

## PHYSICAL ACTIVITY AND ASSOCIATED SOCIO-DEMOGRAPHIC FACTORS IN ADOLESCENTS FROM THE EASTERN REGION OF POLAND

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### ABSTRACT

**Background.** The introduction and maintenance of healthy habits in the field of physical activity at the early stage of life is particularly important for public health. With increasing of public awareness in physical activity, researchers are increasingly questioning its determinants in different age groups. In this paper we focus on variables such as age, sex and place of residence.

**Objectives.** To determine what selected socio-demographic factors influence the level of physical activity of school youth from the eastern region of Poland in different domains of daily life.

**Material and Methods.** A random sample of 916 Polish school youth from Secondary Schools from Eastern Region of Poland aged 16-18 was interviewed in spring 2016 by diagnostic survey method with the use of the official Polish long version of the International Physical Activity Questionnaire (IPAQ).

**Results.** Analysing the relationship between gender and the level of physical activity statistically significant differences were found in all domains in favour of boys. The level of total physical activity in girls was 5345.5 MET-min./week, whereas in boys – 6556.6 MET-min./week. In the area of total physical activity, the highest values were observed in pupils from small towns and villages, with lower values in the youth living in large and medium-sized cities. When the relationship of age with the level of physical activity in particular domains was examined, only the activity in the work/school domain ( $p = 0.0129$ ) spoke in favour of the youngest pupils (2578.7 MET-min./week) when compared to the oldest ones (2226.4 MET-min./week).

**Conclusions.** The level of physical activity in young people from the Eastern region of Poland is decreasing with age, both in girls and boys. It is therefore important, especially for the group emerging adulthood, to offer a wide variety of updated, involving, age and gender-oriented school physical activity classes that could be easily practised outside the school environment to improve the level of physical activity in leisure domain.

**Key words:** *physical activity, adolescents, IPAQ questionnaire, determinants, Poland*

### STRESZCZENIE

**Wprowadzenie.** Szczególnie ważne dla zdrowia publicznego jest wprowadzenie i utrzymanie zdrowych nawyków w obszarze aktywności fizycznej już we wczesnym okresie życia człowieka. Wraz ze zwiększoną świadomością społeczeństwa w obszarze zachowań zdrowotnych uwzględniających aktywność fizyczną, badacze coraz częściej stawiają sobie pytania o czynniki je determinujące w różnych grupach wieku. W niniejszej pracy z uwagi między innymi na grupę badawczą skupiono się na zmiennych takich jak wiek, płeć i miejsce zamieszkania.

**Cel pracy.** Poznanie jakie wybrane czynniki socjodemograficzne warunkują aktywność fizyczną młodzieży ponadgimnazjalnej ze wschodniego regionu Polski w różnych domenach życia.

**Material i metoda.** Badania przeprowadzono wiosną 2016 roku na losowo wybranej grupie 916 uczniów ponadgimnazjalnych, będących w przedziale wieku 16-18 lat. Badania przeprowadzono metodą sondażu diagnostycznego, przy wykorzystaniu oficjalnej polskiej wersji Międzynarodowego Kwestionariusza Aktywności Fizycznej (IPAQ-wersji długiej).

**Wyniki.** Analizując związek płci z poziomem aktywności fizycznej stwierdzono istotne statystycznie zróżnicowanie z całkowitym poziomem aktywności fizycznej we wszystkich analizowanych obszarach na korzyść chłopców. Poziom całkowitej aktywności fizycznej u dziewcząt wynosił 5345,5 MET-min./tydz., podczas gdy u chłopców - 6556,6 MET-min./tydz. W obszarze całkowitej aktywności fizycznej zaobserwowano najwyższe wartości u uczniów z małych miast i wsi, z niższymi wartościami u młodzieży mieszkającej w dużych i średnich miastach. Gdy badano związek wieku z poziomem aktywności fizycznej w poszczególnych domenach życia, jedynie aktywność w domenie praca/szkoła ( $p = 0,0129$ ) przemawiała na korzyść najmłodszych uczniów (2578,7 MET-min./tydz.) w porównaniu do najstarszych (2226,4 MET-min./tydz.).

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**Wnioski.** Poziom aktywności fizycznej młodzieży ze Wschodniego regionu Polski obniża się wraz z wiekiem, tak u chłopców, jak i u dziewcząt. Jest zatem niezmiernie ważne, szczególnie w grupie wieku stojącej u progu dorosłości, aby zaproponować młodzieży szeroką ofertę interesujących zajęć ruchowych w szkole. Powinny one być nowoczesne, dopasowane do wieku, płci i z łatwością oraz chęcią przenoszone poza obszar szkoły, aby zwiększać niski poziom aktywności fizycznej w czasie wolnym.

**Słowa kluczowe:** *aktywność fizyczna, młodzież, kwestionariusz IPAQ, determinanty, Polska*

## INTRODUCTION

One of the main factors influencing lifestyle is physical activity, which can be considered both in the context of health-promoting lifestyle activities as well as disease prevention measures. The increase in physical activity level is one of the activities that has the greatest positive impact on the health of the population. If everyone followed the recommendation on physical activity on a daily basis, the population health would definitely improve and the health care costs would drop significantly [17]. Systematic exercises, which have already been well documented in scientific research, have preventive and therapeutic effects on many different diseases, including: diabetes, cardiovascular diseases, colorectal cancer and depression [12, 26]. Unfortunately, the transition from childhood to adulthood is characterized by a significant decline in physical activity [6, 24]. Having this in mind, a number of countries have introduced their own guidelines or recommendations regarding the recommended dose of physical activity in adolescence [4, 10]. The introduction of the guidelines helps researchers to assess the scale of changes in the physical activity level of the examined age group as well as helps governmental institutions and individuals to work together to promote physical activity. All activities should be focused on sport activities conducted in schools, as children and young people spend a significant part of the day on school duties [27]. There are many techniques that serve to assess the physical activity of the population. However, the lack of standardisation between them is the major limitation in the study of this factor. This is due to, the use of different methodological instruments and to the fact that research into participation in sport or recreation is conducted independently of one another. Consequently, this can lead to many differences in research design, questionnaires, methodologies, or term definitions. [23]. Therefore, the tool used in this study in form is the long version of the IPAQ questionnaire, adapted in many countries, which allows for comparisons of the obtained results in an international scale. Despite the fact that Poland belongs to the group of developed countries, its Eastern macro-region, including Lublin Voivodeship, is one of the poorest regions in Poland and one of the weakest in the European Union. The problems adversely affecting

the socio-economic situation and the development prospects of this area have a largely structural backing, which is historically conditioned. They are additionally negatively strengthened by the effects of the peripheral position of the macro-region on the external frontier of the European Union, which as a whole is largely underdeveloped [20]. Therefore, the need to monitor the level of physical activity of school youth in this region of Poland is the primary criterion of the choice of the presented research problem.

The following paper focuses on the level of physical activity of the research group and the socio-demographic factors that determine it, out of age, gender and place of residence were taken into account.

## MATERIAL AND METHODS

The study was conducted in the spring of 2016 on a randomly selected group of pupils attending public secondary schools from the Eastern Region of Poland (Lublin Voivodship), aged 16-18. Schools were drawn in a simple, dependent way. Surveys were completed independently by the students during classes at school. The average time to complete the questionnaire was 40 minutes. The interviewees were explained what the purpose of the survey was and how to complete the procedure. Participation in the study was voluntary and did not involve any form of gratification. The study protocol was approved by the Bioethical Committee of the Medical University of Lublin in Poland (KE-0254/295/2015).

According to the IPAQ [8] data cleaning protocol, part of the test material had to be abandoned due to its incompleteness. As a result, out of the 916 completed questionnaires, 109 were excluded from further analysis, so that the final sample concerned 807 pupils. The efficiency index was 88%. 51% of the girls and 49% of the boys participated in the study. Almost 22% of the respondents were at the age of 16, 37% were 17 years old and 41% - 18. As the place of residence, pupils most often indicated a village - 40% and the medium-sized city - 31%. The categories of a small town and a large city recorded smaller values (14% and 15% respectively). We used the following four categories of settlements: village (fewer than 1000 inhabitants); small city (1001-30.000 inhabitants); medium-sized city (30.001-100.000 inhabitants); large city (100.000 inhabitants and more).

For estimating the level of physical activity, the official long form of the Polish version of the IPAQ was used. The questionnaire consists of 27 questions that cover 4 domains of physical activity (work, transport, domestic and garden, and leisure-time) as well as time spent sitting. The items in IPAQ are structured so that they provide separate domain specific scores for walking, moderate-intensity, and vigorous-intensity activity. All questions refer to the previous 7 days. The results were presented as the estimation of energy expenditure in metabolic equivalent-minutes per week (MET min./week). According to the IPAQ scoring protocol [8], MET min./week of specific activity (walking or moderate intensity activity or vigorous intensity activity) is computed by multiplying MET value of a particular activity (3.3 for walking, 4.0 for a moderate intensity activity, and 8.0 for a vigorous intensity activity) with minutes spent in that particular activity. To calculate physical activity scores only the activities lasting at least 10 minutes at the time were taken into account. Algorithms for calculating the continuous physical activity scores were used to estimate physical activity based on pupils' answers [8]. Total physical activity score was calculated, as well as separate scores for each of the 4 physical activity domains [8]. The choice of the questionnaire was determined by its high diagnostic value [5] and widespread use in a number of international studies [1]. To investigate the parameters associated with physical activity, the following variables were additionally used: place of residence, age and gender.

The statistical analyses of the collected data were performed by STATISTICA software, version 10. In

the IPAQ – the long form, for 4 domains of physical activity and total physical activity and time devoted to sitting, arithmetic (arithmetic mean, median, minimum and maximum values, and variance measures (standard deviations) were calculated. Then, the significance tests using t-student and a variance analysis (ANOVA) were performed. In the case of non-normality of distributions of the analysed variables (*Schapiro-Wilk* test), non-parametric tests were used: *Mann-Whitney U* and *Kruskal-Wallis* ANOVA. *Chi-square* independence tests were performed for qualitative variables. In all analysed cases, we assumed the significance level  $p=0.05$ .

## RESULTS

The total level of physical activity of the researched pupils was 5935.5 MET-min./week. The relationship between gender and the level of physical activity was analysed, statistically significant differences in all analysed physical activity domains were found in favour of boys. The level of total physical activity of girls was 5345.5 MET-min./week. The highest score was found within work/school domain (2119.0 MET-min./week.) and leisure domain (1240.5 MET-min./week), while the lowest in the domestic and garden domain (859.6 MET-min./week). In the case of boys, the total physical activity level was 6556.6 MET-min./week, and the highest score was also noted within work/school domain (2611.7 MET-min./week) and leisure domain (1640.8 MET-min./week) and the lowest, as in the case of girls, in domestic and garden domain (1084.5 MET / min) (Figure 1).

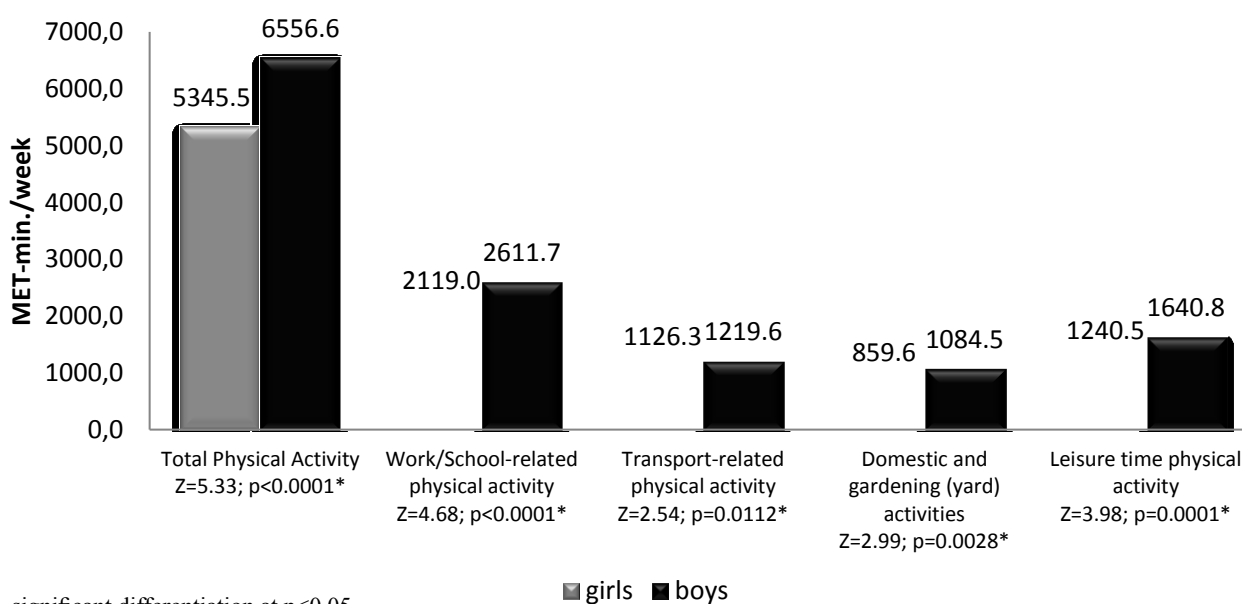
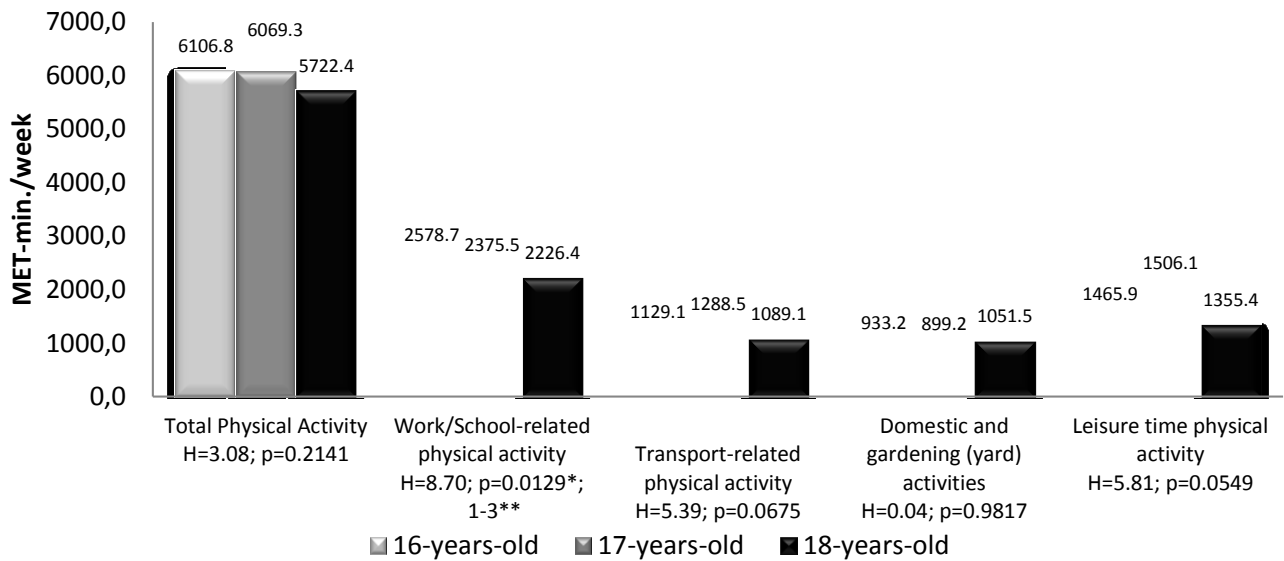


Figure 1. Physical activity in metabolic equivalents-minutes per week (MET-min./week) and the gender-related difference

When the relationship between age and the total level of physical activity was analysed, there were found no significant differences ( $p=0.2141$ ), with a decrease in total physical activity of students with age. When the relationship of this variable with the level of physical

activity in 4 individual domains was contrasted, such a relationship was found only in work/school domain ( $p=0.0129$ ) and in favour of the youngest pupils (2578.7 MET- min./week) when compared to the oldest (2226.4 MET- min./week) (Figure 2.).

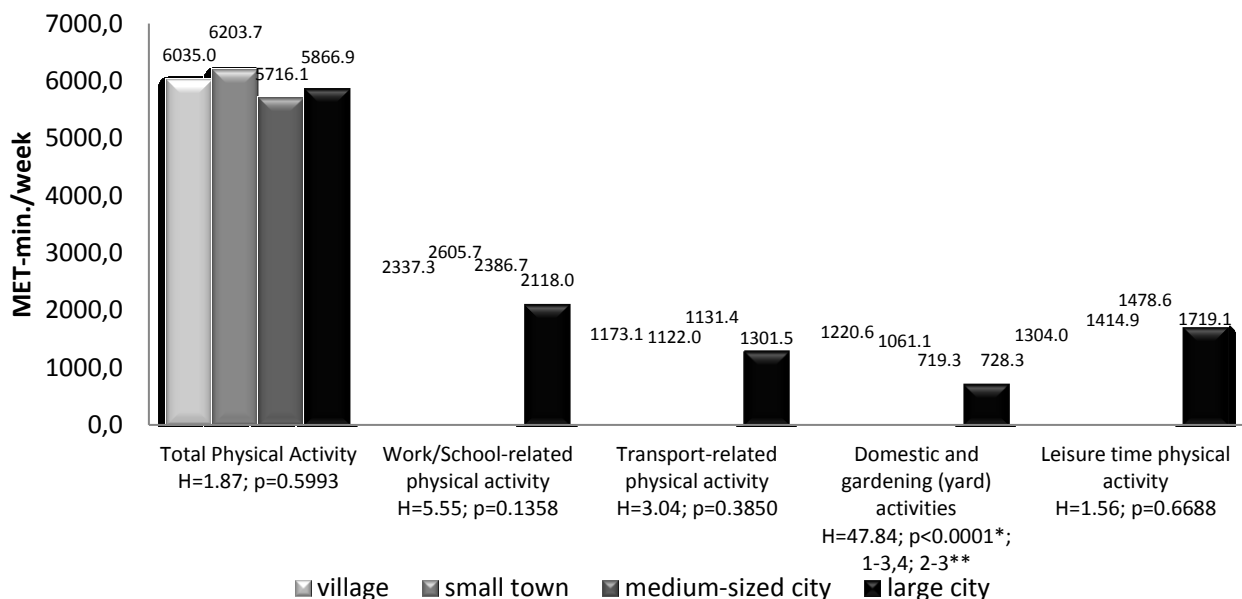


\*- significant differentiation at  $p<0.05$   
 \*\*- age groups between which there were found statistically significant differences significant differentiation at  $p<0.05$

Figure 2. Physical activity in metabolic equivalents-minutes per week (MET-min./week) the age group-related deference

In the case of the place of residence of pupils and the total level of physical activity no significant relationship was found. The only statistically significant difference was observed in domestic and garden domain ( $p < 0.0001$ ). The highest score in this domain was obtained by residents of village (1220.6 MET- min./week.) and the residents of small town (1061.1 MET- min./week.), and the lowest by

pupils living in the medium-sized city (719.3 MET- min./week) and large city (728.3 MET- min./week). Significant differences in physical activity within domestic and garden domain between village residents and residents of medium-sized and large city have also been demonstrated, as well as between inhabitants of small and medium-sized town in favour of pupils from smaller settlements (Figure 3.).



\*- significant differentiation at  $p<0.05$   
 \*\*- places of residence between which there were found statistically significant differences

Figure 3. Physical activity in metabolic equivalents-minutes per week (MET-min./week) and the place-related differences

## DISCUSSION

In the study, conducted on a representative number of youth ( $n=807$ ) from Eastern part of Poland, the total level of physical activity was 5935.5 MET-min./week. The majority of pupils (77.4%) presented a high level of physical activity where their total energy expenditure exceeded 1500 MET-min./week and resulted in at least 3 days or more of vigorous-intensity activity or 7 or more days of any combination of walking, moderate-intensity or vigorous-intensity activities of at least 3000 MET-min./week.

Gender and age differentiated the level of the undertaken physical activity. Girls were less active than boys. The level of total physical activity in girls was 5345.5 MET-min./week. If we want to compare the results of this research with similar ones conducted in European adolescents we will not find many done with the use of the long form of the IPAQ. In Lithuanian girls, the level of activity was also lower than in boys and amounted to 4.404 MET-min./week [3]. Also, the Czech girls achieved lower scores than boys, and the least active girls were 15-year-olds (2.372 MET-min./week) [11]. Another study in which lower scores were obtained in the area of total physical activity by females is the research project on adolescents from the Visegrad Countries (V4) [2]. The Polish girls participating in that project (5862.0 MET-min./week) achieved almost identical results in total physical activity score as the girls from this study (5345.5 MET-min./week).

With age, the level of physical activity of school youth decreased. A similar example that would confirm the thesis is the one conducted on the international junior group of teenagers (12-14 years) from the HELENA study [7], who presented a higher total physical activity score – 4.963 MET-min./week than the older group (15-17 years) – 4.144 MET-min./week. The results of the HBSC study in Poland also confirmed the hypothesis about a decreasing level of physical activity with age and a lower level of activity in girls. For both genders, a linear decrease in the percentage of adolescents who followed the recommendations on health-enhancing physical activity was observed [14]. A confirmation of the decisive role of gender and age in influencing the level of physical activity can also be found in other international studies conducted within this age group [9, 13, 15, 18, 21, 22, 24, 25].

The debate about greater physical activity in boys than girls may be enriched by ethnographic research involving teenagers that have shown that boys receive more encouragement for physical activity from family and society than girls [16]. Boys are particularly encouraged to perceive sports as consistent with the conceptualisation of their masculinity. Through activity and competition in sport they can establish

their position and increase their popularity in the group. On the other hand, doing a sport is rarely seen as feminine [18]. Furthermore, in the qualitative research done among teens, girls reported the following reasons for low participation in physical activity: practising sports is seen as something masculine and not ‘cool’ for girls who prefer other forms of socializing, such as shopping together or having a coffee with friends. Another reason may be, an awareness of the value that comes from studying and working in school, which is revealed in girls earlier than in boys, as well as a greater variety of sports activities directed to boys. Finally, there is a fear of looking unattractive in a sports outfit, which is expressed by girls [19].

Pupils’ place of residence is another socio-geographic variable that was used to analyse the level of physical activity in school youth. While analysing the teenagers’ place of residence and the total physical activity score we did not find any significant relationship. Statistically significant differences were observed only in the domestic and garden domain. The highest score in this domain was observed in inhabitants of rural areas and small towns, while the lowest score in the medium-sized and large cities inhabitants. It can only be assumed that young people from rural areas and smaller urban centres spend far more time than their peers from larger urban centres to help their parents with field or garden work. In this case, it is difficult to find comparable data from other international research due to a huge variation in the authors’ accepted criteria for the size of the surveyed settlements as well as a lack of numbers of inhabitants living in the area.

Our study also had several limitations. Although, there are more precise physical activity measures as activity monitors, questionnaires are most often used in population based studies of physical activity. Our survey was conducted in spring, so another possible limitation might result from a different amount of activity done in different seasons. Further studies of physical activity in the eastern region of Poland should investigate differences concerning education and of parents’ income, in order to develop more adequate physical activity promoting strategies.

## CONCLUSIONS

The level of physical activity of young people from the eastern region of Poland is decreasing with age, both in girls and in boys. It is therefore important, especially for the age group emerging the adulthood to offer a wide variety of involving, age and gender-oriented school physical activity classes that could be easily practised outside the school environment to improve the level of physical activity in leisure domain. Since girls present lower level of physical activity in all



domains of life and physical activity at school has the greatest impact on the total value of physical activity of pupils, PE classes should become more attractive to girls to help them find favourite types of physical activity. It might be helpful to create a selection of especially designed blocks for girls within PE classes, such as e.g. fitness, aqua aerobics, dancing to instil lifelong love for physical activity, outside the school environment. Secondary school seems to be the last moment for young people to implement healthy habits and learn how to spend leisure time actively in their adult lives.

### Conflict of interest

The authors declare no conflict of interests.

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