

## RELATIONSHIP BETWEEN DIET AND PHYSICAL ACTIVITY LEVEL IN ADOLESCENTS FROM POST-GRAMMAR SCHOOLS

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### ABSTRACT

**Introduction.** Appropriate diet and physical activity are vital determinants of psychophysical development in children and adolescents.

**Objective.** The aim of the study was to analyse an association between dietary habits and physical activity levels of adolescents from post-grammar schools.

**Material and methods.** The study included 110 girls and 65 boys between 16 and 19 years of age from two post-grammar schools in Biała Podlaska in Poland. They were subjected to a diagnostic survey providing information on their diet (number of meals a day, their regularity, frequency of bread, dairy, meat, fish, sweet, fruit, vegetable and fast food consumption, preferred ways of food processing). Physical activity levels were determined with the International Physical Activity Questionnaire – Short Form (IPAQ-SF). Based on these data, the respondents were stratified to high, moderate and low physical activity groups. Due to small number of participants presenting with low physical activity levels, we did not include this group in further analyses. The significance of differences in the dietary habits of adolescents presenting with high and moderate physical activity levels was verified with the  $\chi^2$  test.

**Results.** Most girls and boys presented with high levels of physical activity. However, we did not find an evident relationship between dietary habits and physical activity levels. Girls from high and moderate physical activity groups differed solely in terms of the number of daily meals, frequency of meat and sweet consumption, and significant intergroup differences observed among boys pertained to the frequencies of whole-wheat bread, meat and fast food consumption. The abovementioned food products were consumed more often by girls and boys presenting with high physical activity levels.

**Conclusions.** The dietary mistakes observed in physically active adolescents from post-secondary schools justify intensification of their dietary education programs.

**Key words:** diet, physical activity, girls, boys

### STRESZCZENIE

**Wprowadzenie.** Prawidłowe odżywianie i aktywność fizyczna to podstawowe czynniki wpływające na rozwój psychofizyczny dzieci i młodzieży.

**Cel.** Celem pracy była ocena sposobu odżywiania się młodzieży szkół ponadgimnazjalnych w zależności od poziomu aktywności fizycznej.

**Material i metody.** Badaniem objęto 110 dziewcząt i 65 chłopców w wieku 16-19 lat z dwóch szkół ponadgimnazjalnych w Białej Podlaskiej. Wśród młodzieży przeprowadzono sondaż diagnostyczny, który dostarczył informacji o sposobie odżywiania się badanych (liczbie i regularności spożywania posiłków, częstości spożycia pieczywa, produktów mlecznych, mięsa, ryb, słodczy, owoców i warzyw, żywności typu „fast food” i sposobu obróbki kulinarnej). Aktywność fizyczną oceniono poprzez zastosowanie Międzynarodowego Kwestionariusza Aktywności Fizycznej IPAQ (forma krótka). Umożliwiło to podział dziewcząt i chłopców na grupy o dużej, średniej i małej aktywności fizycznej. Ze względu na małą liczebność badanych o małej aktywności fizycznej wyniki tych osób nie były poddawane dalszym analizom. Istotność statystyczną różnic w sposobie odżywiania się młodzieży o dużej i średniej aktywności fizycznej oceniono testem  $\chi^2$ .

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**Wyniki.** Większość badanych dziewcząt i chłopców charakteryzowała się dużą aktywnością fizyczną. Nie można natomiast jednoznacznie stwierdzić, że występuje zależność pomiędzy sposobem odżywiania a poziomem aktywności fizycznej. U dziewcząt istotność statystyczna różnic pomiędzy grupą o dużej i średniej aktywności fizycznej wystąpiła tylko w przypadku: liczby spożywanych posiłków, częstości spożywania mięsa i słodczy; u chłopców natomiast w częstości spożywania pieczywa razowego, mięsa i żywności typu „fast food”. U dziewcząt, jak i u chłopców, częstsze spożywanie produktów z wyżej wymienionych grup wystąpiło u badanych o dużej aktywności fizycznej.

**Wnioski.** Stwierdzone nieprawidłowości w sposobie odżywiania się, przy dużej aktywności fizycznej młodzieży ponadgimnazjalnej, wskazują na potrzebę zwiększenia edukacji żywieniowej badanych dziewcząt i chłopców.

**Słowa kluczowe:** *sposób żywienia, aktywność fizyczna, dziewczęta, chłopcy*

## INTRODUCTION

Physical activity and rational diet constitute vital determinants of health. However, a tendency to reduce physical activity level in favor of passive ways of spending free time have been observed recently [2, 3, 14], along with unfavorable nutritional behaviors, such as non-varied diets, deficient in minerals and vitamins. Usually, such diets are based on high-calorie products with low nutritional values [15, 20, 23].

Optimal frequency and intensity of physical activity for school children and adolescents have been a subject of many published guidelines. American National Association for Sport and Physical Education recommends at least 60 minutes of physical activity daily, optimally each day of the week [6]. Also according to WHO and European Community, to promote healthy growth, children and adolescents should undertake at least 60 minutes of moderate or intense activity each day, optimally in form of endurance exercises, improving agility and strength of various muscle groups [31]. However, the report published by the National Institute of Public Health – National Institute of Hygiene suggests that a considerable proportion of adolescents in Poland do not undertake the recommended amount of physical activity. The number of physically active individuals decreases with age, especially among girls. In 2010, appropriate levels of physical activity were presented by no more than 4% of girls from the oldest age group (17-18 years). However, there is a potential for improvement, as an increase in the proportion of regularly exercising individuals has been documented among the youngest boys and girls [30].

Too low level of physical activity, inappropriate diet and resultant overweight and obesity may affect psychophysical development of children and adolescents and lead to many diseases of the adulthood, such as diabetes mellitus, cardiovascular disorders and osteoporosis [11, 13, 22]. This may exert unfavorable effect on psychosocial functioning of an individual [8, 18]. Therefore, despite many previous studies dealing with the problem in question, social awareness with regards to beneficial effects of a rational diet and regular physical activity

still should be a subject of continuous monitoring and improvement.

The aim of the study was to analyze the diets of 16- to 18-year-old pupils; specifically we studied an association between physical activity levels of the study participants, their nutritional behaviors and consumption of selected food products.

## MATERIAL AND METHODS

The study included 110 girls and 65 boys between 16 and 19 years of age from two post-grammar vocational schools in Biała Podlaska. 65% of girls and 72% of boys commuted to schools from local villages.

All participants were subjected to a diagnostic survey with the questionnaire determining their dietary habits and frequency of consuming selected food products.

Physical activity levels were determined with the International Physical Activity Questionnaire – Short Form (IPAQ-SF) [7]. The questionnaire included 7 statements regarding various types of physical activity associated with daily living, work and recreation. We determined the time spent sitting, walking and performing moderate and vigorous physical activities. Each type of physical activity was expressed in MET-min/week, by multiplying the intensity coefficient for a given activity by the number of days the activity was done during the week and the amount of time spent in this activity in minutes per day. On the basis of these data, the respondents were stratified to high, moderate and low physical activity groups, in line with the IPAQ methodology [7]. However, due to small number of participants presenting with low physical activity levels (5 girls and 7 boys), we did not include this group in further analyses. Eventually, the study included two groups of boys and girls, characterized by high (Group 1) and moderate (Group 2) physical activity levels.

The groups were compared in terms of their dietary habits, with statistical significance of differences verified with the  $\chi^2$  test. All calculations were carried out with a Statistica 11 package.

## RESULTS

A survey with the International Physical Activity Questionnaire (IPAQ) enabled us to stratify girls and boys to groups characterized by high and moderate physical activity levels. 70% of girls and 69.2% of boys presented with high levels of physical activity, and remaining 25.5% of girls and 20.0% of boys were qualified to moderate physical activity group.

The data on dietary habits of girls and boys presenting with high and moderate levels of physical activity are summarized in Tables 1 and 2.

Table 1. Dietary habits of girls, stratified according to their physical activity levels

Parameter	Group 1		Group 2		$\chi^2$	p
	n	%	n	%		
<b>Number of meals a day</b>						
1-2	13	16.9	0	0.0	<b>11.830</b>	<b>0.018*</b>
3	20	26.0	9	32.1		
4	23	29.9	15	53.6		
5	11	14.3	4	14.3		
more than 5	10	13.0	0	0.0		
<b>Having breakfast</b>						
yes	49	63.6	18	64.3	0.003	0.951
no	28	36.4	10	35.7		
<b>Having a hot meal during the day</b>						
yes	59	76.6	21	75.0	0.029	0.863
no	18	23.4	7	25.0		
<b>Time of the last meal of the day</b>						
5.00-6.00 P.M.	19	24.7	7	25.0	4.306	0.116
7.00-8.00 P.M.	29	37.7	5	17.9		
after 8.00 P.M.	29	37.7	16	57.1		
<b>Preferred way of food processing</b>						
cooking	50	64.9	15	53.6	1.471	0.689
frying	19	24.7	9	32.1		
roasting	7	9.1	3	10.7		
grilling	1	1.3	1	3.6		
<b>Types of consumed beverages</b>						
juices, nectars	10	13.0	5	17.9	2.430	0.296
sweetened beverages	35	45.5	8	28.6		
water	32	41.6	15	53.6		
<b>Snacking between meals</b>						
yes	52	67.5	21	75.0	0.540	0.462
no	25	32.5	7	25.0		

\* significant difference at  $p \leq 0.05$

Most girls, especially those from moderate physical activity group (Group 2), declared having 4 meals a day. Female respondents presenting with high and moderate physical activity levels differed significantly in terms of the declared numbers of daily meals ( $p=0.018$ ). In contrast, we did not find significant intergroup differences in the number of daily meals consumed by boys from high and moderate physical activity groups. Irrespective of their physical activity level, most male respondents declared having 3 or 4 meals a day.

Table 2. Dietary habits of boys, stratified according to their physical activity levels

Parameter	Group 1		Group 2		$\chi^2$	p
	n	%	n	%		
<b>Number of meals a day</b>						
1-2	4	8.9	2	15.4	2.960	0.564
3	16	35.6	5	38.5		
4	12	26.7	4	30.8		
5	5	11.1	2	15.4		
more than 5	8	17.8	0	0.0		
<b>Having breakfast</b>						
yes	31	68.9	11	84.6	1.249	0.264
no	14	31.1	2	15.4		
<b>Having a hot meal during the day</b>						
yes	33	73.3	12	92.3	2.088	0.148
no	12	26.7	1	7.7		
<b>Time of the last meal of the day</b>						
5.00-6.00 P.M.	2	4.4	2	15.4	2.220	0.329
7.00-8.00 P.M.	20	44.4	4	30.8		
after 8.00 P.M.	23	51.1	7	53.8		
<b>Preferred way of food processing</b>						
cooking	15	33.3	5	38.5	0.975	0.807
frying	21	46.7	6	46.2		
roasting	6	13.3	2	15.4		
grilling	3	6.7	0	0.0		
<b>Types of consumed beverages</b>						
juices, nectars	9	20.0	2	15.4	1.425	0.490
sweetened beverages	23	51.1	9	69.2		
water	13	28.9	2	15.4		
<b>Snacking between meals</b>						
yes	38	84.4	13	100.0	2.299	0.129
no	7	15.6	0	0.0		

Having breakfast before school is a vital component of appropriate diet. The majority of our respondents, more often boys than girls, declared having breakfast before school; the proportion of boys having breakfast before school was higher in Group 2. Moreover, this group included larger proportion of boys who declared having a hot meal during the day.

We also asked our respondents about the time they usually had their last meal of the day. Most adolescents had their last meal very late, after 8.00 P.M. The largest proportion of girls and boys who chose this answer presented with moderate levels of physical activity.

Nearly half of boys from both groups pointed to frying as their preferred way of food processing. In contrast, majority of girls from both groups (64.9% and 53.6% of the respondents from Group 1 and Group 2, respectively) preferred cooking over frying.

The largest proportion of boys, both those from high and moderate physical activity groups, preferred sweetened beverages. Such beverages were particularly popular among boys from Group 2. Water, the most commonly recommended type of beverage for children and adolescents, was more popular among boys presenting with high physical activity levels. 53.6% of girls overall pointed to water as their preferred beverage

type. However, detailed analysis showed that female respondents from Group 1 preferred both sweetened beverages (45.5%) and water (41.6%). None of these intergroup differences reached the threshold of statistical significance.

The majority of participants, more often boys than girls, declared having snacks between meals. Snacking was more prevalent among individuals from Group 2 (as declared by 100% and 75% of boys and girls, respectively).

Table 3. Frequency of selected food product consumption among girls, stratified according to their physical activity levels

Food product group	Group 1		Group 2		$\chi^2$	p
	n	%	n	%		
<b>Whole-wheat bread</b>						
every day	15	19.5	8	28.6	6.298	0.178
3-4 times a week	18	23.4	1	3.6		
1-2 times a week	25	32.5	9	32.1		
less often	9	11.7	4	14.3		
not at all	10	13.0	6	21.4		
not at all	10	13.0	6	21.4		
<b>Dairy products</b>						
every day	15	19.5	5	17.9	1.941	0.746
3-4 times a week	31	40.3	11	39.3		
1-2 times a week	17	22.1	9	32.1		
less often	12	15.6	3	10.7		
not at all	2	2.6	0	0.0		
not at all	2	2.6	0	0.0		
<b>Meat</b>						
every day	31	40.3	5	17.9	7.869	0.049*
3-4 times a week	27	35.1	9	32.1		
1-2 times a week	13	16.9	11	39.3		
less often	6	7.8	3	10.7		
not at all	0	0.0	0	0.0		
not at all	0	0.0	0	0.0		
<b>Fish</b>						
every day	0	0.0	0	0.0	11.281	0.103
3-4 times a week	5	6.5	1	3.6		
1-2 times a week	41	53.2	8	28.6		
less often	30	39.0	15	53.6		
not at all	1	1.3	4	14.3		
not at all	1	1.3	4	14.3		
<b>Vegetables and fruits</b>						
every day	21	27.3	8	28.6	6.54	0.881
3-4 times a week	37	48.1	14	50.0		
1-2 times a week	19	24.7	4	14.3		
less often	0	0.0	2	7.1		
not at all	0	0.0	0	0.0		
not at all	0	0.0	0	0.0		
<b>Fast foods</b>						
every day	0	0.0	0	0.0	4.525	0.21
3-4 times a week	4	5.2	0	0.0		
1-2 times a week	32	41.6	11	39.3		
less often	31	40.3	16	57.1		
not at all	10	13.0	1	3.6		
not at all	10	13.0	1	3.6		
<b>Sweets</b>						
every day	18	23.4	3	10.7	19.849	0.005**
3-4 times a week	24	31.2	14	50.0		
1-2 times a week	19	24.7	0	0.0		
less often	10	13.0	11	39.3		
not at all	6	7.8	0	0.0		
not at all	6	7.8	0	0.0		

\*\* significant difference at  $p \leq 0.01$

Only varied diet may cover the demand for all essential nutrients. Therefore, we asked our respondents how often they included whole-wheat bread, dairy products, meat, fish, vegetables, fruits, fast foods and sweets in their diets. The results for girls and boys from high and moderate physical activity groups are presented in Tables 3 and 4.

Most respondents declared consuming whole-wheat bread. Girls, irrespective of their physical activity levels,

Table 4. Frequency of selected food product consumption among boys, stratified according to their physical activity levels

Food product group	Group 1		Group 2		$\chi^2$	p
	n	%	n	%		
<b>Whole-wheat bread</b>						
every day	11	24.4	1	7.7	13.959	0.007**
3-4 times a week	20	44.4	3	23.1		
1-2 times a week	9	20.0	2	15.4		
less often	4	9.0	7	53.8		
not at all	1	2.2	0	0.0		
not at all	1	2.2	0	0.0		
<b>Dairy products</b>						
every day	15	33.3	6	46.2	1.083	0.781
3-4 times a week	19	42.2	4	30.8		
1-2 times a week	10	22.2	3	23.1		
less often	1	2.2	0	0.0		
not at all	0	0.0	0	0.0		
not at all	0	0.0	0	0.0		
<b>Meat</b>						
every day	27	60.0	3	23.1	11.631	0.020*
3-4 times a week	16	35.6	6	46.1		
1-2 times a week	2	4.4	2	15.4		
less often	0	0.0	1	7.7		
not at all	0	0.0	1	7.7		
not at all	0	0.0	1	7.7		
<b>Fish</b>						
every day	0	0.0	0	0.0	2.171	0.538
3-4 times a week	3	6.7	2	15.4		
1-2 times a week	23	51.1	6	46.2		
less often	15	33.3	5	38.5		
not at all	4	8.9	0	0.0		
not at all	4	8.9	0	0.0		
<b>Vegetables and fruits</b>						
every day	20	44.4	5	38.5	1.533	0.464
3-4 times a week	13	28.9	6	46.2		
1-2 times a week	12	26.7	2	15.4		
less often	0	0.0	0	0.0		
not at all	0	0.0	0	0.0		
not at all	0	0.0	0	0.0		
<b>Fast foods</b>						
every day	10	22.2	0	0.0	13.308	0.009**
3-4 times a week	16	35.6	1	7.7		
1-2 times a week	11	24.4	4	30.8		
less often	7	15.6	6	46.2		
not at all	1	2.2	2	15.4		
not at all	1	2.2	2	15.4		
<b>Sweets</b>						
every day	14	31.1	2	15.4	2.928	0.403
3-4 times a week	20	44.4	5	38.5		
1-2 times a week	8	17.8	5	38.5		
less often	3	6.7	1	7.7		
not at all	0	0.0	0	0.0		
not at all	0	0.0	0	0.0		

\* significant difference at  $p \leq 0.05$ ;

\*\* significant difference at  $p \leq 0.01$

usually consumed this type of bread 1-2 times a week. In contrast, the two groups of boys varied in terms of their frequencies of whole-wheat bread consumption. While the largest proportion of boys from high physical activity group consumed whole-wheat bread 3-4 times a week, individuals presenting with moderate levels of physical activity usually chose answer “less often than once a week”. The  $\chi^2$  test showed that this intergroup difference in the frequency of whole-wheat bread consumption was statistically significant. We did not observe significant intergroup differences in the frequencies of milk and dairy consumption. Most girls, irrespective of their physical activity levels, declared consuming milk and dairy 3-4 times a week. Boys from moderate physical activity group consumed dairy products slightly more often than their peers presenting with high physical activity levels, typically every day (46.2%).

In both girls and boys, physical activity turned out to be a significant determinant of the frequency of meat consumption. The largest proportions of individuals

presenting with high physical activity levels (40.3% and 60.0% of girls and boys, respectively) declared that they consumed meat every day. In contrast, such high frequencies of meat consumption were declared by only 17.9% and 23.1% of girls and boys from moderate physical activity groups, respectively.

Girls from high physical activity group usually consumed fish 1-2 times a week, whereas those presenting with moderate physical activity levels declared that they ate fish less often than once a week. Most boys, irrespective of their physical activity levels, declared consuming fish 1-2 times a week.

Vegetables and fruits should be included in everyday diet of children and adolescents. However, such high frequencies of fruit and vegetable consumption were declared by only 27.3% and 28.5% of girls from high and moderate physical activity groups, respectively. The situation was somehow better in the case of boys: daily intake of vegetables and fruits was declared by

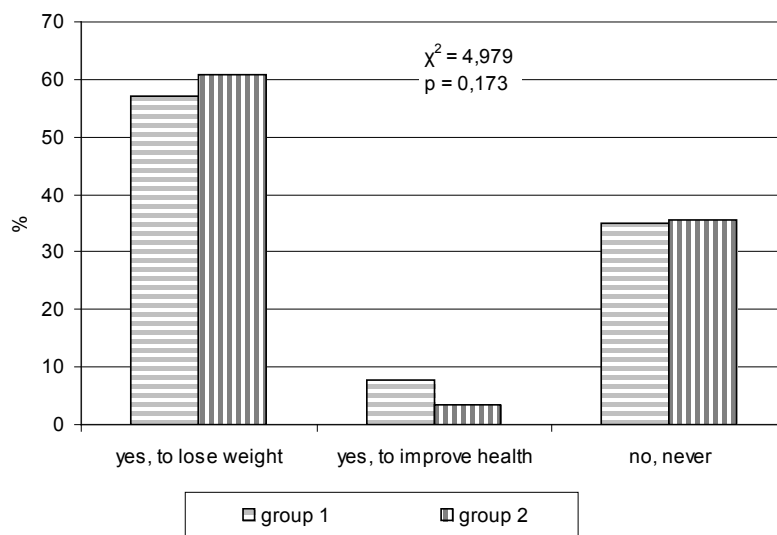


Figure 1. Use of weight-loss diets among girls, stratified according to their physical activity levels.

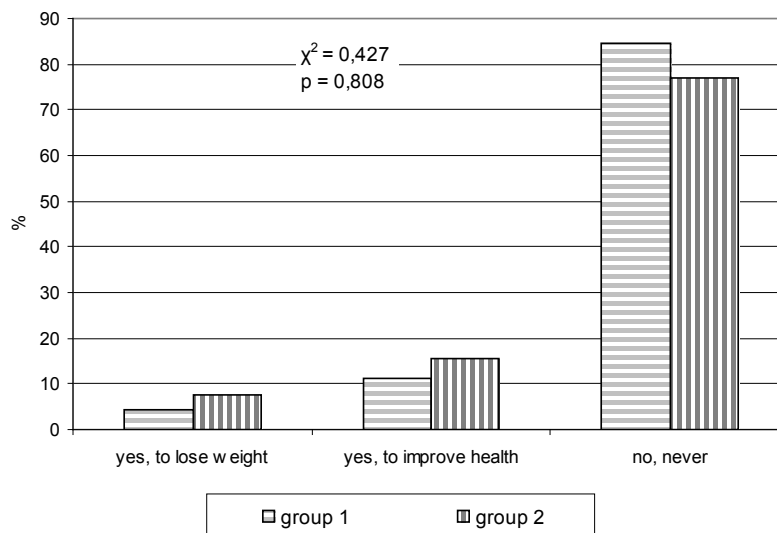


Figure 2. Use of weight-loss diets among boys, stratified according to their physical activity levels.



44.4% and 38.5% of male respondents from Group 1 and Group 2, respectively.

Growing popularity of the so-called fast foods is a negative tendency observed among Polish adolescents. We showed that this type of food was more often preferred by boys, especially those from high physical activity group. More than 20% of male respondents presenting with high physical activity levels declared consuming fast foods every day, and more than 35% of them did so 3-4 times a week. Boys from moderate physical activity group usually consumed fast foods less often than once a week. These intergroup differences turned out to be statistically significant. Girls presenting with different physical activity levels did not differ significantly in terms of their frequencies of fast food consumption; the most often declared frequencies of fast food consumption were "1-2 times a week" and "less often than once a week".

Growing popularity of sweets in the diet of children and adolescents is with no doubt unfavorable from a health perspective. We showed that sweets were more often preferred by individuals from high physical activity groups. Up to 23.4% of girls presenting with high physical activity levels and only 10.7% of those from moderate physical activity group declared consuming sweets every day. Similarly, daily consumption of sweets was declared by up to 31.1% and only 15.4% of boys presenting with high and moderate physical activity levels, respectively. Moreover, we observed that a large proportion of girls from moderate physical activity group (39.9%) consumed sweets less often than once a week. The intergroup differences in the frequency of sweet consumption turned out to be statistically significant solely in the case of girls.

Due to growing popularity of Western patterns of extremely slim silhouette, many young people start various types of weight-loss plans. Such practices were declared by most girls included in our study (64.9% and 64.3% of female respondents from high and moderate physical activity groups, respectively). The principal motivation behind switching to a weight-loss diet was reduction of body weight. Boys practiced slimming diets less often than girls, usually to improve their health. We did not find significant differences in the frequency of practicing weight-loss diets by boys presenting with different physical activity levels (Figures 1 and 2).

## DISCUSSION

Physical activity is an integral component of human health. However, the amount of physical activity undertaken by adolescents worldwide is far from satisfactory [1, 4, 12], and Polish youth do not differ in this matter from their peers from other European countries [27,

29]. Nevertheless, some adolescent populations were reported to present with moderate or even high levels of physical activity [5, 26].

Our study showed that a considerable proportion of Polish adolescents (approximately 70%) presented with high levels of physical activity. However, direct comparison between our findings and the results published by other authors may be hindered due to differences in the methodology of physical activity assessment.

Aside from physical activity, also a rational diet constitutes a significant determinant of health. Many previous studies showed that individuals presenting with higher physical activity levels more often declare adherence to the rules of healthy eating [17, 26]. However, also an opposite tendency was reported, as analyses of nutritional behaviors presented by adolescent athletes revealed many mistakes, such as insufficient number of daily meals, exercising in a fasted state, too frequent consumption of sweets, fast foods, snacks (e.g. crisps, salty sticks), and drinking sweetened carbonated beverages [9, 10, 19].

We did not find an evident relationship between dietary habits and physical activity levels. Girls presenting with moderate levels of physical activity declared having larger number of meals per day than their peers from high physical activity group. In contrast, we did not observe significant intergroup differences in the numbers of daily meals declared by boys presenting with different physical activity levels (typically three meals per day). Similar numbers of meals in a day were declared by boys and girls participating in the study conducted by *Sitko et al.* [25], as well as by girls examined by *Piotrowska et al.* [21].

Having the first meal before school is an important component of appropriate diet. However, up to one-third of girls participating in our study did not eat breakfast. In boys, this problem was observed mostly in high physical activity group. *Wanat et al.* [28] showed that more than 50% of grammar school pupils do not eat breakfast. According to *Sitko et al.* [25], this problem is more prevalent among girls than in boys, as well as among the secondary school pupils (40% as compared to 18% of adolescents from grammar schools). Also the fact that a considerable proportion of our participants ate dinner late should be considered alarming. More than 50% of boys from both groups and 57.1% of girls from Group 2 declared having their last meal of the day later than at 8.00 P.M.. This phenomenon is increasingly reported among adolescents, both in Poland and in other European countries [21, 24].

Another vital problem is snacking between meals, especially consumption of high-calorie products with low nutritional values. The proportion of respondents who declared having snacks between main meals was higher in moderate physical activity groups (up to 100%

of boys). According to *Szczerbiński* et al. [26], snacking between meals is more common among boys than in girls. While the proportion of boys who declared eating between meals decreased with an increase in physical activity index (UIAF), the opposite situation was observed in girls, in whom the prevalence of snacking between meals was higher in the group presenting with the highest levels of physical activity.

Another unfavorable dietary habit documented in our study is repletion of fluids with widespread and highly advertised sweetened beverages. The vast majority of girls and boys participating in our study declared their preference to this type of beverages. Water was the second most popular beverage among our respondents. The only exception pertained to girls from moderate physical activity group who pointed to water as their preferred beverage. Previously *Lagowska* et al. [16] showed that water is the most popular beverage among Polish adolescents; according to these authors, water was preferred by adolescent athletes and least popular among participants presenting with low physical activity levels. In turn, subjects characterized by moderate levels of physical activity declared their preference to sweetened beverages, alcohol and energy drinks. Extremely high popularity of sweetened carbonated beverages, including cola-type beverages, was also reported by *Szczerbiński* et al. [26], especially in the case of girls and boys presenting with the lowest values of physical activity index.

Also the type of ingested foods and the frequency of their consumption are important components of appropriate diet. Therefore, we analyzed the frequencies of whole-wheat bread, milk, dairy, meat, fish, vegetable and fruit consumption among our respondents. The level of physical activity turned out to be associated with the frequency of whole-wheat bread consumption among boys, and determined the frequency of meat consumption in both sexes. The abovementioned food products were generally more popular among girls and boys presenting with high levels of physical activity. These findings are consistent with the data published by *Szczerbiński* et al. [26]. According to these authors, higher levels of physical activity are associated with greater adherence of adolescents to the rules of healthy eating, namely more frequent consumption of fruits, vegetables, milk and dairy products. In the same study, an increase in physical activity index was associated with a decrease in the proportion of boys who declared eating sweets and fast foods. Similar phenomenon was also reported by *Lagowska* et al. [16], who showed that fast foods were most popular among pupils presenting with low physical activity levels, and least often consumed by adolescent athletes. However, we observed the opposite phenomenon, as individuals presenting with high levels of physical activity declared consuming

sweets and fast foods more often than their peers from moderate physical activity group.

## CONCLUSIONS

1. This study did not show an evident association between dietary habits and physical activity levels of adolescent girls and boys. Physical activity turned out to be a significant determinant of dietary habits solely in the case of whole-wheat bread, meat and fast food consumption among boys and ingestion of meat and sweets among girls.
2. We identified a number of dietary mistakes, such as not having breakfast, eating late, snacking between meals and consumption of sweetened beverages.
3. Altogether, these findings justify intensification of dietary education programs for adolescent boys and girls.

### Conflict of interest

*The authors declare no conflict of interest.*

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