

# The Relationship Between Physical Activity and Content of the Physical Education Classes in 11-12 Years Old Lithuanian Schoolchildren. The Pilot Study

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## **Abstract**

*The aim was to evaluate and compare 11 – 12 years old Lithuanian schoolchildren's total class physical activity, time spent in moderate-to-vigorous physical activity and passively in both Game play and Motor skills practice physical education classes. The study involved 32 schoolchildren, of which 20 (62.5%) were boys. Physical activity was measured using Tri-axis Acti Trainer Activity Monitor accelerometer. Results showed that 9.4% of schoolchildren reached or exceeded 50% of moderate-to-vigorous physical activity in Game play class and none in Motor skills practice class. Boys scored higher than girls on moderate-to-vigorous physical activity, but only in Motor skills practice class. Boys also scored higher on total class physical activity, moderate-to-vigorous physical activity and lower on time spent passively in Game play rather than Motor skills practice class. Physical activity and passivity indicators in classes with different content in the group of girls did not differ. Results suggest that there is a necessity of reconsideration of the curriculum of physical education classes in Lithuania in terms of time spent in moderate-to-vigorous physical activity and including activities which would be both enjoyable and useful.*

**Key words:** *curriculum of physical education class; moderate-to-vigorous physical activity; passivity.*

## **Introduction**

Studies show that health-enhancing physical activity of schoolchildren in Lithuania, just as in many other countries, raise concerns. Only 17% of 11 years old girls and

23% of boys reported that they were engaged in moderate-to-vigorous physical activity (at least 60 minutes daily (WHO, 2012)). A systematic literature review shows that moderate-to-vigorous physical activity has positive effect on body mass index, muscle strength and tone, spine and joints flexibility, proper bone density, anxiety and depression, physical (sport competence), global, social and academic self-concept, and academic performance for school-age youth (Strong et al., 2005). Schools are supposed to provide the biggest part of the necessary amount of moderate-to-vigorous physical activity through informal and especially formal physical education (Pate et al., 2006).

The primary goal of physical education is to implement the need for lifelong physical activity. Physical education classes at school are the most available way to promote physical activity among schoolchildren (Fairclough, Stratton, & Baldwin, 2002). In accordance with the US Department of Health and Human Services (USDHHS; 2000) recommendations, schoolchildren should be active from moderate to vigorous level in at least 50% of the physical education class. The curriculum of physical education classes should be managed in a way so that little time would be left for schoolchildren to be inactive. However, research shows that physical education classes often fail to meet these recommendations (Nader, 2003; Pate et al., 2006; Wang, Pereira, & Mota, 2005). One study in USA (Utah) revealed that schoolchildren of 6 - 7 years of age were engaged in moderate-to-vigorous physical activity in only 35% of the class time (Scruggs et al., 2003). In England, schoolchildren from 7 to 14 years of age also reached moderate-to-vigorous physical activity for just 34.3% of physical education class time (Fairclough & Stratton, 2005a). The most recent literature meta-analysis showed that schoolchildren in intervention conditions spend 24% more of class time in moderate-to-vigorous physical activity compared with schoolchildren in usual practice conditions (Lonsdale et al., 2013). Kelder et al. (2003) presented CATCH Physical Education Program results. In schools where the program was implemented, schoolchildren's engagement in moderate-to-vigorous physical activity was higher (50.4%) compared to control schools (47.5%).

Usually, schoolchildren's engagement in moderate-to-vigorous physical activity decreases with age. For example, Surapiboonchai et al. (2012) showed decrease in moderate-to-vigorous physical activity from 88.5 in elementary to 50 in middle and to 36.5% in high school.

Authors assume that physical activity levels may also vary depending on the content of physical education class (Dudley et al., 2012; Fairclough & Stratton, 2005b; Laurson et al., 2008; McKenzie et al., 1995). Dudley et al. (2012) state that activities in physical education classes which require motor skills practice are less related to higher moderate-to-vigorous physical activity. In contrast, other research revealed that, for example, in Motive 8 classes, where coaching with an emphasis on promoting sporting skills, agility and physical activity was provided, 75% of children achieved 22 minutes of moderate-to-vigorous physical activity measured by accelerometer, compared with the 9 minutes of moderate-to-vigorous physical activity achieved

by 75% of children in usual school physical education classes (Rowlands, Pilgrim, & Eston, 2008). In line with the latter data, team sports (basketball, volleyball, soccer) in both genders were found to meet the recommendations of being physically active at least 50% of physical education class time (Sarradel et al., 2011). Stratton (1996) also found that among activities in which students are engaged in moderate-to-vigorous physical activity more than 50% of class time were high intensity team sports such as soccer and basketball. On the other hand, physical activity in physical education classes may depend on whether it is just game play (for example, basketball) class or skills teaching class. It could be explained that in classes where motor skills are practiced, special equipment is usually used, more instructions and tasks are presented, training time and efficiency are then reduced (Smith et al., 2009). Meanwhile, in physical education classes where team games are played, disadvantages mentioned above probably could be avoided because tasks in these classes are more for fun, rules are familiar to schoolchildren and less time is spent on teacher's explanations. These classes are usually presented so that young people could have a positive experience regarding physical activity. But there is still a lack of studies examining levels of physical activity in physical education classes with different content, and research on this issue is inconsistent.

### ***The Present Study***

This pilot study is a part of the bigger scientific research, which is aimed at investigating physical activity and physical fitness in schoolchildren in physical education classes in Lithuania and developing the curriculum most appropriate for optimal physical education practice at school. The curriculum is guided by the main goal of physical education – to encourage lifelong engagement in physical activity. In accordance with USDHHS (2000), one of the key strategies for improving the quality of physical education is the implementation of a well-designed curriculum, aimed at maximizing physical activity in the class and keeping schoolchildren engaged in moderate-to-vigorous physical activity for at least 50% of class time. No official guidelines exist in Lithuania in terms of participation in moderate-to-vigorous physical activity during physical education class. So, the current research pursues to add evidence for the future curriculum of physical education class and give guidance for physical education teachers regarding activities which better fulfill physical activity requirements and consider schoolchildren's age related to physical activity needs.

Searching for activities of physical education class which would be both interesting and useful is also encouraged. Furthermore, these activities should be easy to implement into children's everyday life. So, one of the intentions for the researchers was to compare physical activity in physical education classes with different content, when difference is based on the physical activity for fun versus motor skills development.

One of the key issues which arises when evaluating physical activity in schoolchildren, especially younger ones, is related to the assessment methods.

While self-report instruments are considered less reliable or valid because they are subjective and may be influenced by factors such as recall ability, ethnicity, culture or socioeconomic status, objective instruments help the researcher to avoid these disadvantages. Accelerometers, particularly the triaxial type, are reasonably reliable and valid measures of physical activity in children (Rowlands & Eston, 2007).

So, the aim of the current research is to evaluate and compare 11 – 12 year old Lithuanian schoolchildren's total physical education class' physical activity, time spent in moderate-to-vigorous physical activity and passively in both Game play and Motor skills practice physical education classes.

## **Methods**

### **Subjects**

This pilot study involved the total of 32 schoolchildren, 20 (62.5%) boys and 12 (37.5%) girls from the 6th grade of secondary school in Lithuania. Thirty one children, 20 boys (64.5%) and 11 (35.5%) girls, participated in Game play and 25 children, 18 (72.0%) boys and 7 (28.0%) girls participated in Motor skills practice classes. Among 24 schoolchildren who participated in both classes, 18 (75.0%) were boys and 6 (25.0%) were girls. All schoolchildren who were not excused from participating in physical education classes and were rated as being in good health state by their physicians were allowed to participate in the study. The schoolchildren's age ranged from 11 to 12, mean  $11.24 \pm 0.25$  years. The mean height of schoolchildren was  $155.97 \pm 6.64$  cm, mean weight was  $43.20 \pm 5.40$  kg and body mass index ranged from 13.65 to 22.51, with mean  $17.76 \pm 1.97$ . There were no significant ( $p > .05$ ) gender differences in age, height or weight. Participants were all Lithuanians in ethnicity. The research was approved by the Lithuanian Bioethics Committee. Written informed consent to participate in this study was obtained from the schoolchildren's parents or guardians.

### **Procedure**

#### **Physical Education Classes**

Forty-five minutes long physical education classes twice a week are common in Lithuania. One of the weekly classes was chosen as Game play, another as Motor skills practice. We used Bevans, Forrest and Riley's (2010) coding of physical education classes content. The class where skills are applied in a game or competitive setting has been named Game play class. This class is focused on children having fun. Physical education class focused on practice of skills with the primary goal of skills development, has been named Motor skills practice class. Each class consisted of three parts: introductory, main and final. In the introductory part schoolchildren warmed-up and were doing stretching exercises, and were relaxing in the final part of each class. In the main part of the Game play class schoolchildren played "Square" – an in-door and out-door team sports game in which each team is trying to knock each other's players using a ball. Elements of basketball game: mastering the basic

dribbling moves, throwing the ball at the basket from the fine line and other places of the basketball court were taught in the main part of Motor skills practice class. Both classes were in-door and directed by the same teacher with 10 years of experience teaching physical education.

### **Measurements**

Physical activity and passivity indicators were assessed using Tri-axis ActiTrainer Activity Monitor accelerometer (27g; 3.8 x 3.7 x 1.8 cm). Accelerometers, particularly of the triaxial type, are reasonably reliable and valid measures of physical activity in children (Bates, 2006). Triaxial accelerometers measure acceleration in three orthogonal planes (vertical, mediolateral and anteroposterior) and provide an output for each plane as well as a composite measure. They are highly recommended as an accurate measurement tool when the intensity or the pattern of activity is of interest (Rowlands & Eston, 2007). Schoolchild's names, ages, heights and weights were recorded into each accelerometer. Schoolchildren were asked to wear the device during the physical education class. Accelerometers were switched-on on the first and switched-off on the last minute of physical education class. The devices were attached on the left hip with elastic belt and were set to record physical activity at one minute intervals. The obtained data were stored in memory and then transferred to a computer. Using Actilife program the data were processed and moved to the SPSS programs for further processing. In accordance with Actilife program, when physical activity rate was in the range from 0 to 99 units, it was considered as passivity. Moderate-to-vigorous physical activity was estimated when the range of physical activity fluctuated between 1952 and 9498 units. Total physical activity covered all units of physical activity calculated in physical education class. The units of passivity and moderate-to-vigorous physical activity for further analysis were transformed into percentages which indicated the proportion of time spent in these kinds of physical activity compared to total class time.

Anthropometric measures of height and weight were taken using TBF-300WA wrestling body composition analyzer and HR-200 Height Rod.

Observational data were taken by two trained researchers. Protocol included data about time spent by the teacher explaining tasks to the schoolchildren. Time during which the teacher explained and demonstrated the practical tasks, was fixed with chronometer.

### **Statistical Analyses**

Statistical data analysis was completed using SPSS for Windows 19.0 software (SPSS Inc., Chicago, USA). Since this is a) a pilot study with small sample size, b) means of variables were not normally distributed, non-parametric statistics was chosen. Comparison between gender groups was carried out using Mann-Whitney test. Comparison of physical activity ranks between different types of lessons was

conducted using the Wilcoxon signed rank test. Although data in statistical tests were calculated as ranks, results were presented as means  $\pm$  SD in percentages to allow for comparison with the results of other research. Effect sizes  $r$  for nonparametric between-subjects and within-subjects tests were calculated using formula  $r = Z / \sqrt{N}$  (where  $N$  is the total number of observations on which  $Z$  is based) (Clark-Carter, 2010) to indicate the standardized difference between two measures. Magnitude of the effect was interpreted as follows:  $< 0.30$  as small effect size,  $0.30-0.80$  – medium effect size, and  $> 0.80$  – large effect size (Cohen, 1988). Results were considered statistically significant when the probability value ( $p$ ) was less than 0.05 or equal. Descriptive statistics was also calculated.

## Results

Preliminary data analysis revealed that in each Game play and Motor skills practice class, 44 minutes of physical education class duration were fixed. Boys were engaged in moderate-to-vigorous physical activity between 18.18 and 54.55%, girls between 4.55 and 61.36% of Game play class time. Actually, only three (9.4%) schoolchildren (two boys and one girl) reached or exceeded 50% of physical education class time recommended level of moderate-to-vigorous physical activity in Game play class. In contrast, in Motor skills practice class, boys were engaged in moderate-to-vigorous physical activity between 9.10 and 36.40%, girls between 2.3 and 27.30% of class time. None of the schoolchildren reached the 50% class time bound of moderate-to-vigorous physical activity in Motor skills practice class.

Proportion of passivity ranged from 0 to 18.80% of Game play class time for boys and from 0 to 31.82% for girls. In Motor skills practice class, the upper bound of time spent passively in the group of boys was higher (36.40%) than in Game play class, but in girls it was almost the same (31.80%). The lower bound of time spent passively in Motor skills practice class in both genders was equal to 0. That means that at least one boy and one girl were not passive during the entire class time.

Observational data also showed that the teacher spent 5 minutes and 46 seconds (more than 13% class time) explaining the tasks for schoolchildren in Game play class. Out of that time, 3 minutes and 6 seconds (more than 7% class time) were devoted to the tasks in the main part of the class (showing and explaining team game rules). In contrast, in Motor skills practice class, it took 8 minutes and 35 seconds (almost 19.5% class time) for the teacher to explain tasks, and 5 minutes and 35 seconds (nearly 13% class time) were spent explaining tasks in the main part of the class (showing and explaining basketball skills).

Results of Mann-Whitney test (Table 1) show that boys scored significantly higher ( $p < .05$ ) than girls on moderate-to-vigorous physical activity with medium effect size ( $> .30$ ), but only in Motor skills practice class. Total physical education class physical activity and proportion of passivity in Motor skills practice class and total physical education class physical activity, proportion of moderate-to-vigorous physical activity

and passivity in Game play class did not differ significantly between boys and girls ( $p > .05$ ). Though, proportion of mean moderate-to-vigorous physical activity in both boys and girls did not reach the 50% class time bound in neither of the classes.

Table 1

Comparison of physical activity and passivity indicators in Game play ( $N_{Total}=31$ ;  $N_{Boys}=20$ ;  $N_{Girls}=11$ ) and Motor skills practice ( $N_{Total}=25$ ;  $N_{Boys}=18$ ;  $N_{Girls}=7$ ) classes between gender groups (Mann-Whitney test).

Variable (% , where not indicated otherwise)	Mean $\pm$ SD			p	Effect size r
	Total	Boys	Girls		
GPC total PA (units)	1558.45 $\pm$ 413.48	1667.48 $\pm$ 329.82	1360.20 $\pm$ 489.08	.117	.28
GPC MVPA	33.72 $\pm$ 12.49	35.68 $\pm$ 9.84	30.17 $\pm$ 16.20	.246	.21
GPC passivity	9.82 $\pm$ 8.87	7.27 $\pm$ 5.79	14.46 $\pm$ 11.65	.070	.33
MSPC total PA (units)	1272.66 $\pm$ 229.15	1319.36 $\pm$ 212.89	1152.57 $\pm$ 241.35	.183	.24
MSPC MVPA	19.56 $\pm$ 8.45	21.86 $\pm$ 7.76	13.66 $\pm$ 7.64	.031	.44
MSPC passivity	14.18 $\pm$ 10.20	16.17 $\pm$ 11.33	9.09 $\pm$ 3.22	.180	.24

Note: GPC – Game play class; MSPC – Motor skills practice class; PA – physical activity; MVPA – moderate-to-vigorous physical activity.

Wilcoxon signed rank test reveals (Table 2) that boys scored significantly higher on total class physical activity, moderate-to-vigorous physical activity and lower on time spent passively in Game play rather than Motor skills practice class ( $p < .05$ ) with medium effect sizes (.62 - .75). Physical activity and passivity indicators between classes with different physical activity content did not differ significantly in the group of girls. Analysis of physical activity indicators in both genders shows the significant increase of physical activity and higher proportion of moderate-to-vigorous physical activity in Game play rather than Motor skills practice class ( $p < .05$ ) with medium effect sizes (.56 and .70, respectively). Proportion of passivity did not differ between Game play and Motor skills practice classes ( $p > .05$ ).

Table 2

Comparison of physical activity and passivity indicators between Game play and Motor skills practice classes (Wilcoxon signed rank test) for boys, girls and both genders

Variable (% , where not indicated otherwise)	Boys (N=18)			Girls (N=6)			Both genders (N=24)		
	Mean difference (GPC - MSPC)	p	Effect size r	Mean difference (GPC - MSPC)	p	Effect size	Mean difference (GPC - MSPC)	p	Effect size r
Total PA (units)	383.42	.002	.75	-19.16	.917	.04	282.78	.006	.56
MVPA	14.50	.001	.76	10.97	.293	.43	13.62	.001	.70
Passivity	-7.20	.008	.62	6.71	.249	.47	-3.98	.153	.29

Note: GPC – Game play class; MSPC – Motor skills practice class; PA – physical activity; MVPA – moderate-to-vigorous physical activity.

## Discussion

As the sedentary lifestyle prevails not only in adults, but also in adolescents and even in children, physical education at school aims to develop motivation, competence and

lifelong active participation in physical activity. It is central in promoting moderate-to-vigorous physical activity to obtain multiple health benefits, such as decreased likelihood of developing heart disease, type 2 diabetes, and obesity (USDHHS, 2000). It is recognized that education in physical education classes is one of the most effective interventions to improve schoolchildren's physical activity (Graham, Holt-Hale, & Parker, 2006; Kahn et al., 2002; Pate et al., 1995; Sallis & McKenzie, 1991; WHO, 2004). USDHHS (2000) urges that schoolchildren should pursue moderate-to-vigorous physical activity at least 50% of physical education class time. The main aim of the current research was to evaluate and compare moderate-to-vigorous physical activity in physical education classes with different content in Lithuania. Results of the current study indicated that participation in moderate-to-vigorous physical activity did not meet the requirements of USDHHS (2000) for 50% of physical education class time to be spent in moderate-to-vigorous physical activity. The present research showed that 11-12 year old Lithuanian schoolchildren did not reach the recommended moderate-to-vigorous physical activity neither in Game play (33.24% class time), nor in Motor skills practice (19.62% class time) classes.

These results are in line with other research, which also showed that moderate-to-vigorous physical activity of physical education classes is usually lower than recommended by USDHHS (2000) in the United States (McKenzie, Marshall, Sallis, & Conway, 2000; Simons-Morton, Taylor, Snider, & Huang, 1993) as well as in Europe (Cardon et al., 2004; Fairclough, 2003; Wang, Pereira, & Mota, 2005; Warburton & Woods, 1996). McKenzie et al. (2001) state that schoolchildren in more than 800 primary schools in the US were engaged in moderate-to-vigorous physical activity during physical education classes around 37% of physical education class time. Nine-year-old schoolchildren in Nader (2003) study spent from 15 to 37% and in Cardon et al. (2004) study about 40% physical education class time in moderate-to-vigorous physical activity. Skala et al. (2012) study using System for Observing Fitness Instruction Time (SOFIT) direct observation found that third-, fourth-, and fifth-grade Texas (US) schoolchildren were engaged in less than half their physical education class time in moderate-to-vigorous physical activity (38%), while approximately 25% of class time was spent in classroom management. In that study, larger and, interestingly, longer classes were negatively associated with moderate-to-vigorous physical activity and positively correlated with time spent in management.

Meanwhile, studies with adolescents showed even a little bit lower 27 - 34% of physical education class time engagement in moderate-to-vigorous physical activity (Fairclough & Stratton, 2005a; Fairclough & Stratton, 2005b), which is in accordance with the argument that general physical activity of schoolchildren decreases with age (Surapiboonchai et al., 2012). Thus, the current study supports studies in other countries which highlight the importance of enhancing schoolchildren's physical activity and engagement in moderate-to-vigorous physical activity. These results also support the idea of constant physical education curriculum improvement allowing for more opportunities for health enhancing physical activity in physical education classes.



However, there are studies which show that schoolchildren's moderate-to-vigorous physical activity matches the recommendations (USDHHS, 2000) to be active not less than 50% of physical education class time. For example, Chow, McKenzie, & Louie (2008) study using SOFIT showed that fourth to sixth grade (9 - 12 years) schoolchildren in Hong Kong were more active than their peers in the US, as they were engaged in moderate-to-vigorous physical activity for on average 15.8 minutes (50.7%) of physical education class time. Scruggs et al. (2007) using pedometers and SOFIT also presented results, which showed 68.9% of schoolchildren in physical education class reached 50% engagement in moderate-to-vigorous physical activity. Dudley et al. (2012) made a systematic direct observation of 81 physical education classes Grade 7 across six schools in Australia over a six-month period. Their results indicated that mean physical education class time schoolchildren spent in moderate-to-vigorous physical activity was 56.9%. Yet, about 40% of observed classes, especially only girls' classes have not met the recommended (50% class time) moderate-to-vigorous physical activity level. Observation of passivity results in the current research indicated that just over 6% of class time was spent in skill instruction. Passivity in our research was over 7% for boys and 14% for girls in class where schoolchildren played team games and, respectively to gender, over 16 and 9% in skills developing class. So, we join the authors who suggest that teacher interaction and physical education class content may have some impact on physical activity and passivity variation across classes with different content.

Some authors on the basis of their research data propose that game play is one of the most effective activities to provide a sufficient amount of moderate-to-vigorous physical activity (Arnett & Lutz, 2003; Hastie & Trost, 2002; McKenzie et al., 2006; Wickel & Eisenmann, 2007). Løndal (2011) argues that children are more easily engaged in physical activity that they perceive as meaningful and enjoyable. Some other studies also suggest that children are more physically active, and their physical activity levels are higher during activities in which they can fully reveal their abilities and where the environment is motivating to be physically active (McKenzie et al., 1991; West & Shores, 2008).

The results of the present study confirmed those suggestions. Although the current research showed that measures using Actigraph accelerometers mean moderate-to-vigorous physical activity in Game play physical education class did not reach the recommended moderate-to-vigorous physical activity level bound (50% class time), it was nevertheless higher (33.72%) than in Motor skills practice class (19.56%), where schoolchildren were taught basketball skills. Although, not significantly for girls. Respectively, results of time spent passively, on the contrary, were higher in Motor skills practice class (14.18%) than in Game play class (9.82%), but only for boys, as well as time spent by the teacher for class management (19.5 in Motor skills practice and 13% in Game play class), as showed in our observational data.

The results reported here are in line with some other studies, which also approached the issue of moderate-to-vigorous physical activity differences in the physical

education classes with different content. For example, results of the West and Shores (2008) study, which also used accelerometer (GTM1) to assess the children's physical activity across different activities in recreation including: (a) skills and drills, (b) scrimmage, (c) modeled play, and (d) free play, showed that 6-11 year old boys were most active during the modeled play and the free play activities. However, physical activity level was significantly lower in skills training. Girls were on average less active in all activities compared to boys. Girls' levels of performance were the same across all activities in that study.

Studies which used heart rate telemetry for assessing physical activity reported similar findings regarding differences in moderate-to-vigorous physical activity in physical education classes with different content. For example, Fairclough and Stratton (2005a) found that 11 – 14 year old schoolchildren accumulated most moderate-to-vigorous physical activity during team games such as soccer and hockey (43.2% class time), while the least moderate-to-vigorous physical activity was observed during movement activities such as dance and gymnastics (22.2% class time). Recent study of Sarradel et al. (2011) presented results which stated that team sports in both genders, and tennis in the case of girls, fulfilled the recommendations to occupy at least 50% of physical education class time in moderate-to-vigorous physical activity. Some earlier studies of McFarlane and Kwong (2003), and Kulinna et al. (2003) indicated that schoolchildren were more active in team games (e.g., soccer, basketball) rather than in other activities.

In the recent study of Dudley et al. (2012), physical activity measured using SOFIT while observing randomly selected schoolchildren in physical education class of mixed content, found that schoolchildren were engaged in moderate-to-vigorous physical activity for mean of 56.9% of class time, while the main part of class content was game play (43.5% class time).

Culpepper, Tarr, and Killion (2011) found, using pedometers, that across physical education classes with different content, schoolchildren accumulated the larger number of steps in games/sports class than in the skill practice and fitness activities. Authors argue that the latter two activities do not guarantee sufficient moderate-to-vigorous physical activity in physical education class, however the game/sports activities do. This study also found that boys were more active than girls. Many other studies (Fairclough & Stratton, 2005a; McKenzie et al., 2000) confirmed the latter finding and state that despite the content of physical education class, boys lead the field of physical activity. Comparison of physical activity indicators in the present study also showed that girls yield to boys in the area of physical activity. Although, a very small sample of girls is presented, so these results should be considered with caution. Though, some studies exist which did not find any difference in physical education class moderate-to-vigorous physical activity among 12 year old boys and girls (Wang, Pereira, & Mota, 2005) or the difference indicated higher physical activity of girls, but depending on the activity type. Girls reported a greater heart rate in physical education classes than boys in team sports, dance, outdoor activities, and tennis (Sarradel et al.,

2011). Authors argue that girls may be more motivated to do those activities than boys. Even if it is a speculation in case of that study, other research proved the importance of autonomous motivation for the engagement in physical activity (Ryan et al., 2009).

Although physical activity in schoolchildren in the current and other studies was measured using different methods (direct observation, accelerometers, pedometers, heart rate telemetry), in general results were consistent. Physical education class activities, such as team sports or game play, which are fun, encourage schoolchildren's self-efficacy and competence, are related with higher health-enhancing physical activity in middle school children.

The results of the current study suggest that there is a necessity of reconsideration of the curriculum of physical education classes in Lithuania in terms of time spent in moderate-to-vigorous physical activity and address this problem appropriately.

Many efforts have already been done in order to enhance schoolchildren's physical activity and participation in physical education classes in other countries. Schoolchildren's and their teacher's motivation, as well as teaching styles have been investigated (Fairclough & Stratton, 2005b; Hein et al., 2012). Studies found that teachers' autonomous motivation is related to the child-centered or productive teaching styles (Hein et al., 2012). In turn, schoolchildren had higher moderate-to-vigorous physical activity in those physical education classes where teacher used the child-centered approach (Fairclough & Stratton, 2005b).

Other authors suggest that access to adequate physical education equipment and facilities is also related to schoolchildren's activity levels. Authors propose to increase the number of physical education teachers per schoolchildren, because it was found to impact schoolchildren's activity levels by reducing the amount of time devoted to class management (Bevans, Forrest, & Riley, 2010).

In order to enhance moderate-to-vigorous physical activity and avoid declining participation in physical education classes, authors propose that some gender differences should be taken into account. Physical education curriculum should include high physical activity intensity class content that is liked by girls, such as dancing, aerobics, sports games and allow for differentiated class activities between boys and girls (Sigmund et al., 2010).

### ***Strengths and Limitations***

We acknowledge that the sample of this study is very small. However, this is a pilot study, and the main results are in line with other similar studies. That somewhat explains their validity. Another limitation is that the study included only two classes: one Game play and one Motor skills practice. In future studies, not only more classes with different content (for example, fitness, dance, gymnastics), but also more observations per class content should be investigated.

Another limitation is that the data of this study is cross-sectional. More data is needed about changes in moderate-to-vigorous physical activity in physical education classes as schoolchildren age.

We suppose that it would also be important to investigate the relationship between proportion of activities included in physical education class content and moderate-to-vigorous physical activity of schoolchildren outside school.

The present study also has some strengths. The use of accelerometers measuring physical activity is usually considered as valid measurement. This is the first study in Lithuania investigating physical activity in physical education class using objective measurement methods. To our knowledge, this the first study in Lithuania exploring moderate-to-vigorous physical activity in physical education class at all.

## Conclusion

Moderate-to-vigorous physical activity in Lithuanian schoolchildren did not reach the 50% of physical education class time as recommended by USDHHS (2000) in neither Game play nor in Motor skills practice classes. Though, moderate-to-vigorous, as well as total class physical activity, were higher in Game play rather than Motor skills practice class. On the basis of the present research some proposals regarding the curriculum of physical education classes are made. Although we found that game play activities in physical education class are a better choice for 11 – 12 year old boys seeking them to accumulate more health-enhancing physical activity, motor skills practice is also important as it allows children to learn and apply new forms of physical activity. Moreover, it is not so important where children would apply those skills – physical education class, playground or elsewhere. Remembering the main goal of physical education, the most important thing is to engage children to be active in their everyday lives in general. So, the key issue is to teach them those skills which are enjoyable, useful and could be applicable in their life after school. Well-designed studies which would investigate how skills taught in physical education class are implemented into action after school are required.

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# Odnos tjelesne aktivnosti i sadržaja nastavnih satova tjelesnog i zdravstvenog odgoja kod litvanskih učenika u dobi od 11 do 12 godina. Pilot studija

## Sažetak

*Cilj je bio procijeniti i usporediti ukupnu tjelesnu aktivnost, vrijeme provedeno u umjerenoj do žustroj tjelesnoj aktivnosti i pasivno, kako u momčadskim igrama tako i na satima tjelesne i zdravstvene kulture na kojima su se vježbale motoričke vještine kod litvanskih učenika u dobi od 11 do 12 godina. U studiji su sudjelovala 32 učenika, od kojih 20 (62,5%) dječaka. Tjelesna aktivnost mjerila se troosnim Acti Trainer Activity Monitor akcelerometrom. Iz rezultata je vidljivo da je 9,4% učenika doseglo ili premašilo 50 % umjerene do žustre tjelesne aktivnosti na satima na kojima su se vježbale momčadske igre, a nitko na satima na kojima su se vježbale motoričke vještine. Dječaci su postigli bolji rezultat od djevojčica u umjerenoj do žustroj tjelesnoj aktivnosti, ali samo na satima vježbanja motoričkih vještina. Dječaci su također postigli bolji rezultat u pogledu ukupne tjelesne aktivnosti, umjerene do žustre tjelesne aktivnosti i nižu u pogledu pasivno provedenog vremena na satima momčadskih igara nego na satima vježbanja motoričkih vještina. Pokazatelji tjelesne aktivnosti i pasivnosti na satima različitih sadržaja u skupini djevojčica nisu se razlikovali. Rezultati upućuju na nužnost promišljanja o kurikulumu tjelesnog i zdravstvenog odgoja u Litvi u pogledu vremena koje se provodi u umjerenoj do žustroj tjelesnoj aktivnosti, kao i uključivanja aktivnosti koje će biti i zabavne i korisne.*

**Ključne riječi:** *kurikul nastave tjelesnog i zdravstvenog odgoja; pasivnost; umjerena do žustra tjelesna aktivnost.*

## Uvod

Studije pokazuju da ima razloga za zabrinutost kada je riječ o tjelesnoj aktivnosti litvanskih učenika koja pogoduje zdravstvenom stanju, baš kao u mnogim drugim zemljama. Samo 17% jedanaestogodišnjakinja i 23% jedanaestogodišnjaka izjavljuju da se svakodnevno bavi umjerenom do žustrom tjelesnom aktivnošću (WHO, 2012).

Iz sustavnog pregleda relevantne literature razvidno je da umjerena do žustra tjelesna aktivnost ima pozitivne učinke na indeks tjelesne mase, mišićnu snagu i tonus mišića, fleksibilnost kralježnice i zglobova, pravilnu gustoću kostiju, anksioznost i depresiju, tjelesnu (u smislu sportske kompetencije), globalnu, društvenu i akademsku sliku o sebi, kao i akademski uspjeh kod učenika (Strong i sur., 2005). Škole bi trebale omogućavati nužnu količinu umjerene do žustre tjelesne aktivnosti putem neformalne, a osobito formalne nastave tjelesnog i zdravstvenog odgoja (Pate i sur., 2006).

Primarni cilj nastave tjelesnog i zdravstvenog odgoja jest uvođenje potrebe za cjeloživotnom tjelesnom aktivnošću. Stoga su sati tjelesnog i zdravstvenog odgoja u školama najdostupniji način promicanja tjelesne aktivnosti među učenicima (Fairclough, Stratton, i Baldwin, 2002). U skladu s preporukama američkog Ministarstva zdravlja i usluga (USDHHS, 2000.) učenici bi trebali biti fizički aktivni na razini od umjerene do žustre na najmanje 50 % nastave tjelesnog i zdravstvenog odgoja. Kurikul nastave tjelesnog i zdravstvenog odgoja trebao bi biti izveden na način da se učenicima ne ostavi previše vremena za neaktivnost. Međutim iz provedenih istraživanja jasno je da nastava tjelesnog i zdravstvenog odgoja nerijetko ne uspijeva ispuniti zahtjeve navedenih preporuka (Nader, 2003; Pate i sur., 2006; Wang, Pereira, i Mota, 2005). Jedna je studija provedena u SAD-u (saveznoj državi Utah) došla do rezultata da učenici u dobi od 6 do 7 godina u umjerenoj do žustroj tjelesnoj aktivnosti provode samo 35% nastavnog vremena (Scruggs i sur., 2003). I u Engleskoj su učenici u dobi između 7 i 14 godina također dostigli razinu umjerene do žustre tjelesne aktivnosti u samo 34,3% ukupne nastave tjelesnog i zdravstvenog odgoja (Fairclough i Stratton, 2005a). Prema posljednjoj meta-analizi relevantne literature, učenici u interventnim uvjetima provode 24% više nastavnog vremena u umjerenoj do žustroj tjelesnoj aktivnosti negoli učenici u uobičajenim uvjetima vježbanja (Lonsdale i sur., 2013). Kelder i sur. (2003) predstavili su rezultate CATCH programa tjelesnog i zdravstvenog odgoja. U školama u kojima je taj program proveden umjerena do žustra tjelesna aktivnost učenika bila je viša (50,4%) u odnosu na kontrolne škole (47,5%).

Uključenost u umjerenu do žustru tjelesnu aktivnost kod učenika obično pada kako odrastaju. Primjerice, Surapiboonchai i sur. (2012) dokazali su pad umjerene do žustre tjelesne aktivnosti s 88,5 u osnovnoj, 50 u nižim razredima srednje i 36,5% u višim razredima srednje škole.

Niz autora pretpostavlja kako razina tjelesne aktivnosti varira i ovisno o sadržaju nastavnih satova tjelesnog i zdravstvenog odgoja (Dudley i sur., 2012; Fairclough i Stratton, 2005b; Laurson i sur., 2008; McKenzie i sur., 1995). Dudley i sur. (2012) tvrde da su aktivnosti na nastavnim satima tjelesnog i zdravstvenog odgoja, a koje zahtijevaju vježbanje motoričkih vještina manje povezane s višom razinom umjerene do žustre tjelesne aktivnosti. Za razliku od toga, u drugim istraživanjima otkriveno je da, na primjer, na satima tijekom kojih se provodi trening s naglaskom na promicanje sportskih vještina, agilnosti i tjelesne aktivnosti 75% djece postiže 22 minute umjerene do žustre tjelesne aktivnosti mjereno akcelerometrom, u usporedbi s 9 minuta

umjerene do žustre tjelesne aktivnosti kod 75% djece tijekom uobičajenih nastavnih sati tjelesnog i zdravstvenog odgoja (Rowlands, Pilgrim, i Eston, 2008). U skladu s potonjim podacima, momčadski sportovi (košarka, odbojka, nogomet) kod oba spola zadovoljavaju zahtjeve preporuke o tjelesnoj aktivnosti tijekom najmanje 50% vremena trajanja nastave tjelesnog i zdravstvenog odgoja (Sarradel i sur., 2011). Stratton (1996) također otkriva da su među aktivnostima u kojima su učenici uključeni u umjerenu do žustru tjelesnu aktivnost više od 50% nastavnog sata iznimno intenzivni momčadski sportovi poput nogometa i košarke. S druge strane, tjelesna aktivnost na nastavi tjelesnog i zdravstvenog odgoja možda ovisi i o tome je li riječ o satu momčadske igre (primjerice, košarke) ili satu poduke iz vještina. To se može objasniti činjenicom da se na satima vježbanja motoričkih vještina obično koriste posebna nastavna pomagala, a prisutno je i više predstavljanja uputa i zadataka pa stoga preostaje manje vremena za trening, zbog čega je učinkovitost vježbanja smanjena (Smith, Nichols, Biggerstaff, i DiMarco, 2009). Istodobno na satima tjelesnog i zdravstvenog odgoja na kojima se igraju momčadske igre takvi nedostaci nisu prisutni jer su zadaci usmjereni na zabavu, učenicima su pravila igre poznata, pa se manje vremena troši na objašnjenja nastavnika. Navedeni sati obično su predstavljeni na način koji omogućuje mladima pozitivno iskustvo i stav prema tjelesnoj aktivnosti. No i dalje nema dovoljno studija koje se bave razinom tjelesne aktivnosti na nastavnim satima tjelesnog i zdravstvenog odgoja različitih sadržaja, a izvedena istraživanja donose nedosljedne rezultate.

### ***Trenutna studija***

Ova pilot studija dio je opsežnijeg znanstvenog istraživanja koje za cilj ima istražiti tjelesnu aktivnost i spremu učenika na nastavi tjelesnog i zdravstvenog odgoja u Litvi te razviti kurikulum najprikladniji za optimalnu nastavu tjelesnog i zdravstvenog odgoja u školama. Kurikul se vodi glavnim ciljem tjelesnog i zdravstvenog odgoja – poticanjem cjeloživotnog bavljenja tjelesnom aktivnošću. Prema USDHHS (2000), jedna od ključnih strategija za unapređenje kvalitete nastave tjelesnog i zdravstvenog odgoja jest provedba dobro osmišljenog kurikula koji za cilj ima maksimalno povećanje tjelesne aktivnosti na nastavi i angažiranost djece u umjerenoj do žustroj tjelesnoj aktivnosti najmanje 50% nastavnog vremena. U Litvi ne postoje službene smjernice u smislu sudjelovanja u umjerenoj do žustroj tjelesnoj aktivnosti za vrijeme nastave tjelesnog i zdravstvenog odgoja. Stoga ovo istraživanje kao cilj ima pružiti nove dokaze budućem kurikulumu nastave tjelesnog i zdravstvenog odgoja te dati smjernice nastavnicima tjelesnog i zdravstvenog odgoja u vidu aktivnosti koje ponajbolje zadovoljavaju zahtjeve vezane uz tjelesnu aktivnost, kao i uzimanja u obzir dob učenika u određivanju tjelesnih potreba.

Potiče se i istraživanje aktivnosti nastave tjelesnog i zdravstvenog odgoja koje bi istodobno bile zanimljive i korisne. Nadalje, te bi aktivnosti trebale biti jednostavne za uključivanje u svakodnevni život djece. Dakle, jedna od glavnih namjera autora bila je usporedba tjelesne aktivnosti u nastavnim satima tjelesnog i zdravstvenog odgoja

različitog sadržaja, pri čemu se razlikovanje temelji na tjelesnoj aktivnosti usmjerenoj prema zabavi u odnosu na razvoj motoričkih vještina.

Jedan od ključnih problema koji se nameće kod procjene tjelesne aktivnosti učenika, osobito onih mlađih, jest metoda procjene. Dok se instrumenti samoprocjene smatraju manje pouzdanima ili vjerodostojnima zbog činjenice da su subjektivni i da na njih mogu utjecati čimbenici kao što su sposobnost prisjećanja, narodnost, kulturalni ili društveno-gospodarski status, objektivni instrumenti pomažu znanstvenicima da izbjegnju takve nedostatke. Akcelerometri, osobito oni troosnog tipa, razmjerno su pouzdano i vjerodostojno sredstvo za mjerenje tjelesne aktivnosti kod djece (Rowlands i Eston, 2007).

Dakle, cilj ovoga istraživanja jest procijeniti i usporediti ukupnu tjelesnu aktivnost litvanskih učenika u dobi od 11 do 12 godina na nastavi tjelesnog i zdravstvenog odgoja, vrijeme provedeno u umjerenom do žustroj tjelesnoj aktivnosti ili pasivnosti na nastavnim satima tjelesnog i zdravstvenog odgoja na kojima se vježbala neka momčadska igra ili na satima vježbanja motoričkih vještina.

## **Metode**

### ***Ispitanici***

U pilot studiji sudjelovala su ukupno 32 učenika, 20 (60,5%) dječaka i 12 (37,5%) djevojčica šestog razreda jedne litvanske škole. Trideset jedno dijete, 20 dječaka (64,5%) i 11 (35,5%) djevojčica sudjelovalo je na nastavi momčadske igre i 25 djece, od kojih 18 (72,0%) dječaka i 7 (28,0%) djevojčica na nastavnim satima vježbanja motoričkih vještina. Od 24 djece koja su sudjelovala na oba nastavna sata, 18 (75,0%) su bili dječaci, a 6 (25,0%) djevojčice. Svim učenicima, osim onima koji na nastavi tjelesnog i zdravstvenog odgoja nisu sudjelovali zbog narušenog zdravstvenog stanja potvrđenog liječničkom ispričnicom, dopušteno je sudjelovanje u studiji. Učenici su bili stari od 11 do 12 godina, srednje vrijednosti  $11,24 \pm 0,25$  godina. Srednja vrijednost učenika u pogledu visine iznosila je  $155,97 \pm 6,64$  cm, srednja vrijednost mase iznosila je  $43,20 \pm 5,40$  kg, a indeks tjelesne mase kretao se od 13,65 do 22,51, sa srednjom vrijednošću  $17,76 \pm 1,97$ . Nije bilo znatnih razlika ( $p > 0,05$ ) po spolu u pogledu dobi, visine i mase. Svi sudionici bili su litvanske narodnosti. Istraživanje je odobreno od Litvanskog odbora za bioetiku. Usto su roditelji ili skrbnici djece potpisali pismeni obrazac odobrenja za sudjelovanje učenika u studiji.

### ***Postupak***

Nastavni sati koji se održavaju dva puta tjedno i traju 45 minuta uobičajeni su u Litvi. Jedan od tih dvaju nastavnih sati odabran je za momčadsku igru, a drugi za vježbanje motoričkih vještina. Upotrijebljeno je Bevens, Forrest i Riley (2010) kodiranje sadržaja nastavnih sati tjelesnog i zdravstvenog odgoja. Nastavni sat na kojemu se vještine upotrebljavaju u kontekstu igre ili natjecanja nazvali smo satom momčadske igre. Taj nastavni sat usredotočen je na to da se djeca zabave. Nastavni

sat tjelesnog i zdravstvenog odgoja usredotočen na vježbanje vještina s primarnim ciljem razvoja vještina nazvan je satom vježbanja motoričkih vještina. Svaki se nastavni sat sastojao od tri dijela: početnog, glavnog i završnog dijela sata. U početnom dijelu učenici su se zagrijali i napravili vježbe istezanja, a u završnom su se dijelu svakoga sata opušitali. U glavnom dijelu nastavnog sata momčadske igre učenici su igrali „Kvadrat“ – momčadsku sportsku igru namijenjenu izvođenju u zatvorenom ili na otvorenom u kojoj svaka momčad pokušava loptom izbaciti igrače suprotne momčadi. Elementi košarke: osnovni pokreti driblanja, ubacivanje lopte u koš s različitih mjesta na košarkaškom igralištu činili su osnovicu glavnog dijela nastavnog sata vježbanja motoričkih vještina. Oba nastavna sata izvedena su u zatvorenoj dvorani, a proveo ih je isti nastavnik s 10 godina iskustva u nastavi tjelesnog i zdravstvenog odgoja.

### **Mjerenja**

Pokazatelji tjelesne aktivnosti i pasivnosti procijenjeni su upotrebom troosnog ActiTrainer Activity Monitor akcelerometra (27g; 3,8 x 3,7 x 1,8 cm). Akcelerometri, osobito oni troosnog tipa, razmjerno su pouzdano i vjerodostojno sredstvo za mjerenje tjelesne aktivnosti djece (Bates, 2006). Troosni akcelerometri mjere ubrzanje po tri ortogonalne ravni (vertikalnoj, mediolateralnoj i anteroposteriornj) te daju podatke za svaku pojedinu ravan kao i ukupne podatke. Preporučuju se kao precizni alat za mjerenje u slučajevima kada je predmet istraživanja intenzitet ili obrazac aktivnosti (Rowlands & Eston, 2007). U svaki akcelerometar uneseni su podaci o imenu, dobi, visini i težini učenika. Učenici su zamoljeni da navedene naprave nose tijekom nastavnih sati tjelesnog i zdravstvenog odgoja. Akcelerometri su uključeni u prvoj i isključeni u posljednjoj minuti nastavnog sata tjelesnog i zdravstvenog odgoja. Navedene uređaje djeca su nosila na elastičnom pojasu kod lijevog kuka, a uređaji su mjerili tjelesnu aktivnost u intervalima od jedne minute. Dobiveni su podaci pohranjeni u memoriju i poslije preneseni na računalo. Upotrebom programa Actilife ti su podaci zatim obrađeni te prebačeni u SPSS programe na daljnju obradu. U skladu s programom Actilife, kada je stopa tjelesne aktivnosti iznosila između 0 i 99 jedinica, smatra se pasivnošću. Umjerena do žustra tjelesna aktivnost ustanovljena je kada je raspon tjelesne aktivnosti fluktuirao između 1952 i 9498 jedinica. Ukupna tjelesna aktivnost pokrila je sve jedinice tjelesne aktivnosti zabilježene tijekom nastave tjelesnog i zdravstvenog odgoja. Jedinice pasivnosti te umjerene do žustre tjelesne aktivnosti radi daljnje analize pretvorene su u postupke koji ukazuju na omjer vremena provedenog u tim oblicima tjelesne aktivnosti u odnosu na vrijeme trajanje nastavnog sata.

Antropometrijske mjere visine i težine zabilježene su uporabom analizatora tjelesnog sastava za hrvanje TBF-300WA te štapom za mjerenje visine HR-200.

Podatke iz promatranja zabilježila su dva iskusna znanstvenika. U protokol je bilo uključeno vrijeme koje je nastavnik utrošio na objašnjavanje zadatka učenicima. Vrijeme utrošeno na objašnjavanje i demonstraciju praktičnih zadataka određeno je kronometrom.

## **Statistička analiza**

Statistička analiza podataka izvedena je putem softvera SPSS za Windows 19.0 (SPSS Inc., Chicago, USA). S obzirom da je ovdje riječ o a) pilot studiji s malim obrađenim uzorkom, b) varijable nisu uobičajeno distribuirane, odabrana je neparametrijska statistika. Usporedba među skupinama po spolu izvedena je testom Mann-Whitney. Usporedba rangova tjelesne aktivnosti između različitih tipova nastavnih sati izvršena je Wilcoxon testom. Premda su podaci u statističkim testovima izračunati kao rangovi, rezultati su predstavljeni kao srednje vrijednosti  $\pm$  SD u postotcima kako bi se omogućila usporedba s rezultatima drugih istraživanja. Opseg učinka  $r$  za neparametrijske testove između subjekata i unutar subjekata izračunati su upotrebom formule  $r = Z / \sqrt{N}$  (gdje je  $N$  ukupni broj opservacija na kojima se  $Z$  temelji) (Clark-Carter, 2010) kako bi se ukazalo na standardiziranu razliku između dva mjerenja. Jakost učinka protumačena je na sljedeći način: mali učinak  $< 0,30$ ,  $0,30-0,80$  srednji učinak i  $> 0,80$  visok učinak (Cohen, 1988). Rezultati su smatrani statistički značajnima kada je vrijednost vjerojatnosti ( $p$ ) bila manja ili jednaka  $0,05$ . Provedena je i deskriptivna statistika.

## **Rezultati**

Preliminarnom analizom podataka zabilježeno je da su i na nastavnom satu momčadske igre i na nastavnom satu vježbanja motoričkih vještina izvedene 44 minute nastavnog sata tjelesnog i zdravstvenog odgoja. Dječaci su bili uključeni u umjerenu do žustru tjelesnu aktivnost najmanje 18,18 i najviše 54,55%, a djevojčice najmanje 4,55 i najviše 61,36% vremena nastavnog sata momčadske igre. Samo je troje učenika (dva dječaka i jedna djevojčica) doseglo ili premašilo 50% trajanja nastavnog sata tjelesnog i zdravstvenog odgoja u umjerenoj do žustroj tjelesnoj aktivnosti tijekom nastavnog sata momčadske igre. Za razliku od toga, tijekom nastavnog sata vježbanja motoričkih vještina, dječaci su ostvarili umjerenu do žustru tjelesnu aktivnost u najmanje 9,10 i najviše 36,40% trajanja nastavnog sata, a djevojčice najmanje 2,3 i najviše 27,30%. Nitko od učenika nije dosegao 50% trajanja nastavnog sata u umjerenoj do žustroj tjelesnoj aktivnosti na nastavnom satu vježbanja motoričkih vještina.

Omjeri pasivnosti kretali su se od 0 do 18,80% za dječake i od 0 do 31,82% za djevojčice na nastavnom satu momčadske igre. Tijekom nastavnog sata vježbanja motoričkih vještina, gornja granica pasivnosti u skupini dječaka bila je viša (36,40%) u odnosu na sat momčadske igre, ali kod djevojčica gotovo istovjetna (31,80%). Donja granica pasivno provedenog vremena tijekom nastavnog sata vježbanja motoričkih vještina kod oba je spola iznosila 0. To znači da najmanje jedan dječak i jedna djevojčica uopće nisu bili pasivni tijekom cijeloga nastavnog sata.

Iz podataka dobivenih promatranjem izvedeno je da je nastavnik utrošio 5 minuta u 46 sekundi (više od 13% nastavnog sata) na objašnjavanje zadatka učenicima na nastavnom satu momčadske igre. Od toga, 3 minute i 6 sekundi (više od 7% trajanja nastavnog sata) posvećeno je zadatku u glavnom dijelu sata (pokazivanje i

objašnjavanje pravila igre). U usporedbi s tim, na satu vježbanja motoričkih vještina na nastavnikovo objašnjavanje zadatka utrošeno je 8 minuta i 35 sekundi (gotovo 19,5% nastavnog sata), od toga 5 minuta i 35 sekundi (gotovo 13% nastavnog sata) na objašnjavanje zadataka u glavnom dijelu nastavnog sata (demonstracija i objašnjavanje košarkaških vještina).

Rezultati testa Mann-Whitney (Tablica 1) pokazuju da su dječaci ostvarili znatno viši rezultat ( $p < ,05$ ) od djevojčica s obzirom na umjerene do žustre tjelesne aktivnosti sa srednjom jakosti učinka ( $> ,30$ ), no samo na nastavnom satu vježbanja motoričkih vještina. Ukupna tjelesna aktivnost na nastavnom satu tjelesnog i zdravstvenog odgoja i omjer pasivnosti tijekom nastavnog sata motoričkih vještina, kao i ukupna tjelesna aktivnost na nastavnom satu tjelesnog i zdravstvenog odgoja i omjer umjerene do žustre tjelesne aktivnosti i pasivnosti tijekom nastavnog sata momčadske igre nisu se znatno razlikovali po skupinama dječaka i djevojčica ( $p > ,05$ ). Omjer srednje vrijednosti umjerene do žustre tjelesne aktivnosti kako kod dječaka tako i kod djevojčica nije dosegnuo ciljanih 50% trajanja nastave ni na jednom nastavnom satu.

Tablica 1.

Wilcoxon test (Tablica 2) otkriva da su dječaci ostvarili znatno viši rezultat u pogledu ukupne tjelesne aktivnosti na nastavnom satu i umjerene do žustre tjelesne aktivnosti, kao i niži u pogledu pasivno provedenog vremena na nastavnom satu momčadske igre u odnosu na nastavni sat vježbanja motoričkih vještina ( $p < ,05$ ) sa srednjom jakosti učinka ( $,62 - ,75$ ). Pokazatelji tjelesne aktivnosti i pasivnosti među satima različitog sadržaja tjelesne aktivnosti u skupini djevojčica nisu se znatno razlikovali. Analiza pokazatelja tjelesne aktivnosti kod oba spola pokazuje značajan porast tjelesne aktivnosti i viši udio umjerene do žustre tjelesne aktivnosti na nastavnom satu momčadske igre u odnosu na nastavni sat vježbanja motoričkih vještina ( $p < ,05$ ) sa srednjom jakosti učinka ( $,56$  i  $,70$ ). Udio pasivnosti nije se znatno razlikovao na nastavnom satu momčadske igre u odnosu na nastavni sat vježbanja motoričkih vještina ( $p > ,05$ ).

Tablica 2.

## Rasprava

S obzirom na to da ne samo kod odraslih, već i kod adolescenata i djece prevladava sjedilački životni stil, nastava tjelesnog i zdravstvenog odgoja u školama za cilj ima razviti motivaciju, kompetencije i cjeloživotno aktivno sudjelovanje u fizičkim aktivnostima. Od ključne je važnosti za promicanje umjerene do žustre tjelovježbe radi ostvarivanja brojnih zdravstvenih dobrobiti, kao što su smanjena vjerojatnost oboljenja od srčanih bolesti, dijabetesa drugog tipa i pretilosti (USDHHS, 2000). Općenito je prihvaćeno da je nastava tjelesnog i zdravstvenog odgoja jedan od najučinkovitijih oblika intervencije u obliku poboljšanja učeničke tjelesne aktivnosti (Graham, Holt-Hale, i Parker, 2006; Kahn i sur., 2002; Pate i sur., 1995; Sallis i McKenzie, 1991; WHO, 2004). USDHHS (2000) potiče na uključivanje učenika u umjerenu do žustru

tjelovježbu na najmanje 50% nastave tjelesnog i zdravstvenog odgoja. Glavni je cilj ovog istraživanja bio procijeniti i usporediti umjerenu do žustru tjelesnu aktivnost litvanskih učenika na nastavnim satima tjelesnog i zdravstvenog odgoja različitog sadržaja. Rezultati studije ukazuju na to da sudjelovanje u umjerenom do žustroj tjelovježbi nije zadovoljilo zahtjeve USDHHS-a (2000) o 50% ukupnog trajanja sata provedenog u umjerenom do žustroj tjelesnoj aktivnosti. Predstavljeno istraživanje pokazalo je da litvanski učenici u dobi od 11 do 12 godina nisu uspjeli dosegnuti preporučene granice umjerene do žustre tjelesne aktivnosti kako na satima momčadske igre (33,24% trajanja sata), tako ni tijekom nastavnih sati vježbe motoričkih vještina (19,62%).

Navedeni rezultati u skladu su s ostalim istraživanjima na ovu temu, koji također dokazuju da je umjerena do žustra tjelesna aktivnost učenika na nastavnim satima tjelesnog i zdravstvenog odgoja obično niža od preporučene od strane USDHHS-a (2000) i u SAD-u (McKenzie, Marshall, Sallis, i Conway, 2000; Simons-Morton, Taylor, Snider, i Huang, 1993), i u Europi (Cardon, Verstraete, De Clercq, i De Bourdeaudhuij, 2004; Fairclough, 2003; Wang, Pereira, i Mota, 2005; Warburton i Woods, 1996). McKenzie i sur. (2001.) u svojem radu iznose podatke iz više od 800 osnovnih škola diljem SAD-a, gdje su djeca sudjelovala u umjerenom do žustroj tjelovježbi tijekom nastave tjelesnog i zdravstvenog odgoja u oko 37% nastavnog vremena posvećenog tjelesnom i zdravstvenom odgoju. Devetogodišnji učenici, ispitanici studije Nader (2003), proveli su od 15 do 37%, a sudionici studije Cardon i sur. (2004) oko 40% nastavnog vremena posvećenog tjelesnom i zdravstvenom odgoju u umjerenom do žustroj tjelesnoj aktivnosti. Studija Skala, Springer, Sharma, Hoelscher i Kelder (2012) u kojoj je korišteno izravno promatranje sustavom SOFIT (System for Observing Fitness Instruction Time) došla je do rezultata prema kojima su učenici trećeg, četvrtog i petog razreda u Teksasu bili uključeni u umjerenu do žustru tjelesnu aktivnost na manje od pola (38%) nastavnog vremena posvećenog tjelesnom i zdravstvenom odgoju, a otprilike je 25% vremena utrošeno na upravljanje razrednim odjelom. Prema toj studiji, veći i, što je zanimljivo, nastavni sati duljeg trajanja bili su negativno povezani s umjerenom do žustrom tjelovježbom i u pozitivnoj korelaciji s vremenom utrošenim na upravljanje aktivnostima.

Istodobno studije provedene na adolescentima pokazuju čak i vremenski kraću, od 27 do 34%, uključenost u umjerenu do žustru tjelesnu aktivnost na satima tjelesnog i zdravstvenog odgoja (Fairclough i Stratton, 2005a; Fairclough i Stratton, 2005b), što je u skladu s argumentom da opća tjelesna aktivnost djece s dobi opada (Surapiboonchai i sur., 2012). Stoga predstavljena studija podržava istraživanja iz drugih zemalja koja naglašavaju važnost unapređenja učeničke tjelesne aktivnosti i uključenosti u umjerenu do žustru tjelesnu aktivnost. Navedeni rezultati također podržavaju ideju o trajnom poboljšavanju kurikula tjelesnog i zdravstvenog odgoja, čime bi se otvorile nove prilike za tjelesnu aktivnost s ciljem poboljšanja zdravstvenog stanja na satima tjelesnog i zdravstvenog odgoja.



Međutim, postoje i studije koje pokazuju kako je učenička uključenost u umjerenu do žustru tjelovježbu na nastavi tjelesnog i zdravstvenog odgoja u skladu s preporukama (USDHHS, 2000) o aktivnosti ne kraćoj od 50% nastavnog vremena. Primjerice, istraživanje Chow, McKenzie, i Louie (2008) uz uporabu sustava SOFIT došlo je do rezultata da su djeca u dobi od 9 do 12 godina (četvrtog do šestog razreda) u Hong Kongu aktivnija od svojih vršnjaka u SAD-u i uključena u umjerenu do žustru tjelovježbu najmanje 15.8 minuta (50,7%) nastavnih satova tjelesnog i zdravstvenog odgoja. Studija Scruggs i sur. (2007) uz upotrebu pedometara i sustava SOFIT predstavila je rezultate prema kojima je 68,9% učenika na nastavi tjelesnog i zdravstvenog odgoja doseglo 50-postotnu uključenost u umjerenu do žustru tjelovježbu. U sklopu istraživanja Dudley i sur. (2012) provedeno je izravno promatranje 81 nastavnog sata tjelesnog i zdravstvenog odgoja sedmog razreda u šest škola u Australiji u razdoblju od šest mjeseci. Rezultati te studije ukazuju na to da je srednja vrijednost nastavnog vremena tjelesnog i zdravstvenog odgoja provedenog u umjerenoj do žustroj tjelovježbi iznosila 56,9%. No 40% promatranih satova, osobito onih u kojima su sudjelovale samo djevojke, nije zadovoljilo preporučenu razinu umjerene do žustre tjelesne aktivnosti od 50% ukupnog trajanja sata. Zapažanja koja se tiču rezultata pasivnosti u našem su istraživanju ukazivala na to da se na upute utroši tek malo iznad 6% nastavnog sata. U našem je istraživanju kod dječaka pasivnost iznosila 7% u skupini dječaka i 14% u skupini djevojčica na nastavnim satima momčadske igre te 16 i 19% na satima razvoja vještina. Dakle, pridružujemo se autorima koji ukazuju na to da interakcija nastavnika i sadržaja sata tjelesnog i zdravstvenog odgoja vjerojatno ostvaruju određeni učinak na varijacije tjelesne aktivnosti i pasivnosti na nastavnim satima različitog sadržaja.

Neki autori na temelju rezultata svojih istraživanja predstavljaju momčadsku igru kao jednu od najučinkovitijih aktivnosti za dostatnu količinu umjerene do žustre tjelesne aktivnosti (Arnett i Lutz, 2003; Hastie i Trost, 2002; McKenzie i sur., 2006; Wickel i Eisenmann, 2007). Løndal (2011) tvrdi da je djecu lakše angažirati u tjelesnu aktivnost koju percipiraju kao značajnu i zabavnu. I neka druga istraživanja daju naslutiti da su djeca fizički aktivnija i da im je razina tjelesne aktivnosti viša tijekom nastavnih aktivnosti u kojima mogu u potpunosti iskazati svoje sposobnosti i u kojima je okružje motivirajuće za tjelesnu aktivnost (McKenzie i sur., 1991; West i Shores, 2008).

Rezultati ovdje predstavljene studije potvrđuju te sugestije. Premda u našem istraživanju srednja umjerena do žustra tjelesna aktivnost na nastavnim satima momčadske igre u sklopu nastave tjelesnog i zdravstvenog odgoja mjerena Actigraph akcelerometrima nije dostigla preporučenu i ciljanu razinu umjerene do žustre tjelovježbe od 50% nastavnog sata, ipak je ona bila viša (33,72%) u usporedbi s nastavnim satima vježbanja motoričkih vještina (19,56%) tijekom kojih su učenici učili košarkaške vještine, premda u skupini djevojčica ne značajno. Rezultati pasivno provedenog vremena, sasvim suprotno, bili su viši na nastavnim satima vježbanja motoričkih vještina (14,18%) negoli na nastavnim satima momčadske igre (9,82%),

no samo kod dječaka, baš kao i vrijeme nastavnika utrošeno na upravljanje razrednim odjelom (19,5 na nastavnim satima vježbanja motoričkih vještina i 13% na nastavnim satima momčadske igre), što dokazuju i podaci izvedeni promatranjem.

Ovdje predstavljeni rezultati u skladu su s nekim drugim istraživanjima, koja su također pristupila problemu razlike u umjerenoj do žustroj tjelesnoj aktivnosti na nastavnim satima tjelesnog i zdravstvenog odgoja različitog sadržaja. Na primjer, rezultati studije West i Shores (2008), u kojoj je također korišten akcelerometar (GTM1) radi procjene tjelesne aktivnosti djece u raznolikim rekreacijskim aktivnostima uključujući: (a) vještine i ponavljanja, (b) okršaje, (c) modeliranu igru i (d) slobodnu igru, pokazuju da su dječaci u dobi od 6 do 11 godina bili najaktivniji za vrijeme modelirane i slobodne igre. Tjelesna aktivnost bila je znatno niža prilikom vježbanja vještina. Djevojčice su u prosjeku bile manje aktivne u svim aktivnostima u usporedbi s dječacima. U toj studiji njihova razina aktivnosti bila je jednaka neovisno o različitosti nastavnih aktivnosti.

I studije u kojima je korištena telemetrija otkucaja srca za procjenu tjelesne aktivnosti iznose slične spoznaje u pogledu razlika u umjerenoj do žustroj tjelovježbi na nastavi tjelesnog i zdravstvenog odgoja različitog sadržaja. Primjerice, Fairclough i Stratton (2005a) došli su do rezultata da učenici u dobi od 11 do 14 godina postižu najvišu umjerenu do žustru tjelesnu aktivnost za vrijeme momčadskih igara poput nogometa i hokeja (43,2% nastavnog sata), a najniža je umjerena do žustra tjelesna aktivnost zamijećena tijekom aktivnosti vezanih uz pokret kao što su ples i gimnastika (22,2% nastavnog sata). Prema nedavno objavljenoj studiji Sarradel i sur. (2011), momčadski sportovi su u slučaju oba spola, uz tenis u slučaju djevojčica, zadovoljili preporuku o najmanje 50% nastavnog sata tjelesnog i zdravstvenog odgoja provedenog u umjerenoj do žustroj tjelesnoj aktivnosti. Neke ranije studije, kao što su McFarlane i Kwong (2003) ili Kulinna, Martin, Lai, Kliver i Reed (2003) ukazuju na to da su djeca aktivnija u momčadskim igrama (npr. nogomet, košarka) nego u drugim aktivnostima.

Nedavno objavljena studija Dudley i sur. (2012), u kojoj je tjelesna aktivnost mjerena sustavom SOFIT istodobno s promatranjem nasumično odabranih učenika na nastavnim satima tjelesnog i zdravstvenog odgoja miješanog sadržaja došla je do spoznaja da su učenici uključeni u umjerenu do žustru tjelesnu aktivnosti u prosjeku 56,9% vremena nastavnog sata, a glavni je dio sadržaja sata bila momčadska igra (43,5% nastavnog sata).

Culpepper, Tarr i Killion (2011) upotrebom pedometara otkrili su da od nastavnih satova tjelesnog i zdravstvenog odgoja različitog sadržaja učenici prikupe veći broj koraka u igrama/sportovima nego na satima na kojima se bave vježbanjem vještina ili sprema. Autori tvrde da potonje dvije nastavne aktivnosti ne jamče dostatni udio umjerene do žustre tjelesne aktivnosti na satima tjelesnog i zdravstvenog odgoja, no da igre i sportovi to jamče. I u tom istraživanju primijećeno je da su dječaci aktivniji od djevojčica. Brojne druge studije (Fairclough i Stratton, 2005a; McKenzie i sur., 2000) potvrdile su tu spoznaju te iskazuju kako neovisno o sadržaju nastavnog sata tjelesnog

i zdravstvenog odgoja, dječaci vode po pitanju tjelesne aktivnosti. Usporedbom pokazatelja tjelesne aktivnosti u ovoj studiji također smo došli do podataka o tome da su djevojčice slabije od dječaka u tjelesnoj aktivnosti, iako je zastupljen vrlo malen uzorak djevojčica pa navedenim rezultatima valja pristupiti s dozom opreza. Treba napomenuti kako postoje studije u kojima nije iskazana razlika u pogledu umjerene do žustre tjelesne aktivnosti na nastavnim satima tjelesnog i zdravstvenog odgoja među 12-godišnjim dječacima i djevojčicama (Wang, Pereira, i Mota, 2005) ili u kojima su uočene naznake pojačane tjelesne aktivnosti djevojčica, no ovisno o tipu nastavnih aktivnosti. Naime, kod djevojčica su uočeni brži otkucaji srca na nastavnim satima tjelesnog i zdravstvenog odgoja u odnosu na dječake kada se radilo o momčadskim sportovima, plesu, aktivnostima na otvorenom i tenisu (Sarradel i sur., 2011). Autori tvrde da su djevojčice možda za takve aktivnosti motivirane više od dječaka. Iako je u slučaju navedene studije to samo pretpostavka, postoje istraživanja koja su dokazala važnost autonomne motivacije za uključenost u tjelesnu aktivnost (Ryan i sur., 2009).

Bez obzira na činjenicu da je tjelesna aktivnost kod učenika u ovoj i drugim studijama mjerena različitim metodama (izravnim promatranjem, akcelerometrima, pedometrima, telemetrijom otkucaja srca), općenito su rezultati dosljedni. Nastavne aktivnosti tjelesnog i zdravstvenog odgoja kao što su momčadski sportovi ili igre, koje su zabavne, potiču samopouzdanje i kompetencije povezane su s višim stupnjem zdravstveno pogodne tjelesne aktivnosti kod djece u višim razredima osnovne škole.

Iz rezultata studije razvidno je kako postoji nužnost promišljanja o kurikulu tjelesnog i zdravstvenog odgoja u Litvi u pogledu vremena provedenog u umjerenoj do žustroj tjelovježbi, kao i prikladnih načina rješenja tog problema.

U drugim zemljama već su postignuta brojna nastojanja u vidu unapređenja učeničke tjelesne aktivnosti i sudjelovanja u nastavi tjelesnog i zdravstvenog odgoja. Motivacija učenika i njihovih nastavnika, kao i stil poučavanja našli su se pod povećalom (Fairclough i Stratton, 2005b; Hein i sur., 2012). Istraživanjima je otkriveno da je autonomna motivacija nastavnika povezana s produktivnim stilom poučavanja kojemu je dijete u središtu (Hein i sur., 2012). Isto tako, učenici su ostvarili pojačanu umjerenu do žustru tjelesnu aktivnost na nastavnim satima tjelesnog i zdravstvenog odgoja gdje je nastavnik primjenjivao takav produktivni pristup (Fairclough i Stratton, 2005 b).

Neki drugi autori upućuju na mogućnost da na učeničku razinu aktivnosti utječu i adekvatna nastavna pomagala i objekti za nastavu tjelesnog i zdravstvenog odgoja. Predlažu povećanje broja nastavnika tjelesnog i zdravstvenog odgoja po učeniku jer je dokazano da to utječe na razinu aktivnosti kod učenika skraćivanjem vremena koje se posvećuje upravljanju razrednim odjelom (Bevans, Forrest, i Riley, 2010).

S ciljem jačanja umjerene do žustre tjelesne aktivnosti i izbjegavanja smanjivanja sudjelovanja u nastavi tjelesnog i zdravstvenog odgoja, autori predlažu neka se uzmu u obzir razlike po spolu. Naime, kurikulum tjelesnog i zdravstvenog odgoja trebao bi uključiti nastavne sadržaje fizičkih aktivnosti visokog intenziteta, a koji se sviđaju djevojčicama, kao što su ples, aerobik i sportske igre te omogućiti diferencirane nastavne aktivnosti za dječake i djevojčice (Sigmund i sur., 2010).

## **Prednosti i nedostaci**

Svjesni smo da je obrađeni uzorak u ovoj studiji vrlo malen. Međutim, ovo je pilot studija, a njezini glavni rezultati u skladu su sa sličnim istraživanjima. To je donekle i dokaz njezine valjanosti. Još jedan nedostatak tiče se činjenice da je studija provedena na samo dva nastavna sata: nastavnom satu momčadske igre i nastavnom satu vježbanja motoričkih vještina. U budućim studijama trebalo bi istražiti ne samo više nastavnih sati različitih sadržaja (primjerice, tjelesna sprema, ples, gimnastika), nego i više zapažanja prema sadržaju nastavnog sata.

Još jedan nedostatak nalazimo u kros-sekcijskim podacima ove studije. Potrebno je više podataka o promjenama umjerene do žustre tjelesne aktivnosti na nastavi tjelesnog i zdravstvenog odgoja kod djece starije dobi.

Mišljenja smo kako bi bilo važno istražiti odnos između udjela aktivnosti uključenih u nastavni sadržaj nastave tjelesnog i zdravstvenog odgoja te umjerene do žustre tjelesne aktivnosti učenika izvan škole.

Predstavljena studija ima i svojih prednosti. Upotreba akcelerometara za mjerenje tjelesne aktivnosti smatra se valjanim mjerenjem. To je prva studija u Litvi koja je promatrala tjelesnu aktivnost na nastavi tjelesnog i zdravstvenog odgoja upotrebom objektivnih metoda mjerenja. Koliko nam je poznato, ovo je i prva studija u Litvi koja se uopće bavila istraživanjem umjerene do žustre tjelesne aktivnosti na nastavi tjelesnog i zdravstvenog odgoja.

## **Zaključak**

Umjerena do žustra tjelesna aktivnost kod litvanskih učenika nije dosegla 50% ukupnog trajanja nastavnog sata kako je preporučeno od USDHHS-a (2000) kako na nastavnom satu momčadske igre, tako ni na nastavnom satu vježbanja motoričkih vještina. Iako je umjerena do žustra, kao i ukupna tjelesna aktivnost, bila viša na nastavnom satu momčadske igre nego na nastavnom satu vježbanja motoričkih vještina. Na temelju ovog istraživanja izneseni su prijedlozi koji se tiču kurikula tjelesnog i zdravstvenog odgoja. Premda smo došli do spoznaje da su aktivnosti momčadske igre na nastavnim satima tjelesnog i zdravstvenog odgoja bolji izbor za dječake u dobi od 11 do 12 godina, čime oni ostvaruju pojačanu tjelesnu aktivnost pogodnu za zdravlje, i vježbe motoričkih vještina su važne jer omogućuju djeci učenje i primjenu novih oblika tjelesne aktivnosti. Nadalje, nije važno gdje bi djeca te vještine mogla primijeniti – na nastavi tjelesnog i zdravstvenog odgoja, igralištu ili negdje drugdje. Prisjetimo li se glavnog cilja nastave tjelesnog i zdravstvenog odgoja, shvatit ćemo da je najvažnije angažirati djecu da postanu aktivna u svakodnevnom životu. Dakle, od ključne je važnosti poučiti ih vještinama u kojima uživaju, koje su im korisne i koje mogu primijeniti u svojem životu poslije škole. Potrebne su dodatne, dobro osmišljene studije kojima bi se istražilo kako djeca primjenjuju vještine stečene na nastavi tjelesnog i zdravstvenog odgoja u svoj život izvan škole.