, that is, beliefs of one's self, goals and values, and the situation (Lazarus, 1999; after Nicholls & Polman, 2007). Mitić quotes the transactional approach of Endler and Parker (Endler & Parker, 1990; after Mitić, 2016), with three coping dimensions, or styles: problem (task)-oriented coping, emotion-oriented coping, and avoidance-oriented coping. Persons who use the problem-oriented coping strategy usually find it easy to adapt, whereas those who use emotion-oriented and avoidance-oriented coping strategies are less adaptive. Cognitive factors and strictly controlled emotions are a characteristic of task-oriented coping aimed at problem solving through cognitive restructuring and situational reconceptualisation. These strategies are used when a situation is perceived as changeable. When a situation is perceived as unchangeable, emotion-oriented coping strategies are used in order to lessen the stress through emotions, with no attempt made to change the situation (Mitić, 2016). Among athletes, the most common coping dimensions are coping with problems and coping with emotions (Nicholls & Polman, 2007; Crocker, Kowalski & Graham, 1998). Less effective forms of coping with stress lead to dropping out of sports (Klint & Weiss, 1986; Smith, 1986; after Nicholls & Polman, 2007), a decline in performance (Lazarus, 2000a; after Nicholls & Polman, 2007), and the termination of one's professional sport career (Holt & Dunn, 2004a; Nicholls & Polman, 2007), which is why it is important for both researchers and coaches working with athletes to better understand coping with stress in sport (Nicholls & Polman, 2007).

Until the 1990s, only few studies demonstrated how much programmes for enhancing coping capacity contributed to overall self-efficacy. However, it is assumed that the most effective conditions among those that can change the level of self-efficacy are the coping experiences that indicate efficient coping behaviours. According to Bandura (Bandura, 1977), the most effective way to strengthen self-efficacy is to witness the improved performance and development of the coping capacity for use in future situations. A number of studies have reported an increase in the internal locus of control in participants who were exposed to interventions designed to help them gain new behavioural competencies (Smith, 1970; Stein & Vallston, 1983; Duckworth, 1983; after Smith, 1989), which is a construct that has a certain degree of conceptual overlapping with general self-efficacy. Smith (Smith, 1989) noticed that previous positive findings regarding the locus of control variable indicate that coping skills training can lead to an increase in general self-efficacy, as well as a shift to the internal locus of control. He argues that higher gains can be expected in generalised self-efficacy rather than in the internal locus of control, to an extent in which the measurement of self-

efficacy is explicitly focused on the measurement of perceived behavioural skills. In his study, conducted on a sample of test-anxious college students, he found that coping skills training that can be generalised results in changes in self-efficacy that go beyond the situations at which specific training programmes are aimed. These findings helped him identify the factors that increase generalised self-efficacy expectancies and influence the stability of such changes, and provide implications and guidelines for further research concerning the effects of coping mechanisms on self-efficacy, which have found their way into practice and confirmed a two-way influence of self-efficacy and coping mechanisms in contextual conditioning.

The Problem and the Aim of the Research

The research problem is related to whether and how, i.e. to what extent, coping mechanisms predict self-efficacy in adolescent athletes. The aim of this research was to examine and determine the predictive relationship between coping mechanisms and self-efficacy in adolescent athletes.

Hypotheses

This research began with the following hypotheses: (H0) there is a statistically significant model of coping mechanisms that can predict self-efficacy in adolescent athletes; (H1) task orientation as a stress coping modality predicts higher self-efficacy in adolescent athletes; (H2) focusing on emotions as a stress coping modality predicts lower self-efficacy in adolescent athletes; and (H3) avoidance orientation (Avoidance and Distraction) as a stress coping modality predicts lower self-efficacy in adolescent athletes.

METHOD

Sample

The structure of the respondents who participated in this research is presented according to gender. The sample of respondents included in this research consists of 167 adolescent athletes, of whom 90 are boys, and 77 are girls. The respondents voluntarily agreed to be interviewed.

Instruments

The questionnaire used was CISS (Endler & Parker, 1990), and more specifically its adaptation by Sorić and Proroković (Sorić & Proroković, 2002). It consists of 48 items to which respondents give answers through a five-point Likert-type scale. There are three subscales: Problem-Focused Coping, Emotion-Focused Coping and Avoidance, which

has its own two subscales (Distraction and Social Diversion). The instrument reliability in this research was verified by calculating Cronbach's alpha coefficient, which is as follows, by subscales: Problem-Focused Coping (16 items, reliability coefficient of 0.78), Emotion-Focused Coping (16 items, reliability coefficient of 0.85), and Avoidance (16 items, reliability coefficient of 0.85), with Distraction (8 items, reliability coefficient of 0.77) and Social Diversion (5 items, reliability coefficient of 0.75). For the entire questionnaire containing 48 items, the reliability coefficient is 0.85.

The instrument for assessing self-efficacy is the Generalized Self-Efficacy Scale (GSE, Schwarzer & Jerusalem, 1995), which consists of 10 items. Respondents indicate the extent to which the statements apply to them on a five-point Likert-type scale (ranging from 'not true at all' to 'completely true'). The instrument has previously demonstrated good reliability on different samples (Schwarzer, Basler, Kwiatek, Schroder & Zhang, 1997; Ivanov, 2002, as cited in Mitić, 2016). In this research, the Generalized Self-Efficacy Scale has a reliability coefficient of 0.83.

Procedure

The research was conducted in May and June 2022, in Serbia, on a sample of 167 respondents who voluntarily participated in the research. Some of the respondents completed a printed questionnaire, while others completed an online survey distributed via email and SMS. The written form of the test battery was converted into an electronic form, respecting the order of the given items as well as the degree of agreement with the statement. The purpose of the research and the involvement of the respondents were explained both orally and in writing (in the online form), and the procedure for answering different questions was described in detail at the beginning of each part of the questionnaire, and communicated personally before filling out the questionnaire. The respondents were also informed that their participation in the research was voluntary and could be terminated at any moment, and that their anonymity would be respected. By completing the questionnaire, the respondents gave their consent for the data they provided in the questionnaire to be used solely for research purposes.

Statistical Data Processing

Various statistical procedures were used to process the research data in accordance with the set goals and hypotheses. First, the significance of the correlation between coping mechanisms, on the one hand, and self-efficacy, on the other, was tested. For this purpose, the Pearson correlation coefficient was applied. Multiple regression analysis was used to test predictive effects, and to check whether and to what extent different stress management strategies predict self-efficacy.

RESULTS

Table 1. Descriptive statistics

	Minimum	Maximum	Mean	SD
Self-Efficacy	14	40	32.13	4.118
Task	39	78	58.06	7.439
Emotion	18	75	44.98	9.806
Avoid	26	75	51.54	10.795
Distraction	8	36	21.26	6.387

The distribution of variables in the research shows that the most prevalent coping mechanisms are task orientation and avoidance, which has the highest variability (SD 10.79). It is followed by orientation to emotions, while distraction is the least represented. The average value for self-efficacy is 32.13, with a standard deviation of 4.12.

Table 2. Correlation between self-efficacy and coping mechanisms

		Task	Emotion	Avoid	Distraction
Self-efficacy	Pearson Correlation	.536	-.128	.120	.086
	Sig. (2-tailed)	.000	.102	.132	.271

One statistically significant positive correlation of high to moderate intensity was obtained. When there is a higher task-focused coping mechanism, self-efficacy will also be higher. Other correlations are low. What is also interesting is the negative relation between the emotion-focused coping mechanism and self-efficacy in young athletes.

Hypotheses Check

Table 3. Model Summary

Model	R	R^2	Adjusted R^2	$F_{(4, 154)}$	Sig
1	.535[a]	.286	.267	15.423	0.000

Predictors: (Constant), distraction, task, emotions, avoiding

A statistically significant model was obtained that can predict 28.6% of the variance in the criterion on the sample of respondents.

Table 4. Coefficients

Model	β	T	sig.	Model
1	(Constant)		6.882	.000
	task	.516	7.207	.000
	emotions	-.168	-2.354	.020
	avoiding	-.072	-.429	.669
	distraction	.127	.765	.445

Task-focused and emotion-focused coping mechanisms were identified as statistically significant predictors. Self-efficacy is higher in athletes with higher task-focused coping, and lower in emotion-focused coping.

DISCUSSION

As it was hypothesised, our research proves the connection between self-efficacy and coping styles, as well as their predictive relationship, which was demonstrated by a statistically significant model that explained 28.6% of the variance in the criterion in the sample of respondents. The findings proved the research hypothesis H0. The results regarding the relationship between stress coping strategies and self-efficacy have proven hypotheses H1 and H2, and show that problem-oriented stress coping has a statistically significant (positive) relation with self-efficacy, while emotion-oriented coping has a negative relation with self-efficacy. Avoidance and distraction did not show any statistical significance in the prediction of self-efficacy, thereby disproving hypothesis H3 which states that avoidance-oriented mechanisms (Avoidance and Distraction) are predictors of lower self-efficacy. Previous research has also proved the relationship between self-efficacy and coping strategies (Haney & Long, 1995, after Nicholls & Polman, 2007). Coping, as a critical factor in performance and satisfaction, has the potential to significantly contribute to applied practice (Lazarus, 2000). Problem-oriented coping strategies include problem definition, search for different ways of problem solving, and making decisions on definite actions with the purpose of changing the stressful situation, whereas emotion-oriented coping strategies include actions such as seeking emotional support, relaxation or meditation, and wishful thinking (Lazarus & Folkman, 1984).

Given that self-efficacy has been proven to be one of the key factors of success, our findings indicate that it is essential to develop capacities for defining problems, finding alternatives, decision making and taking actions directly related to problem solving by teaching and training athletes. When selecting sports candidates, it is also important to pay attention to preferred coping styles, which can predict their self-efficacy and, thus, success and satisfaction.

The results of this study are limited and refer to the research sample, but they could encourage further research on the predictive relationship between coping mechanisms and self-efficacy in athletes.

CONCLUSION

This research studied different strategies for coping with stressful situations in adolescent athletes of different genders, and the prediction of

self-efficacy in relation to them. The general goal of the research was to examine and determine the predictive relationship between coping mechanisms and self-efficacy in adolescent athletes. The formulation of one general hypothesis and three specific hypotheses was the starting point for operationalisation. The sample of adolescent athletes included 167 participants (90 boys and 77 girls). The most important conclusions to be drawn from the research findings include a statistically significant model that explained 28.6% of the variance in the criterion in the sample of respondents. Task- and emotion-oriented coping mechanisms were identified as statistically significant predictors. Self-efficacy was higher in athletes with higher task orientation, and lower in those with emotion orientation.

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ПРЕДИКТИВНИ ОДНОС КОПИНГ МЕХАНИЗАМА И САМОЕФИКАСНОСТИ КОД СПОРТИСТА АДОЛЕСЦЕНАТА

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Резиме

У психологији спорта, управљање изазовима је од кључног значаја за успех и благостање спортиста. Самоефикасност, као један од најважнијих карактеристика успешних спортиста, важан је фактор стратегија у креирању обука и тренинга за развој вештина, селекцији спортиста, истрајавању у професионалној оријентацији и њиховој сатисфакцији. Континуирано управљање изазовима који се стално мењају и способност спортиста да се носе са стресорима су важни фактори њиховог успеха, перформанси али и благостања како у професионалном, тако и приватном животу. Истраживања о утицају копинг механизама на самоефикасност почињу да се развијају деведесетих година. Резултати истраживања су указали на то да спортисти преферирају суочавајуће механизме превладавања који се односе на усмереност на проблем када се ситуација перципира као променљива, и усмереност на емоције и контролу стреса када се ситуација преципира као непроменљива. Избегавајући механизми предвиђају неистрајност и одустанак од ове професионалне оријентације, и нису карактеристични за професионалне спортисте. Овим експлоративним истраживањем фокусирали смо се на проблем који се односи на то да ли и на који начин, односно у којој мери, копинг механизми предвиђају самоефикасност код спротиста адолесцената са циљем да се испита и утврди предиктивни однос копинг механизама и самоефикасности. Укупан број испитаника који су учествовали у истраживању износи 167 спортиста адолесцената, од којих је 90 мушког, а 77 женског пола. Варијабле истраживања су операционализоване адекватним инструментима. Инструмент за процену самоефикасности је Скала генерализоване самоефикасности (GSE, Schwarzer & Jerusalem, 1995), док је за процену стилова превладавања коришћена адаптација ЦИСС Ендлера и Паркера (The Coping Inventory for Stressful Situations, Endler & Parker, 1990), коју потписују Сорић и Пророковић (Сорић & Пророковић, 2002). Статистичке технике за обраду података коришћене у истраживању су Пирсонов коефицијент корелације и вишеструка регресиона анализа. Најважнији закључци који проистичу из резултата истраживања укључују статистички значајан мо-

дел којим је могуће предвидети 28.6% варијансе у критеријуму на узорку испитаника. Као статистички значајни предиктори издвојили су се копинг механизми усмерени на задатак и на емоције. Самоефикасност је већа код спортиста са вишим усмерењем на задатак, а мања код усмерености на емоције.

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THE CRIMINAL LAW FRAMEWORK FOR COMBATING DOPING IN SPORTS IN SERBIA

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Abstract

This paper deals with the aspects of criminal law as regards the suppression of doping in sports in the law of the Republic of Serbia. The Law on the Prevention of Doping in Sports prescribes two criminal offences, namely Facilitating the Use of Doping Substances and the Unauthorized Production and Circulation of Doping Substances. These are criminal acts that are prescribed by the so-called secondary criminal legislation of the Republic of Serbia. The analysis of these criminal offences is afforded the central place in this paper. At the same time, for the sake of systematicity, numerous common features of these criminal acts were separated and analysed, such as protective object, object of action (doping agent), consequence of the criminal act, guilt, special intention, etc., and then their other features were separately considered. It is noticeable that the criminal offenses from the Law on the Prevention of Doping in Sports have corresponding regulatory shortcomings, above all they do not include certain important aspects related to the suppression of doping in sports, so certain proposals de lege ferenda were made based on the criminal offenses from the Criminal Code. The paper also gives a cursory review of the most important international documents in this area, i.e. the two most important documents ratified by the Republic of Serbia, namely the International Convention against Doping in Sport and the European Convention against Doping in Sport, bearing in mind that these acts were the basis for adoption of a special anti-doping law in our country. Additionally, the paper clarifies what is considered doping in sports according to the provisions of the positive law of Serbia.

Key words: doping in sport, doping substances, criminal protection, Facilitating the Use of Doping Substances, Unauthorized Production and Circulation of Doping Substances, criminal offences.

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КРИВИЧНОПРАВНИ ОКВИР СУЗБИЈАЊА ДОПИНГА У СПОРТУ У РЕПУБЛИЦИ СРБИЈИ

Апстракт

Аутори у раду објашњавају проблематику допинга у спорту. Законом о сузбијању допинга у спорту предвиђена су два кривична дела, и то омогућавање употребе допинг средстава и неовлашћена производња и стављање у промет допинг средстава. Ради се о кривичним делима која су прописана тзв. споредним кривичним законодавством Републике Србије. Централни део рада представља анализа наведена два кривична дела. При томе, систематичности ради, издвојена су и анализирана бројна заједничка обележја ових кривичних дела, као што су заштитни објекат, објект радње (допинг средство), последица кривичног дела, кривица, посебна намера и сл., а потом су посебно размотрена њихова остала обележја и облици. Приметно је да кривична дела из Закона о спречавању допинга у спорту имају одговарајуће регулаторне мањкавости, пре све што не обухватају одређене битне аспекте везане за сузбијање допинга у спорту, па су по узору на кривична дела из Кривичног законика дати извесни предлози de lege ferenda. Дат је летимичан осврт на најзначајније међународне документе у овој области, односно на два најзначајнија документа која је Република Србија ратификовала, а то су Међународна конвенција против допинга у спорту и Европска конвенција против допинговања у спорту, имајући у виду да су ти акти представљали основ за доношење посебног анти-допинг закона у нашој држави. Такође, појашњено је и шта се сматра допингом у спорту према одредбама позитивног права Србије. На посебном месту у раду аутори разјашњавају питање шта се сматра допингом у спорту у Републици Србији.

Кључне речи: допинг у спорту, средства за допинг, омогућавање употребе допинг средстава и неовлашћена производња, стављање у промет допинг средстава, кривична дела.

INTRODUCTION

From the point of view of criminal law, sport is linked either to violence or to doping (Marković, Trifunović, Šekeljić, 2016; Radenović & Mijatović, 2017). The use of substances and methods aimed at improving results in sports is as old as sports, and was recorded as far back as ancient Greece (Pajčić & Petković, 2008, p. 551). And yet, it was only during the second decade of the 20th century that it became clear that it was necessary to establish bans on the use of certain substances in sports. Cases of doping began to seriously compromise the credibility of sports achievements, and the victories of some 'arena heroes' became questionable and debatable (Vlad et al, 2018, p. 529).

According to same authors, the problem of doping in sports also had its own political connotation, which reflects the international relations of an era (Vlad et al., 2018, p. 530). This information revealed the negative aspects of the history of sports, in which such substances were used unscrupulously, not only in the name of achieving better sports results but also as a propaganda weapon in demonstrating the superiority of

a certain ideological-political order. To note a specific case, it was used to demonstrate the superiority of the communist and socialist order (Vlad et al, 2018, p. 530). However, judging by the available information, the western side of the Iron Curtain did not lag at all in this regard (Yesalis, Bahrke, 2002, pp. 42-76).

The first systematic law in Serbia related to the issue in question – the Law on the Prevention of Doping in Sports (hereinafter: LPDS/2005) – was adopted in 2005, although even before that there was a certain, admittedly modest legal framework that regulated some issues of the given matter (see: Đurđević, 2008, pp. 73-74; Šuput, 2008, p. 16). Today, the Law on Prevention of Doping in Sports from 2014 (LPDS) is in force. This law regulates measures and activities in order to prevent doping in sports (Article 1), and expressly prescribes the prohibition of doping in sports (Article 2). Facilitating the Use of Doping Substances (article 38) and the Unauthorized Production and Circulation of Doping Substances (Art. 39) are criminalized.

A BRIEF OVERVIEW OF THE MOST IMPORTANT INTERNATIONAL DOCUMENTS ON DOPING IN SPORT

The first international sports organisation to ban doping was the International Athletics Federation in 1928, and other sports organisations followed suit. The first international sports organisations that introduced doping tests in 1966 were the International Cycling Union (French: Union Cycliste Internationale - UCI) and the International Federation of Football Associations (French: Fédération Internationale de Football Association - FIFA) (Pajčić & Petković, 2008: 552). A year later, the International Olympic Committee established its Health Commission, and established a list of prohibited substances, with the first doping controls carried out at the Winter Olympic Games in Grenoble in 1968, and at the Summer Olympic Games in Mexico City that same year. In the beginning, sanctions against doping rule violators were exclusively of a sporting nature. However, opinions that the state, with its repressive apparatus, should be involved in the fight against doping as the greatest evil of modern sports became louder and more influential (Pajčić & Petković, 2008, p. 552).

With the aim of preventing and fighting doping in sports, and eliminating it, as stated in its preamble, in October 2005, the International Convention against Doping in Sports was adopted within the framework of UNESCO. The Convention entered into legal force in 2007, and, by its nature, it is a framework convention that imposes obligations on states to adopt appropriate measures both at the national and international level, in accordance with the principles of the Code. The World Anti-Doping Code was adopted by the World Anti-Doping Agency on March 5 2003 in Co-

penhagen, and is Appendix 1 of this Convention (Article 2, Paragraph 3, Item 6 of this Convention).

It is important to point out that, in order to coordinate the fight against doping in sports both at the national and the international level, the Convention obliges the participating countries to respect the principles of the Code as a basis for the obligations contained in Article 5 of the Convention, which concern the adoption of appropriate measures through legislation, regulations, as well as policies or procedures of the administration, without denying the right of states to adopt additional measures that are complementary to the Code (Article 4 of the Convention).

At the level of particular international law, it is important to mention the European Convention against Doping in Sports, which was adopted within the framework of the Council of Europe in Strasbourg in 1989. The proclaimed goal of the Convention is the final elimination of doping from sports, obliging members to take the necessary steps within the framework of their constitutional provisions to implement the provisions of the Convention (Article 1).

WHAT IS DOPING IN SPORTS UNDER SERBIAN LAW?

To understand the criminal offences, it is important to first determine what is considered 'doping in sports' in terms of our positive legal regulations. According to article 2(2) of the LPDS, doping in sports "is the existence of one or more violations of anti-doping rules" which are established in article 3 of the same law. According to the latter article 3(1) of the LPDS, violation of anti-doping rules exists in cases of: (1) the presence of a prohibited substance or its metabolites, or markers, in the athlete's body sample; (2) using or attempting to use (application, introduction, injection, or any other type of consumption) a prohibited substance, or a prohibited method (hereinafter: doping substances); (3) refusal, or omission without convincing justification, to provide a sample after notification of doping control, or avoidance of providing a sample in another way; (4) any combination of three missed doping tests and/or failure to complete the athlete location form, in accordance with the international results management standards approved by the World Anti-Doping Agency, within a period of 12 months and by an athlete involved in a registered test group; (5) interfering or attempting to interfere with any part of doping control; (6) illegal possession of doping substances by the athlete or persons assisting the athlete; (7) unauthorised sale, transportation, sending, delivery or distribution of a prohibited doping substance, or a prohibited doping method (either physically, electronically or by any other medium) by the athlete, persons assisting the athlete, or a third party, to any person under the authority of organisations in the field of sports, or an attempt to do so; (8) administering or attempting to adminis-

ter any doping substance to an athlete in competition, or administering or attempting to administer to any athlete out of competition any doping substance prohibited out of competition; (9) assisting, inciting, aiding, abetting, concealing, creating conditions or any other form of intentional complicity or attempted complicity in violation, or attempted violation of anti-doping rules, or in violation of a measure imposed for violation of anti-doping rules; (10) associating, in a professional or sports-related capacity, an athlete or other person under the jurisdiction of an authorised anti-doping organisation with a person who helps an athlete who is subject to an imposed measure for violating anti-doping rules, or has been punished in criminal, misdemeanour or other proceedings for an act that represents a violation of anti-doping rules in the sense of this law, if the penalty is still in effect or less than six years have passed since the imposition of such penalty, or with a person who is an intermediary or representative of such a person; and (11) behaviour of an athlete, or other person that represents a threat or serves to intimidate another person with the intention of dissuading him from communicating information related to doping and non-compliance with anti-doping rules, or aims to put in a disadvantageous position a person who in good faith has provided evidence or information that relate to doping and non-compliance with anti-doping rules, to an authorised anti-doping organisation or competent state body. However, there will be no violation of the specified anti-doping rules in cases of approved exceptions for therapeutic use, and other exceptions established by the World Anti-Doping Code (article 3(2) of the LPDS).

For the sake of further understanding this problem, the question of what is meant by the terms ‘sport’ and ‘athlete’ may be posed. The LPDS does not define these terms, but they are defined in the Law on Sports (hereinafter: LS). Article 2 of the LS stipulates that ‘sport’ is an activity of special importance for the Republic of Serbia, and that it represents a part of physical culture that includes every form of organised and unorganised performance of sports activities, and sports activities by natural and legal persons in the sports system, with the aim of satisfying human needs for creativity, affirmation, physical exercise and competition with others. Therefore, sport consists of “performance of sports activities and sports activities”, and these concepts are also determined by this law.

An ‘athlete’ is a person engaged in sports activities. The LS makes a distinction between an amateur athlete, a professional athlete, a competitive athlete, a top athlete, a promising athlete, a talented athlete and a categorised athlete. An athlete can engage in sports activities independently or within organisations in the field of sports, amateur or professional (article 9 LS).

CRIMINAL OFFENSES FROM THE SERBIAN LAW ON THE PREVENTION OF DOPING IN SPORTS

Preliminary Remarks

The criminal legislation of the Republic of Serbia consists of the so-called basic (or main), and secondary (or special) criminal legislation. The basic criminal legislation consists primarily of the provisions contained in the Criminal Code (CC), which regulate the matter of the general offence, as well as the majority of the matter of the special offenses of criminal law as a branch of positive law. Secondary criminal legislation, on the other hand, consists of criminal law provisions contained in other, non-criminal laws, which regulate the corresponding areas of social life, but in their separate heads, which are usually titled as penal provisions with the aim of providing more complete legal protection in that sphere, they prescribe certain criminal offences (Turanjanin, 2022; Turanjanin & Ćorović, 2018, p. 3; *see* also Otašević & Đurđević, 2022, p. 337). Therefore, the provisions of secondary criminal legislation refer to part of the matter of a special part of criminal law, with the majority of this matter still being found in the Criminal Code.

Bearing in mind that the LPDS is a regulation that primarily regulates measures and activities for the prevention of doping in sports of a different nature, this legal text nevertheless, with the aim of comprehensively regulating this matter, in Chapter V which is devoted to penal provisions, prescribes the aforementioned two criminal offenses - Facilitating the Use of Doping Substances (article 38) and Unauthorized Production and Circulation of Doping Substances (article 39). Therefore, these two criminal offences fall under the domain of secondary criminal legislation. This approach can also be found in comparative criminal legislation, such as in Germany, where the special Anti-Doping in Sport Act of 2015 (*Gesetz gegen Doping im Sport*) also provides for corresponding criminal offenses related to doping (§ 4). On the other hand, in other criminal legislation, these acts are systematised in the basic criminal legislation, as is the case with Croatia, where article 191a of the Criminal Code prescribes the criminal offense of unauthorised production and trafficking of substances prohibited in sports.

The previous LPDS/2005, in addition to the two above mentioned criminal offences, regulated another one other – the use of doping substances. However, according to the current LPDS, this is now a misdemeanour (article 41(1) point 1).

Facilitating the Use of Doping Substances

This criminal offense has a basic (paragraph 1) and a severe (paragraph 2) form. In its essence, it is close to the criminal offense of Facilitating the Taking of Narcotics from CC. Hence, the legal understandings

related to the latter criminal offense can be applied to the criminal offense from article 38 of the LPDS.

The action of the basic form is prescribed alternatively as: (1) giving a doping mean to an athlete; (2) prescribing a doping mean to an athlete; (3) issuing a doping mean to an athlete; (4) applying a doping mean to an athlete; (5) inducing an athlete to use a doping mean; (6) assisting an athlete in using a doping mean; or (7) enabling the athlete to use a doping mean in another way. The aforementioned actions are prescribed in the legal provision using perfective verb forms ('have/has prescribed', 'have/has specified', etc.). In this sense, it is indisputable that a one-time undertaking of one of the aforementioned actions is sufficient for a completed criminal offence.

The act of 'giving' consists of making available or handing over doping substances to the athlete (Šuput, 2008, p. 20; cf.: Lazarević, 2006, p. 655). This implies that there was a factual handing over of the doping mean to the athlete, which resulted in direct or indirect state control over the object of the action, and it is irrelevant whether it was used (cf.: Delić, 2014, p. 103; Babić & Marković, 2018, p. 177). Giving must be free of charge (Delić, 2014, p. 103; Mrvić Petrović, 2016, p. 169; Babić & Marković, 2018, p. 177), because if a certain compensation (cash or other thing/barter) were given for a doping mean, it would be the criminal offense of unauthorised production and distribution of doping substances from article 39 of the LPDS (Turajanin & Ćorović, 2018, pp. 304-305). Admittedly, there are opinions that giving a doping mean can be done with 'some compensation', but that it must not be a sale (Šuput, 2008, p. 20; Đurđević, 2008, p. 430; cf.: Lazarević, 2006, p. 655). We believe that this opinion is not correct, because in the case of giving any compensation, in the sense of what was said, it is a criminal offense from article 39 of the LPDS (Turanjanin & Ćorović, 2018, p. 305, fn. 73).

'Prescribing' a doping mean is an action performed by a doctor when they prescribe a certain doping mean to the athlete, that is, when he issues a prescription for a certain medical device that contains, or is in itself a doping mean (Đurđević, 2008, p. 430). Even in this case, it is not necessary for the athlete to use a doping substance, while the action in question can only be undertaken by a doctor.

'Dispensing' a doping mean is an action performed by a pharmacist when he dispenses to the athlete a mean that contains, or is in itself a doping mean (Đurđević, 2008, p. 430), although the possibility that such an activity can be undertaken by other medical professionals should not be ruled out (medical/pharmaceutical technicians, nurses, etc.) (Turanjanin & Ćorović, 2018, p. 305). Additionally, this act does not require the use of a doping mean by the athlete as a condition for the existence of the act.

The 'application' of a doping mean is manifested in the "active participation in the introduction of a doping mean into the athlete's organism" (Đurđević, 2008, p. 430), such as when a person injects a doping substance into the body of an athlete.

The act of 'inducing' is, in fact, incitement, which is provided for in this act as an act of execution. It implies the formation of an athlete's decision to use doping substances, or the strengthening of his insufficiently firm decision that otherwise would not have been realised (cf. Stojanović, 2017, pp. 801-802). Indication can be realised in different ways - verbally, through conclusive actions, indirectly, etc. (Delić, 2014, p. 102). It cannot be fully accepted that "stimulating an already expressed desire to take doping substances" (also: Šuput, 2008, p. 21) represents a form of inducement, because if someone had an 'expressed desire' to take a doping substance, then persuasion, encouragement and other similar activities rather represent a form of psychological assistance.

The act of 'aiding' is represented by numerous heterogeneous activities consisting of assisting, supporting or facilitating the athlete to use a doping mean. As is usual in criminal law, in this case it can be manifested as physical or psychological assistance. In the first case, aiding can be manifested as making available to the athlete the substances by which he uses the doping mean, such as giving syringes or needles for intravenous administration, and in the second case, aiding can be manifested as giving certain advice on how to take a certain doping mean.

In addition to the above, the legislator generally determined the last alternatively prescribed action in the sense of 'enabling' an athlete to use a doping mean in some other way. It can be considered that what is meant under other substances is making a room available to the athlete for the purpose of taking the doping mean (Đurđević, 2015, p. 207), i.e. taking him "to a place where the doping mean can be taken or used undisturbed" (Šuput, 2008, p. 21). In fact, the act of 'enabling' is nothing more than a form of aiding. Moreover, almost all of the aforementioned actions, with the exception of guidance, represent a kind of help provided to the athlete in the process of using doping substances (Đurđević, 2015, p. 206; compare Stojanović, 2017, p. 802).

Since the intended actions of the execution of this criminal offense are determined by the perfect verb, in the event that the perpetrator repeats them towards one and the same athlete, it can be a continuing offense from article 38 of the LPDS under the conditions prescribed in article 61 of the CC (Turanjanin & Ćorović, 2018, p. 307).

The passive subject of this criminal offense is the athlete, and that term should be understood as previously explained in terms of the relevant provisions of the LS. It is clear that a passive subject – an athlete does not need to know that he is allowed to use a doping mean. A criminal offense will certainly exist if, for example, the club doctor poured a

doping substance into a refreshing drink without the athlete's knowledge (Đurđević, 2015, p. 207). Moreover, in such situations, there is a greater degree of guilt of the perpetrator, because he acts secretly, even abusing the athlete's trust (if it is a doctor, trainer, etc.).

As previously explained, in order for this to be a criminal offense, it is necessary that the aforementioned actions are undertaken with the aim of doping in sports.

The basic form of the criminal offense of enabling the use of doping substances is punishable by imprisonment lasting between six months and five years.

The more severe form is regulated in 38(2) of the LPDS. It exists if the basic form: (1) was committed against a minor; (2) was committed against several persons; or (3) caused particularly severe consequences.

A 'minor' in criminal law is a person who has reached the age of 14, but has not reached the age of 18 (Art. 112, point 9 of the CC). It is obvious that children, i.e. persons who have not reached the age of 14 (art. 112, paragraph 8 of the CC), are omitted for this qualified form. It made more sense to provide as a qualifying circumstance the circumstance of the criminal offense being committed against a 'child', which substances all persons under the age of 18 (Art. 112 paragraph 10 of the CC), as was done with the qualified form of the criminal offense of Facilitating the Taking of Narcotics from art. 247(2) of the CC. Perhaps with a logical interpretation (argumentum a fortiori - maiore ad minus), this provision could also include persons under the age of 14 (Turanjanin & Ćorović, 2018, p. 309). Certainly, the existing solution is unacceptable. Hence, it is proposed to replace the term 'minor' with the term 'child' in the essence of this form, or to prescribe, while maintaining the existing form, an even more difficult form where a child would appear as a passive subject (Mandarić & Delibašić, 2014, p. 46). The existing qualifying circumstance must be covered by the perpetrator's intention, that is, the perpetrator must be aware that the action is being taken against a minor. If he was mistaken about that fact, he can only answer for the basic form (Turanjanin & Ćorović, 2018, p. 309).

As for the term 'several persons', it includes at least two persons (Stojanović, 2017, p. 803). Of course, all these individuals must be athletes.

Particularly severe consequences should be understood, first of all, as a severe impairment of the athlete's health (Stojanović, 2017, p. 803). In relation to this consequence, negligence is required in the sense of Art. 27 of the CC, because it is a criminal offense qualified by a more serious consequence. There is an opinion that particularly severe consequences include, in addition to the aforementioned, "severe violation of the regularity of the competition" (Đurđević, 2015, p. 209).

A prison sentence of two to ten years is prescribed for this form.

It is not clear whether the negligent death of an athlete can also be brought under the latter qualifying circumstance. Death as a qualifying circumstance is usually emphasised in the nature of the act, which was not done in this case, and it is not justified to put death on the same level as other qualifying characteristics. In that case, is there a confluence of the basic form of the criminal offense of facilitating the use of doping substances and negligent deprivation of life from Article 118 of the CC (on jurisprudence *see* Turanjanin, 2023)? The solution is legally logical, but criminal-politically unjustified, because the perpetrator would be in a more favourable position due to the rules on determining the single penalty for the collision. Namely, for both of these criminal offenses (from Article 38 of the LPDS and from Article 118 of the Criminal Code), the maximum prison sentence of 5 years is prescribed, so that the single sentence would have to be less than 10 years. It is illogical that 10 years of imprisonment can be imposed for serious damage to health attributed to the negligence of the perpetrator (which is the maximum for a qualified form of criminal offense from Article 38 of the LPDS), while less than 10 years of imprisonment can be imposed for the negligent death of an athlete, as an objectively more serious consequence (because under the process of assessing the penalty, the punishment could not be the sum of the individually prescribed punishments for these acts). From that point of view, it would be more correct to assume that the formulation of particularly severe consequences also includes the negligent death of an athlete, although it is still criminally and politically controversial to equate negligent death, as the most severe consequence, with other forms of particularly severe consequences (Turanjanin & Ćorović, 2018, pp. 309- 310). That is why it would be necessary to prescribe the most serious form of this criminal offense in case the death of an athlete occurred.

Given that some doping substances (for example, both cocaine and heroin are on the List of Prohibited Doping Substances – they are designated as substances of abuse) are also narcotic drugs, relevant from the point of view of being a criminal offense from article 247 of the CC, the question of which criminal offense will be involved if the action has one such tool for its object arises, considering the similarity of the criminal offenses of Facilitating the Use of Doping Substances from article 38 of the LPDS and Facilitating the Taking of Narcotics from article 247 of the CC. In order for a situation to be a criminal offense from article 38 of the LPDS, two conditions must be cumulatively met: first, the action must be taken against the athlete and, second, it must be taken for the purpose of doping in sports. Otherwise, i.e., if one of these conditions is not met, the situation will be considered a criminal offense of Facilitating the Taking of Narcotics from Article 247 of the CC (Turanjanin & Ćorović, 2018, pp. 310-311). In connection to this, it should be pointed out that the same punishments are prescribed for the basic and qualified forms of the men-

tioned criminal acts, with the fact that Facilitating the Taking of Narcotics has another, more severe form in the event that the death of a passive subject has occurred, which is a situation, as already, not regulated in article 38 of the LPDS.

Unauthorised Production and Circulation of Doping Substances

This criminal offense has a basic (paragraph 1) and privileged (paragraph 2) form. According to their features, these forms are similar to the basic and easier form of the criminal offense of unauthorised production and distribution of intoxicants from Article 246 of the CC, so that the legal understandings related to them can also be applied to the incrimination from article 39 of the LPDS.

The act of execution of the basic form is set alternatively as: 1) production of a doping substance, 2) processing of a doping substance, 3) sale or offering for sale of a doping substance, 4) purchase of a doping substance or its possession, i.e., transfer for sale, 5) mediation in the sale or the purchase of doping substance, or 6) unauthorized marketing of doping substance in another way.

However, some authors state that the aforementioned actions can essentially be classified into two basic groups: (1) execution of actions that are of a production nature, which includes the production and processing of doping substances; and (2) execution of actions related to the circulation of doping substances, in which other actions are included (Otašević & Đurđević, 2022, pp. 341-342).

In any case, in order for this to be a criminal offence, it is necessary that some of the aforementioned actions be taken without authorisation. Article 5(2) of the LPDS only stipulates that the production and trade of prohibited doping substances that contain narcotic drugs is carried out in accordance with the law. However, in the Republic of Serbia, there is no special law that generally regulates the production and circulation of doping substances, so the issue of 'authorisation' must be viewed depending on which doping substances is in question in a specific case (Đurđević, 2015, p. 213). In any case, when assessing whether the above mentioned activities were performed without authorisation, one should start from the Law on Medicines and Medical Devices and the Rulebook on the Approval of Exceptions for Therapeutic Use (Đurđević, 2015, p. 213; Otašević & Đurđević, 2022, p. 342).

The 'production' of a doping substance represents any activity by which this substance is created, i.e. "the corresponding chemical, physical or biological process by which a certain material is obtained or contributes to obtaining a substance" (Delić, 2014, p. 87) that has the feature of a doping substance. This activity depends on the type of doping substance, primarily on whether it is a natural or artificial substance (Đurđević, 2015, p. 212).

The 'processing' of a doping substance, on the other hand, substances obtaining one doping substance from another, improving the ingredients of a doping substance, purifying it, etc. (Šuput, 2008, p. 19).

The term 'sale' should be understood in the way it is normally understood. It is a question of the consent of the seller (executor) and the buyer regarding the object (i.e. the doping substance) and the price (Turanjanin & Ćorović, 2018, p. 312). 'Offering for sale' is an attempt to sell, or in other words, make an offer regarding the price and quality of a doping substance (Šuput, 2008: 19).

'Purchasing' represents the activity of the perpetrator by which he acquires the doping substance (Turanjanin & Ćorović, 2018, p. 312), 'holding' actual power over the doping substance (cf. Stojanović, 2017, p. 794), and 'transferring' the activity of moving (including transportation) doping substances from one place or area to another (Turanjanin & Ćorović, 2018, p. 313). However, in order for these actions to be relevant from the point of view of the nature of this criminal offense, they must be carried out 'for the purpose of sale'. The wording 'in order to sell' represents, in fact, the intention that expresses the goal of these activities (cf.: Stojanović, 2017, p. 796). If said activities are undertaken without this intention, then this crime will not exist. In this sense, the verdict of the High Court in Belgrade K 3704/10 of March 21 2013 stated that:

> not a single item was found in the apartment where the defendant was staying, which would lead to the conclusion that it was a matter of possession for the purpose of selling for the purpose of doping of prohibited doping substances in sports, since the doping substances in question were not packaged and prepared for sale, i.e. they were not measured nor were there any valid data on possible buyers of the same... In addition, during the procedure, the connection of the defendant with sports organizations or athletes who could possibly be consumers of such substances was not proven, which undoubtedly leads to the conclusion that the defendant used prohibited doping substances exclusively for your personal needs.
>
> (According to: Turanjanin & Ćorović, 2018, p. 314)

'Mediation in the sale or purchase of doping substances' consists of the activities of the executor in which he connects the seller and the buyer of doping substances, transmits their messages regarding the possible purchase and sale, keeps their assets until an agreement is reached, etc. (Đurđević, 2015, p. 213). In this case, therefore, the executor makes sure that a unauthorised purchase, or sale, of a doping substance occurs.

In the end, the legislator, through the action formulated through the general clause 'another method of unauthorised circulation of doping substances', tried to include all other actions beyond those listed in the description of the act, which also include the marketing of said drugs. First of all, barter comes into consideration as a counterpart to buying and sell-

ing, when the buyer hands the executor some other thing instead of money (Turanjanin & Ćorović, 2018, p. 313). There are opinions that it can also be a gift or loan of doping substances to another person (Šuput, 2008, p. 19; Đurđević, 2015, p. 213). However, if a gift or loan is made to an athlete for the purpose of doping in sports, this criminal offense will not exist, but the criminal offense of facilitating the use of doping substances from Art. 38 of the LPDS will (Turanjanin & Ćorović, 2018, p. 313).

Of course, all the activities listed above must be carried out for the 'purpose of doping in sports', as already discussed, because without this subjective characteristic, this criminal offense does not exist. In connection to this, the judgment of the Appellate Court in Belgrade Kž. I no. 2518/11 from July 04 2011 pointed out that there is no criminal offense in the Unauthorized Production and Circulation of Doping Substances "if there is no evidence that the defendant's actions were undertaken with the aim of placing them on the market for the purpose of doping in sports, which is an essential characteristic of the nature of this criminal act". A similar point of view was accepted in the judgments of the Appellate Court in Belgrade Kž. I no. 382/22 of June 02 2022, and the High Court in Belgrade K no. 156/19 of February 25 2022, in which it was stated that "it is not enough that the defendant keeps doping substances for sale, but the prosecutor must also prove during the proceedings that those substances are kept for sale for the purpose of doping in sports".

A prison sentence of three to twelve years is prescribed for this form.

As with the previous criminal offense, there may be a problem of how to qualify the perpetrator's actions if they have as their object a doping substance that is also a narcotic drug within the meaning of the CC. Will it be about the Unauthorized Production and Circulation of Doping Substances, or the Unlawful Production and Circulating of Narcotics? If a doping substance that also has the character of a narcotic drug within the meaning of the CC is trafficked for the purpose of doping in sports, there will be a criminal offense under article 39(1) of the LPDS. Otherwise, i.e., if it is traded outside of the stated goal, it will be considered an Unlawful Production and Circulating of Narcotics (Turanjanin & Ćorović, 2018, p. 316).

The privileging form from Para. 2, Art. 39 of the LPDS represents, by its nature, a preparatory action for the execution of the basic form of this criminal offense from Para. 1, with the fact that the legislator elevated this action to the rank of execution action (cf.: Stojanović, 2017, pp. 797-798: 195). In this sense, the merger between the basic and privileging form of this part is not possible on the basis of subsidiarity. Therefore, the special form will exist only if the basic form of this criminal offense has not been realised (Đurđević, 2008, p. 442; Turanjanin & Ćorović, 2018, p. 316).

The object of this form of activity are not doping substances, but the equipment, material or substances intended for the production or preparation of doping substances.

The act of execution is defined alternatively as: (1) making; (2) procuring; (3) possessing; or (4) providing for use the specified equipment, material or substance. Making implies the making of the specified object of action; acquisition represents their acquisition in a certain way (for example by purchase, barter, gift); possession represents the state, i.e., possession of said objects; making them available for use substances renting them out to third parties (Turanjanin & Ćorović, 2008, p. 317).

Even with this form, it is necessary for the mentioned actions to be undertaken with the aim of doping in sports. At the same time, the executor must know that the object of the action, i.e. the equipment, material or substance, is intended for the production or preparation of doping substances.

For the privileged form, a prison sentence of six months to five years is prescribed.

This criminal offense is close to the privileging form of the criminal offense of Unlawful Production and Circulating of Narcotics from Art. 246(7) of the CC. Bearing in mind that the equipment, material and substances can be used for the production of doping substances that are also narcotic drugs, the question of legal qualification can also be open in this case. If actions of this type are undertaken for the purpose of doping in sports, the offence will be this form of the criminal offence of unauthorised production and distribution of doping substances from article 39(2) of the LPDS. Otherwise, if that goal does not exist, and the object of the operation is to produce a doping substance that has the characteristics of narcotic drugs, the offence may be a criminal offence of Unlawful Production and Circulating of Narcotics from article 246(6) of the CC (Turanjanin & Ćorović, 2018, p. 317).

What can be noticed is that the LPDS did not prescribe the more severe forms of this criminal offence following the example of the criminal offence of Unlawful Production and Circulating of Narcotics from 246 of the CC. Namely, from a criminal and political point of view, it would be justified to prescribe as more severe forms the situations of committing this act by a group or organised criminal group, that is, the situation of organising a network of sellers or intermediaries for the purpose of committing the same, as well as performing the aforementioned actions against a child. Also, it would make sense to prescribe an optional possibility of exemption from punishment in the event that the perpetrator reveals from whom he obtained the prohibited doping substance (Otašević & Đurđević, 2022, pp. 347-348).

CONCLUDING REMARKS

After the analysis of the incriminations in question, it can be concluded that the criminal law aspects of suppressing appropriate actions related to doping in sports are not the most precise and complete. In this sense, we will present certain proposals.

Firstly, we consider it useful for the LPDS to define the terms 'sport' and 'athlete' for its needs, because the available practice, which is rather scarce, shows that the courts differently treat the cases in which the incriminations from this law can be applied. To be more precise, it is not clear whether it refers only to sports competitions or also to recreational sports.

Secondly, in the case of the qualified form of facilitating the use of doping substances from Art. 38(2) of the LPDS, it is necessary to designate the child as a passive subject, and not a minor, as it is wrongly stated now. Thirdly, it is necessary to prescribe the situation when the death of an athlete occurs as a result of the basic form as the most serious form, which would remove the existing gap regarding that issue.

Fourthly, in the case of the criminal offense of unauthorised production and distribution of doping agents from Art. 39 of the ZSDS, it is necessary to prescribe more severe forms, specifying as qualifying circumstances such as the commission of a criminal offense by a group or a limited criminal group, that is, the organisation of a network of re-sellers or intermediaries for the purpose of committing such offenses, and the commission of the offence in question against a minor. For a criminal offence, it is useful to foresee the possibility of exemption from punishment if the perpetrator reveals from whom he obtained the doping substance.

It seems to us that these changes would significantly improve the existing solution, and would contribute to a more comprehensive and effective suppression of doping in sports.

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КРИВИЧНОПРАВНИ ОКВИР СУЗБИЈАЊА ДОПИНГА У СПОРТУ У РЕПУБЛИЦИ СРБИЈИ

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Резиме

Рад се бави кривичноправним аспектима сузбијања допинга у спорту у праву Републике Србије. Наиме, Закон о спречавању допинга у спорту прописује два кривична дела, и то омогућавање употребе допинг средстава (чл. 38) и неовлашћену производњу и стављање у промет допинг средстава (чл. 39). Отуда централно место у овом раду заузима анализа ових кривичних дела. При томе, систематичности ради, издвојена су и анализирана бројна заједничка обележја ових кривичних дела, као што су заштитни објекат, објект радње (допинг средство), последица кривичног дела, кривица, посебна намера и сл., а потом су посебно размотрена њихова остала обележја и облици. Пре тога, дат је летимичан осврт на најзначајније међународне документе у овој области, односно на два најзначајнија документа која је Република Србија ратификовала, а то су Међународна конвенција против допинга у спорту и Европска конвенција против допинговања у спорту, имајући у виду да су ти акти представљали основ за доношење посебног анти-допинг закона у нашој држави. Такође, појашњено је и шта се сматра допингом у спорту према одредбама позитивног права Србије. По својим обележјима, кривична дела из чланова 38 и 39 Закона о спречавању допинга у спорту веома су слична инкриминацијама неовлашћене про-

изводње и стављања у промет опојних дрога из члана 246 Кривичног законика и омогућавању уживања опојних дрога из члана 247 Кривичног законика, тако да између њих није лако направити разлику тим пре што поједина допинг средства једно представљају и опојне дроге. Међутим, приметно је да кривична дела из Закона о спречавању допинга у спорту имају одговарајуће регулаторне мањкавости, пре све јер не обухватају одређене битне аспекте везане за сузбијање допинга у спорту, па су по узору на кривична дела из чланова 246 и 247 Кривичног законика дати извесни предлози de lege ferenda.

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PHYSICAL ACTIVITY IN PRESCHOOL CHILDREN WITH INTELLECTUAL DISABILITIES

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Abstract

The aim of this paper is to examine the effect of socio-demographic factors, children's motor skills and parents' physical activity on the physical activity of preschool children with intellectual disabilities. The research sample included 47 children with intellectual disabilities, as well as 47 parents. For the examination of socio-demographic variables, a questionnaire was created, which included information about parents and children. The *Vineland Adaptive Behavior Scale* was used to assess adaptive behaviour in the domain of motor skills. For assessing the children's gross motor skills, the *Test of Gross Motor Development* was used, and the *Family Lifestyle Survey* was used for the assessment of the physical activity of parents, and children with intellectual disabilities. The results show that the majority of children with intellectual disabilities partake in some physical activity for at least 20 minutes, one to four times a week. Multiple linear regression analysis found that the independent variables explained 11.2% of the variance in children's physical activity. Gross motor skills represented the strongest individual contribution to the physical activity of children with intellectual disabilities.

Key words: physical activity, motor skills, intellectual disability, parents, preschool period.

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ФИЗИЧКА АКТИВНОСТ КОД ПРЕДШКОЛСКЕ ДЕЦЕ С ИНТЕЛЕКТУАЛНОМ ОМЕТЕНОШЋУ

Апстракт

Циљ овог рада је да испита утицај социо-демографских фактора, моторичких вештина деце и физичке активности родитеља на физичку активност предшколске деце с интелектуалном ометеношћу. Узорак истраживања укључио је 47-оро деце с интелектуалном ометеношћу, као и 47 родитеља. За испитивање социодемографских варијабли креиран је упитник који укључује информације о родитељима и деци. За процену адаптивног понашања у домену моторичких вештина коришћена је *Винеландова скала адаптивног понашања,* за процену грубомоторичких способности деце коришћен је *Тест развоја грубе моторике,* док је за процену физичке активности родитеља и деце с интелектуалном ометеношћу коришћена *Анкета о породичном начину живота*. Резултати показују да већина деце с интелектуалном ометеношћу учествује у некој физичкој активности, у трајању од најмање 20 минута, једном до четири пута у седмици. Вишеструком линеарном регресионом анализом утврђено је да су независне варијабле објасниле 11,2% варијације физичке активности деце. Груба моторика представља најјачи појединачни допринос физичкој активности деце с интелектуалном ометеношћу.

Кључне речи: физичка активност, моторичке вештине, интелектуална ометеност, родитељи, предшколски период.

INTRODUCTION

Regular physical activity (PA) contributes to better physical and mental health and is crucial for the formation of motor skills (Loprinzi et al., 2012). Creating opportunities for people with intellectual disabilities (ID) to have access and participate in regular PA has become an issue of great importance (Hinckson et al., 2013b). Research indicates that people with ID, as a population, are more likely to be in a worse condition in terms of general health, to be obese, and to devote very little time to physical exercise (Heller et al., 2011). Research has documented that people with ID most often have binding deficits in physical and motor functioning, and because of this, among other things, they spend more time engaged in sedentary activities (Memari et al., 2012). Physical inactivity is common in this population, and there is a lack of light, moderate and vigorous exercise (Bartlo & Klein, 2011).

People with mild, moderate, and severe ID show different degrees of developmental motor delay. Mild ID (MID) is characterised by motor functioning that is two to three standard deviations below the average. Moderate ID (MoID) is characterised by a greater limitation and is three to four standard deviations below the mean value, and severe ID is associated with below-average motor functioning, by about four standard deviations (Đurić-Zdravković, 2020; WHO, 2018). It is considered that the IQ score, due to the difficulty of precise measurement, is less valid and very often insufficient for assessing reasoning in real situations (APA, 2013; Cervantes

et al., 2019), and one of the most significant changes in DSM-5 was its removal from diagnostic criteria (APA, 2013). Instead, the ID category is diagnosed based on adaptive functioning. It was agreed that the upper limit of IQ for determining ID remains approximately around 70, i.e., two standard deviations below the mean (APA, 2013; Đurić-Zdravković, 2020).

Due to the health condition and limitations arising from the living environment, opportunities for people with ID to exercise regularly may be limited (Hamilton et al., 2007). Many people with ID live in supported living conditions or with their families, and it is precisely in these environments that very few of these people achieve the recommended daily level of PA (Rimmer et al., 2010). It is important to provide conditions for regular PA that suits the individual and that will be included in their daily activities. Identifying opportunities to participate in recreational activities and physical exercise, and developing collaborations with people with ID and their caregivers offer the potential to realise the benefits of regular exercise. This is vital for promoting and improving their general health condition, bettering their quality of life and well-being, and minimising health complications that may arise as a result of a lack of exercise (Haveman et al., 2010).

When it comes to children with ID, the World Health Organization recommends at least 60 minutes of moderate to intense PA every day, according to the specific abilities of the child (Bull et al., 2020), which is approximately 12,000 steps per day (Colley et al., 2012). Most of the research studying PA in the preschool population was conducted with children of typical development. A limited number of studies examines the determinants and correlates of PA within the population of preschool children with ID (Djuric-Zdravkovic et al., 2021). However, even within this small sample of literature, the benefits of PA are noted, and are reflected in the improvement of health and motor problems of children of this population (Collins & Staples, 2017; Wouters et al., 2019). Parental support and the mood set at home can encourage or limit a child's PA (Telford et al., 2004, according to Petrović et al., 2023). Parents are practically identified as carriers of PA in preschool children (Ninković et al., 2019). Considering that more frequent motor deficits and delays in motor development are registered in children with ID, it is certain that parental behaviour is also related to the PA patterns of these children.

Despite the differences in the design of the few available studies and the procedures used, it has been observed that sedentary activities increase as children with ID get older, especially if early intervention that forms appropriate behaviours within PA is not used (Hinckson & Curtis, 2013a). Therefore, it is necessary to study the factors related to the PA of young children with ID before the formation of wrong behaviour patterns and before the worsening of the symptoms of this clinical picture.

The aim of this paper is to examine the effect of socio-demographic factors, children's motor skills and parents' PA on the PA of preschool-age children with ID.

MATERIAL AND METHODS

Participants

The research sample included 47 children with ID (29 boys (61.7%), and 18 girls (38.3%)), ages four through seven years and two months (AS=5.78, SD=0.86). It was found that there are no significant differences in age between girls and boys (χ^2=2.816, df=3, p=0.714). The sample included children with mild, moderate, and severe ID. The sample included 47 parents – 43 mothers (91.49%) and four fathers (8.51%). The parents' age ranged from 26 to 52 years (AS=33.14, SD=7.22).

The inclusive criteria for this study were: children with ID, children of middle and older preschool age, regular attendance of the child in kindergarten in the current enrolment year, and one parent from the family of each child included in the sample. Exclusive criteria included: autism spectrum disorders, the existence of additional psychiatric or medical diagnoses, neurological diseases, or hearing or vision impairment in children. Other socio-demographic data on parents, as well as data on children, is presented in Table 1.

Table 1. Socio-demographic data on parents and children with ID

Parents		Children	
Data	M (SD) / N (%)	Data	M (SD) / N (%)
Age M (SD)	33.14 (7.22)	Age M (SD)	5.78 (0.86)
Mothers N (%)	43 (91.49)	Girls N (%)	18 (38.30)
Fathers N (%)	4 (8.51)	Boys N (%)	29 (61.70)
Education N (%)		Diagnosis N (%)	
Elementary	5 (10.63)	MID	14 (29.79)
High school	32 (68.09)	MoID	26 (55.32)
Bachelor	2 (4.26)	SID	7 (14.89)
Master	8 (17.02)		
Marital status N (%)		Kindergarten	N (%)
Married	30 (63.83)	Regular	8 (17.02)
Not married	17 (36.17)	Developmental	39 (82.98)
Employment N (%)			
Employed	15 (31.91)		
Not employed	32 (68.09)		

M – mean, SD – standard deviation, N – frequency, (%) – percentage, MID – mild intellectual disability, MoID – moderate intellectual disability, SID – severe intellectual disability.

Measures

A questionnaire was created for the purposes of this research in order to examine socio-demographic variables, which included information about parents and children. Variables related to parents included age, gender, level of education (elementary, high school, bachelor and master), marital status (married/not married), and employment status (employed/unemployed). The variables included in this study that related to children are age, gender, primary diagnosis, and belonging to a regular or developmental group within a preschool institution. The examiners obtained this information by surveying the parents.

The *The Vineland Adaptive Behavior Scales, Third Edition (VABS-III; Sparrow et al., 2016)* is the most commonly used measure of adaptive skills for the assessment of adaptive deficits in persons with ID and developmental disorders. In VABS-III assessment, informants may be parents. This instrument assesses adaptive behaviours in domains of communication, daily life, socialisation and motor skills. For the purpose of this research, the domain of motor skills/PA domain was used, which includes the subdomains for gross (use of large muscle groups for movement and coordination) and fine motor skills (use of small muscle groups for object manipulation). The subdomain for gross motor skills has 43 items, while the subdomain for fine motor skills has 34 items. Therefore, this domain was used to assess the child's use of gross and fine motor skills in everyday life. Items are rated on a 3-point Likert-type scale, on which '0' indicates that the individual does not perform assessed behaviour, '1' indicates that the individual performs the behaviour sometimes, and '2' indicates that the individuals perform assessed behaviour most of the time. VABS-III can be used to plan developmental intervention and monitor progress. In this study, the Cronbach's alpha coefficient for the VABS-III motor skills domain was 0.74 – 0.72 for the gross motor subdomain, and 0.75 for the fine motor subdomain.

In order to assess PA in children with ID and their parents, the *Family Lifestyle Survey (FLSS)* was used. It is a modification of a part of the *Family Check-Up questionnaire* (Dishion & Kavanaugh, 2003). Parents reported on the items of the instrument to provide information about the extent to which they and their children engage in PA within the family context. This form of the instrument consists of seven items that measure children's PA, one item that measures sedentary behaviour in children, and two items that refer to the measurement of the parents' PA. The scoring of the parents' PA is done on a five-point frequency scale ranging from 0 (almost never) to 4 (nearly always), while the PA of children is measured by the answers provided, which, for example, determine the number of minutes or hours related to different types of exercise. This instrument was perfected and used during work on projects (2014-2018, Prof. Dr. E. Stormshak) funded by the U.S. Department of Education. In

this study, the Cronbach's alpha coefficient for the FLSS was 0.81. The coefficient for children's PA was 0.77, while it was 0.83 for parents' PA.

The *Test of Gross Motor Development, Third Edition (TGMD-3; Ulrich, 2016)* is a standardised instrument for assessing the gross motor skills of children ages three to ten years and eleven months. It is used to identify children who are significantly behind their peers in the development of gross motor skills, and for individual planning of PA development programmes. The test consists of two subtests: *Locomotor* and *Ball Skills*. *Locomotor* measures gross motor skills that require fluid, coordinated body movement as the child moves through space. *Ball Skills* measure the gross motor skills of effective throwing, hitting and catching. TGMD-3 consists of a total of 13 items. *Locomotor* contains six items (run, jump, hop, skip, gallop, and slide), and *Ball Skills* includes seven object-control items (catch, kick, strike with a bat, strike with a racquet, underarm throw, overhand throw, and dribble). Points are determined for each assessment skill in relation to whether the criterion for its execution is met (score 1) or not (score 0). In this study, the average coefficient alpha is 0.81 for *Locomotor*, followed by 0.83 for *Ball Skills*, and 0.87 for the TGMD-3 composite score.

Procedure

In the form of a semi-structured interview, the researchers individually asked the parents questions while collecting data on the instruments VABS-III and FLSS, as well as when filling out the questionnaire related to socio-demographic variables. Standardised procedures related to the TGMD-3 include: (1) verbal and visual demonstration of each skill one at a time; (2) one practice test for each skill; (3) if necessary, a repetition of additional verbal and visual demonstration after practice, and (4) two attempts (by the child) without hinting or assistance from the researcher. It is important to note that, as the study was conducted, strategies were introduced to reduce distraction and to stimulate children's participation. These included reward systems, scheduling of activities, individual assessment, and the use of coloured markers to mark activities for positioning during demonstrations.

The diagnosis of the ID category, which is an integral part of the child's medical documentation, was previously performed by child psychiatrists and child neurologists within competent paediatric institutions in Serbia.

The testing itself was conducted between October 2022 and January 2023, in public and private, and regular and developmental kindergarten groups in the wider territory of Belgrade. The Administration of each kindergarten and parents gave their written consent for the inclusion of children in this research and the inspection of the accompanying medical documentation, and the children gave their verbal consent before the test.

It was also explained to both parents and children that they have the right to refuse to participate in the research at any time. The study was conducted in accordance with the Declaration of Helsinki and was approved by the Ethics Board of the University of Belgrade, Faculty of Special Education and Rehabilitation (number 134/2).

Statistical Analysis

Calculations within the study were done in the statistical programme IBM SPSS, version 25.0 software. Descriptive data is expressed as means (M) ± standard deviation (SD), frequencies and percentages. The reliability of the used instruments was checked using the internal consistency coefficient (Cronbach's α). Chi-squared was applied for appropriate comparisons. Correlations between variables were analysed using the Pearson correlation test. The level of statistical inference was determined at $p < 0.05$. Multiple linear regression was applied when determining the prediction of children's PA depending on socio-demographic factors, motor skills and the PA of parents.

RESULTS

VABS-III standard scores in the motor skills domain ranged between 32 and 107 (M=61.18, SD=14.83).

The assessment of children's PA led to the following results: in relation to children's activity level and their sedentary behaviour, 19.7% of the parents stated that their children usually sit while playing, colouring with crayons, watching TV or flipping through children's books; 43.2% of the children combine play with activities that involve movement and playing video games standing up; and 37.1% of the children do not stop moving/running from one part of the home to another/going up and down the stairs and jumping. In addition, 52.9% of the children engage in some PA (cycling, running, basketball, football, etc.) for at least 20 minutes, one to four times a week, 18.5% of the children exercise for at least 20 minutes five to seven times a week, and 28.6% of the children never exercise, not even 20 minutes a week. The majority of parents stated that their children play some sport at home or in kindergarten (69.8%), play outside (62.3%), walk (89.7%) and go to the park (82.5%) for less than an hour every day, except when the weather is extremely bad. The activity of riding a bicycle/tricycle is the least represented (18.9%) during daily physical activities (PAs) among children. Parents rated the items related to children's PA with 1 (15-30 minutes a day) and 2 (30 minutes to an hour a day) (M=1.42, SD=0.81), which indicates that children on average spend more than 30 minutes, but less than one hour on engaging in the mentioned PAs.

When it comes to the PA of parents, 57.7% of the respondents stated that they almost never participate in PA individually (M=0.56, SD=0.22), but 71.1% of the parents stated that they sometimes and often participate in PAs with their child (M=2.49, SD=1.23). All average score values on VABS-III, FLSS and TGMD-3 are given in Table 2.

Table 2. *The distribution of VABS-III, FLSS and TGMD-3 scores*

	M ± SD	Range
VABS-III		
Gross motor skills	34.56 ± 8.77	0 – 86
Fine motor skills	26.62 ± 6.06	0 – 68
Total Motor Skills	61.18 ± 14.83	0 – 154
FLSS		
PA of children	7.12 ± 3.45	0 – 20
PA of parents	1.53 ± 0.73	0 – 8
TGMD-3		
Locomotor	20.24 ± 7.67	0 – 46
Ball Skills	19.61 ± 9.51	0 – 54
Total TGMD-3 scores	39.85 ± 17.18	0 – 100

VABS-III: Vineland Adaptive Behavior Scales, Third Edition; FLSS: Family Lifestyle Survey; TGMD-3: Test of Gross Motor Development – 3rd edition, M – mean; SD – standard deviation; PA – Physical activity.

The results of the correlation analysis presented in Table 3 indicate different relations between the study variables (VABS-III, FLSS and TGMD-3) and socio-demographic variables. The parents' age is not related to any variable ($p>0.05$), except for children's PA and parents' PA ($p<0.01$, $p<0.05$, respectively). It is a matter of direct proportionality in this relation ($r=0.36$ and $r=0.30$). The gender of parents does not correlate with any of the tested variables ($p>0.05$), while the parents' education directly correlated with almost all variables ($r=0.27$ to $r=0.69$), except with the parents' marital status and the child's diagnosis ($p>0.05$). Marital status is weakly inversely correlated with the parents' employment ($r=-0.23$), and it is in weak direct proportionality with the PA of children and parents ($r=0.31$ and $r=0.33$). Employment in direct proportionality correlates only with the PA of children and parents ($r=0.42$ and $r=0.29$), as well as with the children's locomotor skills ($r=0.26$). The children's diagnosis correlates with all non-demographic variables of the study in direct proportionality ($r=0.44$ to $r=0.71$), except with the PA of the parents, where an inverse proportionality was found ($r=-0.42$). Gross motor skills in direct proportionality moderately and strongly correlate with all non-demographic variables ($r=0.42$ to $r=0.71$), while fine motor skills have weak correlations with motor variables ($r=0.25$ to $r=0.31$), except for the PA of parents where the relation is not statistically significant ($p>0.05$). The PA of both children and parents forms weak to strong directly proportional relationships with all motor variables ($r=0.25$ to $r=0.71$), as well as with children's locomotor and ball skills ($r=0.26$ to $r=0.71$).

Table 3. *The matrix of inter-correlations between study variables and demographic characteristics*

	1	2	3	4	5	6	7	8	9	10	11
1. Parents' age											
2. Gender of parents	0.06										
3. Education of parents	0.10	-0.17									
4. Marital status	0.04	0.14	0.12								
5. Employment	0.05	0.07	0.69**	-0.23*							
6. Diagnosis of the child	0.09	0.09	0.19	0.08	0.16						
7. VABS-III – Gross motor skills	-0.02	0.03	0.27*	0.07	0.12	0.68**					
8. VABS-III – Fine motor skills	0.08	0.06	0.44**	0.05	0.04	0.66**	0.48**				
9. FLSS – PA of children	0.36**	-0.08	0.37**	0.31**	0.42**	0.71**	0.59**	0.25*			
10. FLSS – PA of parents	0.30*	0.08	0.58**	0.33**	0.29*	-0.42**	0.42**	0.13	0.46**		
11. TGMD-3 – Locomotor	0.14	0.17	0.49**	0.19	0.26*	0.44**	0.68**	0.30*	0.71**	0.39**	
12. TGMD-3 – Ball Skills	0.11	0.18	0.56**	0.17	0.19	0.53**	0.71**	0.31**	0.69**	0.27*	0.45**

Note. $^{**}p < 0.01$, $^{*}p < 0.05$

VABS-III: Vineland Adaptive Behavior Scales, Third Edition; FLSS: Family Lifestyle Survey; TGMD-3: Test of Gross Motor Development – 3rd edition; PA – Physical activity.

Multiple linear regression analysis showed that a significant regression model was identified ($F = 19.072$; $p < 0.001$; $R^2 = 0.112$). Therefore, the results of the regression analysis indicate that the independent variables explained 11.2% of the variance in children's PA. Regression analysis indicates that there is no collinearity in the results, which suggests that the results have adequate statistical significance. Table 4 illustrates the significance, direction, and strength of the relation between individual predictors and the PA of children with ID. The child's diagnosis (β=0.099; p=0.003), as the first predictor with a positive standardised beta value, suggests that a more severe clinical picture (lower IQ, lower quality of motor skills) will more likely contribute to a lower quality of PA in children with ID. The quality of gross motor skills of children with ID contributes positively to their PA (β=0.236; p=0.000), as well as their locomotor abilities (β=0.092; p=0.004). In addition, within the observed predictors, it can be noted that children with ID whose parents are more physically active are themselves significantly more physically active (β=0.172; p=0.001). Gross motor skills represented the strongest single contribution to the PA of children with ID.

Table 4. Multiple linear regression of the prediction of children's physical activity

	Unstandardised Coefficients		Standardised Coefficients			
	β	Std. Error	β	t	Sig.	Partial R
(Constant)	2.078	0.081		27.136	0.000	
Education of parents	0.010	0.014	0.022	1.618	0.262	0.006
Diagnosis of the child	0.079	0.017	0.099	2.814	**0.003****	0.080
VABS-III – Gross motor skills	0.071	0.012	0.236	5.492	**0.000****	0.214
VABS-III – Fine motor skills	0.007	0.005	0.027	1.110	0.309	0.025
TGMD-3 – Locomotor	0.034	0.013	0.092	3.231	**0.004****	0.084
TGMD-3 – Ball Skills	0.031	0.022	0.065	1.706	0.134	0.054
PA of parents	0.054	0.011	0.172	4.284	**0.001****	0.182

Note. $^{**}p < 0.01$

VABS-III: Vineland Adaptive Behavior Scales, Third Edition; FLSS: Family Lifestyle Survey; TGMD-3: Test of Gross Motor Development – 3rd edition; PA – Physical activity

DISCUSSION

The aim of this study was to examine the effect of socio-demographic factors, children's motor skills and parents' PA on the PA of preschool children with ID. Taking into account the percentage of realisation of PA in children with ID, it is clear that the examined sample does not follow the recommendation of the World Health Organization of at least 60 minutes of moderate to intense PA per day. On average, children with ID spend between 30 and 60 minutes engaging in the aforementioned PAs, and most parents state that PAs are mostly carried out within preschool institutions. Previous papers in this area also indicate a reduced level of PA in children with ID (Hartman et al., 2015; McGarty et al., 2017). It is observed that more than a third of the children within the examined sample very often move, jump and run in a stereotypical, dysfunctional manner. Such actions appear in the repertoire of behaviour of children with ID and can interfere with the performance of functional activities related to self-care and household/kindergarten tasks, as well as involvement in play and typical kindergarten interaction with other children and adults (Đurić-Zdravković, 2020; Joosten & Bundy, 2010). The individual PA of parents of children with ID is not frequent either, because more than half of the respondents state that they almost never engage in these activities. The reasons for this can be numerous, and some of the most often mentioned reasons relate to the daily implementation of various activities by parents that include the care for, and support of, a child with ID, and there is little time and energy left to engage in physical exercise (Diaz, 2020). Nevertheless, the information that is encouraging

refers to the joint participation of parents and children in PAs, which is practiced by more than 70% of the parents. This is optimistic data, because it is clear that children with ID are under the influence of their parents when it comes to carrying out PA, while the adult population, people with MID for example, is more independent and therefore more physically active in performing daily life activities (Wouters et al., 2019). Forming the habit of conducting PA, as well as gradually increasing the intensity and frequency of exercise and reducing sitting time, should be implemented from the earliest age within the early intervention programme, depending on the abilities of the child with ID (Djuric-Zdravkovic et al., 2021).

In the correlation analysis, the parents' level of education and the type of the child's diagnosis correlated with all non-demographic variables in direct proportionality. This means that parents with a higher level of education were more physically active than parents with a lower level of education, as well as that their children had better gross and fine motor skills, and locomotor and ball skills, and were significantly more physically active. Parents who are more educated may be more informed about the symptoms and specifics of ID, which allows them to seek professional support and initiate intervention much earlier than parents with a lower level of education. Children with ID who have a more severe clinical condition have a worse quality of all motor skills and participate less in PAs, which was also confirmed by previous research (Wouters et al., 2019). This could be partly related to the negative influence of cognitive deficits on engaging in PA (Hartman et al., 2015).

When it comes to predicting the PA of preschool children with ID, motor activities (gross motor and locomotor) were singled out as very important components. The study showed that children with low gross motor development were less physically active than children with more developed gross motor abilities. The low quality of gross motor and locomotor skills in children with ID resulted in low participation in PAs. The inter-connection between low gross motor skills and low participation in PAs has already been found, but in the population of children with ID of primary school age (Westendorp et al., 2011). The diagnosis of the child and the PA of the parents also proved to be significant predictors. Thus, the level of ID was another potential factor influencing the extent of PA, but so far it has been mainly studied in adults with ID (Hilgenkamp et al., 2012). It has been shown that parents have a significant influence on the level of PA of their children with ID. Children with ID often rely on parental support, role models and interaction when engaging in PA, because they generally cannot identify informal opportunities for engagement, as a result of their physical or cognitive deficit (Njelesani et al., 2015).

It is necessary to conduct more research in order to determine whether and how the quality of motor development in children with ID can be increased, and whether better motor development has a positive effect on the structure of PA directly (in childhood) and in the future (in adulthood), as was found to be the case with children with typical development (Loprinzi et al., 2012). Likewise, increased access and opportunities for PA in children with ID should be investigated. Given that parental modelling has been identified as a key facilitator of PA in children, there is a need for dyadic interventions targeting the parent as well as the child with ID.

Local officials, special education teachers and parents should pay more attention to the PA of children of all categories of ID. It is necessary to monitor the range of usual functional PA, as well as its quality. The findings of this study emphasise the importance of stimulating the development of motor skills, in order to increase the volume of PA. In preschool children with ID, this can be realised as part of IEP 1, which is implemented in preschool institutions. It is important to note that within this document, legally, no special development area related to motor development or physical activity is planned (Regulation on detailed instructions for determining the right to an individual educational plan, its application and evaluation). Therefore, a detailed plan should be created to support the stimulation of children's physical activity development through a pedagogical profile and individualisation measures that would be applied within the IEP 1 (Đurić-Zdravković et al., 2021).

Although this study produced interesting results, it has several important limitations. First, this is a cross-sectional analytic study, and it does not include a longitudinal follow-up. When examining the relations between PA in children with ID and other variables (taking into account children's age, diagnosis, and other family factors), it is important to understand that they represent relations that occur over a period of time. Therefore, it is not possible to generalise the results, or the predictive or causal relations. The results of this study, in relation to the part referring to the PA of parents and children with ID, may be subject to informant bias, where there is a possibility of giving excessively positive answers. Therefore, it is recommended that future researchers apply empirically based research methods (e.g., observation in kindergarten) in order to more comprehensively look at the quality of PA of children with ID.

CONCLUSION

Given the evidence-based recommendations on the health benefits of meeting the recommended 60 minutes of PA per day, the low percentage of children with ID in Belgrade who meet the guidelines is of great concern. The results of this study determined that children with ID spend

an average of more than 30 minutes, but less than one hour, engaging in physical activities. Parents of children with ID almost never participate in physical activity on their own, although they do participate in physical activity with their children. Within the prediction of physical activity of children with ID, motor activities (gross motor and locomotor) were singled out as very important components. This study suggests that Serbian educational institutions and decision-makers in the Government of the Republic of Serbia should make more efforts to ensure that children with ID and their parents are given increased access to and opportunities for engaging in and effectively performing PA.

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ФИЗИЧКА АКТИВНОСТ КОД ПРЕДШКОЛСКЕ ДЕЦЕ С ИНТЕЛЕКТУАЛНОМ ОМЕТЕНОШЋУ

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Резиме

Редовна физичка активност доприноси бољитку физичког и менталног здравља, и кључна је за формирање моторичких вештина. Особе с интелектуалном ометеношћу склоније су да мање времена посвећују физичком вежбању. Циљ овог рада је да испита утицај социо-демографских фактора, моторичких вештина деце и физичке активности родитеља на физичку активност предшколске деце с интелектуалном ометеношћу. Узорак истраживања укључивао је 47-оро деце с интелектуалном ометеношћу различитих степена, као и 47 родитеља. За испитивање социо-демографских варијабли креиран је упитник за потребе овог истраживања који је укључивао информације о родитељима и деци. За процену адаптивног понашања у домену моторичких вештина (домен физичке активности) коришћена је Винеландова скала

адаптивног понашања, за процену грубомоторичких способности деце коришћен је Тест развоја грубе моторике, док је за процену физичке активности родитеља и деце с интелектуалном ометеношћу коришћена Анкета о породичном начину живота. Резултати показују да већина деце с интелектуалном ометеношћу учествује у некој физичкој активности (вожња бицикла, трчање, кошарка, фудбал и сл.) у трајању од најмање 20 минута, једном до четири пута у седмици. Већина родитеља деце с интелектуалном ометеношћу изјавила је да скоро никада не учествују самостално у физичкој активности, али да често учествују у физичким активностима заједно са својим дететом. Вишеструком линеарном регресионом анализом утврђено је да су независне варијабле објасниле 11,2% варијације физичке активности деце, као и да тежа клиничка слика (нижи IQ, нижи квалитет моторичких способности) доприноси нижем квалитету физичке активности деце, док локомоторичке способности и физичка активност родитеља позитивно доприносе дечијој физичкој актвности. Груба моторика представља најјачи појединачни допринос физичкој активности деце с интелектуалном ометеношћу.

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STRUCTURED PHYSICAL ACTIVITY DURING SCHOOL RECESS: MORE THAN PHYSICAL FITNESS BENEFITS

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Abstract

Regular physical activity is associated with numerous health benefits in school children and adolescents. Therefore, it is important to create a supportive environment that promotes physical activity, especially in schools. In order to examine the effects of two recess-based interventions on children's physical fitness and optimism, and involvement in school's violence, a prospective study was conducted. The sample comprised of 210 primary school students attending grades one through four (101 boys, 109 girls), assigned to two Intervention groups (IG1, IG2) and a Control group (CG). For eight weeks, IG1 was provided with exercise equipment, IG2 was exposed to daily structured physical activity during recess, and CG had regular recess. Pre- and post-intervention measurements revealed significant differences ($p \leq .05$) between groups in physical fitness and optimism, with IG2 (structured physical activity) scoring most favourably. In addition, the percentage of students who were not involved in peer violence as perpetrators significantly increased in IG2 during the intervention. IG1 performed the best in the agility test, and CG achieved the lowest fitness and optimism scores. No other significant differences were detected. Structured physical activity during recess might be a promising strategy of optimising students' health and school climate.

Key words: EUROFIT, Youth Life Orientation Test, pessimism, children, exercise equipment.

СТРУКТУРИРАНА ФИЗИЧКА АКТИВНОСТ ТОКОМ ВЕЛИКОГ ШКОЛСКОГ ОДМОРА: ВИШЕ ОД КОРИСТИ ЗА ФИЗИЧКИ ФИТНЕС УЧЕНИКА

Апстракт

Редовна физичка активност је повезана са бројним здравственим користима код школске деце и адолесцената. Зато је важно обезбедити подржавајуће окружење које

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промовише физичку активност, нарочито у школама. Са циљем да се испитају ефекти две интервенције током одмора на физички фитнес, оптимизам и учешће ученика у школском насиљу, спроведена је проспективна студија. Узорак је обухватио 210 ученика првог до четвртог разреда основне школе (101 дечак, 109 девојчица), распоређених у две интервентне групе (ИГ1, ИГ2) и једну контролну групу (КГ). Током осам недеља, ИГ1 је само имала реквизите за вежбање на располагању, ИГ2 је била изложена свакодневној структурираној физичкој активности током великог одмора, док је КГ имала редовне школске одморе. Мерења пре и после интервенције показала су да постоје статистички значајне разлике између група ($p \leq .05$) у физичком фитнесу и оптимизму, при чему је најбоље резултате имала ИГ2 (структурирана физичка активност). Поред тога, проценат ученика који нису били укључени у вршњачко насиље као извршиоци је значајно опао у ИГ2 током интервенције. ИГ1 је имала најбоље резултате на тесту агилности, док је КГ постигла најслабије резултате на тестовима фитнеса и оптимизма. Друге значајне разлике нису констатоване. Структурирана физичка активност током великог школског одмора може представљати обећавајућу стратегију оптимизације здравља ученика и школске климе.

Кључне речи: EUROFIT, Youth Life Orientation Test, песимизам, деца, спортски реквизити.

INTRODUCTION

Although the benefits of regular physical activity on youths' health are well documented (Janssen & LeBlanc, 2010), 81% of adolescents globally do not meet the minimum physical activity recommendations (Guthold et al., 2020). In order to facilitate an active lifestyle, a supportive environment should be created, thus making healthy choices the easier ones. These principles, set by the Ottawa Charter (World Health Organization, 1986), have been implemented in Health Promoting Schools (HPS), introduced in Europe for the first time in 1992. HPS approach calls for employing all school resources and partnerships in the promotion of the health of students and staff, which includes physical activity.

Children can be physically active during physical education classes, in school sports clubs, while staying in extended stay, during active breaks in classrooms, while actively commuting to/from schools, or during school recess. Although recess is part of a regular school day in every school in Serbia, there is currently no legislation to regulate the duration, organisation, and content of school recess (Kermeci & Đorđić, 2018). The study revealed that the duration of recess ranges between 10 and 30 minutes, with a modal value of 20 minutes. In most cases, it follows the second lesson in the elementary school daily schedule. Besides the main recess, there are also short 5-minute recesses between lessons.

Although school recess provides the opportunity for physical activity, not many students spend at least 40% of the recess time in moderate-to-vigorous physical activity (MVPA) as recommended (Ridgers et al., 2006). Previous research suggests that boys are more active than girls during recess (Stratton 1999, 2000; Zask et al., 2001; Greca & Silva,

2017). In order to promote students' physical activity, schools can offer more structured activities, led by a trained adult, which can result in increased levels of MVPA during recess (Howe et al., 2012; Larson et al., 2014; Black et al., 2015; Coolkens et al., 2018). On the other hand, unstructured recess, might be a more favourable context for students to focus, develop social skills, collaborate and improve mood (Parrot & Cohen, 2020). Some simple and feasible interventions, like multi-colour playground markings, zonal design, and increased equipment availability, turned out to be effective in terms of physical activity promotion (Stratton & Mullan, 2005; Verstraete et al., 2006; Ridgers et al., 2007; 2010).

Considering the effects of structured and unstructured recess activities on physical fitness, a recent study detected similar improvements of cardiorespiratory fitness in both intervention and control schools, besides increased level of light and moderate physical activity during week days (Casolo et al., 2019). Authors suggest that children's spontaneous physical activity during recess might be comparable to the structured one led by adults. Thus, further effort to promote physical activity should target other parts of the school day (Casolo et al., 2019). Another study combined structured aerobic exercises and cognitively engaging physical activities in a 22-week recess intervention (Van der Niet et al., 2016). Although the intervention improved some aspects of executive functioning in primary school children, no significant differences were detected in physical fitness components. The lack of the intervention's effects on students' physical fitness, which was the case in other studies as well (St Laurent et al., 2019; Latorre-Román et al., 2021), might be explained, to some extent, by implementation challenges and methodological issues. On the other hand, it is possible that not every child responds identically to different types of recess. An interesting study, conducted on a sample of preschool children, suggests that the least active children might benefit the most from structured recess that includes adult led physical activities (Frank et al., 2018). In addition, while a higher provision of recess is correlated with a higher physical activity level, no such relationship was found with physical fitness (Clevenger et al., 2023).

Besides opportunities for physical activity, recess provides children academic, cognitive, behavioural, and emotional benefits, according to a recent review study (Hodges et al., 2022). School recess is seen as a vital social space for children and adolescents, although it has long been associated with violence, bullying, and social exclusion (McNamara, 2021). According to McNamara (2021), children prioritise the social aspect of recess – things happening at recess have a substantial social and emotional weight for them. Changing recess might actually contribute to changing the school's social climate and to reducing violence. Providing structure and additional supervision, and/or developing social skills

through recess activity, could contribute to students' having a more positive school experiences.

Bearing in mind the relevance of school recess as an important facet of the growing-up environment of school children, a study was conducted in order to examine the effects of two recess physical activity interventions on students' physical fitness and optimism, and their involvement in school violence. The study is the first of its kind to compare the effects of different recess interventions on Serbian school children's wellbeing and school climate, as well.

METHODS

Study Participants

The study employed the quasi-experimental design, with two intervention groups, and one control group. Both interventions lasted for eight weeks. Participants were recruited from four rural elementary schools (Sečanj municipality): „Veljko Đuričin" in Jarkovac, „Braća Stefanović" in Neuzina, „Vuk Karadžić" in Konak, and „Stevan Aleksić" in Jaša Tomić. All of the villages are located in a sparsely populated agricultural area in the Central Banat District of the Autonomous Province of Vojvodina, Serbia.

The schools were primary sample units, and they were assigned to the Intervention or the Control programme randomly. The first Intervention group (IG1) consisted of students attending grades one through four in elementary schools in Konak and Jarkovac, the second Intervention group (IG2) consisted of students attending grades one through four in Neuzina, and the Control group (CG) consisted of students attending grades one through four in Jaša Tomić.

The IG1 group was provided with exercise equipment during recess, the IG2 group participated in structured physical activity at recess, while members of the CG spent recess any way they wanted to. Pre- and post-intervention measurements included: level of fitness, optimism, and involvement in school violence. The obtained data was analysed by appropriate statistical methods.

The basic sample characteristics are presented in Table 1. The total sample consisted of 210 participants (101 boys and 109 girls), with 70 students per each study group (IG1, IG2, CG). Only students attending grades one through four participated. Parents provided informed consents for their children to participate, and the approvals of the schools' principals were also obtained.

Table 1. Basic sample characteristics (N = 210)

Group		Boys	Girls	Total
IG1		27	43	70
	1st grade	4	10	14
	2nd grade	8	13	21
	3rd grade	6	9	15
	4th grade	9	11	20
IG2		34	36	70
	1st grade	10	9	19
	2nd grade	6	12	18
	3rd grade	9	8	17
	4th grade	9	7	16
CG		40	30	70
	1st grade	8	6	14
	2nd grade	9	11	20
	3rd grade	9	5	14
	4th grade	14	8	22
Total:		101	109	210

Note: IG1 – first Intervention group (equipment provided); IG2 – second Intervention group (structured physical activity); CG – Control group.

Measures

Physical fitness. In order to assess physical fitness components, the following EUROFIT tests were applied (EUROFIT, 1993): *Standing Broad Jump* - STBJ (measures lower-body power), *Sit-Ups in 30 seconds* - SU30 (measures abdominal muscular endurance), *Bent Arm Hang* - BAHG (measures upper-body muscular endurance), *Sit-and-Reach* - SEAT (measures flexibility), and *10x5 m Shuttle Run* – 10x5 (measures running speed and agility). In addition, the *1.6 km Run/Walk* - 1600 test was used for aerobic capacity assessment (Meredith & Welk, 2013).

Optimism. The Youth Life Orientation Test (YLOT) was used for the self-assessment of optimism and pessimism, and the subscales scores were then used to calculate the general optimism score (Ey et al., 2005). The YLOT consists of 16 items, out of which four items serve as fillers. Each subscale (Optimism and Pessimism) contains 6 items (statements), and participants are required to rate to what extent these statements apply to them: true for me (score 3), sort of true for me (2), sort of not true for me (1), and not true for me (0). An example of an Optimism subscale item is: "When I'm not sure what will happen next, I usually expect it to be something good". Items that measure Pessimism describe negative expectations, like "Things usually go wrong for me". A subscale score is the sum of scores of associated items (it can range from 0 to 18), while the Total Optimism score is calculated by adding up the Optimism subscale score and the inverse Pessimism subscale score. The YLOT scales showed acceptable internal reliability, with Cronbach's Alpha coefficients ranging between 0.61 and 0.65.

Involvement in school violence. Participants answered three questions related to the frequency of: (1) themselves acting as bullies towards peers during the previous two months; (2) them being violent towards teachers during the previous two months; and (3) them being the victims of peer violence during the previous two months. The items were selected from the wider school violence survey (Popadić, Plut, & Pavlović, 2009). The two months period purposefully coincided with the duration of the interventions.

The Description of the Interventions

Two school-based interventions (IG1 and IG2) aiming to promote physical activity during recess were applied daily for eight weeks in total. During the same period, the control group (CG) was also observed. Pre- and post-intervention measurements were conducted in order to compare the effects of IG1, IG2, and CG recess activities on students' physical fitness, self-rated optimism, and level of school violence.

The first Intervention group (IG1) was provided with exercise equipment during a 10-minute recess in order to encourage students' physical activity. The equipment included: hoops, balls, badminton sets, table tennis sets, mini hurdles, ropes, cones, sticks, rubber bands, Frisbees, tractor tires, a bar, and hopscotch courts were drawn on the playground. Before the intervention, the physical education teacher organised a short demonstration of different ways the equipment might be used. No other incentives or guidelines were provided during the intervention. Students were allowed to use the equipment the way they wanted, and as long as they wanted to. They could switch from one to another piece of equipment, or share the pieces with other students. Adults supervised students during the recess, as is usual.

The second Intervention group (IG2) participated in structured physical activity during a 10-minute recess. The activities were led by the physical education teacher, and all students were supposed to take part in the activities. The intervention included the following activities: 1st week – dance aerobics; 2nd week – folk dances, 3rd week – cooperative running games, 4th week – cooperative running games, 5th week – throwing games, 6th week – relay games, 7th week – "Make the letter" game, and 8th week – obstacle course. The intervention provided participants with an additional 50 minutes of well-rounded physical activity weekly.

Students in the Control group (CG) were involved in spontaneous recess activities, i.e. they were allowed to spend recess time the way they preferred. No encouragements for active play or physical activity were provided, including additional exercise equipment. Students simply engaged in regular recess activities like walking, sitting and chatting, and playing.

Data Collection Organisation

Before field data collection, all necessary consents were obtained, including parents' informed consents and the approvals of the schools' princi-

pals. The participating schools provided the conditions for standardised measurement procedures. Data was collected and analysed in accordance with the ethical guidelines of the WMA Declaration of Helsinki (WMA, 2013).

Pre-intervention measurements were conducted in the week preceding the implementation of the interventions, while post-intervention measurements were done the first week following the end of the interventions.

Fitness testing was organised in the schools' gyms during morning hours, and self-reports on optimism and involvement in school violence were completed in classrooms.

Data Analysis

Descriptive statistics was employed, including mean (M) and standard deviation (SD) for interval variables. In addition, intergroup differences at the final measurement were tested by multivariate and univariate analyses of covariance (MANCOVA, ANCOVA). The effect size was assessed by partial eta-squared ($\eta 2$).

For categorical variables, absolute and relative frequencies were determined using the Chi-squared test. The significance level was set at $p \leq .05$. Data was analysed in the statistical software SPSS for Windows, version 20.0.

RESULTS

Differences in Physical Fitness

The MANCOVA revealed a statistically significant difference in the adjusted means between the groups (IG1, IG2, CG) on the fitness variables ($F = 14.813$, $Q = .000$, Wilks' $\Lambda = .23$, partial $\eta^2 = .52$ (Table 2)). The ANCOVA detected significant univariate effects of the interventions ($p = .00$) on the following variables: BAHG, SEAT, 10x5, and 1600.

Table 2. MANCOVA and ANCOVA results: differences between IG1, IG2 and CG in fitness variables

	IG1		IG2		CG		F	*p*	η^2
	M	SD	M	SD	M	SD			
STBJ	119.77	2.86	123.92	1.52	122.73	1.43	0.80	0.45	0.02
SU30	15.46	0.86	14.68	0.46	14.75	0.43	0.33	0.72	0.01
BAHG	8.04	1.99	11.86	1.06	5.14	0.99	9.16	**0.00**	0.17
SEAT	1.79	0.72	3.93	0.38	1.37	0.36	10.66	**0.00**	0.20
10x5	23.89	0.38	26.43	0.20	27.41	0.19	33.97	**0.00**	0.44
1600	9.19	0.37	7.88	0.20	10.11	0.19	29.04	**0.00**	0.40
Wilks' lambda = 0.23; F=14.813; Q= 0.00; η^2=0.52									

Note: STBJ – Standing broad jump; SU30 – sit-ups in 30s; BAHG – Bent arm hang; SEAT – Seat-and-reach; 10x5 – 10x5 m shuttle run; 1600 – 1.6 km run/walk; M – Mean; SD – standard deviation; F – F test; Q – F test significance level; η^2 - partial eta-squared

Pairwise comparisons (LSD test) revealed that the IG2 intervention (structured activity) had significantly more favourable effects than regular recess on the above mentioned variables, and significantly better results than IG1 on the flexibility (SEAT) and aerobic capacity (1600) tests (Table 3). On the other hand, the IG1 group was superior both to IG2 and CG in agility (10x5). No other significant difference between groups was found.

Table 3. Pairwise comparisons between control and intervention groups in physical fitness variables (LSD test)

	Group	M (SD)	Group	M (SD)	*p*
	IG1	119.77 (2.86)	IG2	123.92 (1.52)	.209
STBJ	IG1	119.77 (2.86)	CG	122.73 (1.43)	.365
	IG2	123.92 (1.52)	CG	122.73 (1.43)	.600
	IG1	15.46 (0.86)	IG2	14.68 (0.46)	.433
SU30	IG1	15.46 (0.86)	CG	14.75 (0.43)	.469
	IG2	14.68 (0.46)	CG	14.75 (0.43)	.923
	IG1	8.04 (1.99)	IG2	11.86 (1.06)	.099
BAHG	IG1	8.04 (1.99)	CG	5.14 (0.99)	.204
	IG2	11.86 (1.06)	CG	5.14 (0.99)	**.000**
	IG1	1.79 (0.72)	IG2	3.93 (0.38)	**.012**
SEAT	IG1	1.79 (0.72)	CG	1.37 (0.36)	.609
	IG2	3.93 (0.38)	CG	1.37 (0.36)	**.000**
	IG1	23.89 (0.38)	IG2	26.43 (0.20)	**.000**
10x5	IG1	23.89 (0.38)	CG	27.41 (0.19)	**.000**
	IG2	26.43 (0.20)	CG	27.41 (0.19)	**.001**
	IG1	9.19 (0.37)	IG2	7.88 (0.20)	**.003**
1600	IG1	9.19 (0.37)	CG	10.11 (0.19)	**.032**
	IG2	7.88 (0.20)	CG	10.11 (0.19)	**.000**

Note: STBJ – Standing broad jump; SU30 – sit-ups in 30s; BAHG – Bent arm hang; SEAT – Seat-and-reach; 10x5 – 10x5 m shuttle run; 1600 – 1.6 km run/walk; M – Mean; SD – standard deviation; p – level of significance.

Differences in Optimism

The MANCOVA confirmed the significant difference between the Control and Intervention groups in YLOT scores at post-intervention measurement ($F = 6{,}244$, $Q = 0.00$, Wilks' $\Lambda = .88$, partial $\eta^2 = 0.064$ (Table 4)). Significant univariate effects of the interventions were identified for the Pessimism and Total Optimism scales (ANCOVA).

The results of the pairwise analysis (LSD test), presented in Table 5, suggest that the participants in the Control group had significantly higher Pessimism and lower Total Optimism scores than the participants in both Intervention groups. In addition, students who were exposed to structured physical activity during recess (IG2) scored significantly lower on the Pessimism scale, and higher on the Total Optimism scale than students in IG1 (equipment provided).

Table 4. MANCOVA and ANCOVA results: differences between IG1, IG2 and CG in YLOT scores

	IG1		IG2		CG		F	*p*	η^2
	M	SD	M	SD	M	SD			
Optimism	16.18	0.23	16.76	0.26	16.84	0.26	2.11	0.125	0.022
Pessimism	5.05	0.40	3.61	0.46	6.27	0.46	8.59	**0.000**	0.085
Total optimism	29.13	0.54	31.15	0.60	28.58	0.62	5.17	**0.007**	0.053
F = 6.244; Q = 0.00; Wilks' lambda = 0.876; η^2=0.064									

Note: M – Mean; SD – standard deviation; F – F test; Q – F test significance level; η^2 – partial eta-squared.

Table 5. Pairwise comparisons between control and intervention groups in YLOT scores (LSD test)

	Group	M (SD)	Group	M (SD)	*p*
	IG1	16.18 (0.23)	IG2	16.76 (0.26)	.100
Optimism	IG1	16.18 (0.23)	CG	16.84 (0.26)	.067
	IG2	16.76 (0.26)	CG	16.84 (0.26)	.807
	IG1	5.05 (0.40)	IG2	3.61 (0.46)	**.019**
Pessimism	IG1	5.05 (0.40)	CG	6.27 (0.46)	.057
	IG2	3.61 (0.46)	CG	6.27 (0.46)	**.000**
	IG1	29.13 (0.54)	IG2	31.15 (0.60)	**.014**
Total optimism	IG1	29.13 (0.54)	CG	28.58 (0.62)	.514
	IG2	31.15 (0.60)	CG	28.58 (0.62)	**.003**

Note: M – Mean; SD – standard deviation; p – level of significance.

Differences in Involvement in School Violence

The effects of the interventions on the students' involvement in school violence were analysed by the Chi-squared test. Three indicators were observed: (1) students as victims of peer violence; (2) students as perpetrators of violence towards peers; and (3) students as perpetrators of violence towards teachers. The results of the Chi-squared tests for IG1 (equipment provided) indicated that there was no significant difference in the numbers of students who were victimised by schoolmates before and after the intervention (χ^2 (df=2) = 3.96; p = 0.14). The same was concluded for students as perpetrators of violence towards peers (χ^2 (df=2) = 0.38; p = 0.83), and towards teaching staff (χ^2 (df=2) = .53; p = .77).

Considering IG2 (structured physical activity), no significant differences were observed in the 'students as victims of peer violence' indicator (χ^2 (df=2) = .24; p = .12), and the 'students as perpetrators of violence towards teachers' indicator (χ^2 (df=2) = 4.62; p = .10). However, after the intervention, the percentage of students who were involved in peer violence as perpetrators significantly differed in comparison to the pre-intervention data (Table 6). The number of students who had never

been involved in peer violence as perpetrators increased from 51.4% to 81.4%, while the category 'involved once or twice' recorded a decrease of 31.4 percent points.

Table 6. *IG2 students (structured physical activity) as peer violence perpetrators before and after the intervention*

	Involved as perpetrator in school peer violence in last two months			
	Never	Once or twice	Many times or daily	Total
Before the intervention	36 (51.4%)	29 (41.4%)	5 (7.1%)	70 (100.0%)
After intervention	57 (81.4%)	7 (10.0%)	6 (8.6%)	70 (100.0%)
χ^2 (df=2) = 18.28 p = .0001				

Among students who were involved in regular recess activities (CG), no significant differences were identified in victimisation (χ^2 (df=2) = 1.15; p = .57), in acting as perpetrators of peer violence (χ^2 (df=2) = 0.19; p = .91), or in acting as perpetrators of violence towards teachers (χ^2 (df=2) = 0; p = 1.0).

DISCUSSION

The effects of two eight weeks long recess interventions on the students' physical fitness and optimism, as well as their involvement in school violence, were analysed and compared to the Control group. The first Intervention group (IG1) was provided with exercise equipment, with no additional exercise guidelines or encouragement, except for a brief initial demonstration of how to use the equipment. The other Intervention group (IG2) was exposed to daily structured physical activity, led by a physical education teacher, while the members of the Control group (CG) were engaged in spontaneous recess activities throughout the eight observed weeks.

The study was conducted in small rural schools, with children attending grades one through four. The post-intervention measurement pointed out significant differences between the groups in physical fitness, particularly in muscular endurance (upper arm muscles, abdominal muscles), flexibility, and aerobic capacity. On the other hand, the provision of exercise equipment led to superior results in agility in comparison to structured and regular recess, with no other significant differences between the groups. In contrast to some previous studies (van der Niet et al., 2016; St Laurent et al., 2019; Latorre-Román et al., 2021), structured intervention proved to be more efficient in terms of fitness improvement than the activities of the Control group. However, similar to Casolo et al.

(2019), the non-structured intervention also contributed to children's fitness, namely to agility/running speed, exceeding both the structured and regular recces group. A possible explanation for these results lies in the characteristics of the interventions applied; before the intervention, IG1 participants received brief training about exercise equipment and how to use it, and the equipment provided enabled them to engage in various physical activities, from rope jumping to playing with a tractor tire. Some quality data from the process evaluation implies that the most popular pieces of equipment were hoops, balls, badminton sets, table tennis sets, mini hurdles, ropes, and cones that might stimulate agility movements, thus contributing to the improvement of this fitness component. On the other hand, the structured recess provided students in IG2 with an additional 50 minutes of well-rounded physical activity weekly, led by a trained adult, who was able to organise, motivate and monitor the students' activity, which resulted in significantly higher achievements in four fitness components.

In addition, the Control group performed the worst on the Pessimism and Total Optimism scales, when compared to the Intervention groups. Again, students who engaged in structured physical activity during recess (IG2) had the most favourable scores in comparison to both CG and IG1 (equipment provided). It is possible that structured activities, which mostly engaged the whole group, initiated more meaningful interactions between students, thus enhancing group identity and sense of belonging. This might have led to decreased level of pessimism and increased total optimism.

Considering students' involvement in school violence, structured physical activity turned out to be the most efficient. Three indicators were observed: (1) students as victims of peer violence; (2) students as perpetrators of violence towards peers; and (3) students as perpetrators of violence towards teachers. When pre- and post-intervention results were examined, no significant differences were identified in the observed indicators for IG1 (equipment provided) and CG. However, structured physical activity led to a significant increase in the number of students who had never been involved in peer violence as perpetrators, which might be explained by the fact that exercising together could have prevented children from engaging in aggressive behaviours, with additional adult supervision provided.

Previous studies suggest that school violence is associated with a lack of structure and adult supervision, with school recess usually meeting both criteria (Vaillancourt et al., 2010; Popadić, Plut, & Pavlović, 2014; McNamara et al., 2015;). Structured physical activity, besides improving physical fitness, might provide students with opportunities to develop social skills, connect with each other, and learn how to solve conflicts, which in turn can contribute to a decrease in violent behaviour.

Further development of recess physical activity models can be a promising strategy for improving the school climate, since it requires collaboration between the teaching staff, students, and parents, and could enhance togetherness among students (Jevtić & Milošević, 2021).

CONCLUSION

This study examined the effects of two eight weeks long recess physical activity interventions on elementary school students' physical fitness and optimism, and their involvement in school violence. The study employed the pre-test/post-test quasi-experimental design, with two Intervention groups (IG1: exercise equipment provided during recess; IG2: structured recess physical activity led by a physical education teacher), and one Control group (CG: regular recess). The participants were primary school students attending grades one through four, both girls and boys, recruited from four rural schools in the Central Banat District in Serbia.

It can be concluded that structured physical activity intervention resulted in the most favourable outcomes regarding the students' physical fitness, optimism, and violent behaviour. The least effective was regular recess, while the provision of exercise equipment had a positive effect on the students' agility level.

The limitations of this study are related to sample characteristics and the relatively short duration of the interventions. However, this is the first study to evaluate the effects of different recess physical activity interventions on a sample of Serbian school children. The study employs a prospective design, and provides a solid ground for the practical application of similar locally-based recess interventions.

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СТРУКТУРИРАНА ФИЗИЧКА АКТИВНОСТ ТОКОМ ВЕЛИКОГ ШКОЛСКОГ ОДМОРА: ВИШЕ ОД КОРИСТИ ЗА ФИЗИЧКИ ФИТНЕС УЧЕНИКА

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Резиме

Иако су предности редовног бављења физичком активношћу за здравље деце и адолесцената добро познате, чак 81% адолесцената не испуњава минималне препоруке за физичку активност. У складу са савременим принципима промоције здравља, неопходно је обезбедити средину која подржава физичку активност, што важи и за школску средину. Поред наставе физичког васпитања, деца могу бити физички активна у школи за време спортских секција, у продуженом боравку, током активног транспорта, активних пауза и школског одмора. Постојећа истраживања показују да мањи број ученика активно проводи велики школски одмор, при чему су дечаци активнији од девојчица. Са циљем да се испитају ефекти две различите интервенције, усмерене на велики школски одмор, на физички фитнес, оптимизам и учествовање ученика у школском насиљу, спроведено је проспективно истраживање на узорку од 210 ученика (101 дечака и 109 девојчица) прва четири разреда сеоских основних школа из општине Сечањ. За процену физичког фитнеса коришћени су тестови из ЕУРОФИТ батерије тестова: Скок у даљ из места (STBJ), Подизање у сед за 30 секунди (SU30), Издржај у згибу (BAHG), Дубоки претклон (SEAT) и Чунасто трчање 10x5 метара (10x5), као и трчање на 1.600 метара (1600). Оптимизам ученика процењиван је помоћу упитника Youth Life Orientation Test (YLOT), који се састоји из субскала Оптимизам и Песимизам, а скорови на овим субскалама омогућавају израчунавање скора општег оптимизма. Учествовање ученика у школском насиљу посматрано је помоћу три индикатора: (1) ученици као почионици насиља према вршњацима током последња два месеца, (2) ученици као извшиоци насиља према наставницима током последња два месеца, и (3) ученици као жртве вршњачког насиља током последња два месеца. Интервенције су трајале укупно осам недеља. Прва интервентна група (ИГ1) имала је доступну опрему за вежбање (вијаче, обручи, лопте, рекети, итд.), а пре почетка интервенције наставник физичког васпитања им је кратко објаснио како се реквизити могу користити. Друга интервентна група (ИГ2) учествовала је у структурираним физичким активностима током великог одмора сваког школског дана. Активности су се мењале сваке недеље, водио их је наставник физичког васпитања и укључивале су веома разноврсне активности, од народних плесова и аеробика, до полигона. Ученици у контролној групи (КГ) су током осам недеља имали редовне школске одморе. Резултати MANCOVA и ANCOVA анализе показали су да између група постоје статистички значајне разлике у простору варијабли физичког фитнеса и оптимизма ($p \leq .05$). ИГ2 била је најуспешнија у тестовима за процену издржљивости мишића руку, флексибилности и аеробне издржљивости, док је ИГ1 имала најбоље резултате у агилности. КГ је имала највише скорове на субскали песимизма и најнижи скор на Укупном оптимизму, док су ученици који су учествовали у структурираном вежбању (ИГ2) остварили најпозитивније резултате у овом простору. Такође, тестирање хи-квадрат тестом показало је да је у овој групи дошло до значајног пораста процента ученика који никада нису били укључени у насиље над вршњацима, док то није био случај у првој интервентној и контролној групи. Може се закључити да структурирана физичка активност током великог одмора може допринети оптимизацији здравља ученика и бољој школској клими.

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VENI, *VIDI*, *VICI* GENDER INEQUALITY IN SPORT IN THE REPUBLIC OF SERBIA – DID WOMEN REALLY WIN THIS GAME?

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Abstract

Even though there are no international or national documents that would allow or encourage unjustified differences in treatment between women and men, the fact is that some areas of life are still seen as belonging to men. Sports are, certainly, at the top of that ladder. It is considered a predominantly male field, shaped according to men and seen through the eyes of men. However, with the development of human rights and the mechanism for their protection, the awareness of the equality of women and men in sports has increased. The Republic of Serbia made a set of legal rules regarding: (1) discrimination in general; (2) sports; and, finally, (3) discrimination in sports. This paper aims to present and analyse the normative and strategic frame of the protection against discrimination in sports, to examine the current case law in front of the relevant institutions, and to point out the latest tendencies in the field of gender equality and sports.

Key words: discrimination, sports, gender equality, anti-discrimination litigation, civil litigation.

„ДОЂОХ, ВИДЕХ, ПОБЕДИХ“ ДИСКРИМИНАЦИЈУ НА ОСНОВУ ПОЛА У СПОРТУ У РЕПУБЛИЦИ СРБИЈИ - ДА ЛИ СУ ЖЕНЕ ЗАИСТА ИЗВОЈЕВАЛЕ ПОБЕДУ?

Апстракт

Иако нема националног ни међународног документа који би допустио или охрабрио прављење неоправдане разлике између мушкараца и жена, чињеница је да постоје неке области друштвеног живота које се и даље сматрају мушким. Спорт је, свакако, на врху те лествице. Сматран доминантно мушким пољем, обликован је према мушкарцима и виђен је кроз њихове очи. Међутим, са развојем људских права и њиховом заштитом, расте и свест о једнакости мушкараца и жена у спорту. Република Србија поставила је нормативни оквир у погледу: (1) дискриминације

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уопште, (2) спорта и, напослетку, (3) дискриминације у области спорта. Циљ овог рада је да представи и анализира постојећи нормативни и стратешки оквир заштите од дискриминације у спорту, да испита досадашњу праксу пред надлежним телима и да укаже на савремене тенденције у области једнакости и спорта.

Кључне речи: дискриминација, спорт, једнакост на основу пола, поступак у парницама за заптиту од дискриминације, парнични поступак.

INTRODUCTION

Woman in sport is not weaker, but simply different.
(Mršević, 2000)

Some statements regarding women, men and sports can be taken as an axiom: there are more women than men, globally; however, there are more men in sports, including in leadership and decision-making positions. Consequently, there is an unequal allocation of resources for women's sports and sportswomen – the male norm is taken as the norm for society as a whole, including sports. The following claim is made for the United States: the key leadership roles in sports are held by white, non-disabled, cisgender, heterosexual men (Brassil & Lutz, 2020, referred to in Cunningham, Wicker, & Walker, 2021), and even though members of underrepresented, minority groups frequently represent the majority of the players, leadership roles are seemingly reserved for those who have historically held power[1]. However, this pattern can certainly be transmitted to the European professional sports as well.

Women are seen as fragile, less capable and passive, which affects their capability to participate in sports. The participation of women in professional sports is, often, linked to their sexual identity, and this stereotype can influence the willingness of women to take part in sports. Gender based segregation into male and female categories is based on the concept of fair play. However, this concept can be jeopardised by the unequal treatment of women and men.

This paper aims to: (1) research the current normative framework, on both the national and international levels, regarding gender equality in sports; (2) examine the existing national case law, especially the decisions of the Commissioner for Equality; and (3) point out the latest disputable issues on a global level. Aside from the normative, comparative and historical methods, the case study scientific method is also used in this paper.

The following hypotheses are examined: (1) the unequal position of women and men in sports is recognised on both the international and

[1] Women hold only 33% of the general managerial positions within the Women's National Basketball Association (Senne, 2016);

the national level; (2) the Republic of Serbia sets the adequate legal framework for overcoming all forms of discrimination, including discrimination in sports based on gender; (3) the Commissioner of Equality does not often act in the cases of discrimination in sports based on gender; (4) however, whenever he/she acts, he/she finds the complaint founded; and, finally, (5) the discrimination based on sex is caused by and founded in deeply rooted stereotypes and prejudices.

For the purposes of this paper, the term 'sports' will be used in accordance with the Law on Sports[2].

> Recreational activities (recreational sports, sports for all, mass sports) are the area of sports that includes the voluntary practice of physical exercise, or practice of sports activities with the objective to rest, refresh, have fun, improve health or improve one's results and to fulfil one's need for movement, play or socialising, in all segments of the population (Art. 3. Para. 1. P. 3). Top sports are the area of sports that includes sports activities the objective of which is extraordinary (top) results and sports qualities
>
> (Art. 3. Para 1. P. 4)

The Law on Sports also defines the terms 'athlete', 'amateur athlete', 'professional athlete' and 'top athlete', as well as the terms 'promising' and 'talented athlete'. All these categories refer both to men and women.

THE NORMATIVE AND THE STRATEGIC FRAMEWORK

The most significant international legal act regarding the prohibition of discrimination against women is the Convention on the Elimination of All Forms of Discrimination against Women (hereafter: CEDAW)[3]:

> CEDAW entitles States Parties to take all appropriate measures to eliminate discrimination against women in order to ensure to them equal rights with men in the field of education and in particular to ensure, on a basis of equality of men and women the same Opportunities to participate actively in sports and physical education.
>
> (Art. 10, Para. 1. P. g)

Furthermore, all appropriate measures should be taken to achieve the right to participate in recreational activities, sports, and all aspects of cultural life (Art. 13. Para. 1. P. c).

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[2] Law on Sports, "Official Gazette RS", No. 10/2016;

[3] CEDAW Convention was enacted in 1979, and the Republic of Serbia ratified it in 1981 ("Official Gazette SFRY - International Agreements", No. 11/81);

The General recommendation No. 25, on article 4, paragraph 1, of the Convention on the Elimination of All Forms of Discrimination against Women, which deals with temporary special measures, reminds State Parties that temporary special measures should also be implemented in the area of sports (Para. 38).

Not much more is said in the Beijing Declaration and Platform for Action[4], whose measures on developing non-discrimination education and training include providing accessible recreational and sports facilities, establishing and strengthening gender-sensitive programmes for girls and women of all ages in education and community institutions, and supporting the advancement of women in all areas of athletics and physical activity, including coaching, training and administration, and participation at the national, regional and international levels (Art. 83. Para (m)). Similar measures are recommended for strengthening preventive programmes that promote women's health. The actions taken should create opportunities for women and girls to participate in sport, physical activity and recreation on the same basis as they are made for men and boys (Art. 107. Para (f)). It is recognised that women are underrepresented in decision-making positions in the, *inter alia*, area of sports (Art. 183). Finally, eliminating discrimination against girls in education, skills development and training is set up as one of the strategic objectives in the Beijing Declaration and Platform for Action (Art. 280. Para. (d)).

The Brighton Declaration on Women and Sport[5], passed after the First International conference on women and sport, underlines the unequal position of women and men in sports, especially considering the disproportion in the general population between women and men:

> The Brighton Declaration sets up a few goals: ensuring that all women and girls have the opportunity to participate in sports in a safe and supportive environment which preserves the rights, dignity and respect of the individual; increasing the involvement of women in sport at all levels and in all functions and roles; ensuring that the knowledge, experiences and values of women contribute to the development of sport; promoting the recognition of women's involvement in sports as a contribution to public life, community development and in building a healthy nation; promoting the recognition by women of the intrinsic value of sport and its contribution to personal growth and healthy lifestyle.
>
> (Art. 2)

[4] Beijing Declaration and Platform for Action, the Fourth World Conference on Women, 1995;

[5] Only the Serbian Softball Federation is a signatory of the Brighton Declaration on women and sport, Brighton Signatories: Europe | IWGIWG (iwgwomenandsport.org), accessed 16.4.2023;

On the regional level, the Council of Europe missed the opportunity to emphasise the importance of gender equality in the Revised European Sports Charter in 2021[6]. Even though the Charter contains Article 10, named "The Right to Sport", it refers only to equal access to sports facilities or to sports activities. However, the Council of Europe did pass the Recommendation on gender mainstreaming in sport (CM/Rec(2015)2), which recognises the gap that still exists between male and female participation in sports, caused by the way that each society treats men and women, and followed by stereotypes that lead to the unequal representation of women and men in sport, including leadership and decision-making positions.

The European Parliament resolution on women and sport[7] is significant because it stated several important pieces of information: whereas in the European Union, 29.5% of men, as opposed to 16% of women, and 63% of young men ages 15 through 24, as compared to 37% of young women of that age, say that they regularly take part in physical or sporting activities; and, whereas participation by female athletes in international competitions has increased, technical and medical staff, as well as referees and officials, are still primarily men (at the Sydney Olympic Games women accounted for 38% of the athletes, 8% of the technical staff, and 4% of the medical staff).

The European Charter for Equality of Women and Men in local life appreciates the role of sports and recognises that women and men might have different attitudes toward sports, as a result of gender-stereotyped attitudes. That is why it encourages women and girls, men and boys to take part in various activities, even those predominantly seen as related to the opposite sex. Further, it calls on sports societies to fight against stereotypical views of men and women.

The Republic of Serbia created an adequate legal framework regarding the prohibition of discrimination (discrimination in sports included). The prohibition of discrimination represents one of the fundamental human rights, raised to the rank of basic principles by the Constitution of the Republic of Serbia[8] (2006, Art. 21). Sex, as one of the protected grounds, is particularly mentioned in the aforementioned Article. Moreover, the State shall guarantee the equality of women and men and develop an equal opportunities policy (Art. 15). Article 20, Paragraph 2 foresees that the achieved level of human and minority rights cannot be reduced. The prohibition of discrimination is elaborated in the Law on Prohibition of Discrimination[9], as an umbrella law,

[6] Revised European Sports Charter based on Recommendation CM/Rec(2021)xx of the Committee of Ministers to Member States on the Revised European Sports Charter;
[7] 2002/2280 (INI);
[8] "Official Gazette RS", No. 98/2006 and 115/2021;
[9] "Official Gazette RS", No. 22/2009 and 52/2021;

which, among other personal grounds, prohibits discrimination based on sex, gender, and gender identity (Article 2, paragraph 1, point 1), and provides an entire range of prohibitions related to discrimination in the field of sex:

> Discrimination shall be considered to occur in the case of conduct contrary to the principle of the equality of the genders; that is to say, the principle of observing the equal rights and freedoms of women and men in the political, economic, cultural and other aspects of public, professional, private and family life. It is forbidden to deny rights or to grant privileges, be it publicly or covertly, pertaining to gender or gender change. It is forbidden to practise physical violence, exploitation, express hatred, disparagement, blackmail and harassment pertaining to gender, as well as to publicly advocate, support and practise conduct in keeping with prejudices, customs and other social models of behaviour based on the idea of gender inferiority or superiority; that is, the stereotyped roles of the genders.
>
> (Art. 20)

The Law on Gender Equality[10] dedicates one Article to the prohibition of discrimination of women in relation to sports:

> Gender equality in the field of sports includes: 1) promoting sports, recreation and healthy lifestyles that maintain and improve the health of women and men, girls and boys; 2) ensuring a balanced representation of the sexes and equal opportunities for engaging in sports activities, as well as implementing the fertility procedure when financing these activities. Special measures implemented in the field of sports include: 1) support for sports programs financed from public funds that contribute to the promotion of gender equality and the deconstruction of gender stereotypes; 2) establishment of a balanced representation of the sexes in the management and supervision bodies in the field of sports that these bodies have; 3) ensuring a balanced representation of the sexes in positions in organizations in the field of sports. Public authorities take extraordinary measures to ensure a balanced representation of the sexes in management bodies and positions in organizations in the field of sports, while respecting the specificities arising from this area of social life.
>
> (Art. 45)

The Law on Sports defines the terms ‘direct’ and ‘indirect’ discrimination and prohibits discrimination of athletes, sports professionals, sports organisations, and other persons participating in the sports system, including hate speech, on any grounds, in an open or hidden manner, based on some actual or supposed personal attribute (Art. 4)[11]. The Law

[10] “Official Gazette RS”, No. 52/2021;

[11] The Commissioner on Equality gave some suggestions on the Draft on the Law on Sports, mostly regarding terminology (Regular Annual Report, 2015);

on Sports sets the goals of increasing the participation of children, young, women and disabled persons in sports activities, popularising women's sports organisations, and giving equal significance to women and disabled persons in sport (Art. 4). Contracts that contain discriminatory provisions are null and void, and the athlete is entitled to indemnification for the damage suffered due to acts of discrimination of an organisation in the area of sports (Art. 11). Furthermore, Serbia founded a National Fund for Sports Development intended to support the promotion of sports recreation, and the promotion and stimulation of practising sports in all citizens of the Republic of Serbia, and especially in children, women, youth and disabled persons (Art. 111). In Article 142, the Law on Sport stipulates the obligation of the State to pass the National Strategy on Sports Development for a ten-year period.

The latest, but also the last Strategy on Sports Development in the Republic of Serbia[12], was passed for the period between 2014 and 2018. Among others, it sets the following goal: including more women both in playing sports and in management work in organisations in sports, which includes the participation of at least one-quarter of women in administrative bodies and bodies of organisations in the field of sports. The satisfactory outcome regarding this goal would be the increased number of women engaged in sports activities by 10 to 15% by 2018. However, it is hard to follow measures taken to reach this goal, because the last Report on conducting this Strategy was published for the year 2017. This Report, *inter alia*, stated that the Secretary of the Autonomous Province of Vojvodina opened a public call "Affirmation of Women in Sport" and financially supported it with 2 500 000 RSD[13]. The same report indicates that the number of women experts in sports increased, but there is still a huge gap between male and female experts – 929 compared to 10,819. The particular goal – the achievement of sex and gender equality in the military service was reached by two seminars and one event with 42 participants. The Olympic Committee of Serbia also encouraged the promotion of gender equality, through its programme regarding the Tokyo 2020 Olympics. When the duration of the Strategy ended, the Analyses of the Results were presented. They stated that, if the representation of women in managerial positions is taken into account for positions in the field of sports in the period between 2015 and 2018, data shows that a positive growth trend was achieved, and that in 2018, at the municipal level, there were 14% of managerial positions were occupied by women, whereas that share is somewhat lower (11%) at the level of cities. However, despite the positive trends recorded at all levels, the percentage of women in mana-

[12] "Official Gazette RS", No. 1/2015;
[13] https://www.mos.gov.rs, accessed on 30/4/2023;

gerial positions is low and there is still a lot of space for improvements to achieve the goal of a minimum of 25% of women in managerial positions in sports organisations. If the participation of women among qualified sports experts is taken as an indicator of gender equality in the field of sports, data shows that, in the period between 2015 and 2018, a negative trend was recorded, and the percentage of female experts decreased. Also, it should be noted that the share of women among sports experts is relatively low in the overall observed period, i.e. only one in ten qualified experts was a woman. Based on the data presented, it can be concluded that the participation of women in various fields of sports is at a deficient level, and that it is necessary to develop multiple support programmes for the development of women's sports, recreational sports for women, and training and improvement of sports skills for experts.

Some other researchers came to similar findings. The findings presented in *Women and Men in Serbia* (2020) show that men, more than women, have free time for their activities, including sports. Results of another research conducted for the purposes of the development of The index of gender equality in the Republic of Serbia (2018) concluded that, when it comes to leisure activities (sports, culture, etc.), the share of working men engaged in these activities daily or several times a week is slightly higher than the share of working women (13.9% vs. 11.5%, respectively). The conclusion that The Index came to is that the data unequivocally indicates that the care of others, whether they are members of the household (through household work) or the community (through voluntary and humanitarian activities), is unequally distributed, so that women deal with these activities in greater numbers, which takes time away from those activities that are focused on personal development and well-being, such as sports, cultural activities, etc.

The National Strategy on Gender Equality for the period between 2021 and 2030 does not deal with the issue of sport as a separate topic. It emphasises the importance of sports in the context of accessibility and quality of health protection, and proposes measures that include informing and educating the population about the importance of health protection, disease prevention, and improving the quality of life by leading a healthy lifestyle, and practicing sports and recreation.

The results of the research conducted on a sample of around 8,000 schoolchildren, ages 11 through 12, from Serbia showed that a statistically significant difference was determined between the participation of boys and girls in sports activities. One half of the girls included in the sample had never taken part in sports, which is 20% more in comparison with the boys (Petrović, Momčilović & Pelemiš, 2022). The Commissioner for Equality made a similar statement, and claimed that not enough has been done to encourage girls to participate in sports activities, and that less

than 25% of women take part in recreational activities or sport (Regular Annual Report, 2016).

LEGAL PROTECTION AGAINST GENDER INEQUALITY IN SPORTS

Aside from the anti-discrimination protection in criminal proceedings, which will not be the subject of this paper, protection against discrimination can also be offered in front of the Commissioner for Equality and in civil proceedings.

The Commissioner for Equality, an independent state body entitled to protect from discrimination, among other jurisdictions, receives and reviews complaints pertaining to violations of the provisions of the Anti-Discrimination Law, provides opinions and recommendations in specific cases, and passes measures in accordance with the provisions of Article 40 of the Anti-Discrimination Law. When the Commissioner receives a complaint, he/she forwards the complaint to the person against whom it has been filed. Having received a complaint, the Commissioner shall establish the facts of the case by reviewing the evidence submitted, and by taking statements from the person who filed the complaint, the person against whom the complaint was filed, and other persons if necessary. The Commissioner gives his/her opinion on whether there has been a violation of the provisions of this Law within 90 days of receiving a complaint, of which he/she informs the person who filed the complaint and the person against whom the complaint was filed. If a violation of the provisions of this Law has occurred, the Commissioner issues a recommendation to the person against whom the complaint was filed, suggesting a way of redressing the violation in question (Art. 35 – 39 Anti-Discrimination Law).

It can be seen from the Regular Annual Reports that complaints in the field of culture, art and sport are rare in comparison with the other areas of life, and amount to 0.7% (2022), 2.8% (2021), 1.2% (2020), 1.5% (2019), and 0.7% (2018) of all complaints.

According to the Regular Annual Reports and the decisions available on the official website of the Commissioner, there were only seven cases related to gender discrimination in sports between 2010 and the present moment. Considering the small number of complaints, they will be presented and analysed using the case-law method.

The first case (1)[14] deals with the issue of gender discrimination by the Recreation Centre. In the complaint, it is stated that the Recreation Centre has two appointments (on Tuesday and Thursday), which can be exclusively used by women. In its response, the Recreation centre did not

[14] 07-00-561/2018-02 (24/7/2018);

deny this fact, but explained that those appointments are set aside for women who are victims of domestic violence. Having in mind that the act is justified by a lawful objective, and that the means of achieving that objective are appropriate and necessary, the Commissioner denied the complaint and found no discrimination in this case.

The second case (2) deals with the difference in financing male and female soccer and basketball teams in the same competition rank (Regular Annual Report, 2015). The case of alleged discrimination was made on account of the different scores of the male and female teams in pursuit of the same outcome. Even though it was explained that a difference in scoring actually leads to equality in financing, having in mind the different number of games during one season, the Commissioner found that the goal reached was not the one prescribed by the Regulations, and that there is no proportionality between the means taken and the potential goal. The Commissioner found the act discriminatory and issued a recommendation.

The next case (3) was about the difference in rewarding male and female chess players at the same tournament and in the same competition rank, as well as the use of gender-sensitive language[15]. Even though the claimant stated that the Serbia Chess Federation discriminated against women, the Commissioner actually found that the difference in the rewarded amount is an affirmative measure toward the inclusion of more women in sports. The prescribed prize is the additional one, whereas men and women are entitled to the same primary prize, regardless of gender.

A couple of parents filed a claim (4) against Ice Hall "T", stating that the conditions for the preparation of girls for training are unacceptable and different in comparison with the conditions for boys and men also training in this Ice Hall[16]. However, the Commissioner found that there was no discrimination, because one group was in no less favourable position compared to the other through any act, action or omission.

The next complaint (5) was filed against a branch of the Serbian Volleyball Association, because of their decision to forbid the participation of pregnant volleyball referees in the period between the fourth month of pregnancy and the sixth month after the birth of the baby, at the least[17]. In the complaint, it was stated that this obligatory pregnancy leave is more extended than is the case on the international level, and that this period, together with the after-birth period, put women in an unequal position regarding their advancement to a higher rank and their improvement. In their response, the branch of the Volleyball Association stressed: that the reactions of players, coaches and the audience to referee deci-

[15] 07-00-/2021-02 (10/9/2021);
[16] 07-00-577/2019-02 (27/1/2020);
[17] 07-00-112/2013-01 (22/7/2013);

sions are very often unpleasant and cause stressful situations for every referee, as well as that physical contact with players and the ball during warm-ups and volleyball matches, which often happens during the game, is dangerous for a pregnant woman; that no one can compensate the mother and the baby for the period of mutual separation, and that the Volleyball Association does not want to deprive the baby of its natural urge to be with its mother, nor does it want to take responsibility for the consequences of the separation of the mother from the baby due to the refereeing of a volleyball game; and that, during the period of breastfeeding, the mother cannot control the excess milk, nor can this natural phenomenon be hidden by the wardrobe, so if there is an excretion of excess milk during the match, it would be unpleasant for the referee and others in the hall. After examining all the facts, the Commissioner found that denying the right of female volleyball referees to judge in a certain period due to pregnancy and parenthood violated the provisions of the Law on Prohibition of Discrimination.

In the claim filed against the Football Association of Serbia (FAS) (6), it was stated that the FAS committed discrimination by not refunding the amount of money invested in the development of the female players, in comparison with the money invested in the development of the male players[18]. Although the FAS explained that female football is amateur in nature, the Commissioner, while finding discrimination, stressed the popularity of football and the importance the Football Association of Serbia has in our society. Furthermore, the Commissioner recommended that the FSS take care that it acts in accordance with the principle of equality, and that its actions promote non-discriminatory practices when adopting, amending, interpreting and applying the general acts of the FAS in the future.

The last claim (7) was filed against the institution entitled to determine the dates of basketball matches for girls and boys[19]. It was stated that the institution discriminates against the female teams by not giving them appointments during the weekend, and by constantly giving those appointments to the male teams of the same rank instead. However, the Commissioner found no discrimination, and stated that the claim was, among other reasons, filed against the wrong (legal) person.

What do the results of this research show?

Firstly, without doubt, the cases regarding discrimination in sports, and, more significantly, discrimination in sport based on gender, are sporadic. Furthermore, only one claim was filed because of the potential discrimination against one specific person, and all other claims were filed

[18] 404/2011, (5/4/2011);
[19] 07-00-00735/2021-02 (12/8/2022);

because of the discrimination against a group of people, usually a team or an organisation. Contrary to the previously set hypothesis, the Commissioner's decisions on whether discrimination was present or absent were almost equal in number.

Except for dealing with complaints, the Commissioner is also entitled to warn against discriminatory acts. This type of warning was made against a soccer coach who made stereotypical offensive statements against a female sport reporter. The soccer coach expressed, in an extremely offensive and verbally abusive way, the typical gender stereotype that women's place is in the kitchen and not in the so-called male world of sports. (The Regular Annual Report, 2018). The Commissioner further made a statement regarding an act of violence toward a young female soccer player, committed by one of the soccer club officials.

The other mechanism of protection against discrimination is civil law protection. A special civil procedure was created in order to protect the victims of discrimination – a person or a group – and it contains special rules different from the rules of governing regular civil procedures (Tasić, 2016, Boranijašević, 2017). Those rules are related to, *inter alia*, the issues of parties, interim measures, the burden of proof, and legal remedies. However, the available data shows that only one case was brought in front of the court, which is in compliance with findings that state that women are less willing to participate in court proceedings (Tasić, 2020). The lawsuit was filed against the FAS, because it did not act in accordance with the recommendation of the Commissioner regarding the investment in female players. The Court found that discrimination was committed.

WHAT IS NEXT?

This article did not deal with issues of sexual harassment and sexual abuse of (primarily) sportswomen[20]. However, the fact is that, even in elite sport, sportswomen are exposed to harassment which influences both their physical and mental health, and makes them less competitive.

Meanwhile, the latest preoccupation in the contemporary world of sports is the position of transgender people.

[20] One of the latest cases was the sexual abuse of USA gymnastics by the USA women's national gymnastics team doctor Larry Nassar. He was accused of sexually abusing more than 150 women and girls under the guise of medical treatment (among them is Simone Biles, one of the most successful gymnastics of all time). He is sentenced to decades in prison after pleading guilty to seven counts of criminal sexual conduct (https://www.theguardian.com/sport/2018/jan/15/simone-biles-larry-nassar-sexual-abuse-allegations-usa-gymnastics, https://www.pbs.org/newshour/nation/larry-nassar-loses-last-appeal-in-sexual-assault-scandal, accessed on 5.4.2023);

The case revolving around the world-famous Olympic Runner Caster Semenya raised the questions of sex, gender and the fight against discrimination. The double Olympic Gold medallist missed the Olympic Games in Tokyo in 2021 because she refused to undergo medical testing in accordance with the rules of the World Athletics. World Athletics Eligibility Regulations for Transgender Athletics[21], effective as of 1 October 2019, state that in order to be eligible to participate in the female category at an International Competition, or to set a World Record in the female category in any competition that is not an International Competition, a transgender female athlete must meet the following requirements: (a) she must provide a declaration, issued in the appropriate form, that her gender identity is female; (b) she must demonstrate the prescribed concentration of testosterone in her serum for one year; and (c) she must keep the serum for the expected period. It is emphasised that the procedure is voluntary, and that the legal recognition of the athlete's gender identity as the athlete's sex or the surgical anatomical changes is not expected.

Even though this procedure is seen as more humane than the humiliating sex verification procedure from 1960, which expected women to stay naked and be examined by female doctors (Kraljić & Drnovšek, 2022), this latest test is seen as no less discriminating, having in mind the impact the results have on the personal life of athletes.

FINA (International Swimming Federation) announced a policy that will only allow athletes who have transitioned before the age of 12 to take part in any of the elite international swimming competitions[22]. The statement emphasises that "without eligibility standards based on biological sex or sex-linked traits, we are very unlikely to see biological females in finals, on podiums, or in championship positions" (Para A).

CONCLUSION

Sports was traditionally, and still is in many aspects, a male domain. Women still face specific challenges in accessing, participating in and benefiting from sports (Recommendation CM/Rec(2015)2 of the Committee of Ministers to member States on gender mainstreaming in sport – Explanatory Memorandum, 2015).

Through the thorough examination of the different international and national legal documents regarding (1) discrimination, (2) sport, and (3) discrimination in sports, the first hypothesis – that (gender) discrimination in sports is recognised and prohibited is confirmed. Furthermore, by analysing different normative acts – laws and strategies, it can be seen

[21] Version 2.0, approved by council on 23 March 2023, and coming into effect on 31 March 2023;

[22] Policy on eligibility for the Men's and Women's Competition categories.

that the Republic of Serbia sets the adequate normative and strategic framework for gender equality in sports. Moreover, the Commissioner for Equality, an independent state body, rarely deals with cases of discrimination in sports, and the share of cases considering sport, culture and art is low in the overall number of cases brought before the Commissioner. However, opposite to the expected results, the Commissioner found discrimination only in half of the filed claims. As seen in one of the claims, stereotypes are still deeply rooted.

Ultimately, it can be concluded that women walked a long path to finally reach even apparent equality in the field of sports, and it would take even more to reach actual equality. While acting to do so, they have to remember that "champions keep playing until they get it right" (Billie Jean King), even though this 'game' is combating discrimination, and its prize is equality without boundaries.

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„ДОЂОХ, ВИДЕХ, ПОБЕДИХ" ДИСКРИМИНАЦИЈУ НА ОСНОВУ ПОЛА У СПОРТУ У РЕПУБЛИЦИ СРБИЈИ - ДА ЛИ СУ ЖЕНЕ ЗАИСТА ИЗВОЈЕВАЛЕ ПОБЕДУ?

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Резиме

Иако нема националног ни међународног документа који би допустио или охрабрио прављење неоправдане разлике између мушкараца и жена, чињеница је да постоје неке области друштвеног живота које се и даље сматрају мушким. Спорт је, свакако, на врху те лествице. Истраживања показују да су, од најранијег периода, дечаци више укључени у бављење спортом од девојчица, те да чак и у женским спортским организацијама мушкарци заузимају претежан број руководећих места. Стога је овај рад био усмерен на анализу важећих законских, подзаконских и стратешких докумената на међународном и националном нивоу који се тичу (1) дискриминације уопште, (2) организовања спортских активности и (3) дискриминације у спорту на основу пола. Да би се установило у којој мери постављени нормативни оквир заиста и служи заштити од дискриминације, анализирана је доступна пракса Повереника за заштиту равноправности како у погледу мишљења и препорука донетих на поднете

притужбе, тако и у погледу изјава и саопштења која је Повереник издао. Такође, констатовано је да је, од почетка важења Закона о забрани дискриминације, Закона о равноправности полова и Закона о родној равноправности, поведен само један судски поступак који се тиче дискриминације у спорту на основу пола. Напослетку, уочени су и представљени нови изазови у погледу дискриминације у спорту на основу пола и рода, а који се тичу положаја трансродних особа.

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LANGUAGE AND GENDER: ATTITUDES TOWARDS THE USE OF GENDER-SENSITIVE LANGUAGE AMONG STUDENTS OF SPORTS

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Abstract

The aim of this paper is to analyse the attitudes of students of sports towards the use of gender-sensitive language in the Serbian language. As the correlation between language and gender has been a hot topic in Serbia in the last two years, this paper presents an overview of some of the studies related to language, gender and sports. The theoretical section of this paper covers some main terms such as gender-sensitive language and the connection among language, gender and sport. The aim of the study conducted for the purposes of this paper was to determine whether male and female students of sports have positive or negative attitudes toward the use of gender-sensitive language in contemporary society and in their everyday speech. The study was conducted by using an anonymous survey with open-ended and closed questions, and it included 281 participants. The study results show that students of sports are still not aware of the increasingly widespread use of gender-sensitive language, and that they are not interested in learning about the theoretical aspects of this issue.

Key words: gender-sensitive language, sports, students, Law on gender equality, equality.

ЈЕЗИК И РОД: СТАВОВИ СТУДЕНАТА И СТУДЕНТКИЊА СПОРТА ПРЕМА УПОТРЕБИ РОДНО ОСЕТЉИВОГ ЈЕЗИКА

Апстракт

Циљ овог рада је анализа ставова студената и студенткиња спорта о употреби родно осетљивог говора у српском језику. С обзиром на то да је питање повезаности језика и рода једно од најдискутабилнијих питања у Србији у претходне две године, овај рад представља преглед претходних истраживања из области језика, рода и спорта. Теоријски део овог рада покрива неке главне појмове као што су родно осет-

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љив језик и веза између језика, рода и спорта. Циљ истраживања спроведеног за потребе овог рада јесте да утврди да ли студенти и студенткиње спорта имају позитивне или негативне ставове према употреби родно осетљивог језика у савременом друштву и у свакодневном говору. Истраживање је спроведено путем анонимног упитника са питањима отвореног и затвореног типа, и обухватило је 281 учесника и учесница. Резултати истраживања показују да студенти и студенткиње спорта још нису свесни употребе родно осетљивог језика и да нису заинтересовани да се информишу о теоријским аспектима овог питања.

Кључне речи: родно осетљив језик, спорт, студентска популација, Закон о родној равноправности, равноправност.

INTRODUCTION

Gender-sensitive language is becoming an increasingly important issue in every field in Serbia, and sport is no exception. Although it can be said that we have gotten used to terms such as female professor, female athlete, and the like, the official public speech in Serbia still does not reflect the use of words such as *female deans and female rectors, female coaches, or female drivers (dekanica, rektorka, trenerica, vozačica)*[1]. With that in mind, this paper analyses attitudes towards the use of gender-sensitive language in sports by examining the attitudes and speaking habits of students from the Faculty of Physical Education and Sports Management at Singidunum University.

Since the adoption of the Law on Gender Equality in 2021, there have been many debates, misunderstandings, and arguments about the section of the Law which refers to the use of gender-sensitive language. The law defines gender-sensitive language as:

> language that promotes the equality of women and men and a means of influencing the awareness of those who use that language in the direction of achieving equality, including changes in opinions, attitudes and behaviour within the framework of the language used in personal and professional life.
>
> (Law on Gender Equality, 2021)

Furthermore, it foresees the obligation to use language that is in accordance with grammatical gender, in public administration and state institutions (Article 25), in education, i.e., in textbooks and teaching materials, as well as in certificates, diplomas, classifications, titles, occupations and licenses and other forms of educational work (Article 37, paragraph 3), and in the field of public information (Article 44). Penal policy regarding gender-sensitive language applies only to public authorities but

[1] These words are sometimes used in everyday speech, but they are still not registered in dictionaries and grammars;

is insufficiently specified; it is defined in Article 37, and a fine ranging between RSD 5,000 and 150,000 is prescribed for non-compliance (Article 68, paragraph 9). The obligation to use gender-sensitive language will be put into effect three years following the passing of the law - that is, on June 1, 2024 (Article 73)[2].

It is mostly this penal policy that has triggered negative feelings of the public towards the Law, as many public institutions have risen against it. Namely, the *Serbian Academy of Sciences and Arts* and its *Board for the standardisation of the Serbian language* and *Matica srpska* claim that, apart from this faulty penal policy, there are many other faults within the Law. For example, they believe that the 'interventions' in the use of standards disturb and damage the structure of the Serbian language, that the Law was used to violently ideologise the language, and to abolish or call into question the important semantic component of masculine nouns denoting professions, occupations, and titles which have a generic or general meaning that refers to both sexes. The Board also states that the interventions introduced by the Law are understood as language engineering by which many words inconsistent with the structure of the Serbian language are introduced, along with words that do not enrich but rather collapse its structure, and that this is 'violence against the Serbian language' and 'the law against the Serbian language'. The Board also believes that most feminine nouns that refer to professions, occupations, and titles, proposed by the supporters of the law, are not expedient and not in general use[3].

Despite these negative attitudes, there are also arguments in favour of the Law, as gender-sensitive language is already in everyday use of the Serbian language, and it simply needs to be standardised and accepted. There are numerous counterarguments to the previously mentioned negative remarks against the Law. For instance, one could argue that every use of language (not only the one referring to gender-sensitive language) that is prescribed is language engineering, but it depends on whether we would use a top-down approach or a bottom-up approach[4]. Moreover, sociolinguists who are in favour of gender-sensitive language claim that every language use is an example of both language ideology and gender

[2] The Law on Gender Equality, https://www.paragraf.rs/propisi/zakon-o-rodnoj-ravnopravnosti.html;

[3] All these arguments were presented during three social dialogues that were organized by the Ministry of Human and Minority Rights and Social Dialogue in Belgrade, Novi Pazar and Novi Sad, whose participant was also the author of this paper;

[4] A top-down approach implies imposing a law which would trigger changes, as is the case with the Law on Gender Equality in the Republic of Serbia, whereas a bottom-up approach refers to changes found within a language which would later be implemented in a law;

ideology, and that the only difference lies in the type of the ideology that we nurture – it can be either traditional (against the use of gender-sensitive language) or egalitarian (in favour of the use of gender-sensitive language). When it comes to the statement regarding the damaging of the structure of the Serbian language, there are many examples which confirm the fact that gender-sensitive language has been used in the Serbian language long before the Law was adopted. For instance, words such as: *upravne članice, predsednica, potpredsednica, blagajnica, delovotkinja* were registered in 1875; *nadzornica* was registered in 1898; *predikatorica* or *propovednica* were registered in 1913, whereas the words *banditkinja, geografkinja, protestantkinja, patriotkinja, farmaceutkinja, trgovkinja* were registered in the Serbo-Croatian dictionary in the period between 1967 and 1976. Nevertheless, one of the main arguments in favour of the use of gender-sensitive language is the belief that language should mirror society and its changes. In other words, if there are more opportunities for gender equality within society, the same opportunities should be visible in the language of that society[5].

Since the expert community is quite divided when it comes to the question of whether gender-sensitive language should or should not be used, there are also many differences in the opinions of the general public when it comes to this question. As sports and their representatives are an important segment of every society, the main topic of this paper is to analyse the attitudes and opinions of students of the Faculty of Physical Education and Sports Management at Singidunum University, in order to determine whether they are in favour of or against the use of gender-sensitive language in Serbia. In other words, the research questions are whether students of sports are in favour of gender-sensitive language, whether these students, as future athletes, represent a special case of support for or resistance to gender-sensitive language, and whether the use and/or omission of gender-sensitive language is related to sports, or to society in general. The paper is divided into several sections. The theoretical section explores the definition of gender-sensitive language and the correlation among gender, language and sports, whereas the research section presents the research methodology and research results. Finally, these sections are followed by sections presenting the discussion of the study's results and the conclusions drawn from them.

[5] These arguments are part of the author's speech given at the social dialogue organised by the Ministry of Human and Minority Rights and Social Dialogue;

GENDER-SENSITIVE LANGUAGE

The term 'gender-sensitive language' is defined as the use of forms corresponding to both genders (masculine and feminine) whenever possible, with the aim of eliminating any form of discrimination, and with the aim of establishing gender equality in language and society. It advocates avoiding the use of the generic masculine form, unless necessary, and insists on respecting both genders through language use (Bošković, 2015). In order to do this, it is necessary to use a certain type of suffixes in the Serbian language, which can be considered a discursive practice for marking the gender of nouns. Gender-sensitive language advocates for the elimination of sexist speech. It includes the morphological level of the system and, as research has shown so far, it is not always prone to change according to social trends, although, according to modern definitions of language, it should be. If we consider the fact that the language we use affects our perception of the world around us, then it is clear why gender-sensitive language is an important factor in shaping and changing gender ideologies. In other words, the use of gender-sensitive language is one of the steps in overcoming obstacles to gender equality in every society, as well as a means of achieving gender equality in society (Savić et al, 2009). This issue has become relevant in Serbia in the last few years, especially since the new Law on Gender Equality was introduced in 2021. First of all, there is the question of marking the female gender in the titles and names of professions in the Serbian language (recently, the forms *psihološkinja, fotografkinja, trenerica*, and similar forms that did not exist before, have appeared in daily use in the media), which often leads to conflicts of opinion, both among laymen and among academic staff and language experts of both sexes. Apart from the linguistic aspect, gender-sensitive language is also a question of social power. According to Georgijev (2014), patterns of linguistic behaviour are a reflection of cultural models and ideologies. The linguistic behaviour of the speaker confirms or denies, maintains, or changes a certain ideology. The meaning and use of language can be better understood if seen in correlation with the culture of a certain social community (Georgijev, 2014). Bearing in mind that the language we use reflects our attitudes, beliefs, and the way we treat others, it is clear that, by avoiding the use of feminine forms in those examples where those forms are grammatically and linguistically correct and socially acceptable, we show disrespect, neglect, and even an insult to women. Therefore, the use of gender-sensitive speech implies a greater visibility of women in language, and represents another step towards the betterment of their position in modern Serbian society.

LANGUAGE, GENDER AND SPORTS

According to a study by Fu, Danescu-Niculescu-Mizil, and Lee (2016), a public initiative that urges the media to focus on sports performance suggested that female athletes got more 'sexist commentary' and 'inappropriate interview questions' compared to their male colleagues, which was clearly visible in a video from 2015, which showed male athletes' awkward reactions to receiving questions that are usually posed to female athletes. However, their research results showed that the questions posed to male athletes were generally more game-related than those posed to female athletes (Fu, Danescu-Niculescu-Mizil, Lee, 2016). Furthermore, an analysis of online articles from 2009 discovered that more descriptors associated with the physical appearance and personal lives pertain to male basketball players, as compared to female ones.

By analysing the literature on the images used to portray female athletes in the media, Sherry, Osborne, and Nicholson (2016) conclude that a number of mechanisms contribute to media constructions of women's sport, including low volume of media attention, narrative focus, the salience of position or arrangement, linguistic choice and visual representations of women's sport (Sherry, Osborne, Nicholson, 2016).

As Parks and Roberton (1998) claim:

> given that both language and sport can perpetuate male privilege, it is not surprising that the language of sport also favours men. Examples of sexist language in sports include gender marking (e.g., using 'Lady' or 'ettes' as part of the women's team name), referring to female athletes as 'girls', focusing media coverage on women's physical attractiveness or marital status rather than on their athletic prowess, and assuming that the 'real' event is the men's event and the women's event is 'other'. The language of sport 'trivialises and diminishes female athletes, renders them invisible, denies their adulthood, treats them as interlopers in a traditionally masculine domain'.
>
> (Parks, Roberton, 1998, p. 481)

According to a study in Serbia, conducted in 2022, women in sports are stereotypically presented through media frames in the following ways: (1) female athletes are shown in irrelevant texts, which do not relate to their sports activities; (2) female athletes are presented as feminine, beautiful and/or sexual objects; (3) female athletes are presented as someone's mother, wife or girlfriend; and (4) female athletes are presented as infantile, emotional and irritable (Đukić Živadinović. Vujović, 2022).

Ponterotto's study (2014) of the representation of women's sports in the press reveals the presence of a discursive framework that tends to trivialise the bodies of female athletes. This framework is the result of two basic discourse strategies that she identifies: thematic strategies that

eroticise the female body, and metaphorical strategies that conceptualise the female athlete as a child: "In addition to responding to male subjectivities, they codify male ideals and assert a masculine sense of their identity as men, they also encode an ideology of femininity, which in turn it becomes hegemonic" (Ponterotto, 2014, p. 106).

RESEARCH METHODOLOGY

The aim of this research is to answer the question of whether the student population studying sports is familiar with terminology that is closely related to gender equality, and with the fact that the terminology includes terms such as 'gender-sensitive language' and the 'Law on Gender Equality', as these are the two most relevant terms pertaining to this topic. More precisely, the research question is whether students of sports are in favour of gender-sensitive language, whether these students, as future athletes, represent a special case of support for or resistance to gender-sensitive language, and whether the use and/or omission of gender-sensitive language is related to sport as a specific field, or to society in general.

The research was conducted on a representative sample of male and female undergraduate students of the Faculty of Physical Education and Sports Management at Singidunum University. For the purposes of this study, an anonymous questionnaire was distributed to 281 students, who filled in the questionnaire on a voluntary basis, individually and without time limits. The questionnaire included 101 male respondents, which make up 36% of the total sample, and 180 female respondents, which make up 64% of the sample. Statistical data processing was done in SPSS 21 for most of the questionnaire, wherein descriptive analysis was applied to open-ended questions, and ANOVA was used for a more detailed statistical analysis of the responses.

The questionnaire consists of four different parts. The first part contains questions related to students' language ideology and gender ideology. For this part of the questionnaire, a Likert-type scale was used as a research instrument, as it is one of the most economical instruments and is easy to fill out, easy to assign, and easy to evaluate. The degrees of assessment are expressed numerically: 1 - completely disagree; 2 - mostly disagree; 3 - not sure; 4 - mostly agree; and 5 - completely agree. The second part of the questionnaire refers to the use of gender-sensitive language. More precisely, the names of titles and occupations that are commonly used in sports were given in the masculine form (e.g. *fudbaler*, *trener*), and the task was to write the same titles and occupations in the feminine form. The third part of the questionnaire is based on open-ended questions, as it investigates the theoretical knowledge of terms such as 'gender ideology', 'politically correct speech', 'gender equality', and the 'Law on Gender Equality'. In the fourth part of the questionnaire, the re-

spondents were given 9 sentences and their task was to circle the ones that they would use in their everyday speech. The choice of sentences presented to the students was such that it clearly marked gender-sensitive examples and made a clear differentiation between neutral and biased forms of nouns in the Serbian language.

RESEARCH RESULTS

The data obtained from the questionnaire was processed using descriptive analysis and statistical analysis. It should be taken into consideration that not all participants answered all questions, which is why the number of respondents can vary, though these variations are small.

When it comes to the first part of the questionnaire, the research results show that only 20% of all male and female respondents are familiar with the terms *gender ideology* and *language ideology*, whereas 80% of them have not heard about these terms before and cannot define them properly. However, even though they did not define them, both male and female students clearly nurture certain language and gender ideologies, as there is a general belief among the respondents about the different roles that women and men have in communication, which were offered to them as statements in Likert-type scale. The statements that proved to be the actual beliefs of students include attitudes that women should not curse, that women should use more grammatically correct language which follows grammatical rules, that women should be more careful about what they say and how they say certain things, and that women should receive more compliments than men. When it comes to the differences in attitudes based on the gender of the respondents, a more detailed statistical analysis showed no significant statistical differences in the answers given by male or female students.

Nevertheless, the differences between genders are more clearly visible in the second section of the questionnaire, which is related to the use of gender-sensitive language. The results for the statement: '*I believe that it is necessary for the Serbian language to include words for all occupations in both masculine and feminine forms'* show that only 28% of respondents completely agree with the statement, while 33% of them are not sure. If we were to look at the data analysis according to gender, we would notice an interesting statistical difference ($p<0.05$), wherein 62.2% of the male students completely disagree with this statement, while 70.1% of the female students completely agree with the statement. Based on this data, we can conclude that female students are more inclined to use feminine forms in comparison to male students (Table 1).

Table 1. *The results for statement 1: "I believe that it is necessary for the Serbian language to include words for all occupations in both masculine and feminine forms"*

Statement 1			Gender		Overall
			Male	Female	
answers	I completely disagree	number	23	14	37
		%	62.2%	37.8%	100.0%
		compared to overall	22.5%	7.9%	13.2%
	I mostly disagree	number	13	9	22
		%	59.1%	40.9%	100.0%
		compared to overall	12.7%	5.1%	7.9%
	I am not sure	number	27	65	92
		%	29.3%	70.7%	100.0%
		compared to overall	26.5%	36.5%	32.9%
	I mostly agree	number	16	36	52
		%	30.8%	69.2%	100.0%
		compared to overall	15.7%	20.2%	18.6%
	I completely agree	number	23	54	77
		%	29.9%	70.1%	100.0%
		compared to overall	22.5%	30.3%	27.5%
	Overall	number	102	178	280
		%	36.4%	63.6%	100.0%
		compared to overall	100.0%	100.0%	100.0%

Regarding specific examples of the use of gender-sensitive language, data from the questionnaire indicates a slight increase in the use of nouns of the feminine gender for those sports in which we see an increasing representation of women, as well as for those titles that we largely see in the feminine gender in the media, or for those that are predominantly considered to be female sports. The aforementioned nouns are *sportistkinja*, *plesačica,* and *gimnastičarka,* while the percentage is still surprisingly low for the nouns *trenerica, fudbalerka, biciklistkinja,* and *hokejašica*, which might imply that we are still not ready to accept the fact that women can also participate in these sports. In Table 2, we can find specific examples of gender-sensitive language in sports. The first column shows the use of the given noun in masculine form only, the second column shows the percentage of the respondents who chose the masculine form, the third column gives examples of feminine forms given by respondents, and the fourth column shows the percentage of students who would use the feminine form.

Table 2. Examples of gender-sensitive language in sports

Masculine form (Serbian and English)	% (number)	Feminine form (Serbian)[6]	% (number)
Vozač (driver)	58% (163)	vozačica	42% (118)
Maratonac (marathon runner)	60% (169)	maratonka	40% (112)
Rukometaš (handball player)	52% (146)	rukometašica	48% (135)
Trener (coach)	81% (228)	trenerica, trenerka	19% (53)
Teniser (tennis player)	59% (166)	teniserka	41% (115)
Plivač (swimmer)	66% (185)	plivačica	34% (96)
Košarkaš (basketball player)	52% (146)	košarkašica	48% (135)
Sportista (athlete)	22% (62)	sportistkinja	78% (219)
Karatista (karate man)	58% (163)	karatistkinja	42% (118)
Odbojkaš (volleyball player)	51% (143)	odbojkašica	49% (138)
Bodibilder (bodybuilder)	63% (177)	bodibilderka	37% (104)
Fudbaler (football player)	83% (233)	fudbalerka	17% (48)
Šahista (chess player)	28% (79)	šahistkinja	72% (202)
Plesač (dancer)	15% (42)	plesačica	85% (239)
Olimpijac (Olympian)	60% (169)	Olimpijka	40% (112)
Surfer (surfer)	41% (115)	surferka	59% (166)
Biciklista (cyclist)	81% (228)	biciklistkinja	19% (53)
Hokejaš (hockey player)	84% (236)	hokejašica	16% (45)
Snouborder (snowboarder)	55% (155)	snouborderka	45% (126)
Gimnastičar (gymnast)	30% (84)	gimnastičarka	70% (197)

If we take gender into account, then it can be noticed that male students tend to neglect gender-sensitive language, whereas female students use it somewhat more often. In Table 3, an analysis of variance (ANOVA) is presented for the purpose of confirming this conclusion.

Table 3. Analysis of variance for gender-sensitive language

		Sum of Squares	df	Mean Square	F	Sig.
Vozač (driver)	Between Groups	.049	1	.049	.069	.793
	Within Groups	199.926	280	.714		
	Overall	199.975	281			
Maratonac (marathon runner)	Between Groups	.002	1	.002	.003	.958
	Within Groups	204.994	280	.732		
	Overall	204.996	281			
Rukometaš (handball player)	Between Groups	.301	1	.301	.402	.526
	Within Groups	209.518	280	.748		
	Overall	209.819	281			
Trener (coach)	Between Groups	.031	1	.031	.058	.809
	Within Groups	149.604	280	.534		
	Overall	149.635	281			

[6] There is no need to insert the English translation, as the study refers to the Serbian language and there would be no significant changes in the masculine and feminine forms in English, as many English terms are already gender-neutral;

Teniser (tennis player)	Between Groups	.006	1	.006	.008	.930
	Within Groups	222.990	280	.796		
	Overall	222.996	281			
Plivač (swimmer)	Between Groups	.509	1	.509	.721	.397
	Within Groups	197.449	280	.705		
	Overall	197.957	281			
Košarkaš (basketball player)	Between Groups	.230	1	.230	.300	.584
	Within Groups	214.649	280	.767		
	Overall	214.879	281			
Sportista (athlete)	Between Groups	1.217	1	1.217	2.224	.137
	Within Groups	153.184	280	.547		
	Overall	154.401	281			
Karatista (karate man)	Between Groups	.757	1	.757	1.021	.313
	Within Groups	207.527	280	.741		
	Overall	208.284	281			
Odbojkaš (volleyball player)	Between Groups	.015	1	.015	.018	.893
	Within Groups	225.024	280	.804		
	Overall	225.039	281			
Bodibilder (bodybuilder)	Between Groups	.036	1	.036	.049	.825
	Within Groups	205.907	280	.735		
	Overall	205.943	281			
Fudbaler (football player)	Between Groups	2.100	1	2.100	3.971	.047
	Within Groups	148.056	280	.529		
	Overall	150.156	281			
šahista	Between Groups	3.638	1	3.638	5.969	.015
	Within Groups	170.635	280	.609		
	Overall	174.273	281			
plesač	Between Groups	2.986	1	2.986	7.628	.006
	Within Groups	109.596	280	.391		
	Overall	112.582	281			
Olimpijac	Between Groups	.087	1	.087	.115	.735
	Within Groups	211.403	280	.755		
	Overall	211.489	281			
surfer	Between Groups	2.984	1	2.984	4.150	.043
	Within Groups	201.346	280	.719		
	Overall	204.330	281			
biciklista	Between Groups	1.388	1	1.388	2.441	.119
	Within Groups	159.151	280	.568		
	Overall	160.539	281			
hokejaš	Between Groups	.848	1	.848	1.675	.197
	Within Groups	141.790	280	.506		
	Укупно	142.638	281			
snouborder	Between Groups	.179	1	.179	.241	.624
	Within Groups	207.722	280	.742		
	Overall	207.901	281			
gimnastičar	Between Groups	6.428	1	6.428	10.339	.001
	Within Groups	174.072	280	.622		
	Overall	180.500	281			

By analysing the general theoretical knowledge of the respondents, we can conclude that the concept of gender-sensitive language is still completely unknown to 48% of all respondents, regardless of their gender. Regarding their awareness of the Law on Gender Equality, students of sports are mostly not interested in the topic, as 80% of them did not even answer this open-ended question, or they stated that they are not familiar with it. Overall, the results of the third part of the questionnaire show the same as in the case of most of the open-ended questions: respondents are not willing to answer these theoretical questions, regardless of whether they are familiar with them or not. Therefore, this theoretical section of the research should have been conducted in another form, perhaps as a focus group or an interview, so that the research results could be viable and understandable.

In the last part of the questionnaire, the respondents were given 9 sentences and their task was to circle the ones that they would use in their everyday speech. The choice of sentences presented to the students was such that it clearly marked gender-sensitive examples and made a clear differentiation between neutral and biased forms of nouns in the Serbian language. Nevertheless, the results show that gender-sensitive language is still not part of everyone's everyday speech. The first given set of sentences shows that the highest percentage of respondents would choose the neutral form:

1. Pošto je ona nova *osoba koja predsedava (gender-neutral form)*, ne sme biti pristrasna (58%);
2. Pošto je ona novi *predsedavajući (masculine form)*, ne sme biti pristrasna (26%); and
3. Pošto je ona nova *predsedavajuća (feminine form)*, ne sme biti pristrasna (16%).

Furthermore, when it comes to occupations, there is a certain distinction between male and female forms. The sentences were the following:

1. Ona je uspešan *sportista* (75%);
2. Ona je uspešna *sportistkinja* (16%); and
3. Ona je uspešna *žena od karijere* (9%).

The next set of statements does not refer to sports only, but it does refer to gender-neutral language:

1. Organizujemo žurku dobrodošlice za sve *brucoše* (42%);
2. Organizujemo žurku dobrodošlice za sve *brucoškinje* (0%); and
3. Organizujemo žurku dobrodošlice za sve *studente i studentkinje* I godine (58%).

What can be concluded is that there is no statistical difference in the choice of answers between male and female students. Interestingly, even though 78% of all respondents chose the word 'sportistkinja' in the previous section of the questionnaire, only 16% of them would rather choose this feminine form of the word in this final section, which may lead us to the conclusion that students of sports still do not use gender-sensitive language on a daily basis, although they do know how to use it.

DISCUSSION AND CONCLUSION

With all these results in mind, we can conclude that the students of sports who participated in this research do not show any specific preferences either in favour of or against the use of gender-sensitive language. In other words, they do not show interest in this issue, and they are not completely familiar with the concept of gender-sensitive language and the Law on Gender Equality in theory. However, when it comes to the practical aspect of the use of gender-sensitive language, there are certain words related to sports that are used in their feminine forms more than in their masculine forms. These examples include words such as: *sportistkinja*, *šahistkinja, plesačica* and *gimnastičarka*. It should be taken into consideration that some of these sports are usually associated with women, so the use of gender-sensitive language is not an issue. Nevertheless, when it comes to those sports that are still generally associated with men, such as football, handball, or hockey, the percentage of female forms is extremely low. This leads us to the conclusion that there is still a strong correlation between language use and ideology. In other words, if we believe that there are certain sports that are exclusive to men, then we will only use the masculine form, and vice versa – if there is a sport that is commonly associated with women, there is no obstacle when it comes to the use of the feminine form. What can also be concluded is that there is certainly a connection between a greater number of women engaged in a certain sport, their activities, mentioned in the general public and appearance in media, and the use of gender-sensitive language. Unfortunately, this use has still not reached an extent that would ensure gender equality in the Serbian language in relation to sports. This also leads us to the conclusion that sport follows current trends in contemporary society and does not represent a specific branch of society that has different rules or attitudes when it comes to the use of gender-sensitive language.

When it comes to the difference in attitudes between male and female students of sports, the difference is negligible in all sections of the study but one, which might be considered the most important one: the use of nouns denoting a profession in sports in feminine forms. According to the analysis of variance, male students would rather choose male forms when referring to various professions in sports, whereas female students would rather use the female forms of those words which denote the type of sports they play. This should come as no surprise, since women are those who are more likely to insist on gender equality in society in general, and sports prove to be no exception. However, as this is the only statistical difference in the whole research, we can conclude that both male and female students are familiar with gender-sensitive language, though female students are more prone to using it.

Regarding the fourth part of the research, it can be concluded that, even though there are students of sports who claim that they would like to

use gender-sensitive language and who chose female forms over male forms in the third research section, there is still ignorance and/or uncertainty of changing certain occupational names to the feminine form in everyday speech. This is clearly visible in the choice of the masculine form *sportista* rather than the feminine form *sportistkinja* when the words are to be used in a sentence, although 78% of the respondents chose the feminine form of the word in the previous section when it was not used in a specific sentence. This means that students do know what examples of gender-sensitive language are, but they are still not accustomed to using them on a daily basis.

Taking everything into consideration, we can conclude that students of sports do not have a defined and developed attitude toward gender-sensitive language, that they neither support it nor resist it, and that the use of gender-sensitive language is not related to sports as a specific field, but to society in general. Also, female students are more likely to use gender-sensitive language than their male colleagues.

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ЈЕЗИК И РОД: СТАВОВИ СТУДЕНАТА И СТУДЕНТКИЊА СПОРТА ПРЕМА УПОТРЕБИ РОДНО ОСЕТЉИВОГ ЈЕЗИКА

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Резиме

Циљ рада је да анализира ставове према употреби родно осетљивог језика у спорту испитивањем ставова и говорних навика студената и студенткиња Факултета за физичко васпитање и менаџмент у спорту Универзитета Сингидунум. Теоријски део рада дефинише основне термине који су у вези са родно осетљивим језиком и повезаност између језика, рода и спорта. Практичан део рада представља методологију истраживања, поставку основних питања, и резултате истраживања.

Родно осетљив језик је један од најједноставнијих начина да прикажемо нашу егалитарну родну идеологију, односно наше веровање да адекватном језичком употребом можемо допринети равноправности полова у друштву. У српском језику, родно осетљив језик се најчешће формира додавањем моционих суфикса -ка, -ица и -киња. Од усвајања Закона о родној равноправности 2021. године, питање родно осетљивог језика постало је горућа тема, јер Закон подразумева и увођење родно осетљивог језика у медије и образовање. Стога је ова тема од изузетног значаја за савремено друштво.

Резултати истраживања показују да студенти и студенткиње спорта немају јасно одређен став по питању родно осетљивог језика јер то није тема о којој знају много, мада показују њено разумевање у практичној примени. Наиме, када је реч о спортским занимањима, студенти радије бирају облик у мушком роду, док се студенткиње чешће опредељују за именице у облику женског рода. Примећује се избегавање употребе именице у женском роду за она занимања која се и даље сматрају традиционално мушким спортовима, као што су фудбал, хокеј или рукомет. Када је реч о типично „женским“ спортовима, попут гимнастике и плеса, види се велики проценат употребе именица у облику женског рода. Међутим, иако у већини знају да формирају облик женског рода, ни студенти ни студенткиње спорта га не користе у свакодневној комуникацији, што је приказано у резултатима последњег дела упитника, који се односио управо на употребу родно осетљивог језика у реченици. Дакле, можемо закључити да употреба родно осетљивог језика међу студентима и студенткињама спорта још није на завидном нивоу, али да постоји могућност достизања тог нивоа у будућности, као што показују и проценти формираних именица у облику женског рода за нека од спортских занимања.

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THE CONCURRENT VALIDITY OF MOTION X-RAY TECHNOLOGY UTILISING POLAR VERITY SENSE TO MEASURE VELOCITY, FORCE AND POWER – PILOT STUDY

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Abstract

The assessment of force, velocity, and power is useful in order to develop an athlete's sports performance and avoid any possible injuries. The aim of this study is to assess concurrent validity by using Polar Verity Sense with Motion X-Ray technology in order to measure velocity, force, and power in bench press exercises and compare them with the golden standard (i.e., Qualisys 3D kinematics). This pilot study focused on three male recreational lifters aged 28, with between five and ten years of experience, and a 1RM bench press of 100kg. The procedure lasted for two days. On the first day, 1 RM was assessed on a Smith machine. After seven days, the participants performed two sets of seven bench press repetitions with a 50kg bar on the same machine. The first set was a trial, and the second was analysed. The collected data was analysed using the Polar Verity sensor with Motion X-Ray technology, and 3D kinematic analysis with Qualysis. There were no significant statistical differences between these two systems ($p < 0.05$), while Pearson correlation showed a high and significant correlation between them ($r > 0.692 < 0.999$; $p < 0.05$). This research sets the basis of a new measurement process, which will be easier and more affordable. Future research could focus on bigger research samples, different types of exercise, and faster movements.

Key words: wearables, evaluation, bench press, kinetics, kinematics.

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КОНКУРЕНТНА ВАЛИДНОСТ *MOTION X-RAY* ТЕХНОЛОГИЈЕ КОЈА КОРИСТИ *POLAR VERITY SENSE* ЗА ПРОЦЕНУ БРЗИНЕ, СИЛЕ И СНАГЕ – ПИЛОТ СТУДИЈА

Апстракт

Процена силе, брзине и снаге је корисна како би се развиле различите способности спортисте и избегле потенцијалне повреде. Циљ ове студије је да процени конкурентну валидност коришћењем *Polar Verity Sense* сензора са *Motion X-Ray* технологијом како би се брзина, сила и снага у вежби равног потиска са груди проценили и упоредили са златним стандардом (*Qualisys 3D* система). Ова пилот студија обављена је на узорку три мушка рекреативна вежбача старости 28 година, са између пет и десет година искуства и максималним потиском на клупи (1РМ) од 100 кг. Поступак тестирања је трајао два дана. Првог дана, 1РМ је процењен на Смит машини. После седам дана, учесници су извели две серије од седам понављања равног потиска са груди са 50 кг на истој машини. Прва серија је била пробна, док је друга коришћена за даље анализе. За анализе су коришћени *Polar Verity Sense* сензори са *Motion X-Ray* технологијом и 3Д кинематичка анализа са *Qualisys* системом. Резултати су показали да није било значајних статистичких разлика између ова два система ($p < 0,05$), док је Пирсонова корелација показала високу и значајну корелацију између њих ($p > 0,692 < 0,999$; $p < 0,05$). Ово истраживање поставља основу за нови процес мерења, који ће бити јефтинији и лакши. Будућа истраживања би могла да користе веће узорке испитаника, различите врсте вежби, као и брже покрете.

Кључне речи: преносиви уређаји, евалуација, равни потисак са груди, кинетика, кинематика.

INTRODUCTION

The ability to generate optimal levels of velocity, force and power is essential for sports performance. It is well-known that improvements in these mechanical components play a significant role in achieving success across a wide range of sports (Baiget, Colomar, & Corbi, 2021; Cormie, McGuigan, & Newton, 2011; Nikolaidis, Fragkiadiakis, Papadopoulos, & Karydis, 2011).

Velocity (V) is defined as the rate of change in the position of an object or a person over time (Schmidt & Lee, 2019). This component is an important determinant of an athlete's ability to move quickly and efficiently. It is often considered a critical component in explosive sports, such as sprinting and jumping (Morin & Samozino, 2016). Similarly, in sports like tennis or baseball, this component indirectly impacts performance by contributing to greater racket or bat speeds through generated kinetic chain velocity (Elliott, 2006).

Another important mechanical component that is closely related to velocity is force (F). As defined by Newton's Second Law, force is the product of mass and acceleration (Newton, 1999). As this component en-

ables an individual to overcome external resistance, generate movement, and change directions, it is crucial in many sports, for example in weightlifting (Stone et al., 2005), wrestling (Chaabene et al., 2017; Chaabene et al., 2019), rugby (Cronin & Hansen, 2005;), ice hockey (Hoff, Kemi & Helgerud, 2005), and rowing (Černe et al., 2013).

Skeletal muscle power (P) is the result of force and velocity (Reid & Fielding, 2011), and it plays a remarkable role in sport activities that require a great amount of force generated in a short amount of time. This component has often been considered a good predictor of success in jumping disciplines (Cronin & Sleivert, 2005), kickboxing (Nikolaidis, Fragkiadiakis, Papadopoulos, & Karydis, 2011), tennis (Baiget, Colomar, & Corbi, 2021), and many team sports, such as soccer and volleyball (Bangsbo, 1994; Giatsis, 2001; Künstlinger et al., 1987).

As these mechanical components are closely interconnected, an individualised approach to programming is necessary to achieve optimal levels specific to the athlete's capabilities and the requirements of their sport. With that in mind, accurate measurements of velocity, force and power are essential for the effective programming, tracking and optimisation of sports performance. When measuring these components, it is important to ensure their precision in order to avoid inefficient training loads and potential injuries (Suchomel et al., 2017; Weakley et al., 2021). There are various instruments that can be used to accurately measure these parameters during exercise. For example, force platforms are considered the gold standard in directly measuring ground reaction force (GRF), which is generated during a specific movement, and indirectly quantifying power and velocity output. However, these platforms have a limited measurement area, and are typically used to measure forces in the vertical direction (Hansen et al., 2011; Whittle, 2007). With that in mind, they are usually paired with other instruments such as 3D motion-capture cameras, linear position transducers, and linear encoders to obtain a more comprehensive understanding of kinetic and kinematic parameters (Hansen et al., 2011; Spudić et al., 2021; van den Tillaar & Ettema, 2013). While these instruments provide valid and reliable data, they are usually expensive, complex and primarily used in laboratory settings. As a result, their practical applications are very limited (Crewther et al., 2011; Cronin et al., 2004).

With advancements in technology, portable and wearable velocity-based devices have emerged as a more accessible alternative for everyday use (Fritschi, 2021). These devices are usually connected to mobile apps and implement different technologies, including linear position transducers (ex. GymAware PowerTool and Tendo Unit), linear encoders (ex. VITRUVE), and movement or inertial sensors (ex. PUSH Band and Beast Sensor) to track various parameters during exercise. Although most of these devices show good reliability and validity in tracking velocity, force, or power, the issue of cost-effectiveness still remains in question

(Chéry & Ruf, 2019; Garnacho-Castaño et al., 2015; Kilgallon et al., 2022; Lake et al., 2018; van den Tillaar & Ball, 2019).

Polar Verity Sense (Polar Electro Ltd., Kempele, Finland) was recently introduced as a significantly less expensive option for both recreational and professional use. Furthermore, Polar sensors are open to connecting to other devices (e.g., smart watches, smartphone apps), or to being analysed by other systems (e.g., Motion X-Rays, Movella), making them rather a useful tool (Merrigan et al., 2022). This lightweight, wearable device includes an optical heart rate sensor to monitor physiological parameters during exercise, as well as an accelerometer, gyroscope and magnetometer to track movement and quantify velocity, force, and power. Many researchers have already reported on the good reliability and validity of previous models of Polar sensors in measuring physiological and biomechanical parameters, such as heart rate and energy expenditure (Hinde et al., 2021; Speer et al., 2020; Gilgen-Ammann, 2019; Düking et al., 2018; Olstad et al., 2020), total distance covered during various running speeds (Akyildiz et al., 2022), step-count (Wahl et al., 2017) and velocity and power during running (Cerezuela Espejo et al., 2020; Huggins et al., 2020). Despite the increasing amount of scientific evidence demonstrating the versatility of Polar wearable sensors, there is still a lack of research specifically evaluating Polar Verity Sense. Previous studies have reported on the good validity of this model in measuring average and continuous heart rate (Fullmer et al., 2021; Gil et al., 2021; Merrigan et al., 2022); however, there is a lack of studies concerning the reliability and validity of this model in measuring velocity, force and power.

With that in mind, the aim of this study is to assess the concurrent validity of the Motion X-Ray technology that uses Polar Verity Sense to measure velocity, force and power in a commonly used gym exercise (i.e., bench press). We hypothesise that Polar Verity Sense data analysed with Motion X-Ray technology will be valid in comparison with the golden standard (i.e., Qualisys 3D kinematics) in measuring velocity, force, and power in the bench press exercise.

METHODS

Subjects

This pilot study included three participants (mean age 28, mean body height 178.4 cm, mean body mass 80.45 kg), all of whom are recreational lifters, with experience ranging between 5 and 10 years and 1RM bench press of 100kg. The participants are healthy adults, and they reported no chronic diseases, heart problems, or any musculoskeletal injuries in the six months preceding the study. They signed a written consent form to participate in this pilot study. Both the consent and the experi-

mental procedure are in accordance with the Declaration of Helsinki, and they were approved by the Institutional Review Board of the Faculty of Sport and Physical Education of the University of Belgrade (848/23-2).

Experimental Protocol

The experiments were conducted within two days. On the first day, participants were familiarised with the experimental protocol, and they signed a written consent form. Furthermore, we measured their body height and body mass, followed by a 1RM bench press test. On the second day, which occurred seven days after the first, participants performed the main tests, which included bench press reps with a 50kg bar that represents 50% of their 1RM. Prior to all testing procedures including lifting, a standard warm-up protocol was conducted (5 minutes of cycling and 5 minutes of upper-body calisthenic and dynamic stretching; Leontijevic et al., 2012; Sreckovic et al., 2015). The participants performed two sets of 7 repetitions at 50% of their 1RM. The first set served as a trial, while the second one was used for further analyses.

Experimental Procedures

Body mass and height were assessed by a digital scale and a standard anthropometer, respectively.

A Smith machine was used to test the 1RM, according to the standard procedure. Following three sets of warming up with progressively increased loads, the participants attempted a 1RM load lift. Two to three trials were performed until the participant was unable to reach the full extension of the arms with the highest possible load. The previous trial was taken as 1RM. The period of rest between the trials was 4 minutes long. The bar was positioned 1 cm above the participant's chest and supported by the bottom stops of the measurement device. The participant was instructed to perform the bench press while maintaining the position of their shoulders at 90° of abduction to ensure consistency of the shoulder and elbow joints throughout the tested movement (Newton et al., 1997). No bouncing or arching of the back was allowed. The feet had to remain in contact with the floor while the pelvis remained in contact with the bench.

Bench press lifts were performed on a Smith machine according to the same procedure. Participants performed two sets of seven repetitions at 50 to 60% of 1RM at their own pace, while the second set was used for further analyses. During the entire testing procedure, the Polar Verity Sense was positioned around the right-hand wrist. One of the reflective markers was positioned on the same wrist, glued to the strap of the Polar Verity Sense, while the other was positioned at the far end of the lifting bar.

Data Analysis

A Polar Verity Sense sensor was utilised by Motion X-Ray[1] to track body motion. Motion X-Ray is a physical movement analysis technology that uses acceleration and gyroscope data for recognising athletes' complex motion patterns, calculating their biomechanical parameters (like velocity, force, etc.), and discovering (even small) instabilities and variations to be improved for achieving peak performances. The Polar Verity Sense is equipped with an accelerometer, gyroscope, and magnetometer for measuring acceleration, angular velocity, and the magnetic field (of Earth) with a sample rate of 50Hz. An android device is used to record data from the sensor and send it to the Motion X-Ray service. Motion X-Ray could estimate kinematic parameters (velocity, position, and time) and kinetic parameters (force, energy, power, etc.). To estimate kinetic parameters, Motion X-Ray required the height and weight of the participant, the mass of the weights, and the name of the exercise that the participant was performing during the test. The analysis includes body mass, and the mass of each body part is calculated by the Dempster model (Dempster, 1955).

The data obtained from the cameras used for 3D kinematic analysis was sampled at a rate of 300 Hz and low-pass filtered using the recursive Butterworth filter with a cut-off frequency of 10 Hz. A custom-made software (National Instruments LabVIEW 2013, Austin, TX, USA) was developed to calculate the 3D movement trajectory of the reflective markers over a period of time (i.e., velocity), as well as velocity over time (i.e., acceleration). Additionally, the same custom-made software was utilised to calculate force as a product of mass (lifted weights + mass of participants' arms, calculated from the Dempster model; Dempster, 1955) and acceleration. Finally, power was calculated as a product of force and velocity.

From both Polar Verity Sense and the Qualysis system (2 reflective markers), several variables were obtained for each of the seven repetitions and for both concentric and eccentric contractions: (1) V_avg (m/s) – Average velocity of each contraction expressed in meters per second; (2) V_max (m/s) – Maximal velocity of each contraction expressed in meters per second; (3) F_avg (N) – Average force of each contraction expressed in Newtons; (4) F_max (N) – Maximal force of each contraction expressed in Newtons; (5) P_avg (W) – Average velocity of each contraction expressed in Watts; and (6) P_max (W) – Maximal velocity for each contraction expressed in Watts.

[1] https://www.motionxrays.com/

Statistical Analysis

Descriptive statistics were calculated as the mean and standard deviation before all statistical tests. Data distribution normality was confirmed by the Kolmogorov-Smirnov test, and visual inspection of histograms and QQ plots.

The Pearson correlation coefficient was performed to assess the concurrent validity of the Polar Verity Sense data analysed with Motion X-Rays in regard to the Qualysis 3D kinematics (i.e., the 'golden standard'). Correlation coefficients were interpreted as: small, r = 0.10–0.29; moderate, r = 0.30–0.49; and large, r = 0.50–1.0 (Cohen, 1988). Furthermore, for the same purpose, Bland-Altman analysis was conducted to assess the agreement between measurements and detect any potential bias, along with one-way ANOVAs to examine differences among biomechanical variables obtained using Polar Verity Sense via Motion X-Rays, and those acquired from the two reflective markers measured with Qualysis 3D kinematics.

The significance level was set to $p < 0.05$. The statistical analyses were conducted using Microsoft Office Excel 2017 (Microsoft Corporation, Redmond, WA, USA) and SPSS 26 (IBM, Armonk, NY, USA).

RESULTS

Descriptive statistics for velocity, force and power variables are shown in Table 1.

Table 1. Descriptive statistics for velocity, force and power variables obtained during bench press with 50kg

Variable	Equipment	Mean	Std. Dev.	N
V_avg (m/s)	Qualysis (wrist)	0.510	0.092	42
	Qualysis (bar)	0.518	0.089	42
	Polar (wrist)	0.453	0.094	42
V_max (m/s)	Qualysis (wrist)	0.763	0.152	42
	Qualysis (bar)	0.779	0.145	42
	Polar (wrist)	0.711	0.168	42
F_avg (N)	Qualysis (wrist)	455.36	203.73	42
	Qualysis (bar)	455.42	203.67	42
	Polar (wrist)	452.05	206.17	42
F_max (N)	Qualysis (wrist)	681.10	277.92	42
	Qualysis (bar)	688.83	290.97	42
	Polar (wrist)	592.71	249.91	42
P_avg (W)	Qualysis (wrist)	218.83	78.84	42
	Qualysis (bar)	221.76	78.52	42
	Polar (wrist)	195.52	78.20	42
P_max (W)	Qualysis (wrist)	349.58	118.51	42
	Qualysis (bar)	357.13	116.76	42
	Polar (wrist)	301.69	114.90	42

Correlation matrices presenting relationships between kinematic and kinetic data obtained from the Qualysis 3D kinematic system and the Motion X-Ray system utilising Polar Verity Sense are presented in Tables 2 through 4.

Table 2. Correlation matrix of the averaged and maximal velocity obtained from the Qualisys 3D kinematic system and Motion X-Ray system utilising Polar Verity Sense

Velocity (m/s)	Qualisys (w) - avg	Qualisys (b) - avg	Polar (w) - avg	Qualisys (w) - max	Qualisys (b) - max	Polar (w) - max
Qualisys (w) - avg	1.000	0.929**	0.692**			
Qualisys (b) - avg	0.929**	1.000	0.727**			
Polar (w) - avg	0.692**	0.727**	1.000			
Qualisys (w) - max				1.000	0.943**	0.783**
Qualisys (b) - max				0.943**	1.000	0.795**
Polar (w) - max				0.783**	0.795**	1.000

Avg – averaged; Max – maximal; w – wrist; b – bar; ** $p < 0.05$.

Table 3. Correlation matrix of the averaged and maximal force obtained from the Qualisys 3D kinematic system and Motion X-Ray system utilising Polar Verity Sense

Force (N)	Qualisys (w) - avg	Qualisys (b) - avg	Polar (w) - avg	Qualisys (w) - max	Qualisys (b) - max	Polar (w) - max
Qualisys (w) - avg	1.000	0.999**	0.994**			
Qualisys (b) - avg	0.999**	1.000	0.993**			
Polar (w) - avg	0.994**	0.993**	1.000			
Qualisys (w) - max				1.000	0.972**	0.924**
Qualisys (b) - max				0.972**	1.000	0.935**
Polar (w) - max				0.924**	0.935**	1.000

Avg – averaged; Max – maximal; w – wrist; b – bar; ** $p < 0.05$.

In all cases, large positive correlations were observed for both instruments (i.e., Polar Verity Sense and Qualisys 3D kinematics) and both marker positions. Furthermore, Figure 1 showed the Bland-Altman plots of the averaged and maximal velocity, force and power, obtained from the Qualisys 3D kinematic system and the Motion X-Ray system utilising Polar Verity Sense. The Bland-Altman analysis showed that results consistently fall within the upper and lower limits of agreement, with 95% confidence limits.

Table 4. Correlation matrix of the averaged and maximal power obtained from the Qualisys 3D kinematic system and Motion X-Ray system utilizing Polar Verity Sense.

Power (W)	Qualisys (w) - avg	Qualisys (b) - avg	Polar (w) - avg	Qualisys (w) - max	Qualisys (b) - max	Polar (w) - max
Qualisys (w) - avg	1.000	0.977**	0.863**			
Qualisys (b) - avg	0.977**	1.000	0.879**			
Polar (w) - avg	0.863**	0.879**	1.000			
Qualisys (w) - max				1.000	0.945**	0.810**
Qualisys (b) - max				0.945**	1.000	0.815**
Polar (w) - max				0.810**	0.815**	1.000

Avg – averaged; Max – maximal; w – wrist; b – bar; ** $p < 0.05$.

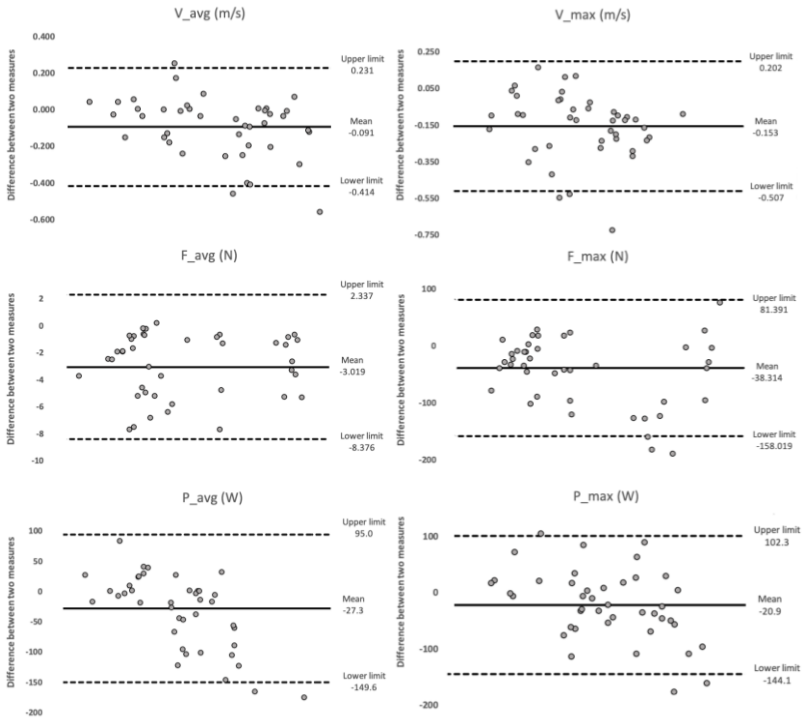

Figure 1. Bland-Altman plots for the averaged and maximal velocity, force and power obtained from the Qualisys 3D kinematic system and Motion X-Ray system utilizing Polar Verity Sense.

Finally, One Way ANOVA showed no statistical significance between the biomechanical variables obtained with Motion X-Rays using Polar

Verity Sense and the two reflective markers measured with Qualisys 3D kinematics ($F_{(2,123)} > 0.242 < 2.113$; $p > 0.05$, ranging from 0.125 to 0.785).

DISCUSSION AND CONCLUSION

This study aimed to assess the concurrent validity of the Motion X-Ray technology that uses Polar Verity Sense when measuring velocity, force and power in a commonly used gym exercise (i.e., bench press). We confirmed our hypothesis that Polar Verity Sense data analysed with Motion X-Ray technology will be valid compared with the golden standard (i.e., Qualisys 3D kinematics) in measuring velocity, force and power in the bench press exercise. Specifically, large and significant correlations between Qualisys 3D kinematics and Polar Verity Sense variables were observed, while no significant differences between them were shown.

The descriptive statistics values (Table 1) for mean and peak velocity (i.e., V_{avg}, V_{max}), force (F_{avg}, F_{max}) and power (P_{avg}, P_{max}) are consistent with the results from previous studies done on the bench press exercise with individuals of a similar level of physical fitness, i.e. recreational weight-lifters (Król & Gołaś, 2017; Lake et al., 2019; Perez-Castilla et al., 2019). Both instruments (i.e., Polar Verity Sense and Qualisys 3D kinematics) corresponded well in measuring velocity, force, and power across all variables; only minimal differences were observed in mean and standard deviation (SD) values, which indicates a good accuracy of Polar Verity Sense in measuring these parameters.

Given the large positive correlations and no significant differences between measurements obtained from both instruments (i.e., Polar Verity Sense and Qualisys 3D kinematics), we can assume that Polar Verity Sense data analysed with Motion X-Ray can be used as a valid tool for measuring velocity, force and power during the bench press exercise. Additionally, the results of the Bland-Altman analysis further confirmed a strong agreement and no observable bias between the measurements obtained from both instruments (i.e., Polar Verity Sense and Qualisys 3D kinematics). All measurements, including averaged and maximal velocity, force, and power, consistently fall within the upper and lower limits of agreement, with 95% confidence limits. This underscores the reliability and consistency of the data obtained from the two systems, and further supports the validity of the Motion X-Ray system utilising Polar Verity Sense compared to the golden standard (i.e., Qualisys 3D kinematics). The averaged force data particularly shows great consistency of measurements compared to the maximal values. This may be attributed to the Polar sensor's heightened sensitivity to rapid movements, occasionally resulting in greater peaks in force when the subject lifts the bar more rapidly, whereas the oscillations observed in the averaged force values are minimal. The rationale for favouring averaged force values becomes

more apparent when we consider the oscillations in muscle force that correspond to the range of motion of the joint involved in the execution of the movement. On occasion, the highest force measurement may coincide with a specific phase of the movement where muscles experience a mechanical advantage due to a more favourable lever arm. This can lead to artificially elevated peaks in force, especially in exercises which are performed at a more rapid pace. Therefore, using averaged force values, as opposed to relying solely on peak values, appears to be a more stable and reliable method for measuring force with Polar Verity Sense. This approach not only ensures greater measurement consistency but also provides a more accurate representation of the genuine effort exerted throughout the entirety of the exercise (Picerno, 2017).

Compared to previous studies which assessed the validity of other portable and wearable devices (i.e., PUSH Band, Beast Sensor), Polar Verity Sense showed similar or better validity for measuring these variables during the bench press exercise (Lake et al., 2019; Perez-Castilla et al., 2019; van den Tillaar & Ball, 2019). However, some devices, such as linear position transducers (i.e., GymAware Power Tool) did show better validity in measuring velocity (Balsalobre-Fernández et al., 2017; Dorrell et al., 2018). This can be due to the fact that linear position transducers directly measure velocity through linear position displacement (Garnacho-Castaño et al., 2015), while accelerometers integrated into Polar Verity Sense estimate velocity by integrating the acceleration signal over time, thus displaying greater susceptibility to noise and integration error (Zhu & Lamarche, 2007). Another possible explanation is related to technical limitations regarding the sampling rate, which is restricted to 50Hz. This can lead to a quantisation error, which is directly related to the sampling rate of the obtained velocity signal (Zhu & Lamarche, 2007).

The results also showed nearly identical large positive correlations between measurements obtained by Polar Verity Sense data analysed with Motion X-Ray and Qualisys reflective markers placed at both positions (i.e., wrist and bar). These results suggest that Polar Verity Sense and the reflective marker attached to its belt remain stationary on the wrist during exercise, which explains the large correlations with measurements obtained from the marker on the bar. Furthermore, this implies that future studies of this kind may only require the marker placed at the wrist to facilitate testing. The results also confirmed that the hand remains fixed during the bench press exercise, thus justifying that wearing Polar Verity Sense on the wrist will not impair the accuracy of the velocity, force and power measurements. This makes it a very convenient tool for practitioners interested in monitoring these parameters during exercise. Furthermore, this opens the possibility of using Polar Verity Sense with Motion X-Ray technology to calculate the force-velocity (F-V) relationship, which can provide valuable insights into the mechanical properties of

muscles and adaptations that occur in order to achieve optimal dynamic output (Cuk et al., 2014; Jaric & Markovic, 2009; Suzovic et al., 2013). This can facilitate the assessment of technique efficiency and areas in need of improvement, and can reduce the risk of injury and accommodate targeted F-V profile-based programming (Jiménez-Reyes et al., 2017; Edouard et al., 2021). Finally, this system can be also used for in-depth monitoring of the physical activities of the youth. This can be particularly important knowing the importance of sport and exercise in the process of youths' education (Ранђеловић & Савић, 2016).

Nevertheless, it is important to acknowledge that the present study has several limitations that need to be addressed. Firstly, this was a pilot study done on a sample comprised of only three participants, which greatly limits the generalisability of the results. Secondly, this study only assessed the validity of Polar Verity Sense in measuring velocity, force, and power during a single exercise (i.e., bench press). Moreover, the exercise performed in this study (i.e. the bench press) is characterised by a moderate speed movement, so it remains unclear whether Polar Verity Sense data analysed with Motion X-Ray is valid for measuring velocity, force, and power during high-speed movements.

In conclusion, the results of this study suggest that Motion X-Ray technology when using Polar Verity Sense data is a valid system for measuring velocity, force and power during the bench press exercise. Considering its compact, portable design and its affordable price, this can potentially be used as an alternative to expensive devices that are currently available for measuring the mechanical properties of muscles (i.e., velocity, force and power). Nonetheless, as this was only a preliminary attempt to validate this device, further research is necessary to better understand its practical applicability. Future studies should focus on investigating the reliability, validity, and sensitivity of this device on a larger sample and across a more extensive scope of exercises involving various speeds. This can open the possibility of regularly using the aforementioned system to monitor the velocity, force, and power parameters during exercise, and potentially lead to improved training outcomes and less injuries in sports.

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КОНКУРЕНТНА ВАЛИДНОСТ *MOTION X-RAY* ТЕХНОЛОГИЈЕ КОЈА КОРИСТИ *POLAR VERITY SENSE* ЗА ПРОЦЕНУ БРЗИНЕ, СИЛЕ И СНАГЕ – ПИЛОТ СТУДИЈА

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Резиме

Циљ ове студије је да процени конкурентну валидност коришћењем *Polar Verity Sense* сензора са *Motion X-Ray* технологијом како би се брзина, сила и снага у вежби равног потиска са груди проценили и упоредили са златним стандардом (*Qualysis 3D*). Хипотеза истраживања је да ће подаци мерени *Polar Verity Sense* сензором и анализирани помоћу *Motion X-Ray* технологије бити валидни у поређењу са златним

стандардом (тј. *Qualysis 3D*). Ова пилот студија обухвата три мушка рекреативна вежбача старости 28 година, са између пет и десет година искуства и максималним потиском на клупи (1РМ) од 100 кг. Поступак тестирања је трајао два дана. Првог дана, 1РМ је процењен на Смит машини. После седам дана, учесници су извели две серије од седам понављања равног потиска са груди са 50 кг на истој машини. Прва серија је била пробна, док је друга коришћена за даље анализе. За анализе су коришћени *Polar Verity Sense сензори са Motion X-Ray* технологијом и 3Д кинематичка анализа са *Qualysis* системом. Резултати су позали да није било значајних статистичких разлика између ова два система ($p < 0,05$), док је Пирсонова корелација показала високу и значајну корелацију између њих ($p > 0,692 < 0,999$; $p < 0,05$). Позитивни резултати поређења Polar Verity Sense сензора са Motion X-Ray технологијом са златим стандардом указују на то да је овај алат валидан за израчунавање силе, брзине и снаге током вежбања. *Polar Verity Sense* са *Motion X-Ray* технологијом је у поређењу са другим сличним инструментима показао сличне и мало боље резултате у погледу валидности прорачуна претходно наведених варијабли. Још један важан статистички резултат је позитивна корелација између резултата маркера и *Polar Verity Sense* сензора, који су постављени на зглоб шаке и на шипку. Ово се објашњава стабилношћу *Polar Verity Sense* сензора током извођења вежбе, што може дати користан увид научницима, који би могли лакше да измере ове варијабле. Што се тиче ограничења студије, ова студија је пилот студија у којој су учествовала три испитаника. Будућа истраживања би могла уврстити више испитаника и различите врсте вежби, укључујући и вежбе са брзим покретима. Упркос ограничењима, ова студија представља веома важан увид у могућности мерења релације сила-брзина које се све чешће користе у спорту, рекреацији и рехабилитацији. Како се технологија развија, алати који се користе и процеси мерења такође показују напредак. То значи да ће научници и практичари, спортисти и рекреативци у наредном периоду имати прилику да мерење својих вежби у тренажном процесу спроводе на јефтинији и лакши начин.

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THE LEGAL SIGNIFICANCE OF THE APPLICATION OF THE EUROPEAN UNION COMPETITION LAW TO SPORTS RULES

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Abstract

The subject of the author's interest in this paper is the consideration of the impact of autonomous sports rules on competition in the relevant sports market. The results of the research are primarily based on the principled opinions or attitudes of the European Court of Justice and the General Court, brought forth in the so-called leading cases, in which the scope of the application of the basic provisions on the competition law of the European Union to sports rules is specified. The basic rules of the Community competition law are found in Articles 101 through 109 of the Treaty on the Functioning of the European Union. Although it is not a formal source of the European Union law, the practice of the European Court of Justice and the General Court is extremely important for the interpretation and application of the aforementioned rules. It acts like a kind of signpost on the way to the application of norms governing the protection of competition on the common market. On the basis of the Stabilization and Association Agreement, the Republic of Serbia undertook the legal obligation to implement community law (*acquis communautaire*) in the domestic legal system. The legal basis for harmonising the competition law in the Republic of Serbia with the law of the European Union is represented by Articles 72 and 73 of the Law on Confirmation of the Stabilization and Association Agreement between the European Communities and their member states.

Key words: autonomous sports rules, peculiarities of sport, competition law, community law.

ПРАВНИ ЗНАЧАЈ ПРИМЕНЕ ПРАВА КОНКУРЕНЦИЈЕ ЕВРОПСКЕ УНИЈЕ НА СПОРТСКА ПРАВИЛА

Апстракт

Предмет интересовања аутора у овом раду јесте разматрање утицаја аутономних спортских правила на конкуренцију на релевантном тржишту у спорту. Резултати истраживања превасходно се темеље на начелним мишљењима или

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ставовима Европског суда правде и Општег суда, заузетим у тзв. водећим случајевима, у којима је прецизиран домашај примене основних одредби о праву конкуренције Европске уније на спортска правила. Основна правила комунитарног права конкуренције налазе се у члановима 101 до 109 Уговора о функционисању Европске уније. Премда није формални извор права Европске уније, пракса Европског суда правде и Општег суда је од изузетног значаја за тумачење и примену наведених правила, попут својеврсног путоказа на путу примене норми које уређују заштиту конкуренције на заједничком тржишту. Правну обавезу имплементирања правних тековина комунитарног права (*acquis communautaire*) у домаћи правни систем, Република Србија преузела је на основу Споразума о стабилизацији и придруживању. Правни основ за усклађивање права конкуренције у Републици Србији са комунитарним правом представљају чланови 72 и 73 Закона о потврђивању Споразума о стабилизацији и придруживању између европских заједница и њихових држава чланица.

Кључне речи: аутономна спортска правила, посебности спорта, право конкуренције, комунитарно право.

INTRODUCTION

Currently, sport is rapidly moving in the direction of complete commercialisation solely for the sake of profit, and it represents a highly profitable business activity worth hundreds of billions of dollars annually (Burton, 2018, pp. 383-384). Organisations in the field of sports carry out a whole range of very diverse commercial activities. They sign sponsorship contracts, advertising contracts, contracts for the sale of media rights for broadcasting sports events, participate in transfers of athletes, and sell tickets for sports events, sports equipment. Accordingly, it is reasonable for sports organisations to try to protect not only the proclaimed sports goals but also their economic interests with the sports rules they adopt. In this way, certain restrictions can be imposed on other persons participating in sports activities. Therefore, it is quite justified to ask the question of whether specific sports rules impose justified sports restrictions on other participants in the sports system, or whether they are unjustified commercial restrictions on competition.

In the most general terms, competition represents the relationship between a certain number of market participants who offer goods or services of the same type, at the same time, to a certain group of consumers. By placing goods or services on the market, each participant inevitably comes into a relationship of potential competition with other participants in the same market (Jovanović & Radović & Radović, 2020, p. 694). Therefore, competition represents a process of rivalry in the market competition. The goal of every rational participant in that process is to be as efficient and productive as possible, in order to make their products or services as attractive as possible to potential consumers, thereby 'beating' other competitors, taking over their clients, and maximising profits. It

goes without saying, with respect to the standardised rules of market competition (Doklestić, 2010, pp. 19-20; Goyder, 2003, p. 8).

In an attempt to answer the question of whether sports rules can impair competition on the market, it is necessary to take into account the 'peculiarities' of sport, which differentiate it from other commercial activities to a certain extent, and to determine the extent of their influence on the application of European Union competition law to autonomous sports rules (Piga, 2017, p. 17).

THE 'PECULIARITIES' OF SPORT IN RELATION TO OTHER BUSINESS ACTIVITIES

The 'peculiarities' of sport are, first of all, reflected in its specific organisational structure. Contemporary sport is predominantly based on a pyramidal structure. Such organisation of sports also implies a hierarchical structure, since organisations in the field of sports at a lower level are subordinate to sports organisations at a higher level, and are obliged to comply with the appropriate sports rules. The pyramidal structure of sports practically allows the sports federation that is at the top of the organisational pyramid at the international level to enjoy monopoly (Report from the Commission to the European Council with a view to safeguarding current sports structures and maintaining the social function of sport within the Community framework 644, 1999).

The 'specificities' of sports are also a consequence of the special nature of competition in sports. Sports events are the result of the competition of different sports organisations, that is, athletes. However, unlike economic activities, sports organisations and athletes are necessary for each other. No sports organisation can survive on its own, but 'depends' on other sports organisations participating in the same competition (Fidanoglu, 2011, p. 72). The plurality of sports organisations is a condition for sports competitions to be held at all. This kind of interdependence of competitors is a characteristic that differentiates sports from economic activities. However, in order for sports events to be interesting for the audience, the result must be reasonably uncertain, which implies that there must be a certain degree of equality in the competitions (Filho, 2017, p. 403). The principle of equality represents one of the basic ideas in sports. According to all participants in sports competitions, the same rules must apply so that their individual abilities and skills can come to the fore. Therefore, unlike economic activities, in which competition between market participants aims to eliminate inefficient participants from the market, the interest of sports organisations is not only the existence of other sports organisations as competition but also their economic sustainability (Siekmann, 2012, p. 714). That is why competition in sports has somewhat different principles than in other business activities.

The ‘peculiarities’ of sports are recognised in the practice of the European Court of Justice. Thus, as long ago as 1974, in the first case in which the question of the application of competition law to sports rules was considered, the Court of Justice took the approach that sport is a subject of EU law only in cases in which it represents an economic activity (C-36/74 Walrave and Koch v Association Union Cycliste Internazionale). This created the concept of ‘sports exception’, which implied that a sports rule of an exclusively sporting nature is outside the framework of Community competition law. Therefore, the ‘specificities’ of sports were regarded in such a way that ‘purely sports rules’, i.e. sports rules that have no economic effect, were automatically exempted from the application of EU competition law. This approach has been consistently followed for several decades, until the decision in the Meca-Medina case in 2006. In this case, the question of whether the anti-doping rules of the International Olympic Committee are in line with EU competition law was considered. During the 1999 FINA World Swimming Championship, swimmers David Meca-Medina and Igor Majcen were banned from participating in competitions for four years by the decision of the World Aquatics Federation (FINA) due to the use of a doping substance (anabolic steroid nandrolone). The athletes appealed this decision to the Court of Arbitration for Sport (CAS) in Lausanne, which confirmed the existence of a violation of anti-doping rules, but reduced the period of suspension to two years. Dissatisfied with such an outcome, the swimmers initiated proceedings before the European Commission, with the argument that setting the limit of the permitted use of nandrolone at two nanograms per millilitre of urine is a form of collective practice between the IOC and 27 laboratories accredited to perform anti-doping control, and that this violates EU competition law and restricts the freedom to provide services (C-519/04 Meca-Medina and Igor Majcen v Commission). The decision of the Lausanne Court was confirmed, and was criticised by the professional public. In this sense, the unusually harsh assessment of prominent sports worker Gianni Infantino, the UEFA director of legal affairs at the time, and current FIFA president, is illustrative. In the author’s text, Mr. Infantino, while not disputing the competence of the EU institutions for the control of commercial sports activities, expressed the opinion that the Commission’s position that every sports rule (and even an anti-doping rule) is subject to an assessment of compliance with EU competition law, represents “a significant step backwards regarding the appreciation of the specifics of sport” (Infantino, 2018).

The fact is that there is a relatively small number of sports rules that can be treated as ‘purely sports rules’. These are, for example, rules about the dimensions of sports fields, the number of athletes participating in a sports competition, separate sports competitions for men and women, transfer periods, and the duration of sports competitions (European

Commission White Paper on Sport, p. 13). Most sports rules have a certain (even indirect) economic effect. Given the limited number of 'pure sports rules', the decision in the Meca-Medina case points out that any sporting rule can be subject to assessment, in order to determine whether it complies with EU competition law. However, this does not mean that every sports rule that has an economic effect and which restricts the freedom to perform commercial activities to a certain extent automatically violates EU competition law. Rather, whether the restrictive effects of a certain sports rule are inherent in the organisation of sports, the proper performance of sports activities, as well as whether they are proportional to the valid sporting interest that was sought to be achieved by adopting that rule should be determined in each individual case (Geeraert, 2013, p. 20). That is, whether competition restrictions are necessary to achieve sports goals and derive from the specificities of relationships in sports is relative to each case (Ječmenić, 2018, p. 145).

THE APPLICATION OF THE EUROPEAN UNION COMPETITION LAW TO AUTONOMOUS SPORTS RULES

The application of EU competition law to sports rules necessarily involves answering the following questions:

1) Can organisations in the field of sports be treated as companies, or associations of companies?

2) Can sports rules have the character of agreements between companies, decisions of business associations or collective practices?

3) Can sports rules affect trade between member states and can sports rules aim or have the effect of preventing, limiting, or distorting competition within the common market?

4) If the answers to the questions are affirmative, can sports rules be exempted from the ban based on Article 101(3) of the Treaty on the Functioning of the EU, or do other rules apply in this regard?

5) Can organisations in the field of sports have a dominant position on the relevant market?

In the following sections of the paper, we will try to provide satisfactory answers to these questions.

Organisations in the Field of Sports as Companies, or Associations of Companies

According to the practice of the European Court of Justice, the term company includes any legal entity that performs some economic activity, regardless of its legal form and method (source) of financing (C-41/90 Klaus Höfner and Fritz Elser v Macrotron GmbH). Moreover, economic activity means any activity that includes the offer of goods or ser-

vices on the market. Non-commercial organisations are also treated as companies to which competition law is applied, if they are engaged in business of a commercial nature (Vukadinović, 2014, p. 395). Then they can make a profit, with the notion that it will be used for a purpose determined by law and statute, and not for the reproduction of capital.

When we apply this point of view to organisations in the field of sports, we come to the conclusion that they will also be treated as companies if they are involved in the performance of economic activities that involve the sale of goods and services, even in situations where they make little or no profit by performing such activities. If they coordinate their activities, they can be treated as associations of companies (Parrish, 2003, p. 117). This attitude was taken in the decisions of the European Commission, and the European Court of Justice, that is, the General Court. One example of this is the decision of the European Commission in the case of ENIC vs. UEFA. The procedure was initiated by the company ENIC, which had a share in the ownership of six professional football clubs from different EU member states. The case was concerned with the question of whether a sports rule prohibiting two or more football clubs participating in a club football competition under the auspices of UEFA from being directly or indirectly controlled by the same entity is in accordance with EU competition law. The European Commission treated the international sports federation (UEFA), and national football federations and sports organisations (football clubs) as companies. The decision points out that professional football clubs are companies, as they 'supply the sports industry' by playing football matches against other football clubs in football competitions. Such sports events are also commercial activities that generate profit through the sale of tickets, rights to television broadcasts, and advertising. Since football clubs represent companies, national football associations that bring together football clubs represent an association of companies, while UEFA, which gathers national football associations at the European level, is an association of associations of companies. UEFA can also represent an individual company when it is directly engaged in performing economic activities related to the organisation of European football club competitions, as well as the European Championship.

The General Court followed a similar approach in the decision related to the Piau case, which considered whether FIFA's sports rules governing the activity of mediating the football transfers restricted competition in the common market. The procedure was initiated by Mr. Laurent Piau. According to the FIFA rules in force at the time, the obligation to possess a license was prescribed for mediating the transfers of football players. The license was issued by the national football associations, where those who wanted to become a sports agent had to pass a written exam, and then sign a professional liability insurance contract, or submit

a bank guarantee in the amount of 100,000 Swiss francs. Mr. Piau, who wanted to become a sports agent, believed that FIFA had restricted competition in the common market by imposing a license requirement. With the current FIFA Regulations on Working With Intermediaries, signed in 2015, the system of 'licensed agents' was abandoned and the system of 'registered intermediaries' was introduced. However, we believe that the decision of the General Court in the Piau case deserves attention even now (that is, it must be viewed in a much broader context), bearing in mind that the position of sports agents differs significantly in different sports and individual countries, depending on the autonomous sports and national legal regulations. The Court here assessed that the national football associations represent associations of companies since they bring together football clubs that carry out commercial activities. The fact that national football associations, in addition to professional ones, also gather amateur football clubs cannot affect their qualification as associations of companies. The status of an amateur club does not mean that they cannot participate in performing economic activities. FIFA, which brings together national football associations at the world level, is an association of companies. FIFA can also represent an individual company in terms of carrying out economic activities related to the organisation the World Cup.

Individual athletes can also be treated as traders if they perform economic activities independently of their sports organisation. For example, they conclude individual sponsorship contracts (Vermeersch, 2007, p. 16). This approach was taken by the European Court of Justice in the Deliège case, which was concerned with the question of whether the International Judo Federation's sporting rules limit the freedom to provide services in the common market. The Court assessed that the fact that, according to the rules of the sports federation, athletes formally have the status of amateurs does not mean that they cannot perform commercial activities. In some amateur sports, the participants are professionals in all aspects of sports, except that they do not receive monetary compensation in the form of a salary for performing sports activities. However, they can earn even very high amounts of money in other ways, most often on the basis of sponsorship and advertising contracts. Thus, although Ms. Deliège was not directly paid by her club, she was sponsored by a bank and a car manufacturer, and accordingly, her activity had an economic character (C-51/96 and C-191/97 Christelle Deliége v Ligue francophone de judo et disciplines associés ASBL). Similar situations occurred in the field of skiing sports, figure skating, combat sports (amateur boxing, wrestling, etc.), and other sports disciplines that enjoy popularity and require exceptional dedication and rigorous training.

Sports Rules - Agreements between Companies, Decisions of Associations of Companies, or Collective Practices

The question of whether sports rules can have the character of agreements between companies,[1] decisions of associations of companies, or collective practices is linked to the theoretical discussion about the legal nature of sports rules. There is no single opinion on this in legal literature (Reichenberger, 2008, pp. 5-6). The opinion that sports rules, in the context of the application of competition law, can have the character of an agreement between companies is based on the contractual theory about the legal nature of sports rules. The basic starting point of this opinion consists in the understanding that sports rules are created through the mutual exchange of consistent statements of will of organisations in the field of sports, by which they express their agreement with their content. Therefore, sports rules have the character of a contract and do not lose that character even in the time that passes after their adoption, so they are also binding for the sports organisations that accede to them, based on private law recognition of their obligation through the accession contract. The supporters of this point of view believe that sports organisations can conclude restrictive agreements with the consent of their will, which have the aim or effect of preventing, disrupting or limiting competition. According to the normative theory, sports rules do not represent the result of an agreement, i.e. agreements of will between the competent sports association and the sports organisations of the members, but the competent sports association adopts them precisely on the basis of the authority recognised by its members. Therefore, sports organisations do not have the immediate ability to influence their content. From this approach, it follows that sports rules can only have the character of decisions of associations of companies, which coordinate the behaviour of sports organisations, or members of the association, in such a way that it can affect the prevention, distortion or limitation of competition. According to the mixed theory, sports rules can have a dual nature. At the moment of adoption, they have the character of a contract that is the product of legally relevant consent of the will of the sports organisations that directly participated in their adoption. However, with the passage of time, they lose the character of contracts for those sports organisations that join the association without the possibility to influence the content of the sports rules. According to this opinion, sports rules can have the characteristics of both restrictive agreements and decisions of associations of companies, depending on the circumstances of the observed case (Gardiner, 2012, pp. 243-244).

[1] Restrictive/cartel agreements;

Bearing in mind that modern sport is predominantly based on a pyramidal structure, we believe that sports rules have the character of decisions of associations of companies. Also, due to the principle of publicity of sports rules, we are of the opinion that they cannot be characterised as a contractual practice between companies.

This attitude is also present in practice. Thus, for example, the anti-doping rules of the IOC in the case of Meca-Medina were characterised as a decision of an association of companies, while the UEFA sports rules in the case of ENIC vs. UEFA were characterised as a decision of an association of associations of companies.

The Effect of Sports Rules on Trade between Member States, and on the Prevention, Restriction or Distortion of Competition within the Common Market

It is indisputable that sports rules can affect trade between member states, given their globally binding nature. Due to the pyramidal structure of the sports organisation, the international sports federation controls the activities of the national sports federations, which then supervise the activities within their jurisdiction, and it is undoubted that many sports rules have international implications. On the other hand, the sports rules of a national sports association that apply on the territory of the country in which that association operates can affect trade within that country.

It has already been said that sporting rules may have the object or effect of preventing, limiting, or distorting competition within the common market. In this context, the recent decision of the General Court in the case of the International Skating Union's Eligibility Rules should be mentioned. According to some authors, if confirmed by the European Court of Justice, this decision would have far-reaching consequences in the direction of limiting the monopoly of international sports federations and liberalising the market for organising sports competitions (Szyszczak, 2018, pp. 188-189). In this case, the sports rules of the International Skating Union (ISU), which prescribed severe sanctions for skaters who participate in a sports event whose upholding was not approved by that union, were analysed. The ISU is an 'umbrella' sports organisation at the international level that is responsible for organising competitions in skating sports. The international rules for skating disciplines adopted by the ISU are binding for national skating federations, skating clubs, and skating athletes. Those rules foresee significant restrictions regarding the ability of skaters to participate in international competitions in skating sports organised by independent organizers. That is, for participation in such competitions, the approval of the ISU or a certain national skating association, is necessary. If the skaters disobey these rules, they risk the imposition of sanctions ranging from warnings and fines to time-limited bans from participating in skating competitions, including a lifetime suspension. The

General Court assessed that the aforementioned sports rules affect competition on the relevant market. That is, they prevent free access to the market for the organisation and commercial exploitation of international skating competitions. This is also reflected in limiting the possibility of developing new skating disciplines. Skaters are prohibited from offering their services to other organisers, which deprives them of additional sources of income during a relatively short sports career on the basis of sponsorship, for example, or by winning a monetary prize for the achieved result in a specific competition. Bearing in mind the amount of effort and sacrifice necessary to reach top sports performance, and the fact that athletes can compete at the top level for a limited number of years, there would have to be particularly justified reasons to condition the prohibition of their participation in other competitions. This could, for example, be the protection of their health and safety. Consequently, the General Court took the approach that the aforementioned sports rules, considering their content, and legal and economic contexts, aim and have the effect of preventing and limiting competition on the common market, according to Article 101(1) of the Treaty on the Functioning of the EU (Cattaneo, 2021, pp. 18-20).

When it is established that a certain sports rule has the purpose or effect of preventing, limiting, or distorting competition within the common market, it should be determined whether there are valid and objective reasons that can justify these infractions. For this purpose, the so-called Wouters test[2] is used. Due to the fact that the proclaimed sports goals are generally considered legitimate, the application of the Wouters test is practically reduced to the assessment (determination) of the predominant interest (Vermeersch, 2007, p. 21). It is considered that a specific sports rule does not conflict with EU competition law when its restrictive effects are inherent in the organisation of sports and the proper performance of sports activities, and if they are proportional to the valid sporting interest that was sought to be achieved by adopting that rule (C-309/99 Wouters v Algemene Raad van de Nederlandse Orde van Advocaten). Therefore, the restrictive effects of a certain sports rule which are immanent to sports, that is, which arise from the special nature of relationships in sports and are necessary for the achievement of legitimate sports goals, are in accordance with Community competition law. During the assessment, all the circumstances of the specific case must be taken into account. In other words, the general context in which the sports rule is adopted, or produces its consequences and goals, must be taken into account (Ječmenić, 2018, p. 145).

[2] Proportionality test;

If the sporting rule cannot be justified on the basis of the Wouters test, Article 101(3) of the Treaty on the Functioning of the EU is applied, and it prescribes an exemption from the application of Article 101(1). Such justification of the restrictive effects of a specific sports rule is applied in cases when it is not inherent in the organisation and proper implementation of competitive sports, which would be justified by the application of the Wouters test, but the positive effects of the sports rule nevertheless exceed its restrictive effects (Geeraert, p. 22). For example, the positive consequences of the application of a certain sports rule can be reflected in the protection of the health and safety of athletes, or the protection of the integrity of the sports competition.

In the decision regarding the case of ENIC vs. UEFA, it was assessed that there was no infringement of competition within the meaning of Article 101(1) of the Treaty on the Functioning of the EU. The legitimate goal of the sports rule that prohibits two or more football clubs participating in the same football club competition from being directly or indirectly controlled by the same entity is to guarantee the integrity of sports competitions. More precisely, the purpose of the mentioned sports rule is to ensure the uncertainty of the outcome of the sports competition and to guarantee the football audience that the matches played are part of an impartial and fair sports competition.

In the case of Meca-Medina, the attitude taken was that the anti-doping rules of the IOC, due to the possibility of an unjustified exclusion of an athlete from sports activities, may have negative effects on the competition. However, as the goals of the anti-doping rules are primarily reflected in the need to protect the health of athletes, to ensure the fairness of sports competitions with equal opportunities for all athletes, and to protect the ethical values of sports, the restrictions provided for by the anti-doping rules are inherent in the organisation of sports and necessary for the proper conduct of competitions, and the prescribed penalties are proportional to the goal that was sought to be achieved by adopting those rules.

In the Piau case, the General Court did not apply the Wouters test, but Article 101(3) of the Treaty on the Functioning of the EU. The court assessed that prescribing the obligation to possess a license and other prerequisites for the performance of representation activities in football transfers limits access to that economic activity and, therefore, affects competition on the common market. Nevertheless, it is emphasised that the obligation to possess a license represents a justified restriction of competition in order to protect the interests of athletes and raise the level of professional and ethical standards in that activity. Consequently, the Court found that it was a justified exception, in accordance with Article 101(3) of the Treaty on the Functioning of the EU.

The Dominant Position of Organisations in the Field of Sports on the Relevant Market

A dominant position is held by a company that has the power to act, to a significant extent, independently of its competitors, customers or suppliers. In other words, a dominant position represents the ability, knowledge, and power of a company to independently determine the terms of exchange, without taking into account the will and interests of other participants in a certain market (Vukadinović, 2014, pp. 441-442). It can be enjoyed by one company independently, or connected to other companies. The dominant position of the company is determined on the basis of two elements. The first is the relevant market, which includes the relevant product market and the relevant geographic market. The second is the participation of the company in the relevant market. Viewed from the aspect of majority physical participation in the relevant market, a company has a dominant position if its market share is over 50%, with a market share of over 40% being a serious indicator of dominance (Besarović, 2010, p. 19).

The relevant product market includes products or services that are considered interchangeable by consumers, taking into account their characteristics, price and purpose. It is, therefore, about identical or similar, i.e. competitive, products and services. The procedure for determining the relevant product market involves an analysis of substitutability on the demand side, whereby the so-called SSNIP[3] test is applied. The goal is to determine the range of products that consumers consider interchangeable (European Commissions Notice on the Definition of the Relevant Market for the Purposes of Community competition law, OJ (1997)). The SSNIP test involves answering the question of whether consumers would, in the event that the seller of a certain product introduced a relatively small, but still significant and permanent increase in the price of that product (between 5% and 10%), turn to the purchase of another product to the extent of making such a price increase unprofitable. A positive answer would mean that the two products represent interchangeable products and belong to the same product market (Doklestić, 2010, p. 145).

The relevant geographic market concerns the spatial boundaries of the area in which a certain conduct will be valued. It includes the territory where the observed entity carries out its economic activity, and where the conditions of competition are sufficiently homogeneous for all traders and can be clearly distinguished from neighbouring areas, wherein the conditions of competition are significantly different.

Acquiring and maintaining a dominant position on the market is not automatically prohibited and illegal. The abuse of a dominant position, i.e. behaviour that distorts competition in an ‘inappropriate’ way, is

[3] Small but significant non-transitory increase in price.

prohibited. Behaviour that abuses a dominant position must exist within the common market, or on a significant part of it (Besarović, 2010, 20). Article 102 of the Treaty on the Functioning of the EU does not foresee possibilities for exceptions to the prohibition of abuse of a dominant position. However, in practice, the concept of the 'objective justification' of appropriate behaviour has been developed. According to this concept, behaviour that can otherwise be qualified as abuse of a dominant position can avoid prohibition if the dominant company proves that there are reasons that represent an objective justification for such behaviour (Doklestić, 2010, p. 386). For instance, this concept would hold true for a company which stopped further delivery of goods to a customer who became a competitor. Also, the ban can be avoided if it is proven that such behaviour has more positive than negative consequences. This is about the protection of the 'overriding interest'. This, for example, can include the protection of the health and safety of consumers.

Regarding the determination of the relevant product market in sports, it can be stated that the SSNIP test is not adequate, and a case-by-case approach is applied (Heikki, 2016, p. 45). In principle, three types of relevant product markets can be recognised in sports. The first is the market for organising sports competitions. The second is the supply market, where sports organisations carry out player transfers. The third is the exploitation market (Pijetlovic, 2015, p. 170), where organisations in the field of sports economically exploit the activities that accompany the holding of sports events; for example, they sell media rights to broadcast sports events, advertising space, or package deals for sports events. The relevant geographic market in sports is the territory where the observed sports rule applies.

As competent international sports federations practically have monopolies in specific sports, there is no doubt that they have a dominant position on the relevant market. If they were to coordinate their activities with the members of the federation, it could be said that they have a collective dominant position, which practically means that they have no competition on the relevant market.

In this sense, in the Piau case, the General Court assessed that FIFA has a collective dominant position on the market for the provision of sports agent services. This understanding is based on the fact that the FIFA rules governing representation in sports transfers are binding for national football associations that are members of FIFA, as well as for football clubs that are members of national football associations. Therefore, FIFA, national football associations, and football clubs in the market of representation in sports transfers are economically connected to the extent that they act as a collective entity vis-à-vis sports agents. If sports agents were to violate the standardised rules, they would be sanctioned by a ban on performing the activity of representation in sports transfers. The fact that FIFA is not a direct user of the services of sports agents is irrelevant for the application of Article 102 of the Treaty on the Functioning of the

EU, since FIFA, as an emanation of national football associations and football clubs, is the actual user of the services of sports agents, and acts on the market of representation in sports transfers through its members. However, according to the Court's understanding, there was no abuse of a collective dominant position on the market in this case, because it was about justified qualitative restrictions aimed at protecting football players, and raising professional and ethical standards in the activity of representation in sports transfers.

On the other hand, the abuse of a dominant position was noted in the decision in the case of the International Skating Union's Eligibility Rules, in which it is pointed out that the ISU is practically the only regulator of skating at the international level and that it exclusively decides on the organisation of international competitions in skating. The existence of a dominant position is indicated by the fact that no independent entity has been able to successfully enter the market for the organisation and commercial exploitation of international competitions in skating sports. Therefore, the sports rules adopted by the ISU completely eliminated competition, creating an insurmountable barrier for their entry into the relevant market. Consequently, the ISU abused its dominant position on the market for the organisation and commercial exploitation of international competitions in skating sports, according to Article 102(3) of the Treaty on the Functioning of the EU.

CONCLUSION

Autonomous sports rules represent a set of rules of a private law nature that regulate the behaviour of all participants in the sports system when performing sports activities. The effect of sports rules is based on the autonomy of the will of those who joined together in sports organisations, i.e. sports federations, and their legal validity is regulated by the provisions of the Law on Sports. In addition to the protection of the proclaimed sports goals, sports organisations try to fortify their economic interests with the sports rules they adopt. Thus, they can impose certain restrictions on other participants in the sports system. Apart from the justified sports restrictions, these can also include the unjustified commercial restrictions on competition. Considering that the pyramidal structure of modern sports practically allows the sports federation that is at the top of the organisational pyramid at the international level to enjoy monopoly, and that organisations in the field of sports at a lower level are subordinate to those at a higher level, sports rules can have far-reaching consequences in limiting competition in the market of sports competition organisation. Therefore, any sporting rule that has an economic effect may be subject to an assessment of compliance with the Community competition law. Hence, whether the restrictive effects of a certain sports rule are inherent in the organisation of sports and the proper performance of

sports activities, and whether they are proportional to the valid sporting interest that was sought to be achieved by the adoption of that rule should be determined in each individual case. Unless the sports federation that has a dominant position fails to prove that there are reasons that represent an 'objective justification' for such behaviour, or that it is a matter of protecting a 'predominant interest', such behaviour is considered an abuse of a dominant position on the market for the organisation and commercial exploitation of sports competitions. These reasons can, for example, be the protection of the health and safety of athletes, or the protection of the ethical values of sports or the integrity of sports competitions.

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ПРАВНИ ЗНАЧАЈ ПРИМЕНЕ ПРАВА КОНКУРЕНЦИЈЕ ЕВРОПСКЕ УНИЈЕ НА СПОРТСКА ПРАВИЛА

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Резиме

Аутономна спортска правила представљају скуп правила приватноправног карактера којима се уређује понашање свих учесника у систему спорта приликом обављања спортских активности и делатности. Дејство спортских правила заснива се на аутономији воље оних који су се удружили у спортске организације, односно спортске савезе, а њихова правна важност нормирана је одредбама Закона о спорту. Поред заштите прокламованих спортских циљева, спортске организације настоје да спортским правилима која усвајају штите и своје економске интересе. Тиме осталим учесницима у систему спорта могу наметати извесна ограничења. Осим оправданих спортских ограничења, то могу бити и неоправдана комерцијална ограничења конкуренције. С обзиром да пирамидална структура савременог спорта практично омогућава монопол спортском савезу који је на међународном нивоу на врху организационе пирамиде, те да су организације у области спорта на нижем нивоу подређене онима на вишем нивоу, спортска правила могу имати далекосежне последице у правцу ограничења конкуренције на тржишту организовања спортских такмичења. Стога свако спортско правило које има економско дејство може бити подложно процени усклађености са комунитарним правом конкуренције. Дакле, у сваком случају понаособ треба утврдити да ли су рестриктивни учинци одређеног спортског правила својствени организацији спорта, правилном обављању спортских активности, те да ли су пропорционални ваљаном спортском интересу који се желео постићи усвајањем тог правила. У супротном, ради се о злоупотреби доминантног положаја на тржишту организовања и комерцијалне експлоатације спортских такмичења, осим уколико спортски савез који има доминантни положај не успе да докаже да постоје разлози који представљају „објективно оправдање“ за такво понашање, или да је реч о заштити „претежнијег интереса“. Ти разлози, на пример, могу бити заштита здравља и безбедности спортиста, или заштита етичких вредности спорта или интегритета спортског такмичења.

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> "Conversational inference is partly a matter of a priori extra-textual knowledge, stereotypes and attitudes, but it is also to a large extent constructed through talk" (Gumperz, 2001, p.37)."

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Journal papers and articles – 1 author

In-text citation:

(Manouselis, 2008), i.e. (Manouselis, 2008, p. 55)

In 'References':

Manouselis, N. (2008). Deploying and evaluating multiattribute product recommendation in e-markets. *International Journal of Management & Decision Making, 9*, 43-61. doi:10.1504/IJMDM.2008.016041

Journal papers and articles – 2 to 6 authors

In-text citation:

First reference: (Uxó, Paúl, & Febrero, 2011)

Subsequent references: (Uxó et al., 2011)

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Uxó, J., Paúl, J., & Febrero, E. (2011). Current account imbalances in the monetary union and the great recession: Causes and policies. *Panoeconomicus*, 58(5), 571-592.

Journal papers and articles – more than 6 authors

In-text citation:

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In 'References':

Cummings, E., Schermerhorn, A., Merrilees, C., Goeke-Morey, M., Shirlow, P., & Cairns, E. (2010). Political violence and child adjustment in Northern Ireland: Testing pathways in a social–ecological model including single-and two-parent families. *Developmental Psychology, 46*, 827-841. doi: 10.1037/a0019668

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In-text citation:

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PhD Dissertations, MA Theses

In-text citation:

(Gibson, 2007)

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Gibson, L. S. (2007). *Considering critical thinking and History 12: One teacher's story* (Master's thesis). Retrieved from https://circle.ubc.ca/

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(Републички завод за статистику, 2011)

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Републички завод за статистику. *Месечни статистички билтен*. Бр. 11 (2011).

Laws

In-text citation:

(Закон о основама система васпитања и образовања, 2004, чл. 5, ст. 2, тач. 3.)

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Закон о основама система васпитања и образовања, Службени гласник РС. Бр. 62 (2004)

Legal and other documents

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(Legal Consequences for States of the Continued Presence of South Africa in Namibia (South West Africa) notwithstanding Security Council Resolution 276, 1971)

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