



DIFFERENCES IN PHYSICAL ACTIVITY, NUTRITIONAL BEHAVIOURS, AND BODY SILHOUETTE CONCERN AMONG BOYS AND GIRLS FROM SELECTED EUROPEAN COUNTRIES

original paper

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ABSTRACT

Purpose. The aim of the study was to evaluate the physical activity level, nutritional behaviours, and body silhouette concern in 15–17-year-old boys and girls from Eastern European countries.

Methods. The research, carried out in 2015, involved 2145 secondary school adolescents, including 877 boys and 1268 girls (mean = 16.5, SD = 2.0). The results of the International Physical Activity Questionnaire (IPAQ) and Health Behaviours Questionnaire were analysed.

Results. The questionnaire results allowed to conclude that boys were definitely more active than girls. A significant relationship between physical activity and the number of meals was found. Another significant relationship was observed between higher physical activity in boys who wanted to gain weight and in girls who wanted to lose weight.

Conclusions. Both boys and girls have positive attitudes towards their health with regard to their level of physical activity, nutritional behaviours, and body silhouette concern. A significant relationship was found in the interrelationship among the features considered, with simultaneous gender differentiation.

Key words: school adolescents, physical activity, IPAQ, nutritional behaviours, body silhouette concern

Introduction

There is no doubt that apart from genetic factors, undertaking regular physical activity (PA) and following proper nutritional principles play a considerable role in preventing a variety of diseases. A number of international researchers [1–4], including those in Poland [5–9], have proved that the role of physical activity can be an important factor in healthy lifestyle.

It has been emphasized that proper physical activity reduces the risk of many disorders, especially cardiovascular system diseases, diabetes, and obesity as a civilization disease [10–12].

Balanced physical activity can reduce the development of cardiovascular system diseases by 15–40%, including 50% with regard to coronary heart disease, 12% to hypertension, and 35% to diabetes [13]. Strong et al. [14] recommend not less than 60 minutes of physical activity of medium and high intensity daily for Ameri-

can adolescents. American College of Sport Medicine [15] standards maintain that physical exercise should be practised for at least 30 minutes per day 5 times a week at a moderate level of intensity or at least 20 minutes a day 3 times a week at a high level of intensity. Over the recent years, the issue of physical activity among school learners has also been addressed more frequently by Polish researchers [16–21], who have shown that physical activity of young people in Poland is not sufficient. Those findings are consistent with the reports on the unsatisfying level of physical activity of young people in some other countries [22–26].

Good nutrition is an equally important factor that influences human development and ensures good state of health. The concept of adequate nutrition comprises, among others, proper eating habits and proper composition of meals, allowing to satisfy the total needs for basic food components necessary for optimal development [27].

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It has been underscored that proper nutrition is a fundamental requirement for physical as well as mental development [28]. It has also been found that the eating habits of Polish adolescents do not considerably differ from those of youth in other countries, which is mainly due to the availability of a wide assortment of food products [29].

Improper nutritional habits have been revealed as major causes of obesity, which to the greatest extent concerns adolescents in the United States, where among 12–18-year-olds, 30.4% were found to be overweight and 15.5% obese [30]. An important development in recent research consisted in investigating both physical activity and dietary behaviours of school adolescents [31–35].

Studying the lifestyle and nutrition habits among school adolescents requires discerning gender differences. The majority of the studies conducted so far have shown a lower level of total physical activity among girls [36–40], as well as differences in the dietary behaviour of boys and girls [41, 42]. Sedentary lifestyle has also been treated as an issue of adolescents' health concern [43]. Nowadays many school learners spend their leisure time watching TV or using computers, which adds to their lack of physical activity.

The present study aimed to investigate the following issues:

1. The relationship between nutrition habits and physical activity in boys and girls.
2. Girls' and boys' body silhouette concern in relationship with their physical activity.

The following hypotheses were put forward:

1. There is no relationship between physical activity and nutrition habits.
2. When concerned about their body silhouette, girls take up physical activity in order to lose weight (to get slimmer) and boys take up physical activity in order to gain body weight (to build the muscles).

Material and methods

Participants

For the purpose of the study, one city in each of the four European countries of the so-called Visegrad Group (the Czech Republic, Poland, Slovakia, and Hungary) was first chosen, then one secondary school was randomly selected so that groups of adolescents aged 15–17 could be involved in the study. It was assumed that in each age group from each country, not fewer than 100 schoolchildren would be examined within a particular gender group. The study was conducted in 2015; the total of 2425 school adolescents from the countries mentioned above took part: 1148 boys (47.3%) and 1277 girls (52.7%) (mean = 16.5, *SD* = 2.0). Owing to a number of incomplete responses, the data used for

the final analysis came from 2145 students: 877 boys (40.9%) and 1268 girls (59.1%).

The study was conducted in 4 cities: Pécs in Hungary, Prešov in Slovakia, Olomouc in the Czech Republic, and Biała Podlaska in Poland. It involved a group of randomly selected 100 girls and 100 boys aged 15–17 in each school.

Research instrument

The research instrument used for the study was the generally recommended full version of the International Physical Activity Questionnaire (IPAQ) [44]. This questionnaire evaluates one's physical activity by summing up all the instances of physical activity performed over the past 7 days which lasted continuously for at least 10 minutes. It refers to 4 areas of physical activity at the moderate and high level of intensity, as well as walking. These cover: performing tasks in the workplace, doing some household chores, practicing sports, and moving around in the leisure time. Physical activity, measured in MET-min/week (the abbreviation 'MET' [metabolic equivalent of task] will be used further in the paper), is calculated by multiplying the number of days of the given ratio of physical activity by the value of MET and the number of minutes of the physical activity performed every day. This measurement instrument has been validated in Polish conditions [45]. The Health Behaviours Questionnaire is based on the questions developed by the Chief Sanitary Inspector of Poland [9].

All the academic teachers who conducted the study obtained the consent of the ethical commissions at their universities, as well as the consent of school headmasters, and the personal consent of the schoolchildren.

The data were collected during selected lessons at school by the leaders of the project from the particular countries and the trained volunteers with the support of information technology teachers. The respondents completed the IPAQ questionnaire in computer laboratories with at least 15 terminals, using an appropriate questionnaire form designed in electronic version [46]. The Health Behaviours Questionnaire was implemented in a similar way. Whereas the former publications generally concerned the diagnosis of one kind of behaviour, the current study is innovative in that it deals with several kinds of behaviour and their interrelationships. This made it possible to arrive at a more accurate evaluation of health behaviours of the boys and girls participating in the study.

In order to answer the research questions, 3 basic parameters of descriptive statistics were determined: arithmetic mean values (\bar{x}), standard deviations (*SD*), and coefficients of variation (*V*). The significance of differences between mean results obtained in girls and boys was determined with the use of t-Student test for independent samples.

Table 1. PhyWscical activity in girls and boys (values in MET)

Area of activity**	Girls			Boys			Total		
	\bar{x}	SD	V	\bar{x}	SD	V	\bar{x}	SD	V
Activity at work	2279.3	3268.3	143.4	2019.7	2735.8	135.5	2125.8	2967.1	139.6
Mobility	1361.8	1844.5	135.4	1216.8	1606.3	132.0	1276.1	1708.8	133.9
Household activity	1178.3	1726.3	146.5	1011.8	1409.3	139.3	1079.8	1548.5	143.4
Sports activity	2471.7	2686.8	108.7	1951.9	2249.9	115.3	2164.4	2450.8	113.2
Total activity	7291.0	6345.7	87.0	6200.2	5671.5	91.5	6646.2	5979.0	90.0

** according to IPAQ

Table 2. Differences in areas of physical activity according to gender

Mann-Whitney U Test				
Area of activity	Rank sum		Z	p
	boys	girls		
Total activity	996,935	1,304,650	3.96	< 0.001*
Activity at work	943,084	1,358,501	0.15	0.883
Mobility	945,075	1,356,510	0.29	0.773
Household activity	955,235	1,346,350	1.01	0.3129
Sports activity	987,728	1,313,857	3.31	0.001*

* significant differences at $p < 0.05$

The results of the study were analysed with the Statistica v.7.1 software. In order to detect statistically significant relationships between the characteristics measured in a nominal scale, the chi-square test for independence was applied. In the case of adopting the quantitative scale, the non-parametric Mann-Whitney U test and the Kruskal-Wallis test were implemented. In all the analysed cases, the significance level was set at $p < 0.05$.

Results

Level of physical activity according to gender

The level of total physical activity in boys was 7291.0 MET-min/week, and it turned out significantly higher than that in girls – 6200.2 MET-min/week. In the four domains of physical activity analysed, boys showed significantly higher physical activity according to IPAQ, also with respect to the activity during leisure time and the participation in sports classes, which reached the value of 2471.7 MET, while in girls it equalled 1951.9 MET (Tables 1–2).

Nutritional behaviours

The term ‘meals’ was used with reference to 5 meals organized in the following way: breakfast, second breakfast, dinner, tea time snack, and supper. In both girls and boys, the most frequent number of meals consumed was 4 a day (36.9% and 41.7%, respectively). Boys had

only 1–2 meals daily more often (10.3%) than girls (6.6%). In turn, girls consumed meals at least 5 times per day more often than boys (31.3% vs. 28.0%).

The analysis of meal numbers revealed significant differences within gender groups (Figure 1).

The dominant meal for all the participants was lunch/dinner (67.3% of boys and 60.9% of girls), the next important meal proved to be breakfast (22.4% of boys and 32.8% of girls). Supper was significant only for 10.3% of boys and for 6.4% of girls.

Significant differences were observed within gender groups concerning the proportion of the 3 main meals (Figure 2).

Physical activity and number of meals consumed according to gender

Boys who had 5 or more meals daily were characterized by the highest physical activity value (8079.4 MET), and the value was significantly higher than that for schoolchildren who consumed 1–2 or 3 meals a day. Similarly, girls who consumed 5 or more meals a day were characterized by the highest physical activity (6767.4 MET), and this value was significantly higher than that for those who consumed 4 meals daily (Figure 3).

Physical activity and consumption of main meals

The highest physical activity value was noted among boys who considered breakfast as the main meal

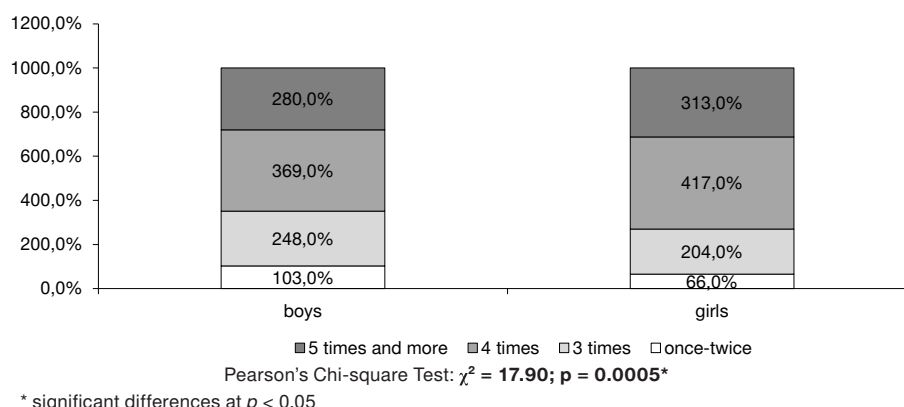


Figure 1. Mean number of meals consumed daily by boys and girls in the study



Figure 2. Main meals in the studied boys and girls

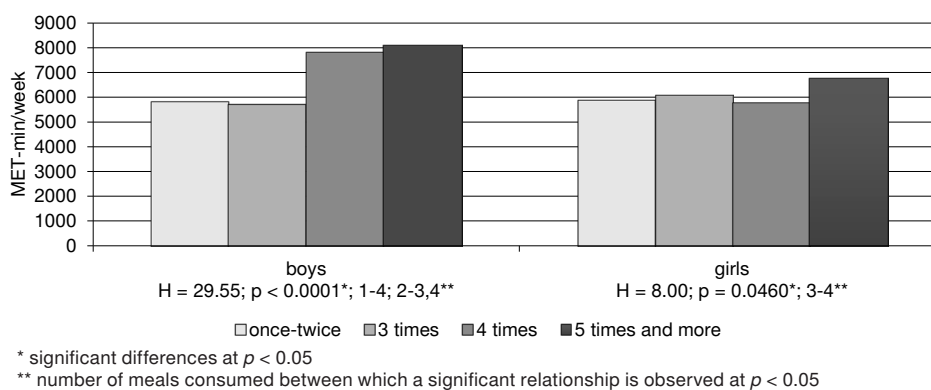


Figure 3. Level of physical activity of boys and girls with consideration of the mean number of meals consumed daily



Figure 4. Level of total physical activity among boys and girls with consideration of the main meal

(7704 MET), followed by dinner (7217.9 MET), and supper (6077.5 MET); however, the differences were insignificant (Figure 4). Similarly, the highest physical activity value was observed in girls for whom breakfast was the main meal (7087.1 MET), followed by dinner (5752.1 MET), and supper (5366.0 MET). The differences in physical activity were significant, to the benefit of girls who treated breakfast as their main meal (Figure 4).

Level of physical activity and willingness to lose weight according to gender

As shown by the participants' responses to the Health Behaviours Questionnaire, willingness to lose weight was expressed by 70.8% of girls and 34.2% of boys. The girls who wanted to lose weight were characterized by significantly higher physical activity (6581.0 MET) than their counterparts not mentioning such an intention (5254.4 MET). The boys who wanted to lose weight were

characterized by physical activity at the level of 7290.1 MET; for the boys who did not want to lose weight, the value was similar (7148.0 MET). Yet, this difference was statistically insignificant.

Level of physical activity and willingness to gain weight according to gender

Willingness to lose weight was mentioned by 16.2% of girls and by 41.2% of boys. In the case of girls who had such an intention, physical activity was at the level of 5823.6 MET, while for the girls who did not want to lose weight, the value was highest: 6243.6 MET. Yet, this difference was statistically insignificant.

Among boys, a significant difference in physical activity was found in the group who wanted to gain weight (7993.7 MET) than among those who did not have such an intention (6638.0 MET).

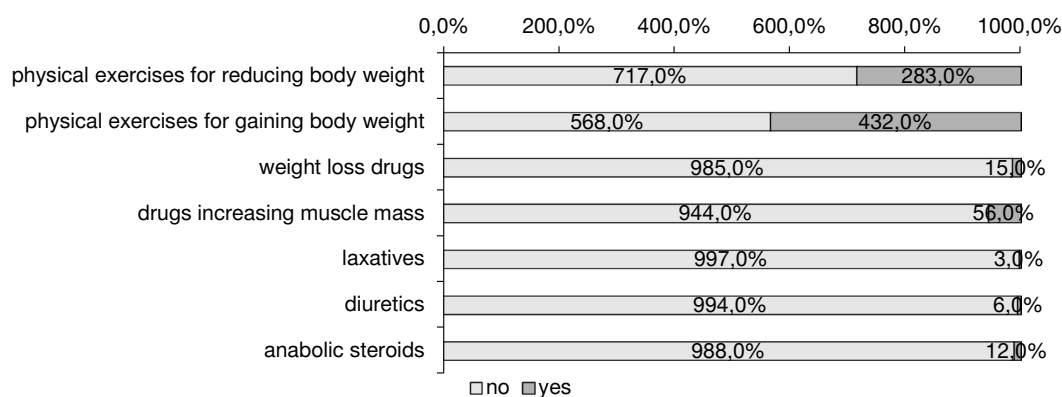
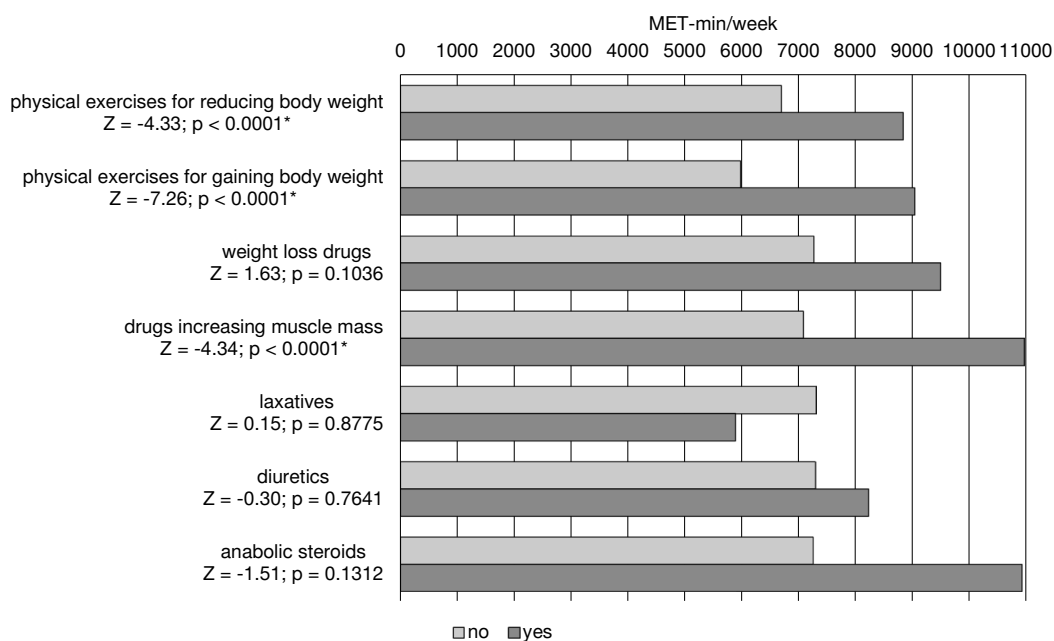


Figure 5. Measures to improve the silhouette used by boys



* significant differences at $p < 0.05$

Figure 6. Level of total physical activity in boys with consideration of measures used for silhouette improvement

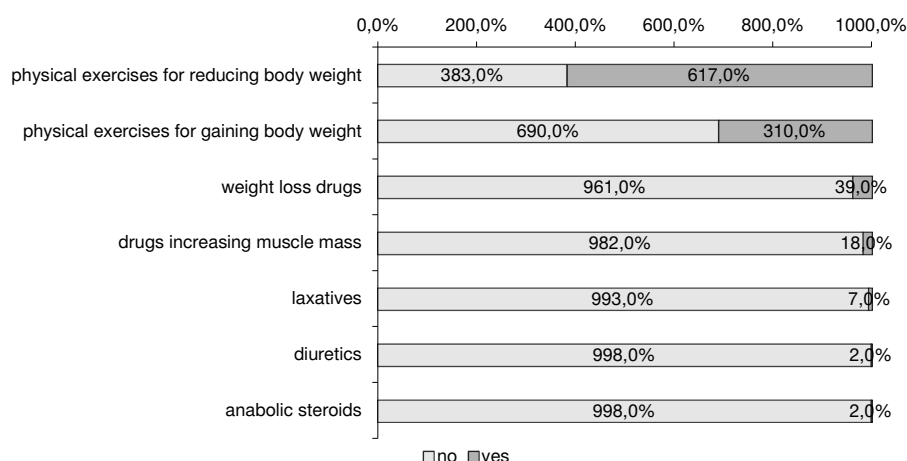


Figure 7. Measures applied by girls to improve their silhouette

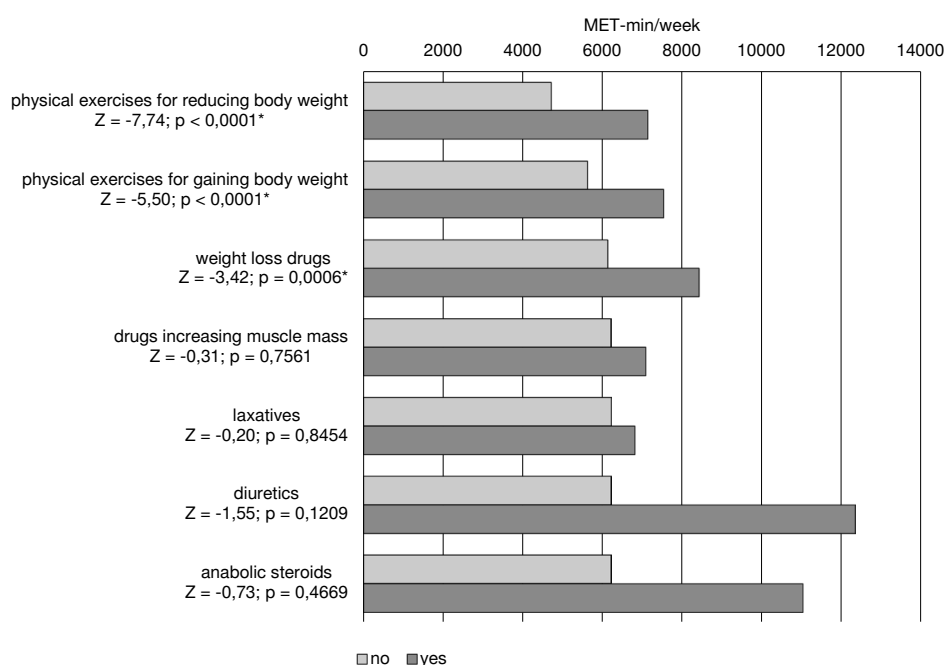
* significant differences at $p < 0.05$

Figure 8. Level of total physical activity in girls with consideration of measures undertaken for improving their silhouette

Measures applied by boys to improve their body silhouette and the level of physical activity

In order to improve their body silhouette, boys most often applied exercises for body mass gain (muscle building) (43.2%) and exercises to reduce body weight (28.3%). Weight gain medications (muscle building) were incomparably more rarely used (5.6%). The values concerning the use of other measures, weight loss drugs, anabolic steroids, and others were trace, approximately 1% (Figure 5).

A significant relationship with increased physical activity was shown for boys who took up exercise in order to gain or reduce body mass or used drugs to gain body mass (Figure 6).

Measures applied by girls to improve their body silhouette and the level of physical activity

Girls to the greatest degree took up exercises in order to lose weight and improve their body silhouette (61.7%), as well as to increase their body mass (muscle building) (31.0%). They used weight loss drugs incomparably more rarely (3.9%). The values pertaining to the use of other measures were trace, and they remained at the level of 1.8% in the case of muscle building medications, and below 1.0% with regard to other measures (Figure 7).

A significant relationship with physical activity was revealed in the case of undertaking exercise with the purpose of reducing or increasing body weight, which confirmed the assumed hypothesis (Figure 8).

Discussion

The importance of in of spending life an active way and of adequate nutrition as key factors in healthy lifestyle requires their constant observation in various social groups.

It is noteworthy that the lack of physical activity during the school age years may lead to considerable health problems in later life [6]. The investigations of the level of physical activity are worth comparing when the same research instrument is applied in the studies, such as the IPAQ [47], which was also implemented in the current study.

It is satisfying to note that the level of physical activity among the adolescents from the Visegrad Group countries (7291.0 MET-min/week in boys and 6200.2 MET-min/week in girls) remains high. According to the studies conducted in Poland to-date, this activity varies considerably. Among schoolchildren from the Silesian province it equals 2976 MET in boys and 2737 MET in girls [37]. Among those from the Lublin province it reaches 7378 MET in boys and 5870 MET in girls [48]. A particularly high result was obtained among Polish post-secondary school adolescents [49]: 13,701 MET in boys and 10,295 MET in girls. In some other studies carried out by Polish researchers among schoolchildren from Warsaw [8], the level of physical activity was 2253 MET in girls and 2697 MET in boys. It should be emphasized that in all the studies, boys were characterized by a higher level of physical activity than girls, which is in accordance with the results obtained in the present study. In the studies mentioned, this significant difference concerned the total physical activity to the benefit of boys, as well as to their participation in sports activities.

One should also observe that the findings of the recent studies concerning Health Behaviour in School-aged Children (HBSC) conducted in Poland in 2014 showed that the recommended level of physical activity needed for proper development and health maintenance was found in 24.2% of the youth. Comparing the 2010 and 2014 data, a statistically significant difference was found, indicating a 4% positive trend following the WHO recommendations [50].

It has to be noted that the boys who participated in this study tend to take up more intensive exercise, which has been confirmed by investigations among school learners in other European countries, e.g. in Lithuania [39] and in Latvia [51]. The fact that boys and girls take up different kinds of sports and leisure activities supports the specificity of physical activities preferred by boys and girls. Whereas girls would mainly choose walking, riding a bicycle, or playing volleyball as far as sports are concerned, it is boys who go cycling and running, and show preference for such sports disciplines as soccer and basketball [39].

As for nutritional behaviours of the adolescents who participated in the study, the picture is positive. Both girls and boys most frequently reported that they had either 4 or 5 meals per day, with the percentage values significantly more favourable for girls. The results obtained correspond to the standards adopted in Poland [41].

Investigating the relationship between the level of physical activity and nutritional behaviours in a given group is an important issue. In the present study, a significantly higher level of physical activity was found among both girls and boys who had 5 or more meals per day, which is in accordance with other studies [31–33]. As claimed by Łagowska et al. [33], girls are characterized by a higher level of the quality of life. While nutritional behaviours above the mean could be ascribed to 13% of girls, only 8% of boys showed a similar level of nutritional behaviours. Also, Marcysiak et al. [32] point at better nutritional behaviours of girls, out of whom 18% do not eat breakfast, as compared with 26% of boys. The results of the research on nutritional behaviours prove to be more favourable towards nutritional behaviours of girls. A significant relationship between having breakfast and physical activity was demonstrated in the group of girls. It seems to result from the fact that when the general structure of meals is considered, these are girls who eat breakfast more often.

On the basis of data from the HBSC study of 2014 [52], 63.9% of school children eat breakfast on a daily basis. Compared with the 2010 study, significant improvements were noted in this respect (4.7% for boys and 3.1% for girls, respectively).

A particularly important issue is exploring the phenomenon of losing and gaining weight, which is connected with one of the most substantial problems in the contemporary world, namely obesity [30, 53]. As shown in the study, more girls (70.8%) than boys (34.2%) were willing to get slimmer, which probably resulted from their greater concern about slim silhouette. This may be confirmed by a significant relationship between the level of physical activity and willingness to lose weight noted among girls.

Willingness to lose weight, mainly with the aim of improving body muscles, was expressed more frequently by boys (41.2%) than by girls (16.2%); it is fashionable among boys, especially in this age group. This might be confirmed by the fact that a significant relationship between the willingness to gain weight and a higher level of physical activity was observed in the group of boys who wanted to gain weight.

Of special interest is finding out what kind of measures are taken to improve one's silhouette. Previous studies indicated considerable differences between genders in this case. Boys did exercises to the greatest extent in order to increase their body weight (43.2%) and to a lesser extent to reduce their body weight (28.3%). Girls in most cases undertook physical activity in order

to reduce body weight (61.7%), less often in order to gain weight (31.0%). This specificity of gender behaviours thus should be an important guideline for the organizers of physical activity classes for boys and girls. It needs to be emphasized that taking exercise with the purpose of reducing or gaining body weight both by girls and boys was significantly related with their higher physical activity. Such a relationship was found in a very small group of girls (3.9%) who used weight loss medicines, and in boys (5.6%) who used medicines to gain body weight, which may be an alarming signal, particularly in the case of boys, as their number was larger.

Generally, a positive phenomenon to note is that the percentage of both girls and boys who used weight loss medicines, laxatives, diuretics, or anabolic steroids remained very low (approximately 1%). However, it should arouse concern, as mentioned above, that 5.6% of boys used medicines in order to gain weight, and 3.9% of girls chose weight loss medicines to improve their body silhouette.

On balance, it can be stated that young adolescents in Eastern Europe have a positive perception of physical activity, nutritional behaviours, and body silhouette, with some individual gender differences that need to be pointed at.

Conclusions

The current study, involving a relatively large population of 15–17-year-old school adolescents from the Visegrad Group countries, has provided grounds to formulate the following conclusions:

1. School adolescents showed a high level of physical activity, with significantly higher values observed among boys.

2. A significant relationship between higher physical activity and a larger number of meals per day was observed both in boys and girls. A relationship between a higher physical activity and eating breakfast was found in girls.

3. The dominant measures applied by boys concerned about their body silhouette were exercises intended to increase body mass (muscle building), while in girls exercises served the purpose of decreasing body mass (losing weight). In both boys and girls the use of exercise to improve their body silhouette was significantly correlated with the level of physical activity.

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