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B. Data collection/entry
C. Data analysis/statistics
D. Data interpretation
E. Preparation of manuscript
F. Literature analysis/search
G. Funds collection

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PHYSICAL ACTIVITY OF STUDENTS OF UNIVERSITY OF PHYSICAL EDUCATION IN KRAKOW AND THE FACULTY OF PHYSICAL EDUCATION AND SPORT IN BIAŁA PODLASKA

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Keywords: students, IPAQ, physical activity

Summary

Introduction. When looking closer at human physical activity we should focus not only on conscious activities taken up in free time but also those performed as part of household duties, school or work duties, or just moving from one place to another.

Aim of the research. Due to the fact that physical education students are supposed to be healthy lifestyle creators and promoters, an attempt to assess the level of their physical activity was made. An attempt to find variables conditioning participation in the broadly defined physical culture was also made.

Material and methods. The research included 392 physical education students, of which 269 were students of the University of Physical Education (AWF) in Krakow and 123 were students of the Faculty of Physical Education and Sport (WWFiS) in Biała Podlaska. The diagnostic poll method and a short version of International Physical Activity Questionnaire (IPAQ) were used. The research results were analysed with the Statistica v. 7.1 program.

Results. The results showed that most students (59%) qualified for a high level of physical activity. Factors determining the scale of taken up efforts and the level of physical activity were Body Mass Index (BMI) and the place of studying. Moreover, the variable statistically considerably differentiating physical activity, expressed in MET units, was sex. Men were better in terms of intensity of physical activity and women took up more activities connected with walking.

Introduction

People’s lifestyles, including their health habits, change throughout their whole lives. These changes depend on many factors such as age, sex, health condition, social role, and other various externals [1]. Lifestyle is shaped mainly during childhood and adolescence, thus it is important to inculcate healthy behaviors in elementary school students. Early shaped negative behaviors are difficult to eradicate later on which means difficulties in improving society’s general health condition [2-3]. Adolescence is a critical period in forming health habits. It is the time of preserving earlier acquired health behaviors but also the time when many risky, often cu-
mulated behaviours appear. Some of them disappear after the experimental phase of but some are preserved. The changes that take place during adolescence decide whether young people enter adult life with resources or burdens [1].

Physical activity, being one of the most important elements of one’s lifestyle, increases chances for a healthy life, especially in old age. It is often neglected both by children and adults as we can read in Ulatowski’s work from 1987. In the last ten years of the 20th century, there have been very few Poles who performed mass sport. Only 6% of the Polish population took part in physical recreation which was a quite poor result in comparison to other European nations [4]. The importance of physical activity was also appreciated in the National Health Program for the years 2007-2015. One of the six operational goals concerning the risk factors and actions in the area of health promotion is increasing physical activity of the population. The reason for this is the fact that the Polish society is characterized by low physical activity. Only 30% of children and teenagers, and 10% of adults take up various kinds of exercise which suffice their physiological needs. It is thought that low awareness of the needs in the field of sport and physical recreation is the main reason for such a conjuncture. Despite the rise in interest in various forms of physical activity among Poles in the last 10 years, its level is still marginal in comparison to other European nations and avoiding physical activity is not condemned by most social groups [5]. Only one in three Poles can boast of performing moderate physical activity which s/he does for about 8 hours a week and only 5% of the population (four times more men than women) does intense exercises. Sitting activities or light physical activity take up, on average, 18 hours a week [1].

Movement is a part of human nature. It not only helps the human body function and develop but also positively affects the human psyche and mood [6]. The development of civilization brings many changes in the lifestyle of a modern human. On the one hand, it makes life easier and more efficient, on the other, it limits movement and physical activity in favor of the sitting position [7]. Using modern information and communication technologies means sitting for many hours and because of its attractiveness, it successfully competes with physical activities [8].

The human body is made for moving which means it needs systematical physical activity to stay healthy and function optimally. Physical activity combined with healthy eating is a basic condition of staying healthy throughout one’s whole life. The appropriate level of physical activity stimulates children’s and teenagers’ physical, motor and psychosocial development. It also creates many positive health effects like reducing body weight, triglyceride level, resistance to insulin, increasing HDL cholesterol level, improving bone structure, muscle strength and increasing stamina. Physical activity increases self-esteem and improves social relations [8].

The biggest threat to modern human’s health is a change of lifestyle into one that is “sedentary, overfed, and energized”. Decreasing daily energy consumption, stress, excessive nutrition induce coming down with non-infectious diseases [6]. World lists of risk factors causing diseases of civilization place hypokinesis among most important ones [9,8,7]. Sensible nutrition, relaxation, and especially physical activity is not a luxury but a must nowadays. If those elements are exercised from a young age they can stop or even eliminate the causes of many diseases. On the other hand, if not in sufficient amount, they can be the cause of diseases [6]. According to many authors, systematic physical activity is the best option in deteriorating health prevention [10–14]. Lack of physical activity habits in an adult life, when the natural drive to move disappears and there is no new stimuli, causes premature ageing [6].

Forming positive habits concerning ways of spending free time, regenerating power, and active recreation requires not only knowledge about the results of their lack but also the up-to-date knowledge about society’s physical activity level [7].

Looking at human physical activity we should focus not only on activities taken up consciously in free time but also take into consideration physical activity connected with every day activities like working, studying, doing household duties and moving from one place to another [15]. Because of the fact that physical education students are supposed to be healthy lifestyle creators and promoters, an attempt to assess the level of their physical activity was made. It seems that the research will allow to measurably assess the level of physical activity of students of physical education in connection with socio-demographic features such as sex, place of residence, place of studying and Body Mass Index – BMI.

Material and method

The research included 392 physical education students, of which 269 were students of the University of Physical Education (AWF) in Krakow and 123 students of the Faculty of Physical Education and Sport (WWFiS) in Biała Podlaska. Males constituted 53% of the examined subjects. As for the place of residence – 72.2% (283 examined) came from the city and the rest from rural areas. 82.9% of examined students had standard BMI (18.5 kg/m² – 24.9 kg/m²), almost 11% were overweight, and 7% underweight (Table 1).
Table 1. Students’ demographic and social features

<table>
<thead>
<tr>
<th></th>
<th>Sex</th>
</tr>
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<tbody>
<tr>
<td>Females</td>
<td>Males</td>
</tr>
<tr>
<td>181 (46.2%)</td>
<td>211 (53.8%)</td>
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<table>
<thead>
<tr>
<th>Academy</th>
</tr>
</thead>
<tbody>
<tr>
<td>WWFiS in Biała Podlaska</td>
</tr>
<tr>
<td>123 (31.4%)</td>
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<table>
<thead>
<tr>
<th>Place of residence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rural</td>
</tr>
<tr>
<td>109 (27.8%)</td>
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</table>

<table>
<thead>
<tr>
<th>Body Mass Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underweight (17.5-18.4 kg/m²)</td>
</tr>
<tr>
<td>25 (6.4%)</td>
</tr>
</tbody>
</table>

The diagnostic poll method and a short version of the International Physical Activity Questionnaire (IPAQ) – “last 7 days” mutation were used. Information concerning frequency and the amount of time spent sitting, walking and doing moderate or intense physical activity was gathered.

Every kind of physical activity is expressed in MET-min./week units. Met unit characteristics of a given physical activity is multiplied by minutes of doing this activity a day and by days of doing it a week. The measurement results allow to classify the examined subjects into groups of high, moderate or low level of physical activity [7].

The research results were analysed with the Statistica v. 7.1 program. To discover statistically relevant features measured in face value, Chi-square test of independence was used. In other cases (for quantity scale), the Kruskal-Wallis non-parametric test and Mann-Whitney U test were used. In every analysed case p = 0.05, the level of relevance was accepted.

**Results**

Physical activity of students at the Physical Education faculty was assessed on the basis of physical activities taken up for 7 days. Only activities lasting at least 10 minutes without any breaks were taken under consideration. Every activity was characterised by MET – Metabolic Equivalent of Work. Intense activities obtained 8 MET, moderate 4 MET, and walking 3.3 MET.

Figure 1 shows general weekly physical activity of the examined students in MET-min./week and its separate components.
rate elements. Intense physical activity, that is activities which cause intense breathing and high heart rate, contributed the most to the general result. Moderate physical activity, causing slightly higher heart rate and breathing, contributed the least. The average rate for this kind of activity expressed in MET-min./week was 1078. Walking, including moving around academy buildings, going shopping for example, or simply walking, reached the average value of 1767.4 MET-min./week.

Taking into consideration the frequency and time spent on physical activity, the examined students were classified into one of the three groups (Fig. 2). Analysis of the research results showed that the largest group comprised of students with intense level of physical activity (59%). 32% qualified for the moderate level. Only 9% of the future physical education teachers during the 7 days before the research did not do any physical activity exceeding 600 MET-min./week and were classified as the low physical activity level.

Because the examined students studied at the Academy of Physical Education, also checked was how much this fact influenced their physical activity. The data analyses presented in Figure 3 show that students from Cracow’s academy could boast of a better MET-min./week than those from AWF in Biała Podlaska. Both groups had similar proportions of elements of overall physical activity. Both, students from Cracow and students from Biała Podlaska had the most physical activity from the intense group and the least from the moderate group. The Mann-Whitney U Test proved that there are significant diversities between groups in average results measured in MET units concerning particular areas of physical activity and physical activity in general.

According to Kunicki [16], the variable which most differentiates ways of spending free time and scale of participation in culture, including recreation, is sex. But, as Figure 4 shows, the difference concerning overall men’s and women’s physical activity is insignificant – only 154.8 MET-min./week. The Mann-Whitney U test revealed crucial differences between men and women in two elements of physical activity – intense physical activity and walking. Activity causing heavy intense breathing was the men’s domain, activities connected with walking were the women’s domain. Despite an insignificant difference in moderate physical activity, men’s MET was slightly higher.

**Figure 2.** Levels of students’ physical activity (%)

**Figure 3.** Diversity of students’ physical activity according to the place of studying on the basis of the Mann-Whitney U test
Taking into consideration students’ place of permanent residence, no significant differences in particular elements of physical activity and physical activity in general were noticed (Fig. 5). The average MET-min./week was slightly higher for students from the city than for those from the country, and the exact numbers were 5366.7 to 5266.7. As for the intense activities, city dwellers obtained better results. Students from the country were better in the case of moderate activities and walking.

Figure 6 shows kinds of activities taken up by the students according to their Body Mass Index. The data presented in the chart suggest that students with normal BMI had higher MET-min./week as far as general physical activity and its intense and moderate com-
pounds are concerned. Physical activities connected with walking were the underweight students' domain. The Kruskall-Wallis test showed important differences only between underweight and normal students in the area of intense activities. The average of the heaviest activities for those with BMI between 18.5 kg/m² and 24.9 kg/m² (2578.2 MET-min./week) was significantly higher than of those underweight (1569.6 MET-min./week).

The analysis of students' place of studying reveals significant differences in level of physical activity (Fig. 7). 63% of Krakow AWF students are characterized by a high level of physical activity and 21.56% by a moderate level. The numbers behind levels of physical activity

![Figure 6](image1.png)

Figure 6. Diversity of students' physical activity according to Body Mass Index (BMI) on the basis of the Kruskal-Wallis test.

![Figure 7](image2.png)

Figure 7. Levels of students' physical activity according to place of studying (%)

*significant diversity at p < 0.05*
for Biała Podlaska WWFiS students are different. This group is characterized by a moderate level of physical activity (55.28%) and only 26.02% reached a high level. It is also disturbing that 18.7% of Biała Podlaska students did not reach either a high level of physical activity or even a moderate one.

Sex turned out to be a rather insignificant factor determining levels of physical activity. The differences in particular elements of physical activity do not exceed 6.36% (Fig. 8). Both men and women were mainly characterized by a high level of physical activity 61.61% and 55.25%. Values below 600 MET-min/
week were reached by 11.6% of women and 7.11% of men.

The place of permanent residence also proved to be a poor predictor in the overall research. This variable does not considerably differentiate the examined students (Fig. 9). Both groups (rural and urban) had similar results of physical activity expressed in percentages. The differences reached 2.49% at most in moderate level

Table 2. Diversity of students’ time spent sitting

<table>
<thead>
<tr>
<th>Sex</th>
<th>Z = –0.41; p = 0.6809</th>
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<tbody>
<tr>
<td>Female</td>
<td>258.9 minutes</td>
</tr>
<tr>
<td>Male</td>
<td>254.0 minutes</td>
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<table>
<thead>
<tr>
<th>Academy</th>
<th>Z = 1.09; p = 0.2727</th>
</tr>
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<tbody>
<tr>
<td>AWF in Biała Podlaska</td>
<td>248.4 minutes</td>
</tr>
<tr>
<td>AWF in Krakow</td>
<td>260.0 minutes</td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>Place of permanent residence</th>
<th>Z = 0.50; p = 0.6196</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rural</td>
<td>250.3 minutes</td>
</tr>
<tr>
<td>Urban</td>
<td>258.6 minutes</td>
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</tbody>
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<table>
<thead>
<tr>
<th>Body Mass Index</th>
<th>H = 4.30; p = 0.1165</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underweight</td>
<td>217.2 minutes</td>
</tr>
<tr>
<td>Normal-built</td>
<td>257.7 minute</td>
</tr>
<tr>
<td>Overweight</td>
<td>268.8 minute</td>
</tr>
</tbody>
</table>

Z – U Mann-Whitney U test values
H – Kruskal-Wallis test values
in favor of students from the country. Both groups can boast of a high level of physical activity that is more than half of students living in the country and living in the city achieved the highest results.

The data presented in Figure 10 shows that Body Mass Index significantly differentiates particular levels of physical activity. The criteria for a high level of physical activity were fulfilled by students whose BMI values ranged between 18.5 and 24.9 kg/m². As many as 24% students with low BMI values were categorized at a low level of physical activity.

The analysis of activity of sitting presented in Table 2 took into account sitting only during the weekdays. Time spent in sedentary position at home, at academy, in means of transport and other places during one day was summarized. The average time for all the students was 256.3 minutes a day. The analysis did not reveal any variables (sex, academy, place of residence, BMI) which would significantly differentiate the examined students regarding time spent sitting.

Discussion

It is commonly known and scientifically proven that sedentary lifestyle and insufficient physical activity are risk factors causing many diseases [17-18,1,7]. Having analysed the Poles’ health condition we can state that it is still in unsatisfactory condition despite some signs of improvement [19,5,7]. Eurobarometr’s research results [20] revealed that almost half of Poles do not exercise or do sports. The research subject of this work goes along with the present trend of researching health behaviours important from society’s health point of view.

According to Patok [21], research results concerning students’ physical activity do not appear to be promising. Especially data concerning Physical Education students seems disturbing. According to Boromirska [22], only 30% of this group was interested in spending their free time actively. In the case of students from Poznań, one in five does not do any physical activity and 19% more admit to occasional participation.

GUS research results [23] show that 34% of Poles can boast of a high level of physical activity. This data is also confirmed by Piatkowska’s research results [24]. It states that 60% of Polish society does not fulfill recommendations concerning a healthy dose of physical activity, which according to IPAQ equals the lowest value qualifying as a high level. Comparison of this fact to the physical activity of students of AWF in Krakow and of WWFiS in Biała Podlaska seems very high (59%).

Apart from defining the future physical education teachers’ level of physical activity, the authors attempted to find factors determining this level. According to Sas-Novosienielski [25], those factors are most often age and sex. Men seem more physically active than women [26-27,7]. In the case of the students, the level of physical activity for both sexes was similar. Statistically significant differences occurred in the area of intense activity and walking. Thus, we can state that high intense activity are men’s domain and women prefer taking up “everyday activities”, for example, walking or going shopping. Booth [28], Caspersen, Pereira and Curran [29] came to similar conclusions.

Among all factors determining the examined physical activity, BMI turned out to be symptomatic. Many researchers highlight the close connection between BMI value, kind and intensity of physical activity [30-31].

If we look closer at the place of studying, in this case of AWF in Krakow and WWFiS in Biała Podlaska, we may presume that the declared physical activity connected with specialization can be dominant in many cases – especially with those who study Physical Education. And this assumption should be the subject of further investigation.

Conclusions

The analysis of physical activity of students of the University of Physical Education in Krakow and students of the Faculty of Physical Education and Sport in Biała Podlaska allowed to form the following conclusions:

1. The examined students were mostly characterized by a high level of physical activity (59%). 9% of the students did not manage to fulfil the criteria for a moderate level.
2. T scale of physical effort taken up by the students and expressed in MET-min./week was determined as statistically significant on the basis of sex, Body Mass Index, and academy at which the students studied.
3. The factors significantly differentiating the level of physical activity of the examined subjects were BMI and the academy at which they studied, similar as in the case of scale of taken up physical effort.

References

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