https://doi.org/10.7251/SSH24V034N
UDC: 796.015.132-053.9:796.035
Original scientific paper
Originalni naučni rad

Effects of a School Physical Education Program on the Physical and Motor Development With Adolescents From Kosovo

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Abstract: *Because adolescents spend most of their time studying and doing schoolwork, they do not have enough time to engage in physical activity; this lack of physical activity is an important public health concern. Therefore, this study aimed to determine how the physical education curriculum and programs affect the physical and motor development of adolescents in the Kosovo. The research was carried out on a sample of 386 male students, who participated in physical education classes that lasted 72 hours (45 minutes after 2 hours per week). In order to realize the objectives of the research, 7 anthropometric measures and 14 motor (fitness) tests were applied. Research results showed changes in all anthropometric measures and motor fitness tests between initial and final measurements. The results of the research showed that physical education programs can have a positive effect on motor development among middle school aged adolescents in the Kosovo.*
Keywords : *adolescents, motor development, fitness, physical activity.*

Introduction

The teaching of physical education in the world is distinguished by its diversity in terms of the elements it contains, their preparation and realization in practice. Despite the diversity of physical education teaching in different educational systems, it is characterized by one common goal. This goal can be identified in the development of the individual into a "physically educated man" (Hardman, 2009). Advocacy of this idea brought physical education as a teaching subject with an expanded role, and as such it has a certain kind of responsibility. That responsibility is reflected in the fact that the content of this subject covers many contemporary issues within the educational process, with features that are not offered by any other subject and teaching material (Hardman, 2009).

This responsibility is fully summarized in the Decision on the role of sport in education, which the European Parliament adopted in November 2007 (Hardman, 2009). In the preamble of the Decision, it is specially emphasized that physical education is the only teaching subject in which children are prepared for a healthy life, that it is aimed at their overall physical and mental development, that important social values are transmitted through it, such as: honesty, self-discipline, solidarity, tolerance, team spirit and fair play and together with sports is considered one of the most important tools for social integration (Hardman, 2009).

Unfortunately, in recent years, physical education teachers have become increasingly concerned about low levels of physical activity, which contributes to a decrease in physical fitness and motor performance among students (Greier, 2013). Sedentary habits, such as watching TV and playing computer games, are becoming more and more popular and replacing usual physical activity (Kaiser-Jovy, Scheu, & Greier, 2017; *Owen, Healy, Matthews, & Dunstan, 2010*; Mathers et al., 2009). Accordingly, the majority of children and adolescents do not achieve the recommendations of at least 60 minutes of moderate to vigorous physical activity per day (Reilly et al., 2004; WHO, 2016). In light of these developments, a large number of scientific studies confirm the negative aspects of reducing physical activity and increasing a sedentary lifestyle (Janssen & Leblanc, 2010; *Houston et al., 2013*; Dutra, Kaufmann, Pretto, & Albernaz, 2015*;* Burtscher*, 2015*; *Greier et al., 2018*). Insufficient physical activity and an increased sedentary lifestyle can lead to a number of negative health effects such as poor posture, obesity, metabolic disorders, diabetes and diseases of the cardiovascular system (Ferrari et al., 2015; Dutra et al. *,* 2015*)*. In addition to negative health effects,

low levels of physical activity are also associated with reduced physical fitness and motor performance (Tomkinson, L é ger, Olds, & Cazorla, 2003; Tomkinson & Olds, 2007; Albon, Hamlin, & Ross, 2010; Hardy, Barnett, Espinel, & Okely. 2013; Muellerova et al., 2015; Ruedl, Greier, Kirschner, & Kopp, 2016; Greier & Drenowatz, 2018; Greier, Riechelmann, Ruedl, & Drenowatz, 2019). Although there is a close relationship between physical activity, physical fitness and motor competence, all three components are important in modifying and promoting health among young people. (Myers, Prakash, Froelicher, Partington, & Atwood, 2002; Bauman, 2004; Ortega, Ruiz, Castillo, & Sj ö str ö m , 2008; Vandorpe et al., 2012; Erfle & Gamble 2015; Ruedl et al., 2016; Greier & Drenowatz, 2018).

This concerns all the more because motor performance, regardless of its genetic determination, can be strongly influenced by the degree of acquisition of fundamental motor skills (Chiodera et al., 2008 ; *Förster , 2005*; *Logan et al., 2012*; *Riethmuller et al., 2009*). The need to nurture motor development further emphasizes the need to start promoting it from a young age. The elementary school years are considered a critical stage for the development of motor competence and physical fitness (Augste & Künzell, 2015). Therefore, special attention should be paid to increasing sports participation during school hours, including opportunities for physical activity in free time. According to the current Curriculum and Program in the Republic of Kosovo, the subject of physical education is represented with 2 hours per week for a duration of 45 minutes or a total of 72 hours per year. The small number of teaching hours in the subject of physical education is a limiting factor and cannot compensate for the lack of physical activity of today's students (Osterroth, Spang, & Gie ß ing, 2012). However, in the Republic of Kosovo, there are limited data and one can only speculate about the influence of physical education teaching on the physical and motor development of primary school children. Therefore, the purpose of this study was to determine how the physical education curriculum and programs affect the physical and motor development of adolescents from elementary schools in the city of Pristina.

Methods

The research is a quasi-experimental longitudinal type and was conducted in a school environment, on a sample of students of secondary school age, within the regular teaching of physical education. A pretest-posttest was used research draft. The respondents worked according to the existing one's curricula and programs approved by the Ministry of Education (Education Development Institute) of the Republic of Kosovo. The program lasted the whole school year, with two hours a week. The initial measurements were carried out in September and the final in May.

Sample of respondents

The research includes a sample of 386 male students from the following three elementary schools in Pristina: OU Nazim Gafuri 142 students, OU Elena Gjika 158 students and OU Zelena Shkola with 88 students. The average age of the respondents was 13.56 ± 0.94 years. The study included all students whose parents gave consent to participate in the research, who were psychophysically healthy and who regularly attended physical and health education classes. Subjects were treated in accordance with the Declaration of Helsinki (Edinburgh 2013 revision).

Measurements

In order to achieve the objectives of the research, the following anthropometric measures were measured: height, weight, waist circumference, skinfold on the upper arm and skinfold on the back. The following motor tests were also measured: hand tapping, foot tapping, deep forward bend on a bench, kick with a bat, forward bend - twist - touch (mechanism for synergistic regulation and tone regulation), long jump from a place, high jump from a place, throwing a medical ball lying down, running for 20 m, (mechanism for regulation of excitation intensity), raising the trunk for 30 sec , push-ups from the knees, sheltering the trunk from lying down (mechanism for regulation of excitation duration), side steps, running in rectangle (mechanism for structuring the movements). Also, based on the height and weight of each child, the body mass index - BMI (kg/m ^{2}) and the percentage of fat tissue based on sum of triceps and subscapular skinfolds - Slaughter equation (Slaughter et al., 1988).

Motor abilities were measured according to the methodology of: Metikoš, D., Prot, F., Hoffman, E., Pintar, J. & Oreb G. (1989) and Kurelić, N., Momirović, K., Stojanović, M., Šturm, J., Radojević, F. & Viskić-Stalec, N. (1975). Anthropometric measures measured according to: International Biological Program (IBP).

The measurement was carried out in the sports halls in which the students regularly perform physical education classes. The halls were adequately lit, with a normal temperature for work. Tests were measured during classes,

always at the same time with all examinees, and in the same order depending on the possibility and difficulty of the tests themselves. All tests were distributed according to working measurement points, so they were always measured by the same gauges. The instruments used during the research were standardized and calibrated before the beginning of the measurement of each group of 30 to 40 students. All respondents were in sports clothes.

Statistical analysis

The normal distribution of the variables was determined by the Kolmogorov - Smirnov test. Basic descriptive statistical parameters (arithmetic mean and standard deviation) were calculated for all variables. The differences in anthropometric measures and motor (fitness) tests between the initial and final measurements were determined by paired t-test. The statistical significance level was set at 0.05. For the statistical analysis, SPSS software (version 26.0, IBM Corp., Armonk, NY, USA) was used.

Results

From the overview of the table 1, it can be seen that between the initial and final measurement, statistically significant differences were determined in the anthropometric measures: Body height (ATLVIS), Body weight (ATLMAS), Body mass index (BMI), Abdominal circumference (AOBTRB), Upper arm skinfold (ANABNA), Back skinfold (ANABLE) and body fat percentage (MAST) ($p<0.001$). Based on the calculated percentage increase in the values of the arithmetic mean between the initial and the final measurement, it can be said that after 9 months from the start of the exercise program, the subjects increased the value of body height by 2.43%, body weight by 7.08 %, body mass index by 2.24%, abdominal circumference by 3.90%, upper arm skinfold by 4.55%, back skinfold by 9.84 and the percentage of fat tissue by 6.76%.

Table 1. *Significance of differences of arithmetic measures between initial and final measurement*

Variables	INITIAL		FINAL		%	R	T-test	Sig
	Mean	SD	Mean	SD				
ATLVIS	162.92	9.22	166.88	8.96	2.43	0.97	-35.35	**0.000**
ATLMAS	55.06	13.38	58.96	13.84	7.08	0.96	-20.51	**0.000**
BMI	20.56	3.87	21.02	3.98	2.24	0.94	-6.69	**0.000**
AOBTRB	73.02	10.47	75,87	11.56	3.90	0.93	-13.31	**0.000**
ANABNA	11.42	5.35	11.94	6.75	4.55	0.91	-3.42	**0.000**
ENABLE	9.35	5.59	10,27	7.05	9.84	0.90	-5.60	**0.000**
MAST	17.01	8.87	18,16	11.02	6.76	0.93	-5.29	**0.000**

Table 2. *Significance of differences of arithmetic means in the motor (fitness) tests between the initial and final measurement*

Variables	INITIAL		FINAL		%	R	T-test	Sig
	Mean	SD	Mean	SD				
MTAR	29.75	4.06	32.07	3.74	7.80	0.63	-13.53	**0.000**
MTAN	17,22	2.39	19,29	1.98	12.02	0.40	-16.91	**0.000**
MDPK	29.88	7.76	31.72	8.35	6,16	0.76	-6.40	**0.000**
MISP	64,66	13,11	58,57	11.94	9.42	0.62	10.98	**0.000**
MBFPZD	15.76	2.48	17.70	2.44	12.31	0.41	-14.29	**0.000**
MSDM	1.54	0.26	1.66	0.27	7.79	0.84	-14.97	**0.000**
MSVM	34,21	7.43	36,32	7.45	6,17	0.74	-7.79	**0.000**
MFML	4.92	1.24	5.54	1.28	12.60	0.83	-16.91	**0.000**
MFE20V	3.91	0.39	3.78	0.40	3.32	0.68	8.06	**0.000**
MDTR	20.85	4.65	21,27	4.70	2.01	0.68	-2.24	**0.026**
MSKL	15.30	4.45	16.62	4.05	8.63	0.65	-7.24	**0.000**
MRCZTL	13.47	1.99	14.43	2.15	7.13	0.56	-9.65	**0.000**
MCVS	11.80	1.36	11,20	1.22	5.08	0.64	10.79	**0.000**
MTVP	28.51	2.70	27.98	2.39	1.86	0.76	5.85	**0.000**

Table 2 shows the differences between the initial and final measurements in the motor (fitness) tests among adolescents of middle school age. From the review of the table, it can be seen that between the initial and final measurement, statistically significant differences have been determined in all motor (fitness) tests. Based on the calculated percentage increase in the values of the arithmetic means between the initial and the final measurement, it can be said that after 9 months from the beginning of the exercise program, adolescents of middle school age increased the value of the motor (fitness) tests: hand tapping (MTAR) for , 7.80%, foot tapping (MTAN) by 12.02%, deep bench press (MDPK) by 6.16%, bat spin (MISP) by 9.42%, forward press - twist - touch (MBFPZD) by 12.31%, Standing Long Jump (MSDM) by 7.79%, Standing High Jump (MSVM) by 6.17% Lying Medley Throw (MFML) by 12.60%, Running 20m (MFE20V) by 3.32 %, 30sec trunk deadlift (MDTR) by 2.01%, knee push-ups (MSKL) by 8.63%, trunk tilt from lying down (MRCZTL) by 7.13%, side steps (MCVS) by 5.08% , running in a rectangle (MTVP) by 1.86% ($p > 0.05$) .

Discussion

This study aimed to investigate how a regular physical education program affects the physical and motor development of urban adolescents in the Republic of Kosovo. The results of the research showed that there was a statistical improvement in all motor (fitness) tests. Also, between the initial and final measurement, statistically significant differences were determined in all anthropometric measures. Changes in height and weight are most likely the result of natural biological processes of growth and development that are particularly pronounced in this phase of adolescence. On the other hand, the fact that the increase in body weight and the body mass index is not the result of an increase in muscle mass is worrying, but rather the result of an increase in the fat component. Namely, in the final measurement there was an increase in the volume of the abdomen by 3.90%, the skinfold on the upper arm by 4.55%, the skinfold on the back by 9.84 and the percentage of fat tissue by 6.76%. The results are consistent with the results of Harris et al. (2009) who determined through a meta-analysis that the intervention carried out in a school environment caused positive changes in other health factors, but not in the body mass index and other measures for assessing body composition. Harris et al. as a possible reason they highlight the insufficient level (duration, intensity and frequency) of physical activity, necessary to make changes. Another possible reason is that physical activity has a smaller influence on body composition, compared to the combined influence of physical activity and dietary factors. Similarly, Dobbins et al. (2013), Guerra et al. (2013), and Kelishadi et al. (2014) reported that a school-based physical activity intervention had no significant effect on BMI. Against these results, in a certain number of studies it has been established that the intervention carried out in the school environment (Carrel et al., 2005; Kain, Uauy, Vio, Cerda, & Leyton, 2004; Kriemler et al., 2010) led to a positive impact on body composition.

Regular physical activity and / or programmed physical exercise are the most important factors that maintain and improve motor skills (fitness). Schools can and should provide conditions for youth to engage in physical activity, improve health-related physical fitness, and can play a very important role in motivating youth to remain physically active (Burgeson et al., 2001). They represent suitable places for promoting and adopting positive health habits. Taking into account the trends, such as the dramatic increase in the prevalence of obesity among children and adolescents, the increased time spent watching TV or playing on the computer, and the decrease in physical activity, the conclusion that schools should take the leading role in involving young people in the appropriate forms of physical activities every working day , with the aim of improving physical fitness related to health and acquiring sports literacy (Pate et al., 2006).

A number of studies point out that it is necessary to implement physical activity programs in schools to increase opportunities for adolescents to participate in physical activities [Kelly et al. 2019; Demetriou et al. 2019; Silva et al. 2020). Kelly et al. (2019) reported that health promotion interventions in schools can increase students' access to physical activity opportunities. Demetriou et al. (2019) reported that in order to increase and maintain the level of physical activity among adolescents, it is necessary to raise and maintain motivation, and the promotion of physical activities in school environments is effective in strengthening this motivation. Silva et al. (2020) indicates that physical activities during physical education classes have the potential to improve students' health and academic performance, while creating opportunities for adolescents to engage in school activities. Several studies have reported that physical education programs are effective in increasing the time spent in physical activities by adolescents and improving physical health (Isensee et al. 2018; Andrade et al. 2014). For example, Isensee et al. (2018) showed

that German adolescents who received interventions at school showed an increase in time spent in physical activities compared to students who did not undergo such an intervention. Andrade et al. (2014) reported that physical education programs can improve the physical health of Ecuadorian adolescents and minimize the decrease in their level of physical activity. And some other previous studies (Kelishadi wet al., 2014; Giannaki et al., 2015; Martin-Smith et al. 2019) supported the findings observed in this study, reporting that a school-based physical education program had a positive effect on changes in health-related physical fitness.

Based on the conclusions of the National Association for Sport and Physical Education (NASPE), it should prepare children and adolescents for a physically active and healthy life, encourage them to engage in activities and develop habits for regular lifelong exercise (The Cooper Institute, 2010). Creating or selecting the best curricula and programs in physical education and their implementation by the highest quality teaching staff is a critical step in ensuring efficiency in the development of physically educated individuals who will choose to participate in physical activities throughout their lives (CDC, 1998).

This study has certain limitations. First, there was no control group and only the differences between the initial and final measurements were analyzed. In future studies, well-designed randomized controlled trials are recommended. Second, this study was conducted only in a few middle schools in urban Pristina and, therefore, the sample did not represent the entire population of the Republic of Kosovo, which makes it difficult to generalize the results of this study. In future research, it is necessary to increase the sample size from all regions of the Republic of Kosovo. Third, although it is important to investigate the influence of gender, age, and maturation on intervention effects, we did not investigate these aspects in this study. Finally, other factors that are known to influence the level of physical activity, physical fitness, such as parental support, nutritional intake and psychological status of the adolescents participating in this study, were not analyzed (Sharma et al. 2018).

Conclusions

In summary, the results of this study confirmed that school-based physical activity programs can have a positive impact on motor (fitness) abilities in adolescents. These results are expected to help health and educational professionals to plan or make decisions about strategies that can promote physical activities in schools. In future research, the effects of school programs for physical activity among adolescents should be taken into account not only on anthropometric measures and motor skills, but also on learning performance, mental health, lifestyle and behavior.

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Primljen: 02. decembar 2023. / Received: December 02, 2023
Prihvaćen: 21. decembar 2023. / Accepted: December 26, 2023

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