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## Diversity of factors determining physical activity in youth in Visegrad countries

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## Authors' Contribution:

- A Study Design
- B Data Collection
- C Statistical Analysis
- D Data Interpretation
- E Manuscript Preparation
- F Literature Search
- G Funds Collection

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## abstract

- Background** The present study aimed to gain knowledge about the diversity of factors determining physical activity in youth from the V4 countries.
- Material/Methods** The study involved 2145 students aged 15-17 years from the Visegrad countries (V4): the Czech Republic, Slovakia, Hungary and Poland. A diagnostic survey was used as the research method in the form of the International Physical Activity Questionnaire (IPAQ-L). The Kruskal-Wallis and Mann-Whitney U tests as well as the Pearson Chi-square independence test were applied to do the statistical calculations and determine statistically significant relationships.
- Results** More than half of the surveyed youth from the V4 countries (58.2%) demonstrated a high level of physical activity. Fewer than 6% of the adolescents exhibited a low level of physical activity.
- Conclusions** Young people tend to exhibit a high PA level, with significantly higher values visible in boys, and the WHO health recommendations were met by 84% of the respondents. The main factors determining the level of physical activity, beside sex, were age and self-assessment of physical fitness.
- Key words** physical activity, IPAQ, youth, Visegrad countries

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## INTRODUCTION

The modern world, with its unprecedented fast pace of life, limits the amount of physical effort and reduces physical activity. In addition, the amount of movement needed to do one's work, housework, or leisure activities has recently dramatically decreased to its lowest level. All this has resulted in a high percentage of physically inactive people, often exceeding 30% of the general population in a particular country [1]. One of the reasons for the low amount of physical activity in adolescents is the development of new information and communication technologies, as well as the use of computers and the Internet.

Duly, regular physical activity seems to be one of the ways to counteract the effects of such a lifestyle. The World Health Organization (WHO), together with other institutions, issues recommendations concerning the levels of physical exercise for particular age groups. For adolescents, moderate or intense physical activity is recommended, at least 60 minutes for 5 or more days per week. It should be remembered though that the forms of exercise should be varied and provide the youth with satisfaction [2].

However, many studies conducted both in Poland [3, 4, 5, 6, 7, 8, 9] and abroad [10, 11, 12, 13, 14, 15, 16] indicate a decline in physical activity in young people. The former studies conducted using the IPAQ questionnaire have confirmed that more and more persons around the world are leading a sedentary lifestyle. The same can be stated about Europeans, Brazilians, Colombians and Americans, who share similar problems. On average, over a quarter of the world's population are considered physically inactive, and more than 30% of them do not meet the standards recommended by the American College of Sports Medicine and the American Heart Association [17]. Also, according to data presented by the Polish National Health Programme in the years 2007–2015, just about 30% of young people engage in various forms of movement whose type and stress intensity meets the physiological needs of the body. Furthermore, as many as 57% of students demonstrate a low level of physical activity [18].

These results suggest that some new initiatives must be taken to increase physical activity in youth as well as to prepare appropriate recommendations popularising participation in health activities. According to the experts working in a team appointed by the Health Education Authority, young people need to be encouraged to make at least moderate physical efforts, i.e. such that cause some desired effects – a feeling of warmth and speeding up the breath for one, or minimally, half an hour per day. Involving young people in spending leisure time actively or in rational recreation should be considered the primary goal of motor classes.

The available literature still does not offer much information that would characterise the level of physical activity appropriate for young people or factors that determine it with the IPAQ questionnaire. Therefore, the following research aims to gain knowledge about the diversity of factors influencing physical activity of schoolchildren in the V4 countries.

## MATERIAL AND METHOD

The study involved 2145 young persons from the Visegrad countries (V4): the Czech Republic – 504 (23.5%), Slovakia – 454 (21.2%), Hungary – 552 (25.7%) and Poland – 635 (29.6%). The respondents were aged 15 to 17 years, i.e. the upper secondary schools students, whose mean age was  $16.5 \pm 2.0$ . To conduct the research, in each country one city was selected with a similar population size. Then, one school was chosen randomly. Further, in each of these schools, 6 classes were selected (again randomly) so that the number of the tested students did not exceed 150 in a particular age group. Altogether, girls predominated in the examined group (59.1%), as well as individuals aged 16 (44.5%) and those with correct BMI (74.5%). The majority had too little free time (51.6%) and assessed their physical efficiency as average (66.0%). More than half of the surveyed youth from the V4 countries demonstrated a high level of physical activity and as many as 84% met the latest WHO recommendations regarding the amount of health-related movement. The detailed characterisation of the examined youth is presented in Fig 1.

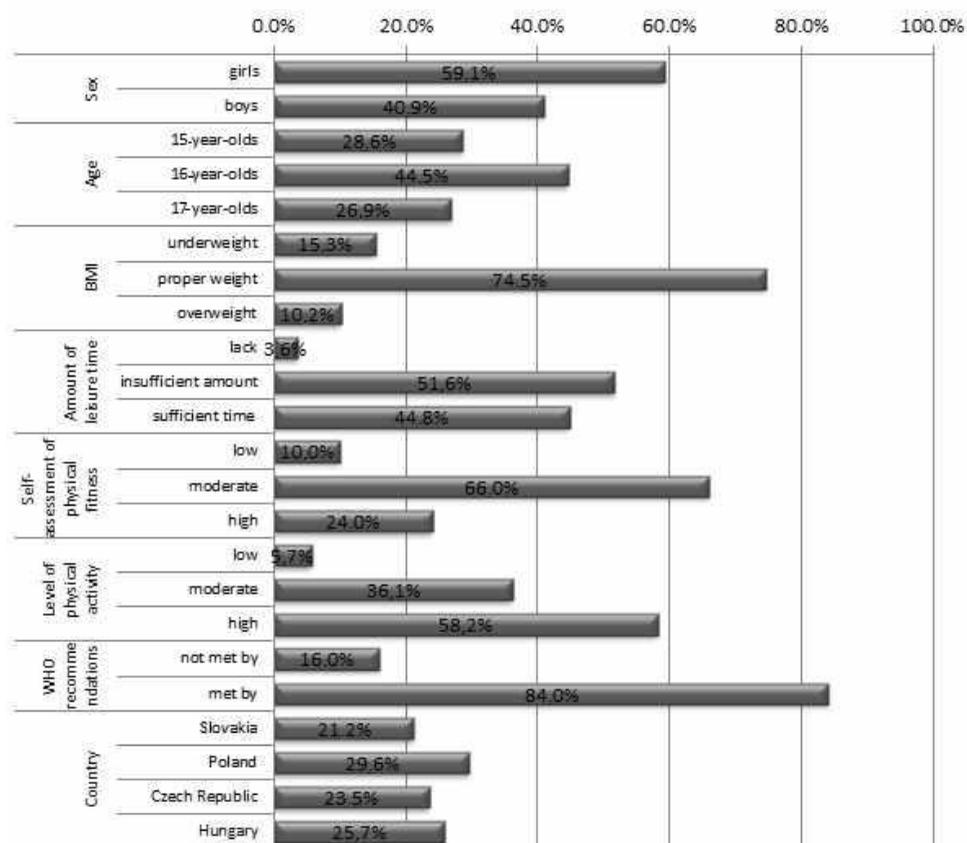


Fig. 1. Characteristics of the studied youth

The research was conducted in 2015. In order to evaluate the data, the Indares platform was used (International Database for Research and Educational Support), which is one of the most popular physical activity control on-line systems used in many international surveys. The programme is used to diagnose PA activity in various population groups with regard to age, sex, lifestyle, place of residence, etc. The study applied the International Physical Activity Questionnaire (IPAQ-L) as its research tool. The level of physical activity was calculated basing on the coefficients that corresponded to each type of activity (school-related activity; transportation physical activity; housework,

and caring for family; as well as sport and leisure-time activity). The questions were supplemented with data on the respondents' height and weight, which enabled calculating the BMI index and self-assessment of physical fitness. Each of them was expressed in MET - Metabolic Equivalent of Work, minutes/week.

The statistical analysis was performed using the programme STATISTICA v.10. To detect statistically significant relationships for quantitative variables, arithmetic means were calculated, and the nonparametric Kruskal-Wallis and Mann-Whitney U test were used. Finally, the Pearson Chi-square independence test was applied for qualitative evaluation. A statistically significant difference was assumed for  $p = 0.05$ .

## RESULTS

The mean level of physical activity of the respondents was 6646.2 MET min/week. It turned out that activity in sports (2164.4 MET min/week) as well as school-related activity (2125.8 MET min/week) had the greatest impact on this result (Fig. 2).

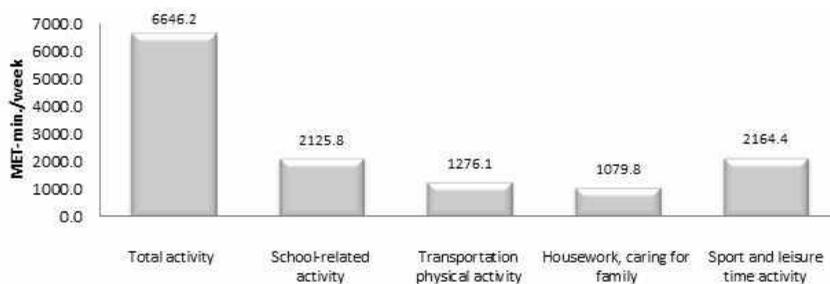


Fig. 2. Domains of physical activity

The analysis of the study findings showed a statistically significant relationship between the examined boys and girls concerning the level of total activity ( $p = 0.0001$ ) and activity in sport ( $p = 0.0009$ ). In both cases, better results were demonstrated by boys (Fig. 3).

\*significant variation at  $p < 0.05$ ; Z - value of Mann-Whitney U test

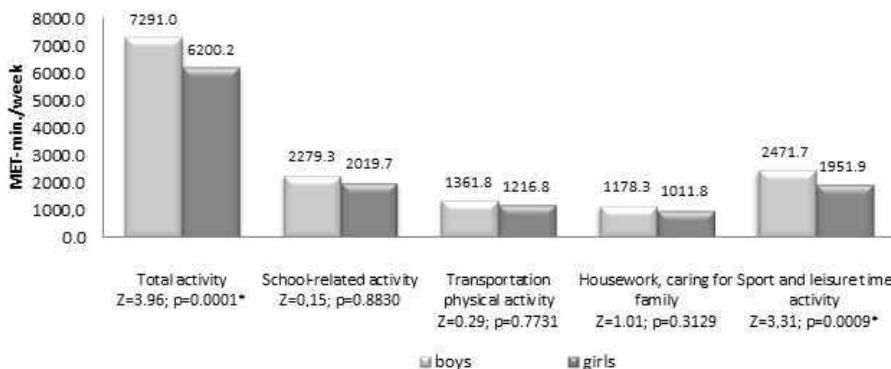
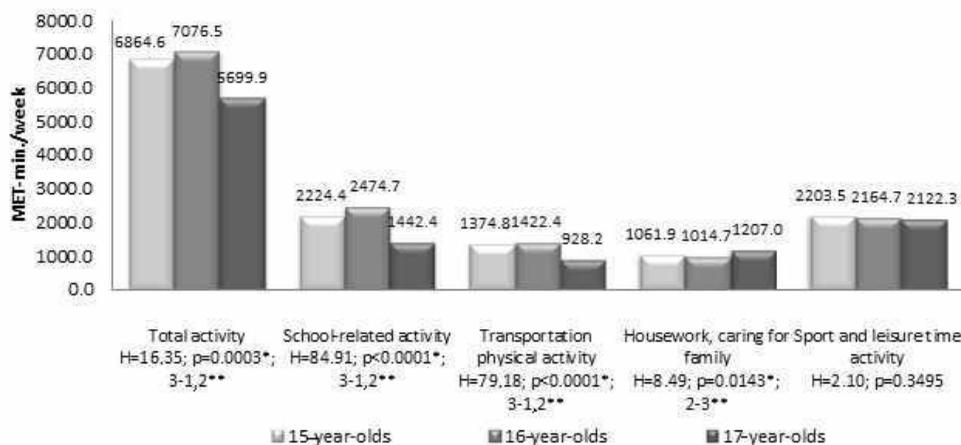


Fig. 3. Variation in the domains of physical activity by gender

In analysis of the impact of age on the level of physical activity in adolescents, statistically significant differences were found in four of the five activity domains, namely: total activity ( $p = 0.0003$ ), school-related activity ( $p < 0.0001$ ), transportation physical activity ( $p < 0.0001$ ) and housework

activity ( $p = 0.0143$ ). In the case of the first three areas, the highest activity was exhibited by students aged 16, whereas the lowest one – by adults. They were active only in the domain of housework and house maintenance (Fig. 4).

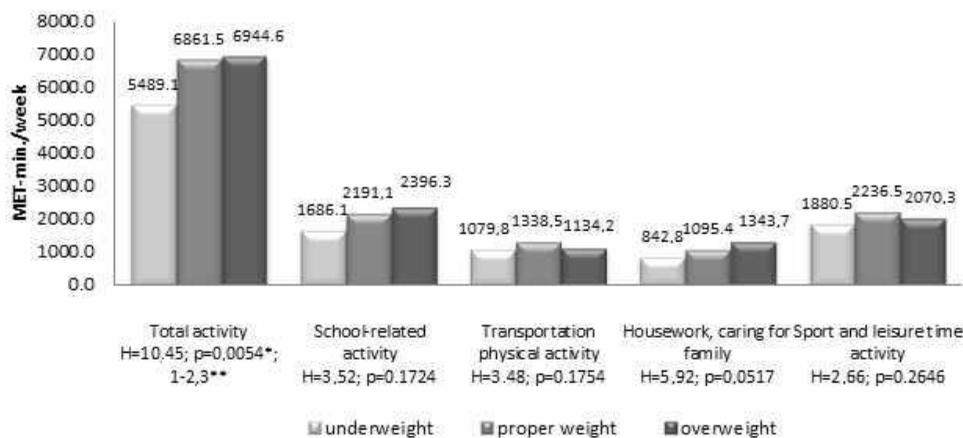
\*significant variation at  $p < 0.05$ ; H - value of the Kruskal-Wallis test



\*\* age groups between which statistically significant variations were found in particular domains

Fig. 4. Variation in the domains of physical activity with regard to age

As for the BMI index and the level of physical activity of the examined pupils, statistically significant differences were found only in the domain of total activity ( $p = 0.0054$ ) to the disadvantage of underweight persons and in favour of those with other BMI categories (Fig. 5).

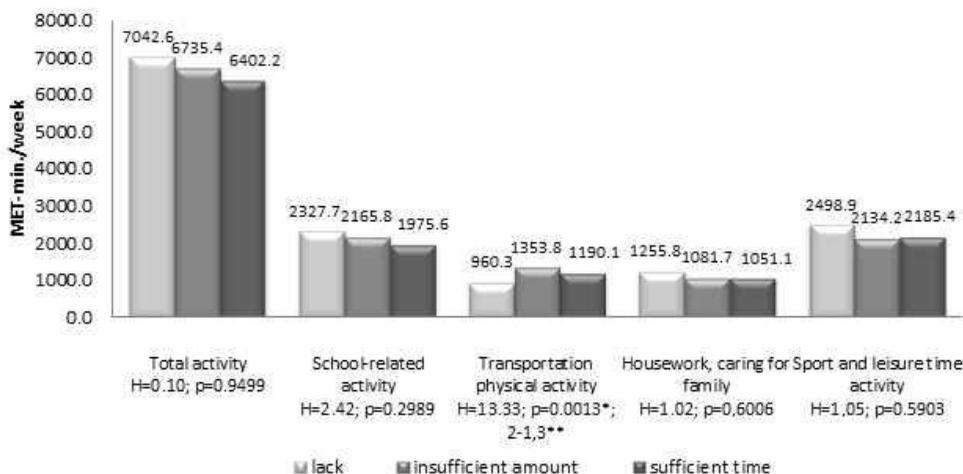


\* significant variation at  $p < 0.05$ ; H - value of the Kruskal-Wallis test

\*\* BMI classifications between which there is a statistically significant difference in a particular domain

Fig. 5. Variation in the domains of physical activity with regard to BMI

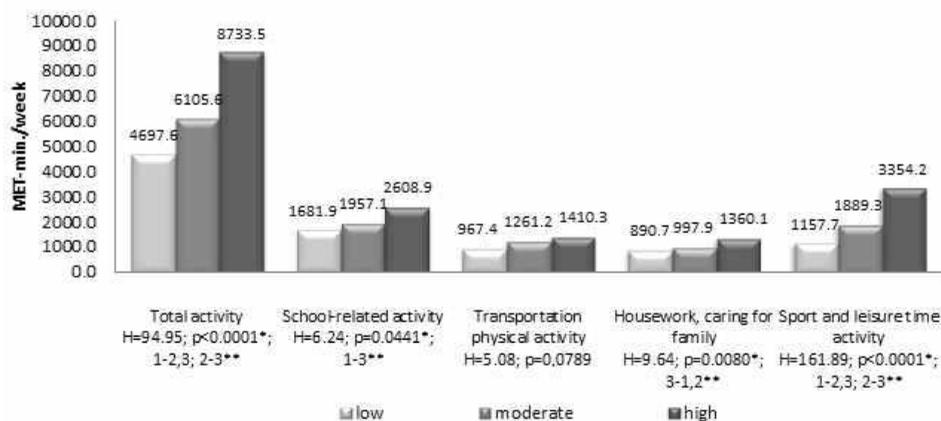
Basing on the conducted research, one can notice a decrease in total physical activity from the level of 7042.6 MET min/week (typical of the youth with sufficient leisure time) to 6402.2 MET min/week in those who lack leisure time. According to the statistical analysis, there was a significant difference in the amount of available leisure time concerning the level of transportation physical activity with better results in those with insufficient free time (1353.8 MET min/week) (Fig. 6).



\* significant variation at  $p < 0.05$ ; H - value of the Kruskal-Wallis test  
\*\* amount of the available leisure time which significantly impacts results in particular domains

Fig. 6. Variation in the domains of physical activity with regard to the amount of leisure time

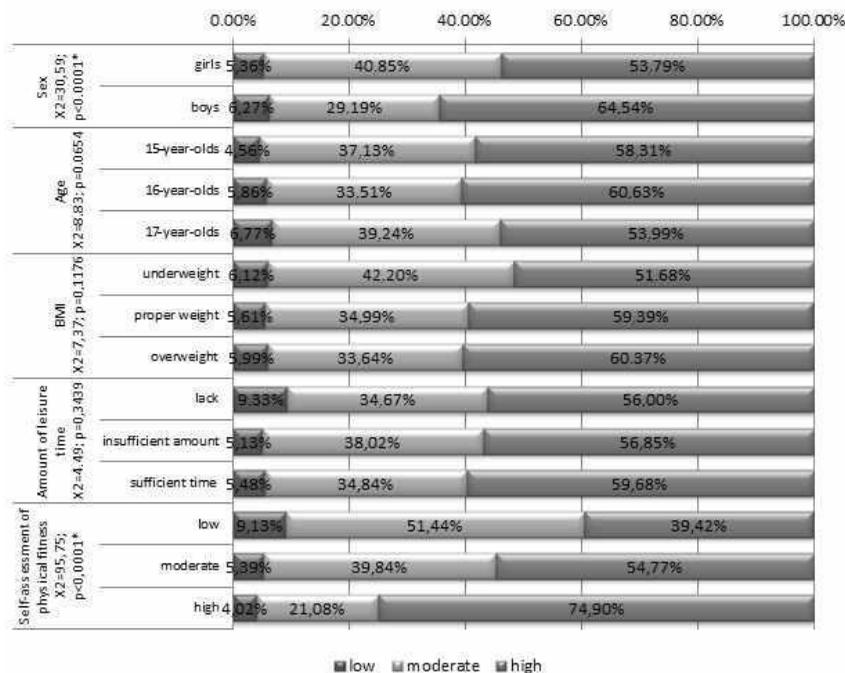
In all analysed areas, a significant variation in the relationship between the self-assessment of physical fitness and the level of physical activity was found. In each of the studied cases, an increase in self-assessment of physical fitness was associated with the rise in the level of activity (Fig. 7).



\* significant variation at  $p < 0.05$ ; H - value of the Kruskal-Wallis test  
\*\* self-assessment of physical fitness, significantly affecting particular domain results

Fig. 7. Variation in the domains of physical activity with regard to self-assessment of physical fitness

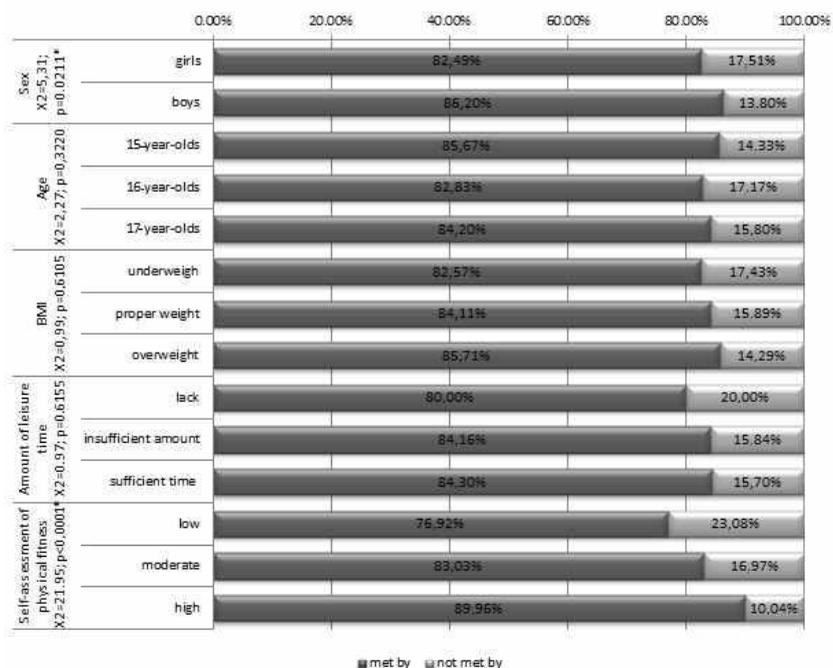
The respondents were assigned to one of the three categories according to the level of physical activity. Most of them were allocated in the group exhibiting high physical activity. Basing on statistical analysis, significant variations were found in the persons assigned to particular levels of physical activity with regard to sex ( $p < 0.0001$ ) with better results achieved by boys, and as for physical fitness self-assessment ( $p < 0.0001$ ) – those who demonstrated the highest levels (Fig. 8).



\*significant variation at  $p < 0.05$ ;  $X^2$  - value of the Pearson Chi-square test

Fig. 8. Variation in the level of physical activity with regard to selected variables

While examining the influence of the selected factors on the WHO recommendations concerning the minimum health level, we found significant differences with regard to gender ( $p = 0.0211$ ), with better results visible in boys, and as for physical fitness self-assessment ( $p < 0.0001$ ) in those with the highest levels (Fig. 9).



\* - significant variation at  $p < 0.05$ ;  $X^2$  - the value of the Pearson Chi square test

Fig. 9. Meeting the WHO recommendations regarding the health minimum in selected variables

## DISCUSSION

Undoubtedly, one of the most important factors affecting human health is physical activity. Nevertheless, its level is often so low that it does not reach the required minimum. The obtained results regarding the high level of physical activity by 58.2% of the youth from the V4 states are not coincident with the present global trends [5, 10, 13, 14, 15, 16] and data published by other authors in Poland [4, 6, 7, 8]. According to the IPAQ classification, 33.5% of Poles demonstrate high, 32.3% – moderate and 27.9% – low level of total physical activity, which is compatible with the European average [19]. Having this in mind, the high level of physical activity of the examined youth is a pleasant surprise. It amounts to 7291.0 MET min/week in boys and 6200.2 MET min/week in girls.

It should be noted though that in all of the above studies, the total PA level was evidenced in boys, which is in line with the results of other studies conducted on the Visegrad youth. In the case of our research, this significant variation in favour of the boys concerned the total physical activity as well as one of its domains, i.e. participation in sports activities.

Basing on the conducted research, we found that age is a crucial factor differentiating the school youth' attitude to physical activity. The highest physical activity was visible in adolescents aged 16 and the lowest – in adults. The older the person, the less s/he would get involved in physical activity in leisure time. The conducted research confirms this particular trend which is visible all over the world. As the Polish Central Statistical Office reports demonstrated [20], the decrease in the level of participation in sports and leisure activities is noticeable already in the 15–19 age groups (54.5%).

While analysing the reports on the PA level, one can notice that the factor influencing the adolescents' participation in physical activity is the BMI index. The analysis of our research indicates an optimistic percentage of the youth of the V4 countries, i.e. 74.5%, who exhibit the correct BMI value. Still, over 20% of teenagers in Europe are overweight (about 15% in Poland). Statistics have shown that metabolic syndrome or obesity occurs in 10% of adolescents of both sexes and all ages [2]. On the other hand, it seems positive that in many countries the Healthy Eating and Physical Activity project is being implemented. Altogether 43 of the countries belonging to the so-called the School for Health in Europe network are involved in the project which aims at increasing physical activity with simultaneous changes in the diet.

Another analysed problem was the amount of time that school students spend on physical activity. The computation of the study results showed that over half of the youth from V4 countries (51.6%) have insufficient leisure time. According to Piątkowska's research [21], the group that spends most of their time sitting are Poles under the age of 19. It turns out that 60% of young people stay in front of the computer every day or almost every day, and a similar percentage watch TV.

The results of the presented study show that 66% of the youth in the V4 states self-assessed their physical fitness as moderate. However, it was found that one's self-evaluation of physical fitness significantly affected the level of physical activity in all of the analysed domains. The review of other studies

concerning the PA level and its dependence on one's self-assessment of physical fitness done by Michota-Katulska [22] showed that more than 60% of junior high school students are satisfied or very satisfied with their physical fitness. There were significant differences between girls and boys in the declared level of satisfaction, with boys being more content with their physical fitness. The level of satisfaction was similar to the one indicated by similar research conducted in junior high school students by Wojtyla et al. [23]. Furthermore, the research indicated that the Global Recommendations on Physical Activity for Health are met by 84% of the surveyed schoolchildren of the V4 countries, while the same is true of only 36% of the American youth [17].

Physical activity has special effects on the development of a young person's body. Thus, the growing-up period significantly influences the formation of well-trained habits and behaviours that will affect further years of life. Accordingly, the problems encountered in adolescence can be solved by school programmes promoting physical activity and healthy lifestyles.

## CONCLUSIONS

The research conducted among the school youth aged 15-17 in the Visegrad countries allows formulating the following conclusions:

1. Pupils demonstrate a high level of physical activity with significantly higher values visible in boys, and the WHO health recommendations were met by 84% of the respondents.
2. The age factor significantly differentiated the level of physical activity in four domains, except for the activity in sports.
3. Self-assessment of physical fitness in students from the V4 countries significantly influenced their level of physical activity in all the analysed areas.
4. The BMI index substantially differentiates the level of total physical activity, whereas transportation physical activity – the amount of available leisure time.
5. There is a need to look for ways to increase physical activity in students in secondary schools, which might be provided in the form of specific actions targeting particular risk groups.

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