

ORIGINAL ARTICLE

ASSOCIATION BETWEEN EATING HABITS AND PHYSICAL ACTIVITY IN PRIMARY SCHOOL STUDENTS

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ABSTRACT

The aim: The study aimed to assess the association between the physical activity level and eating habits of primary school students.**Material and methods:** 139 children attending one of the Polish primary school or football school were included. The research tool was author's anonymous survey.**Results:** The high physical activity level was observed in 34.1% of boys and in 8.8% of girls. As the level of physical activity increased, the consumption of vegetables and fruits also increased. Whole grain bread, coarse-grained groats, whole grain pasta and brown rice were more popular among students with a high physical activity level. The greater the physical activity, the greater the amount of water drank by students. The consumption of sweets, fast food, and ready-made meals, such as frozen pizza or Chinese soup, decreased with increased physical activity. The choice of healthier substitutes for unhealthy snacks was declared by students with moderate or high physical activity level. There was no correlation between BMI and age and the physical activity level. Girls were less active than boys.**Conclusions:** More active physically children had better eating habits and were more aware of healthy eating principles than less active people.**KEY WORDS:** eating habits, students, children and adolescents, physical activity, healthy eating

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INTRODUCTION

Adherence to the principles of healthy nutrition by school-children is particularly essential for their proper development and growth. Students show an increased demand for energy, vitamins, and minerals, which they need for effective learning and concentration [1]. Eating habits can be characterized as systematic behavior when the need for nutrients and emotional and social goals is achieved [2]. The parents, in particular the mother, play the most crucial role in shaping the children's eating habits. Expanding the diet too early can overfeed the baby. On the other hand, a quick withdrawal from breastfeeding may lead to improper supply of nutrients [2, 3]. The eating behaviors developed in the toddler period are most often fixed and, to a large extent, determine the food preferences in the later years of life [3]. Parents shape the children's nutrition habits not only by giving specific food but also through the example they give them [2, 4]. The eating habits of children are also influenced by the media, which most often promote highly processed foods. Ads for unhealthy food products can contribute to poor food choices in children [2]. Healthy behaviors of children and adolescents are also determined by relationships with peers in and outside school. Among adolescents, different dietary habits often occur, which most often deviate significantly from the conventional diet. These include vegetarian, vegan, mono-nutrient, and

low-energy diets. It is a disturbing phenomenon, as young people are often unaware of the effects of improperly balanced diets [3, 5, 6].

Improper nutrition in children leads to worse psychomotor development, rapid fatigue, decreased concentration, and disease development both in childhood and later [1, 7]. Excess or deficiency of energy and nutrients during growth and development can have serious health consequences in adulthood. Obesity in children can be associated with physical and emotional problems and increase the risk of developing chronic diseases. Obese people often have psychosocial problems caused by low self-esteem. Children who became overweight and obese at school age show a higher probability of developing obesity in adulthood [1, 3].

Movement is one of the most essential biological human needs. It is particularly crucial at school age [8, 9]. It stimulates and supports physical, motor, intellectual, mental, and social development in developmental age. It has a positive effect on adaptation to environmental changes and various stimuli (e.g., temperature changes) and strengthening immunity [11]. It helps to maintain healthy body weight through increased energy expenditure. Physical activity helps prevent developmental and health disorders, particularly overweight, obesity, diseases of the locomotor system, atherosclerosis, and osteoporosis. Properly selected physical activity may support the treatment

Table 1. Nutritional status of respondents according to BMI value (N = 139).

Body mass index [kg/m ²]	N (%)
underweight [< 18.5]	18 (12.9%)
normal weight [18.5 – 24.9]	115 (82.7%)
overweight [25.0 – 29.9]	6 (4.3%)
obesity [> 30.0]	0 (0.0%)

Table 2. The physical activity level of the study group based on the 2008 Physical Activity Guidelines for Americans (N = 139).

Physical activity level	N (%)
no activity	15 (10.8%)
low	46 (33.1%)
moderate	45 (32.4%)
high	33 (23.7%)

of diseases such as obesity, bronchial asthma, diabetes, cerebral palsy, and movement disorders [9]. Research shows that the percentage of young people who spend at least an hour on a physical activity every day is very low in Poland. Girls are less physically active. The unsatisfactory level of activity is mainly caused by modern amenities, automation, computerization, means of communication, as well as mass media [8, 11]. A low level of physical activity also causes posture defects and increases the risk of obesity, a significant risk factor, among others, neoplastic diseases and diabetes type 2 [12, 13].

Students' daily activity should be a vital element of the day, starting from walking, cycling, physical education lessons, through sports activities, additional training, or team games with peers [9, 10]. According to the World Health Organization (WHO) recommendations, children and teenagers should undertake at least 60 minutes of moderate physical activity every day, e.g., in the form of brisk walking, dancing, or housework. It is recommended to perform intense physical activity at least three times a week, which will strengthen the muscles and bones, e.g., intensive fitness classes, team games with peers, strength exercises, or swimming. The Food and Nutrition Institute also recommends that in addition to daily basic physical activity, one should exercise 3 – 5 times of moderate-intensity

sports and exercise 2 – 3 times to strengthen muscles and shape the body during the week. The pyramid of physical activity developed by the Food and Nutrition Institute draws attention to the need to minimize the time spent in front of the computer monitor and other electronic devices [11].

THE AIM

The study aimed to assess the relationship between the level of physical activity and the diet of schoolchildren.

MATERIALS AND METHODS

One hundred thirty-nine students aged 10 to 16 participated in the study, including 57 (41%) girls and 82 (59%) boys. The children included in the study attended the fourth-eighth grade of the primary school in Staniatki (n = 109; 78.4%) or the Staniatki Football School (n = 30; 21.6%) in the Małopolskie Voivodeship.

The research was conducted using an author's anonymous questionnaire consisting of thirty questions. The body mass index (BMI) was calculated based on the given height and weight, and its level was determined using percentile grids.

To investigate the relationship between the level of physical activity and the study population's eating habits, students were divided into four groups based on the classification of total weekly physical activity (2008 Physical Activity Guidelines for Americans) [14]. On its basis, four categories were distinguished: inactivity, low, moderate, and high activity.

Microsoft Excel from the Microsoft Office 2007 suite and STATISTICA 10.0, Stat Soft Polska, were used to analyze the collected data.

RESULTS

To verify the influence of various factors on the level of physical activity, the respondents were divided into groups according to gender, age, and BMI. Students were grouped into the following age groups: 10 to 12 years (n = 76; 54.7%) and 13 to 16 years (n = 63; 45.3%). Among the respondents,

Table 3. The level of physical activity by sex, age, and body weight (n = 139).

		Level of physical activity			
		No activity (N = 15)	Low (N = 46)	Moderate (N = 45)	High (N = 33)
Sex	Girls	9 (15.8%)	25 (43.9%)	18 (31.6%)	5 (8.8%)
	Boys	6 (7.3%)	21 (25.6%)	27 (32.9%)	28 (34.1%)
Age	10-12 years	8 (10.5%)	28 (36.8%)	21 (27.6%)	19 (25.0%)
	13-16 years	7 (11.1%)	18 (28.6%)	24 (38.1%)	14 (22.2%)
Weight	Underweight	2 (11.1%)	7 (38.9%)	5 (27.8%)	4 (22.2%)
	Normal weight	12 (10.4%)	37 (32.2%)	39 (33.9%)	27 (23.5%)
	Overweight	1 (16.7%)	2 (33.3%)	1 (16.7%)	2 (33.3%)

Table 4. Characteristics of meals consumed during the day (n = 139).

Characteristics of meals		Level of physical activity			
		No activity (N = 15)	Low (N = 46)	Moderate (N = 45)	High (N = 33)
Number of meals N (%)	1 – 2	1 (6.7%)	4 (8.7%)	2 (4.4%)	2 (6.1%)
	3	8 (53.3%)	21 (45.7%)	25 (55.6%)	6 (18.2%)
	4 – 5	6 (40.0%)	20 (43.5%)	17 (37.8%)	25 (75.8%)
	more than 5	0 (0.0%)	1 (2.2%)	1 (2.2%)	0 (0.0%)
Frequency of eating N (%)	every 2 – 3h	4 (26.7%)	15 (32.6%)	11 (24.4%)	15 (45.5%)
	every 4 – 5h	10 (66.7%)	27 (58.7%)	29 (64.4%)	16 (48.5%)
	every 6h or more	1 (6.7%)	4 (8.7%)	5 (11.1%)	2 (6.1%)
The first meal since getting up N (%)	up to 1h	11 (73.3%)	36 (78.3%)	41 (91.1%)	24 (72.7%)
	up to 2h	3 (20.0%)	8 (17.4%)	3 (6.7%)	6 (18.2%)
	three and more hours	1 (6.7%)	2 (4.3%)	1 (2.2%)	3 (9.1%)
Last meal before going to bed N (%)	just before	2 (13.3%)	6 (13.0%)	3 (6.7%)	1 (3.0%)
	1h	2 (13.3%)	20 (43.5%)	21 (46.7%)	15 (45.5%)
	2 – 3h	10 (66.7%)	18 (39.1%)	19 (42.2%)	16 (48.5%)
	four or more hours	1 (6.7%)	2 (4.3%)	2 (4.4%)	1 (3.0%)
Sneaking between meals N (%)	yes	10 (66.7%)	17 (37.0%)	25 (55.6%)	18 (54.5%)
	no	5 (33.3%)	28 (60.9%)	20 (44.4%)	15 (45.5%)

82.7% (n = 115) were students with normal body weight. There was no obesity in any of the students (Table 1).

Most students in the study population characterized a low or moderate (n = 91; 65.5%) level of physical activity. Students not undertaking physical activity accounted for 10.8% (n = 15) (Table 2).

The group of boys (n = 55; 39.6%) as well as students with normal body weight (n = 66; 47.5%) showed a higher level of activity. Age did not affect the level of physical activity. A lower level of physical activity in the underweight group was more often observed than in students with normal weight (Table 3).

Table 4 presents the characteristics of answers to the questions about the eating habits of particular groups of students related to the number, frequency, and time of meals consumed during the day. Students with moderate or high levels of physical activity had habits in line with proper nutrition principles. Students, who were not physically active, mainly sneaked between meals (n = 10; 66.7%).

As the level of physical activity increased, the consumption of vegetables and fruits also increased. Raw vegetables were also more popular among students with a high level of physical activity (n = 50; 64.1%). It was also true for whole-meal bread (n = 38; 48.7%), coarse-grained groats (n = 14; 17.9%), whole-meal pasta and brown rice (n = 13; 16.7%). Higher consumption of valuable protein sources, such as natural milk (n = 70; 89.7%), natural acidified dairy products (n = 41; 52.6%), fish or legume seeds, was

observed in the group of students declaring a higher level of physical activity. The greater the physical activity, the greater the amount of fluid drunk by the students. The most frequently consumed drink in this group was water (n = 73; 93.6%). The frequency of consumption of sweets, fast food, and ready-made meals, such as frozen pizza or Chinese soup, decreased with increased physical activity. The choice of healthier substitutes for unhealthy snacks was declared by students with moderate or high levels of physical activity (Table 5).

Among the surveyed students, the greatest number of respondents positively assessed their eating habits in the group characterized by a high level of physical activity (n = 24; 72.7%). The negative assessment of eating habits in all students' groups was at a similar level (Table 6).

DISCUSSION

This study showed that overweight students were most often characterized by low or high levels of physical activity. In the study by Łagowska, K. et al., overweight adolescents mostly represented a low level of physical activity [15].

According to the basic principles of healthy eating, the number of meals a day should be between four and five [16]. This study showed that people who were not involved in sports and who were moderately active consumed three meals or less during the day. The largest percentage of respondents who consumed at least four meals a day were people with a high physical activity level. Szczerbiński R.

Table 5. Eating habits of children representing different levels of physical activity (N = 139).

	Level of physical activity			
	No activity (N = 15)	Low (N = 46)	Moderate (N = 45)	High (N = 33)
The frequency of vegetables consumption				
never	1 (6.7%)	1 (2.2%)	0 (0.0%)	1 (3.0%)
less once a week	1 (6.7%)	1 (2.2%)	2 (4.4%)	1 (3.0%)
once a week	0 (0.0%)	1 (2.2%)	2 (4.4%)	0 (0.0%)
several times a week	5 (33.3%)	10 (21.7%)	8 (17.8%)	3 (9.1%)
daily	3 (20.0%)	16 (34.8%)	12 (26.7%)	10 (30.3%)
several times a day	5 (33.3%)	17 (37.0%)	21 (46.7%)	18 (54.5%)
The most commonly consumed form of vegetables				
raw	7 (46.7%)	21 (45.7%)	24 (53.3%)	26 (78.8%)
boiled in water	4 (26.7%)	24 (52.2%)	22 (48.9%)	16 (48.5%)
steamed	0 (0.0%)	12 (26.1%)	13 (28.9%)	7 (21.2%)
baked	3 (20.0%)	9 (19.6%)	7 (15.6%)	7 (21.2%)
fried	2 (13.3%)	8 (17.4%)	7 (15.6%)	4 (12.1%)
grilled	0 (0.0%)	6 (13.0%)	5 (11.1%)	4 (12.1%)
The frequency of fruits consumption				
never	0 (0.0%)	1 (2.2%)	1 (2.2%)	0 (0.0%)
once a week	0 (0.0%)	1 (2.2%)	1 (2.2%)	1 (3.0%)
several times a week	6 (40.0%)	7 (15.2%)	7 (15.6%)	2 (6.1%)
daily	6 (40.0%)	7 (15.2%)	7 (15.6%)	3 (9.1%)
several times a day	3 (20.0%)	30 (65.2%)	29 (64.4%)	27 (81.8%)
The most commonly eaten grain products				
white bread	13 (86.7%)	37 (80.4%)	34 (75.6%)	21 (63.6%)
whole-meal bread	4 (26.7%)	17 (37.0%)	20 (44.4%)	18 (54.5%)
coarse-grained groats	0 (0.0%)	6 (13.0%)	9 (20.0%)	5 (15.2%)
fine-grained groats	1 (6.7%)	5 (10.9%)	3 (6.7%)	4 (12.1%)
white pasta, white rice	10 (66.7%)	24 (52.2%)	25 (55.6%)	25 (75.8%)
whole-wheat pasta; brown rice	0 (0.0%)	5 (10.9%)	7 (15.6%)	6 (18.2%)
The type of the most commonly used heat treatment of meat				
frying	8 (53.3%)	25 (54.3%)	26 (57.8%)	23 (69.7%)
baking	5 (33.3%)	23 (50.0%)	28 (62.2%)	21 (63.6%)
boiling in water	9 (60.0%)	21 (45.6%)	17 (37.8%)	9 (27.3%)
steaming	0 (0.0%)	7 (15.2%)	5 (11.1%)	5 (15.2%)
stewing	2 (13.3%)	7 (15.2%)	5 (11.1%)	12 (36.4%)
grilling	1 (6.7%)	8 (17.4%)	9 (20.0%)	11 (33.3%)
The frequency of legumes consumption				
never	3 (21.4%)	8 (17.4%)	7 (15.6%)	3 (9.1%)
less than once a month	8 (50.0%)	9 (19.6%)	8 (17.8%)	6 (18.2%)
less than once a week	2 (14.3%)	12 (26.1%)	16 (35.6%)	9 (27.3%)
1 – 2 times a week	2 (14.3%)	17 (37.0%)	14 (31.1%)	15 (45.5%)
The type of dairy products consumed most often				
natural milk	10 (66.7%)	33 (71.7%)	40 (88.9%)	30 (90.9%)
flavored milk	1 (6.7%)	1 (2.2%)	5 (11.1%)	3 (9.1%)
natural acidified dairy products	8 (53.3%)	15 (32.6%)	22 (48.9%)	19 (57.6%)
sour flavored dairy products	4 (26.7%)	21 (45.6%)	15 (33.3%)	11 (33.3%)
yellow cheese	8 (53.3%)	32 (69.6%)	30 (66.7%)	25 (75.8%)
cottage cheese	5 (33.3%)	14 (30.4%)	10 (22.2%)	16 (48.5%)
The frequency of fish consumption				
never	1 (6.7%)	7 (15.2%)	5 (9.1%)	1 (3.0%)
less than once a month	5 (33.3%)	11 (23.9%)	12 (27.3%)	5 (15.2%)
less than once a week	4 (26.7%)	6 (13.0%)	7 (15.9%)	6 (18.2%)
once a week	4 (26.7%)	16 (34.8%)	19 (43.2%)	17 (51.5%)
2 – 3 times a week	1 (6.7%)	6 (13.0%)	2 (4.5%)	4 (12.1%)

The most commonly used sandwich spreads				
margarine	2 (13.3%)	8 (17.4%)	8 (17.8%)	6 (18.2%)
butter	12 (80.0%)	42 (91.3%)	38 (84.4%)	29 (87.9%)
cottage cheese	3 (20.0%)	6 (13.0%)	2 (4.4%)	6 (18.2%)
sandwich cheese	2 (13.3%)	10 (21.7%)	13 (86.7%)	12 (36.4%)
flavored butter	2 (13.3%)	6 (13.0%)	11 (24.4%)	3 (9.1%)
jam	4 (26.7%)	16 (34.8%)	16 (35.6%)	11 (33.3%)
lard	0 (0.0%)	3 (6.5%)	0 (0.0%)	1 (3.0%)
vegetable paste	0 (0.0%)	2 (4.3%)	1 (2.2%)	4 (12.1%)
other	0 (0.0%)	1 (2.2%)	5 (11.1%)	7 (21.2%)
The amount of fluids drinking during the day				
0.5 L	0 (0.0%)	2 (4.5%)	1 (2.3%)	0 (0.0%)
less than 1 L	0 (0.0%)	4 (9.1%)	3 (6.8%)	1 (3.0%)
1 – 1.5 L	3 (23.1%)	14 (29.5%)	8 (18.2%)	6 (18.2%)
above 1.5 L	9 (53.8%)	11 (25.0%)	18 (40.9%)	11 (33.3%)
2 L and more	3 (23.1%)	15 (31.8%)	14 (31.8%)	15 (45.5%)
The type of fluids most commonly consumed				
water	12 (80.0%)	36 (78.3%)	42 (93.3%)	31 (93.9%)
tea	9 (60.0%)	27 (58.7%)	35 (77.8%)	27 (81.8%)
sweet carbonated drinks	2 (13.3%)	13 (28.3%)	14 (31.1%)	4 (12.1%)
energy drinks	2 (13.3%)	3 (6.5%)	4 (8.9%)	5 (15.2%)
freshly squeezed juices	1 (6.7%)	14 (30.4%)	9 (20.0%)	16 (48.5%)
pasteurized juices	2 (13.3%)	13 (28.3%)	16 (35.6%)	10 (30.3%)
Type of snacks most often consumed				
sweets	7 (46.7%)	23 (50.0%)	22 (48.9%)	14 (42.4%)
salty snacks	6 (40.0%)	17 (37.0%)	15 (33.3%)	6 (18.2%)
fruits	7 (46.7%)	33 (71.7%)	31 (68.9%)	25 (75.8%)
vegetables	1 (6.7%)	6 (13.0%)	6 (13.3%)	7 (21.2%)
nuts	5 (33.3%)	8 (17.4%)	12 (26.7%)	7 (21.2%)
other	1 (6.7%)	2 (4.3%)	1 (2.2%)	4 (12.1%)
The frequency of consumption of sweets and salty snacks				
never	0 (0.0%)	3 (6.8%)	1 (2.3%)	1 (3.0%)
less than once a week	7 (46.2%)	6 (11.4%)	11 (25.0%)	13 (39.4%)
several times a week	3 (23.1%)	15 (34.1%)	15 (31.8%)	8 (24.2%)
daily	3 (23.1%)	14 (31.8%)	10 (22.7%)	5 (15.2%)
several times a day	2 (7.7%)	8 (15.9%)	8 (18.2%)	6 (18.2%)
The frequency of fast food consumption				
never	3 (23.1%)	4 (9.1%)	3 (6.8%)	8 (24.2%)
less than once a month	9 (53.8%)	24 (52.3%)	27 (59.1%)	21 (63.6%)
less than once a week	1 (7.7%)	11 (22.7%)	14 (29.5%)	2 (6.1%)
1 – 2 times a week	1 (7.7%)	6 (13.6%)	2 (4.5%)	0 (0.0%)
3 or more times a week	1 (7.7%)	1 (2.3%)	0 (0.0%)	2 (6.1%)
The frequency of consumption of ready-made meals (e.g. frozen pizza, Chinese soup)				
never	4 (23.1%)	9 (18.2%)	13 (27.9%)	12 (36.4%)
less than once a month	5 (38.5%)	15 (31.8%)	15 (32.6%)	14 (42.4%)
less than once a week	4 (23.1%)	10 (22.7%)	10 (23.3%)	4 (12.1%)
1 – 2 times a week	1 (7.7%)	9 (20.5%)	7 (16.3%)	3 (9.1%)
3 or more times a week	1 (7.7%)	3 (6.8%)	0 (0.0%)	0 (0.0%)

et al. showed a similar relationship in their work [17]. In the study by Durkalec-Michalski K. et al., consumption of 4-5 meals was declared by twice as many active people as in the inactive [17]. The above research results showed that active students consumed more meals during the day than inactive respondents.

In the study by Szczerbiński R. et al., it was observed that the boys with the lowest level of physical activity (87.2%) most often used snacks between meals. It was also shown that with the increase in the level of physical activity, the percentage of boys eating snacks decreased. The same study found an inverse relationship for girls.

Table 6. Self-assessment of diet (N = 139)

Do you think you are eating healthy?	The level of physical activity			
	No activity (N = 15)	Low (N = 46)	Moderate (N = 45)	High (N = 33)
yes	7 (46.2%)	26 (56.8%)	27 (61.4%)	24 (72.7%)
no	2 (15.4%)	7 (15.9%)	5 (11.4%)	5 (15.2%)
do not know	6 (38.5%)	13 (27.3%)	12 (27.3%)	4 (12.1%)

Those who declared the lowest physical activity level ate the least frequently between meals (63.6%) [17]. In our own study, 66.7% of inactive students ate between meals. The conducted research results indicate lower consumption of snacks between meals among students with higher levels of physical activity.

In this study, the highest fruit consumption was recorded in children with high and low levels of physical activity (75.8% and 71.7%). Vegetables as snacks were consumed mainly by people with a high and medium level of physical activity (21.2% and 13.3%). A study by Szczerbiński R. et al. showed a higher frequency of fruit consumption among people with a high level of physical activity [17]. By contrast, the consumption of vegetables was more frequent in people with medium and high activity levels. The research results showed that with the increase in the level of physical activity of children, the frequency of vegetable consumption increased.

In this study, it was observed that the respondents from the group of students with a low level of physical activity most often used sweets between meals. In the study by Szczerbiński R. et al., the percentage of respondents eating sweets between meals decreased with increased exercise levels [17].

In the study by Łagowska K. et al., people with a low level of physical activity showed the most frequent fast-food consumption. The sports group consumed the least of them [15]. In this study, this type of food was consumed by students who did not practice sports. Consequently, people with higher levels of physical activity chose fast food less often.

The study results by Łagowska K. et al. showed more frequent consumption of sweets among people with a higher level of physical activity [15]. When asked about the frequency of eating sweets, in our own work, as many as 36.4% of students with moderate and high levels of activity replied that they ate them several times a day. In turn, respondents who were not very active and led a sedentary lifestyle marked this answer only in 23.6% [15]. On the other hand, in the study by Durkalec-Michalski K. et al., 27.0% of the surveyed men who were active declared that they did not eat sweets at all [18]. In this study, only 3.0% of respondents with a high level of physical activity indicated this answer.

In the study by Łagowska, K. et al., energy drinks were most often drunk by people with a moderate physical activity level. On the other hand, our study results showed the highest percentage of consumption of such drinks among

the most active students (15.2%) and the lowest among students with a low level of exercise. The above results may be caused by the intense lifestyle of active adolescents and trends among their peers [15].

In the study by Gajda R., respondents with a high level of physical activity consumed whole-meal bread more often than less active people. Similar results were obtained in our own study. Whole-meal bread was consumed mainly by physically active students (54.5%). Therefore, more active people chose healthier carbohydrate sources [19].

According to the study by Gajda R., the sports group (21.6%) drank the most water during the day (6 glasses and more). In our study, 45.5% of physically active students consumed more than 2 liters of fluid during the day. Half a liter and fewer fluids a day were drunk by people with a low level of activity. It was observed that more active people consumed more fluids during the day [19].

In this study, students with a high level of physical activity positively assessed their eating habits. On the other hand, pupils with a sedentary lifestyle could not evaluate their diet. The study results showed that students with a higher level of physical activity were characterized by better eating behaviors than less active students. However, it should be emphasized that in our own study, groups of students with different levels of physical activity were not equally numerous, which, to some extent, could have influenced the obtained results.

CONCLUSIONS

Students with a higher level of activity showed better eating habits than less active respondents and were also more aware of healthy eating principles.

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