

Research Article

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Assessment of nutrition and physical activity of 6th-7th grade schoolchildren in the city of Vilnius, Lithuania

Abstract: Background: Evaluation of eating habits and physical activity is very important for health interventions. Our aim in this study was to assess the characteristics of eating and physical activity of 6-7th grade schoolchildren in the city of Vilnius, Lithuania, as well as the association between dietary habits and physical activity. Methods: The study was conducted within the project "Education of healthy diets and physical activity in schools". The sample consisted of 1008 schoolchildren from 22 schools in the city of Vilnius, and was based on empirical methods, including a questionnaire poll and comparative analysis. Statistical software Stata v.12.1 (Stata corp LP) was used to analyze the data.

Results: Our study showed that less than half (37.1%) of study participants had physically active leisure time. Boys were significantly more physically active than girls. More than half (61.4%) of children ate breakfast every day. Girls were more likely to eat vegetables and sweets. Schoolchildren who ate vegetables and dairy products as well as those who got enough information about physical activity and spoke about it with their family members were more physically active.

Conclusions: The results of the study confirmed that schoolchildren were not sufficiently physically active. It was found that low physical activity is related to dietary and other factors, such as lack of information about physical activity and its benefits.

Keywords: Child and adolescent health; nutrition and diet; physical activity and sport

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1 Background

Health is determined by many factors, with lifestyle having the largest impact [1]. Unhealthy lifestyles can lead to many chronic non-infectious diseases. The World Health Organization (WHO) estimates that each year non-communicable diseases claim the lives of about 35 million people worldwide, accounting for about 60% of all deaths. The vast majority of these deaths and health problems could be avoided by eliminating risk factors such as tobacco and alcohol abuse, unhealthy diet and insufficient physical activity [2]. Children's health indicators are declining and prevalence of obesity is increasing, both of which are most often results of an unbalanced diet and insufficient physical activity [3-5]. Physical activity is closely associated with indicators of better health. Studies have confirmed the hypothesis that regular, considerably intense physical activity, when begun during childhood and continued into adulthood, reduces mortality and morbidity from cardiovascular diseases and diabetes type 2 (diabetes mellitus) in later life [6]. Children's physical activity varies throughout the world. In Europe, physical activity of children and adolescents varies from country to country, depending on age and gender. As in many other countries around the world, European boys are much more active than teenage girls, and younger teenagers tend to be more active than older teens. Also, decreasing rates of physical activity among adolescents is apparent [7,8].

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Child and adolescent eating habits are different around the world. There is an increasing trend in the Western world and in other developed countries toward increased consumption of foods high in calories, fat, salt and sugars; this trend is particularly noticeable among children and adolescents [9]. While the world's scientists research schoolchildren's nutrition and physical activity [6,7,10-13], the aggregate data needs to be updated, as the situation is constantly changing. WHO urges countries to continue to explore the levels of the children's physical activity, fruit and vegetable consumption, and children's awareness of healthy diet and adequate physical activity [3].

Various studies in the scientific literature show correlations between family socioeconomic status and lifestyle and health of children [14-16]. The recent global economic crisis didn't spare the Baltic States: Lithuania experienced a sharp economic contraction: a fall in gross domestic product and increase in unemployment were observed in Lithuania from June 2008 to June 2009 [17-18]. Changes in the economic situation affect the entire society, including families, and conditions associated with economic downturn influence on children's health and lifestyle, including nutrition habits and physical activity.

The objective of this study is to describe the eating and physical activity characteristics of 6th and 7th grade schoolchildren in Vilnius (Lithuania), as well the association between physical activity and other healthy behaviour factors.

2 Methods

2.1 Participants

The study of physical activity and dietary habits of Vilnius secondary school schoolchildren included surveys of 502 (49.8%) sixth grade and 506 (50.2%) seventh grade schoolchildren, 486 boys and 522 girls, which constitutes 48.2% and 51.8% of the study population, respectively. The mean age was 12.7 (SD 0.7) years for boys and 12.6 (SD 0.7) years for girls. Girls rated their learning outcomes as significantly better than those of boys: girls made up 64.9% of schoolchildren with good or very good academic achievements, whereas among boys, 73.1% of those believed that their learning outcomes are poor and very poor ($p < 0.001$).

2.2 Instruments

The study was conducted within the project "Education of healthy diets and physical activity in schools";, which the project stakeholders included the Lithuanian Ministry of Health and the Ministry of Education and Science. The responsible coordinator for the project, which lasted from 2008 till 2012, was the Charity and Support Fund Food Bank.

Information about the eating habits and physical activity of schoolchildren was gathered by a questionnaire that was specially designed for this project. The study involved 6th and 7th grade schoolchildren from 22 schools of the city of Vilnius (Lithuania) participating in the project. The grade was used as sampling unit: one 6th and one 7th grade was selected from each school. The estimated sample size was 943 schoolchildren, but as improperly completed questionnaires were expected (about 10%), the sample was increased to 1050. In all, 1038 filled questionnaires were collected; 1008 (97%) out of them were accepted as appropriate and were used for the further analysis.

2.3 Procedure

Because the study was designed based on sociological research, the Vilnius Regional Bioethics Committee did not require ethical approval. Participation in the study was voluntary; this was stated in the questionnaire along with other information about the study. Filling out the questionnaire was considered consent to participate in the study. All schoolchildren were instructed on how to fill out the questionnaires. Schoolchildren got questionnaires at school and had the possibility to take them home to complete on their own or with help of their parents. Parents were given overall information about the project and the study; only 12 parents did not agree that their children would be allowed to take part in the survey.

2.4 Data analysis

Descriptive statistics were used to describe the eating and physical activity characteristics of 6th and 7th grade schoolchildren. The normality of variable distribution was judged using the Kolmogorov-Smirnov test. A χ^2 test and Fisher's exact probability test was applied for the analysis of categorical data and the Spearman correlation coefficient (r) was used to demonstrate a statistical relationship between two rank variables. The Mann-Whitney test

was used to compare the continuous variables without a normal distribution and ordinal variables in the two groups.

To assess the association between dietary habits, awareness, attitude and low physical activity, a two-level (individuals and schools) mixed-effects logistic regression model was run. No significant differences between multilevel mixed-effects logistic regression model and ordinary logistic regression were found (likelihood ratio test of whether variance components are greater than zero was 0.93 and the corresponding p was 0.167). Ordinary multiple logistic regression with robust estimate variance within clusters (schools) was used to assess association between dietary habits, awareness, attitude and low physical activity. Variables that reached a significance level of 0.30 or less in the univariate analysis, or variables of special interest, were selected for inclusion in multiple logistic regressions.

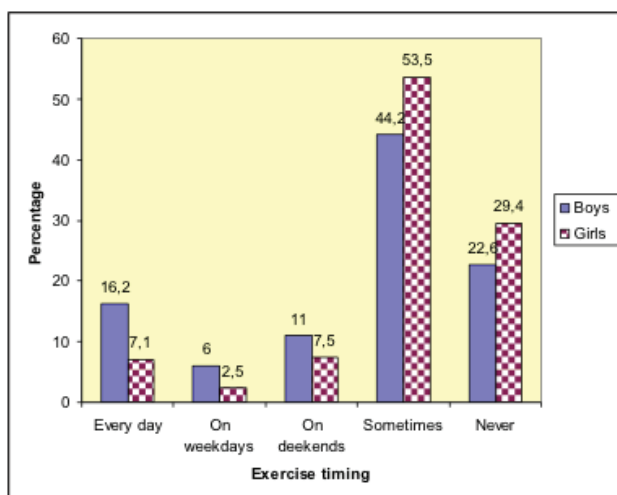
Differences of data were considered statistically significant for $p < 0.05$. Statistical software Stata v.12.1 (Stata corp LP) was used to analyze the data.

3 Results

3.1 Physical activity

Of all study participants, only 11.5% exercised in the morning. Almost half of the research subjects (49%) said that they only sometimes exercise in the morning, and as much as 26.1% said never. There were more boys than girls

Figure 1: Number of schoolchildren who exercise in the morning, by gender (percent), ($p < 0.001$).



($p < 0.001$) among schoolchildren who exercised frequently (Figure 1).

A little more than a third of the research subjects had a physically active leisure time (37.1%). Schoolchildren who were physically active during leisure time most often played basketball, football, also ran or swam in the pool. There were more boys among physically active adolescents: 70.6% ($p < 0.001$). On the other hand, more girls preferred dancing: they represented 82.9% of the respondents attending dance clubs on their free time ($p < 0.001$), which is also an active form of leisure. Dancing was also preferred more among schoolchildren whose academic achievements were good or very good ($p = 0.001$). However, there was no distinction between schoolchildren who were physically active in other forms during leisure time and their learning outcomes ($p = 0.958$).

Schoolchildren were asked whether they often engaged in sports during leisure intense enough so as to become sweaty and increase their breathing rate, also, how much time per week they engaged in sports vigorously enough to become sweaty and increase their breathing rate. It turned out that statistically significantly more boys than girls were engaged in sports vigorously enough (Table 1).

Getting to school and back can be an important part of daily physical activity. More than half of the schoolchildren were walking to school (56.9%), while the remaining took various means of transport. For the majority of schoolchildren (64.6%), the daily walk to school or the bus-stop by foot took up to 10 min; for 6.1%, more than 20 min and the duration of the trip was similar for girls and boys.

Another important part of schoolchildren's physical activity is compulsory physical education. Lithuanian schools have three physical education sessions per week of 45 minutes' duration. The study evaluated the schoolchildren's opinion about these sessions: they were asked whether they liked physical education sessions.

As many as 63.9% of schoolchildren enjoyed physical education sessions; because they could engage in sports, play basketball, football, volleyball and other games, the sessions were fun and interesting. Most researched subjects who did not like physical education classes mentioned bad teachers, because they are forced to engage in certain disliked activities (jogging, make ups, heavy exercise, etc.), or because the sessions were boring. As many as 78% of respondents who stated that they do not like physical education lessons were girls, and only 22% were boys ($p < 0.001$). It is interesting, that no statistically significant difference was found between the opinions about physical education sessions among schoolchildren with

Table 1: Schoolchildren sports frequency and duration, by gender (abs. figures (percent))

	Gender		p	
	Boys	Girls		
How many hours a week you make sports?	<0.5	75 (15.7)	135 (26.7)	p<0.001
	~ 0.5	58 (12.2)	94 (18.6)	
	~ 1	128 (26.8)	108 (21.3)	
	~2-3	110 (23.1)	96 (19)	
	4 and more	106 (22.2)	73 (14.4)	
How often do you make sports?	every day	65 (13.5)	21 (4.1)	p<0.001
	4-6 times/week	102 (21.3)	77 (14.9)	
	2-3 times/week	173 (36)	168 (32.6)	
	1 time/week	52 (10.8)	82 (15.9)	
	1 time/month	19 (4)	64 (12.4)	
	< 1 times/month	32 (6.7)	52 (10.1)	
	never	37 (7.7)	52 (10.1)	

different academic achievements. Physical education sessions were preferred by schoolchildren who were physically active during their leisure time: as many as 78% of them liked these sessions, and only 55.7% of schoolchildren who were physically inactive during leisure liked physical education sessions ($p<0.001$).

The time spent passively is important for an evaluation of physical activity. More than half of the research subjects spent 2 hours or more per day on the computer (59.6%) and watching television (55.1%) on weekdays and; this form of pastime was more popular among boys who also spent significantly more time on computer or watching TV: among the research subjects who spent 4 hours and more on the computer on weekdays, 35.9% were girls and as high as 64.1% were boys ($p<0.001$). On the other hand, girls tended to prefer different forms of passive leisure such as reading books and this was a pastime for 23.9% of boys and 43.3% of girls ($p<0.001$). Moreover, more book readers (41.5%) were among the learners with good and very good academic achievement compared with those who assessed their performance as satisfactory (30.1%) and poor or very poor (20.3%) ($p=0.001$).

Computer hobby at leisure time correlated with time spent on the computer ($r=0.407$, $p<0.001$); whereas television viewing time and the hobby of spending leisure time for TV watching correlated less well ($r=0.245$, $p<0.001$). This means that TV is watched more by schoolchildren

who have different preferences for leisure. Nevertheless, the analysis of the survey results showed no strong correlation between the frequency of participating in sports during leisure time and the time spent on computer ($r=0.060$; $p=0.059$) or TV ($r=0.121$, $p<0.001$).

Although the study confirmed that schoolchildren have little physical activity and spend a much free time passively, 60.6% of survey participants believed that they are sufficiently physically active. Girls and boys had different assessments of their physical activity: there were 53.4% of boys and 46.6% of girls among those who believe they are sufficiently physically active, and as many as 61% were girls among those who believe they are not sufficiently physically active ($p<0.001$).

Physical activity was rated somewhat better by the research subjects who participate more frequently in sports ($r=0.223$; $p<0.001$) and for longer times ($r=0.207$, $p<0.001$) than those exercising less and for shorter periods of time.

3.2 Nutrition of schoolchildren

Dietary habits of schoolchildren such as breakfast eating, number of meals, snacking habits, consumptions of fruit, vegetables, sweets and dairy products, as well as opinions about advisable eating habits were assessed in

this study. More than half (61.4%) of the schoolchildren ate breakfast every day, and girls ate breakfast less often than boys. Schoolchildren who did not eat breakfast most often indicated that it was because they did not want to (47.8%) or had no time (34.5%) and only a small percentage of schoolchildren had no possibility to eat breakfast. Reasons for not eating breakfast were not significantly different among boys and girls.

As many as 31.2% of schoolchildren snacked frequently between meals: 38.7% did so occasionally, whereas 30.1% of respondents indicated they did not snack at all. Snacking habits were the same among genders and most popular snacks were sandwiches, cakes and a variety of sweets, fruits, yogurt, cheese curds, and tea.

The research subjects were asked how many times they think they should eat daily and how many times a day they do eat. Students' perception and the number of

actual meals per day were interrelated ($r=0.391$; $p<0.001$). Nearly more than half (49.2%) of the schoolchildren ate 3 times per day and even more (54.7%) were those who believe that one should eat three times a day (Figure 2). More boys than girls were eating 4 times and more per day (41.9% and 36.1% respectively, $p=0.008$), which can be explained by boys' increased energy demands.

The analysis of the survey results showed a weak correlation between the number of meals and breakfast eating ($r=0.214$; $p<0.001$): schoolchildren who eat more times per day are more likely to have breakfast every day. Furthermore, schoolchildren who ate regularly also indicated that they are more likely to snack ($r=0.204$; $p<0.001$).

55.9% of the research subjects ate vegetables, 69.4% ate fruits, 66.5% ate dairy products and as high as 40.4% of schoolchildren ate sweets every day. Girls were more likely to eat vegetables and sweets than boys. Vegetables were eaten daily by 59.2% of girls and 52.3% of boys ($p=0.033$); sweets were eaten daily by 44.6% of girls and 35.8% of boys ($p=0.035$). In contrast, dairy product and fruit consumption among girls and boys was similar ($p=0.953$ and $p=0.070$).

The evaluation of the research results contained an analysis of the correlation between consumption of different foods (Table 2). It was observed that subjects who ate more vegetables were more likely to eat fruits as well, and those consuming more fruits, also more often ate dairy products. The researchers also considered the relationship between the consumption of various products and snacking and found that learners who ate sweets more often were more likely to snack between meals ($r=0.208$; $p<0.001$). Contrarily, no similar relationship was found between the consumption of other products and snacking between meals.

Although only slightly more than half of the surveyed schoolchildren ate vegetables and fruits every day, as many as 80% of the respondents knew they should eat

Figure 2: Distribution of schoolchildren by number of meals per day, and by number of meals, in their view, that one should have per day (percent).

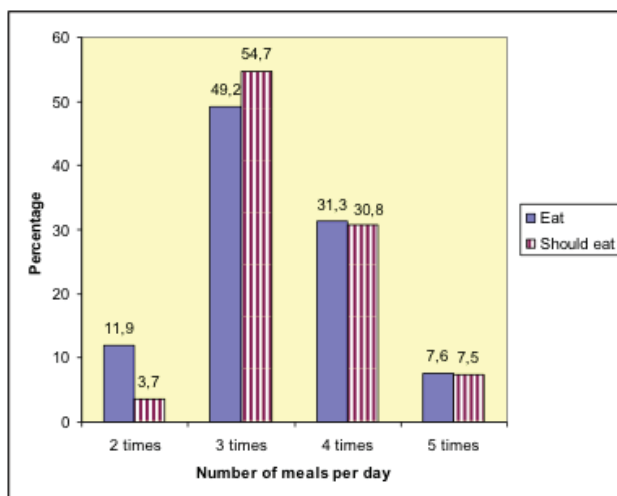


Table 2: Correlation between different food consumption

	Consumption of vegetables	Consumption of fruits	Consumption of sweets	Consumption of dairy products
Consumption of vegetables	—	$r = 0.333$ $p < 0.001$	$r = -0.026$ $p = 0.418$	$r = 0.194$ $p < 0.001$
Consumption of fruits	$r = 0.333$ $p < 0.001$	—	$r = 0.047$ $p = 0.141$	$r = 0.223$ $p < 0.001$
Consumption of sweets	$r = -0.026$ $p = 0.418$	$r = 0.047$ $p = 0.141$	—	$r = 0.042$ $p = 0.191$
Consumption of dairy products	$r = 0.194$ $p < 0.001$	$r = 0.223$ $p < 0.001$	$r = 0.042$ $p = 0.191$	—

them every day. Slightly fewer research subjects knew that they should eat porridge, bread and cereals (61.7%) and milk and dairy (68.3%) every day. Only half of the respondents believed that meat should be eaten every day, and 6.8% of respondents said they should eat sweets daily.

Schoolchildren's opinions about consumption of different products varied depending on their academic achievement level (Table 3). For example, more academically successful schoolchildren knew that bread, porridge and cereal products, fruits and vegetables should be eaten every day. In contrast, a high number of those with poor and very poor academic achievement thought that sweets should be part of their daily diet. Boys' and girls' opinions were slightly divided only on the consumption of fruits and vegetables.

The survey of schoolchildren's awareness of different foods demonstrated that their attitudes, knowledge and opinions have a significant impact on their behaviour. For example: from among the subjects who believed that sweets should be eaten daily, as many as 72.1% of them ate several times a day; as many as 61.1% of those thinking that vegetables should be eaten on a daily basis and 28.3% of those who do not think so, ate vegetables every day ($p < 0.001$); dairy products were consumed daily by 74.4% of those thinking that we should partake of them daily, and only 48.4% by those who shared a different opinion ($p < 0.001$); fruits were eaten daily by 72.9% of those thinking that we should take them every day.

Respondents were also asked to self-assess their diet and only 10.7% of the surveyed schoolchildren said they always eat healthily, 42% reported that they often eat healthily, 35% said sometimes, and 1.4% never, whereas 10.9% of respondents did not know how to evaluate their diet. Girls and boys evaluated their physical diet in a similar way ($p = 0.283$).

3.3 Association between physical activity and dietary and other factors

Ordinary multiple logistic regression was used to assess the relation between low physical activity and other factors (Table 4). It was found that boys were more physically active than girls (OR=0.53 (0.36-0.76); $p = 0.001$). Contrarily for gender, no association was found between grade and physical activity (OR=1.39 (0.93-2.07); $p = 0.103$).

There was a direct relation between low physical activity and infrequent consumption of vegetables (OR=1.5 (1.10-2.06); $p = 0.011$) and dairy products (OR=1.58 (1.15-2.16); $p = 0.004$). Therefore, schoolchildren who ate vegetables and dairy products more often were also more physically active. Additionally, respondents who were more physically active ate fewer sweets (OR=0.65 (0.46-0.92); $p = 0.015$). No association was found between eating frequency and low physical activity (OR=1.35 (0.79-2.28); $p = 0.266$) and consumption of fruits (OR=0.81 (0.55-1.20); $p = 0.299$).

Regression analysis showed that more physically active schoolchildren got enough information about physical activity (OR=1.87 (1.21-2.87); $p = 0.004$) and spoke about it with their family members (OR=1.95 (1.36-2.81); $p < 0.001$). Similar relationships between physical activity and adequacy of information about healthy nutrition (OR=0.68 (0.46-1.01); $p = 0.051$) and speaking about it in the family (OR=1.17 (0.90-1.51); $p = 0.222$) were not found. Although teaching of a healthy lifestyle at school is usually considered to be an influencing factor for healthy behaviour, the study has shown no association between education about health lifestyle and physical activity. Similarly, knowing people who are physically active or eat healthily was not related to physical activity.

Table 3: Schoolchildren' opinion about daily consumption of different foods, by gender and learning outcomes (abs. figures (percent))

Products, which according to schoolchildren' opinion should be eaten daily	Sex		P	Academic results			P
	Boys	Girls		Good and very good	Satisfactory	Poor and very poor	
Bread, cereals, grains	287 (59.2)	334 (64.1)	0.108	243 (67.7)	363 (59.0)	13 (50.0)	0.012
Dairy products	343 (70.7)	345 (66.1)	0.115	251 (69.9)	414 (67.2)	18 (69.2)	0.677
Meat	251 (51.8)	259 (49.6)	0.498	187 (52.1)	307 (49.8)	13 (50.0)	0.793
Fish	129 (26.7)	138 (26.4)	0.938	99 (27.6)	165 (26.8)	3 (11.5)	0.202
Fruits	365 (75.4)	445 (85.2)	<0.001	319 (88.9)	466 (75.8)	19 (73.1)	<0.001
Vegetables	373 (76.9)	454 (87)	<0.001	329 (91.6)	477 (77.4)	17 (65.4)	<0.001
Sweets	39 (8)	29 (5.6)	0.116	16 (4.5)	47 (7.6)	4 (15.4)	0.025

Table 4: Relationships between low physical activity, dietary behaviour and other factors

Variable	OR _c	OR _a	95% CI	p
Gender:				
Boy	0.48	0.53	0.37-0.76	0.001
Girl		1.0		
Grade:				
6	1.41	1.39	0.93-2.07	0.103
7		1.0		
Vegetables	1.57	1.50	1.10-2.06	0.011
Fruits	1.09	0.81	0.55-1.20	0.299
Sweets	0.67	0.65	0.46-0.92	0.015
Dairy products	1.79	1.58	1.15-2.16	0.004
Frequency of eating	1.47	1.35	0.79-2.28	0.266
Adequacy of information on:				
healthy nutrition	1.09	0.68	0.46-1.01	0.051
physical activity	1.85	1.87	1.21-2.87	0.004
Attitude in the family on healthy:				
dietary behaviour	1.61	1.17	0.90-1.51	0.222
physical activity	2.48	1.95	1.36-2.81	< 0.001
Teaching on:				
healthy dietary behaviour	1.03	0.93	0.62-1.38	0.711
physical activity	0.88	1.06	0.59-1.88	0.851
Knowing acquaintances who:				
Eat healthily	1.30	0.84	0.49-1.44	0.518
Are physical active	2.12	1.74	0.84-3.59	0.133

N = 869, Wald chi2 = 507.10, p < 0.0001, H-L chi2 = 6.86, p=0.551, correctly classified 73.88%, Cox-Snell R² = 0.097

4 Discussion

Many studies have demonstrated that various lifestyle habits, including physical activity and eating habits, are established at a young age and it is important to consider these habits because of their effects on the young and developing organism [3]. Despite this fact, physical activity among the majority of schoolchildren is too low. According to the WHO recommendations, the duration of a minimum moderate and intense physical activity for children of 5 to 17 years of age should be at least 60 min [6,19]. As in many other countries, only a small fraction of Lithuanian children are sufficiently physically active, whereas others spend most of the day passively. Among the teenagers surveyed in the city of Vilnius, only 8.6% engaged in sports when not at school during the day of sufficient intensity to become sweaty and increase their breathing rate; another 18% engage in sports 4-6 times a

week. Only 18.2% of research subjects engaged in sports 4 or more hours per week. These results are similar to other studies from Lithuania. According to the Health Behaviour in School-aged Children (HBSC) survey, in Lithuania, the number of 11, 13 and 15 year old teenagers who engage in sports every day, ranges from 11 to 23% [8]. Older teens make less sport than younger ones, with primary school schoolchildren being the most active [20].

Insufficient physical activity among children and adolescents is an important problem in many other countries. For example, in European countries on average only 19% of the 13-year-olds meet the minimum physical activity recommendations of the WHO and are actively moving at least 1 hour a day [8]. Children's physical activity levels also vary widely in different European countries, for instance, about 53% of children are sufficiently physically active in the United Kingdom [21], while in most other countries this figure is lower. In all European countries, as

well as among the study participants, boys are more active than girls [7,8].

In an assessment of physical activity, it is important to take into account the time spent passively. The analysis of the survey results demonstrated that subjects spend too much time passively. Although according to the WHO guidelines, children and adolescents should not watch TV for more than 1-2 hours a day [7,8], more than half (55.1%) of respondents studied were watching TV for 2 hours a day and more. Although this situation does not meet the WHO recommendations, but compared with other studies of Lithuanian children, it is somewhat better. According to the study HBSC of 2005-2006, as many as 82.5% of Lithuanian teenagers of 13 years old watch TV every day for 2 hours or more and here Lithuania is the leader among European teenagers. Compared to the same study (HBSC) of 2009-2010, a decreasing tendency can be seen: 73.5% of Lithuanian schoolchildren of 13 years old watch TV every weekday for 2 hours or more. Moreover, Other study shows that almost half (45.1%) of the Lithuanian first grade schoolchildren watch TV for 2 or more hours a day [23].

Use of a computer is another form of passive pastime. More than half of the surveyed schoolchildren spend their time on computer during leisure for much more than they should: 59.6% of surveyed schoolchildren of Vilnius spent 2 hours or more on computer on working days. This figure is almost twice higher than that in 2005, as determined by the Lithuanian children study in which only 30.7% of the surveyed schoolchildren spent two hours and more on computer on working days [22]. Both studies showed that boys spent more time on computer than girls.

The study of dietary habits of schoolchildren found that some of them do not eat breakfast in the morning; also, children eat too little vegetables, fruits, dairy products, and too many sweets. Regardless of all of the nutritional deficiencies, more than half of the surveyed schoolchildren (52.6%) said they often or always eat healthily. According to the WHO recommendations, children and young people should eat fruit and vegetables several times a day. Although the study showed that only 55.9% and 69.4% of tested student were eating fruits and vegetables on a daily basis, the situation is improving since the results differ quite markedly compared with the survey conducted by HBCS in 2005-2006. According to it, Lithuania probably has the lowest number of teenagers in Europe who eat fruit at least once a day: 27.5% of eleven year olds, 24.5% of thirteen year olds and 19% of fifteen year olds [7]. Respectively, 30% of 11 years old, 24.5% of 13 years old and 23.5% of 15 years old Lithuanian adolescents ate fruit one or more a day in 2009-2010. Despite the

slightly increasing number, Lithuania remained among the countries with the lowest consumption of fruit [8]. However, too low fruit and vegetable consumption among children is a problem not only in Lithuania. For example, the survey of children in Tokushima prefecture, Japan, showed that only 32% of children and teens eat vegetables every day [24]. Even fewer children receiving daily fruit and vegetables are in the areas of various political unrest: in the Gaza Strip, only 13.9% of teenagers eat fruit every day, while the number of those who eat vegetables every day is a little higher – 27% [25]. On the other hand, there are countries where this indicator is much higher: 74% of Cypriot children eat fruit two or more times per day [26]; 68.9% of Canadian school-age children eat fruit every day, and 75.9% eat vegetables, accordingly [26-27]. Different studies show that about 40% of teens eat fruit and vegetables in the United States on average [7,9].

Respondents of this study eat sweets too often; even 40.4% of them eat sweets every day. On the other hand, consumption of high-calorie sweet drinks among Lithuanian adolescent is not very common and ranges from 5 to 12% [8]. Other non-recommended foods are used daily by significant number of school-age children in Lithuania: 13.6% of schoolchildren eat potato chips, 57.2% a variety of sweets, 9.8% hamburgers and pizza daily [28].

Irregular eating is another problem of Lithuanian schoolchildren's nutrition. Only 61.4% of surveyed schoolchildren eat breakfast every day, which reflects the situation of entire country where 46-65% of Lithuanian children eat breakfast on the weekdays. Such percentage is lower than the average of other European countries, which is 55-71% [8].

5 Conclusions

Participants of the study were not sufficiently physically active: only a quarter of the surveyed schoolchildren engaged in sports daily or almost daily during leisure time and even fewer (18.2%) of them engaged in sports for 4 hours per week and more. Only small part of respondents (11.5%) exercised daily in the morning. Whereas most schoolchildren were insufficiently physically active, yet more than 60% of surveyed adolescents indicated that they like physical education sessions and said that they are sufficiently physically active. Boys were more physically active than girls, and sports were chosen for leisure by more boys than girls.

Study showed that as many as 61.4% of schoolchildren ate breakfast every day. Nearly one-third of schoolchildren snacked often and half of study participants ate 3 times per day. Boys ate breakfast more often and had more meals than girls. Slightly more than half of the researched subjects ate fruits, vegetables and dairy products on a daily basis. As much as 40.4% of schoolchildren ate sweets every day. Girls were more likely than boys to eat vegetables and sweets.

It was found an association between physical activity and other factors of healthy behaviour: more physically active were boys and schoolchildren who ate more vegetables, dairy products and fewer sweets. Although it is common to believe that education of healthy lifestyle at school plays a big role in encouraging young people live healthily, study didn't show a relation between physical activity and teaching of healthy lifestyle at school. On the other hand, respondents who talked about physical activity with their family members and had enough information about it, lead more physically active lives.

6 Implications for school health

The study has showed that many schoolchildren are not physically active enough and not all of them have healthy eating habits. Schools can contribute a lot to the development of healthy habits of schoolchildren. Dancing, sport clubs and other physically active after-school activities have to be available and affordable to all students. Teachers have to speak with schoolchildren about healthy nutrition, physical activity and their benefits. This can be done during separate lessons or it can be involved in the curriculums of different courses. Projects, promoting healthy habits and organized by school staff would also promote schoolchildren to lead healthier lifestyle.

Human Subjects Approval Statement: Since the study was designed on sociological research basis, Vilnius Regional Bioethics Committee didn't require the ethical approval.

Conflict of interest statement: Authors state no conflict of interest

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