

Physical activity rates of male and female students from selected European physical education universities

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Abstract

Introduction. Physical education teachers should promote physical activity that is beneficial to health. It is assumed that physical education students as future physical education teachers will have a high level of physical activity. **Aim of Study.** The aim of this study was to compare the level of physical activity (PA) in physical education (PE) students from different countries (Czech Republic, Germany, the Netherlands, and Poland) using the unified questionnaire (an IPAQ-based questionnaire with questions adapted for this purpose). **Material and Methods.** The study included a random selection of female and male ($f = 131$, $m = 214$) university students majoring in physical education. To measure the PA rate, the International Physical Activity Questionnaire – Long Form (IPAQ-LF) was used. Differences between the groups were tested with ANOVA. Significance was denoted by $p < 0.05$. **Results.** Comparison of intense PA rates shows that the highest results were recorded for men and women studying in the Czech Republic, while the lowest ones were for students from Poland and Germany. Considering the results it was noted that male students have higher PA rates than women. Only female students from Germany had a higher result than their fellow male students from Germany. Analysis of differences in moderate PA undertaken by students showed the highest activity level for both women and men studying in the Netherlands. **Conclusions.** We observed that nearly all female participants, except for the students from Germany, had a lower level of intense PA than male participants. Identification of the reasons for differences in PA intensity between the sexes might help eliminate the barriers and increase the level of PA in all countries. We observed that social support may have indirectly predicted the PA of students.

KEYWORDS: physical activity, IPAQ, physical education, students, Europe.

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Introduction

A sedentary lifestyle and lack of physical activity (PA) may contribute to overweight and obesity entailing a risk of such diseases as type 2 diabetes, knee, and hip joint disorders, renal failure, diathesis, and obstructive sleep dyspnea. At a later age, a lack of PA may lead to severe disability and premature death. Regular exercise alters brain structures and, thus, functional and cognitive performance in older adults observed especially in tests demanding a greater amount of executive functions [8]. Evidence and findings from other research [25] suggest

that PA improves explicit memory and executive cognitive functions at the extreme ends of life span (elderly and children).

Regrettably, insufficient PA both in adults and youth is observed worldwide [1]. Research shows that PA declines with age from childhood to adulthood [26]. In addition to PA decreasing with age, the termination of education may additionally decrease PA because of the resulting change in social roles (occupation, marriage) [29]. Moreover, PA can decrease after graduation due to the discontinuation of access to free-of-charge activities or discounted conveniences and infrastructure [16].

Usually, children are highly active, while adulthood is the time when PA, unfortunately, decreases [7]. These findings apply also to students. Results by Bomirska [5] showed that one in five students (20%) majoring in physical education did not get involved in any PA during their studies, and following 19% of the students declared only occasional PA. Differences in terms of awareness, knowledge, quality of life, economic development level, and education system are probably the most significant determinants of the PA rate. The differences recorded in many studies to date, however, may arise from using different measurement methods or different questionnaires. The potential bias effect of the measurement method used for accessing PA on the results obtained has been noted by Kantanista and Osiński [13]. They stated that among Polish people (in the age category 19-64 years) a satisfactory level of PA was observed in from 9.2% of male subjects and 12.0% of female subjects to 77.6% of male and female subjects. They suggest that it might vary depending on the methods of PA measurement. Therefore, in this study, we used the same, unified questionnaire (an IPAQ-based questionnaire with questions adapted for this purpose).

Diverse levels of PA observed in various studies depend on cultural or economic conditions and commonly on the country where the study is conducted. A study from 2010 reported that the Netherlands was a country leading in terms of high PA compared to all other EU countries [24]. In 2018, six countries improved (Belgium, Luxembourg, Finland, Cyprus, Bulgaria, and Malta), and their citizens were more active than from the Netherlands, which held the seventh position in that rank [19]. Gavric [11] reported that of 15 EU countries surveyed in 2002, Dutch citizens were the most physically active ones (39.43 MET hours/week). The Germans seemed to be also very active with approximately 34 MET hours/week [21]. On the other hand of the European PA rates scale is for example Poland. Polish citizens are seen as one of the

least active nations in Europe [18]. 60% of the Polish population society was not sufficiently involved in PA [21]. Unexpectedly, Czechs and Hungarians had much better results than Polish citizens – although these countries have a similar economic growth [12], which is deemed to be an important determinant of the PA rate and underwent a similar political and economical transformation in the recent years. A study by Sekot [22] showed that one-third of the adults in the Czech Republic were physically active at least once a week – men more frequently than women.

Therefore, to compare the situation in the nations with such diverse levels of PA we have undertaken a study, which aimed to assess PA with one unified method of measurement and identify differences between male and female students from the Czech Republic, Germany, the Netherlands, and Poland. Comparing the PA of this group of students may cause a need for change, perhaps a need to modify the programs of physical education teacher training in “young” or new member states.

Material and Methods

The study included a random selection of (n = 131) female and (n = 214) male university students majoring in physical education. 110 students (f = 41; m = 69) from the Czech Republic (age M = 20.7; SD = 0.73), 109 students (f = 49; m = 60) from Poland (age M = 20.8; SD = 1.29), 86 students (f = 27; m = 58) from Germany (age M = 20.8; SD = 2.00), and 40 students (f = 15; m = 25) from the Netherlands (age M = 21.1; SD = 1.82) participated in the study. Differences in the number of subjects in each group resulted from the varied number of students studying at each University in each country who could join the study.

Study design

The study of a cross-sectional design was performed on a selected population of students gaining similar qualifications in the profession of physical education teaching. Research considers differences between selected countries, the first members of United Europe, and countries that joined 45 years later. From the first group of 6 countries, two were selected (the Netherlands and Germany), and the other two countries were selected (Poland and the Czech Republic) from the second group (from 10 countries). This was a pilot study that aimed at proposing some modifications in students' activities to increase the competences of future physical education teachers in promoting physical activity. Descriptive nature of the study aimed at assessing and describing the current status of a variable (PA) in a particular segment

of the population. To maintain the similar conditions of testing the study took place at the same time of the year (early September of 2017). All subjects gave their informed consent for inclusion before they participated in the study. The study was conducted under the rules of the Helsinki Declaration. The study protocol was approved by the Local Bioethics Committee of Poznan Medical University (decision no. 908/16).

Measurement and procedure

To measure the PA rate, the International Physical Activity Questionnaire – Long Form (IPAQ-LF) was used. The purpose of the questionnaire is to estimate the level of PA in four domains: work, leisure, transportation, and household. The IPAQ-LF tool, prepared for international use, has acceptable measurement properties (Spearman's $\rho = 0.8$; criterion validity, assessed against accelerometer measures, median $\rho = 0.30$) as for self-reports [10]. Results were classified according to IPAQ's recommendations into three PA levels:

1. High:
 - 3 or more days of intense physical exercise at least 1500 MET minutes per week,
 - 7 or more days of any combination of exercises exceeding 3000 MET minutes per week.
2. Sufficient:
 - 3 or more days of intense physical exercise of least 20 minutes per day,
 - 5 or more days of moderate exercise or walking of at least 30 minutes per day,
 - 5 or more days of any combination of exercises exceeding 600 MET minutes per week.
3. Insufficient – persons without physical exercise or who do not meet the criteria for sufficient or high level.

According to IPAQ Research Committee's methodology, the level of PA determined as high is a health-promoting amount of PA [21]. Moderate PA means exercise with slightly heavier breathing (and a slightly faster heart rate at 50-70% of the maximum heart rate). Intense PA means heavy exercise requiring very heavy breathing (and a faster heart rate at 70-85% of the maximum heart rate). Every type of exercise was quantified in MET minutes per week – by multiplying the ratio assigned to this exercise (intense – 8 METs, moderate – 4 METs, walking – 3.3 METs) by the number of days of exercise per week and the average duration in minutes per day. Questionnaires were completed in whole-class groups during a regular academic class, in quiet classroom conditions, and took approximately 30 minutes to complete.

Students were informed about the anonymous and voluntary nature of their participation, that the study records would be kept confidential, and that their contributions would be unidentifiable in the final report.

Statistical analysis

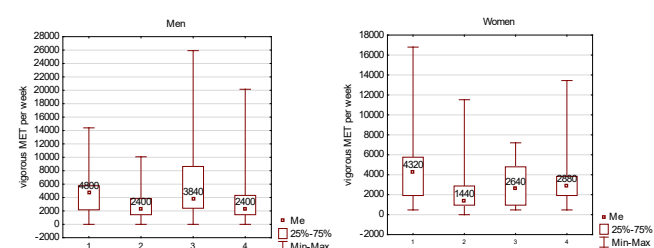
Differences between the groups were tested with ANOVA. Dunn's Test of Multiple Comparisons Using Rank Sums was used for all samples as the post-hoc test. Significance was denoted by $p < 0.05$. Statistical analysis was carried out using Statistica 10.0 software.

Results

Intense physical activity

Comparison of intense PA rates shows that the highest results were recorded for men (4800 MET min/week) and women (4320 MET min/week) studying in the Czech Republic, while the lowest ones were for students from Poland and Germany (2400 MET minutes/week) (Figure 1). Similar differences apply to female students where intense PA was lowest among female students from a Polish university and highest among female students from the Czech Republic (Figure 1).

Considering the results it was noted that male students have higher PA rates than women. Only female students from Germany had a higher result (2880 MET min/week) than their fellow male students from Germany (2400 MET min/week) (Figure 1).



Note: 1 – the Czech Republic, 2 – Poland, 3 – the Netherlands, 4 – Germany. Men: $H = 15.51879$, $p = 0.0014$; CZE-POL $p < 0.05$; women: $H = 14.69412$, $p = 0.0021$; POL-CZE $p < 0.05$

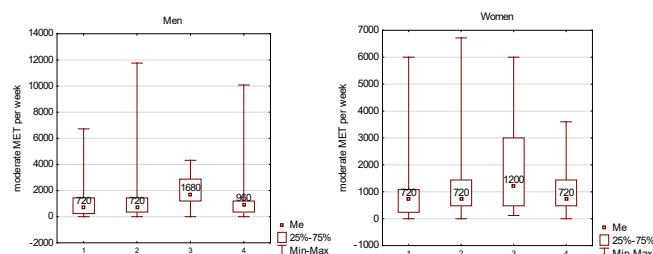
Figure 1. Intense physical activity of students from the Czech Republic, the Netherlands, Germany, and Poland (MET min/week)

Furthermore, the number of days of intense PA performed by the students per week was analyzed. Intense PA was most frequently undertaken by male students from the Netherlands (6 days/week) and the Czech Republic (5 days/week). Of female students, intense PA was most

frequently carried out by Czech students (5 days/week) and least frequently by female students from Poland (3 days/week).

Moderate physical activity

Analysis of differences in moderate PA undertaken by students showed the highest activity level for both women and men studying in the Netherlands (1680 and 1200 MET min/week, respectively). Male students from the German university scored 960 MET min/week. Polish male and female students were involved in moderate PA to a small extent (720 MET min/week). Scores of Polish students were much lower than those recorded in other countries. It was noted that Dutch students of both sexes were much more likely to carry out moderate PA than their fellow students from other universities (Figure 2).



Note: 1 – the Czech Republic, 2 – Poland, 3 – the Netherlands, 4 – Germany. Men: $H = 17.24446$, $p = 0.0006$; NED-CZE $p < 0.05$, NED-POL (U) $p < 0.05$, NED-POL (PE) $p < 0.05$, NED-GER $p < 0.05$; women: $H = 3.037333$, $p = 0.3859$

Figure 2. Differences in moderate physical activity between students from the Czech Republic, the Netherlands, Germany, and Poland (MET min/week)

Analysis of the number of days on which the students undertook moderate PA has shown that students from the Dutch university of both sexes were active most frequently (5 days/week). Other student groups performed moderate PA every 2-3 days.

Discussion

It is common knowledge that the level of education [27] and the place of study (or at least of longer residence) [4] affect the PA level and health behaviors. Seemingly, it should not apply to students – especially of physical education – as their activity should be rather high, and less sensitive to the cultural, social, or national factors. Students majoring in the same professional pathways should be gaining qualifications via comparable study programs, at least according to the Bologna Law of the European Higher Education Area.

Analysis of collected data has shown a very high level of intense PA among PE students from the Czech university. These results were confirmed by reports of other authors which show that, compared to other countries, adult Czechs usually have the highest level of PA. Comparative studies between students from the Czech Republic and China have also shown a high general PA of the Czech students [28]. Therefore, based on this study, Czech students seem to be some of the most active students from European countries. Sjöström et al. [23] suggest that citizens of such countries as the Czech Republic may be presenting a higher level of PA because of the infrastructure facilitating various forms of walking activities which may encourage more frequent PA in general. The importance of easy access to recreational and sports facilities has been emphasized in many studies before, and correctness of this supposition is confirmed by the equally high level of PA in Dutch people who had one of the highest scores in terms of moderate PA among our sample (1680 MET min/week). This is consistent with the Eurobarometer study [24] showing that Dutch students were one of the most active groups of all young adults studying in Europe. This may be due to few facts: good infrastructure (for example cycling, skating and sailing routes), higher rates of community and social engagement in active-lifestyle in general, higher economical status, increased health awareness.

PE students of the university from Poznań presented a lower level of PA. This result is surprising as a previous study by Baj-Korpak [2] has shown students of a Polish university as having high levels of PA, higher than the generally assumed level of 3000 MET min/week. These comparative studies on Polish students have shown that students majoring in physical education in other Polish cities (Biała Podlaska and Kraków) scored 1078 MET min/week at a moderate level and 2493.6 MET min/week at intense PA level. So, although students from different universities in Poland have similar studying program, when comparing activities performed by students majoring in PE in those different universities in terms of their spare time (e.g. PA) you need to take into account differences in study curricula and also a different level of awareness and needs, behavior patterns. The different curricula involve various forms of physical exercise to a certain extent, specifically in the context of recent curricular changes. Perhaps fewer obligatory physical exercise classes may be related to the lower spare-time PA. Therefore, the need for extra leisure-time PA as realized by the students may vary. Unfortunately, in our study, we did not analyze the correlation between study curricula

and the part of physical exercise in the different study programs but it could be important.

Besides presenting a lower level of PA compared to other European countries Polish students' PA score was just sufficient (according to IPAQ). On the contrary, the Czech and the Dutch activity level was higher and above the recommended values. Bednarek et al. [3] compared the levels of PA of Polish and Turkish students and the Polish ones had a much higher PA level per day/week (women: 3720 MET min/week, men: 5045 MET min/week) than the Turkish ones (women: 1690 MET min/week, men: 2590 MET min/week). Another comparison of the PA of Polish and Turkish students has also shown the Polish ones to be much more physically active than the Turkish ones [15]. Zuzda et al. [30] noted that students of the Białystok University of Technology had a higher score (3706.90 MET min/week) than students in Portugal (2790.84 MET min/week). Concerned those three research the season of the year or climate might have been an important factor affecting the PA level. Perhaps the lower level of PA of students from Turkey and Portugal was due to the much warmer climate [6] and higher temperatures discouraging any leisure-time PA. This proposition was, however, rejected by Kijo [14] who noted that for 46.6% of students from Poland majoring in physical education the season of the year was irrelevant for the level of their PA and, according to their declarations, they were most active in the summer. Nevertheless, temperatures even in summer differ significantly between Turkey, Portugal, and Poland. Our study was, however, conducted in similar climate regions (Central European area) and at the same time of the year (early September) and still the results differ significantly. The above-mentioned determinants are probably of lesser importance. Many other factors like motivation, well-being, or environmental variables may substantially determine PA [17]. Facilities such as access to biking paths, swimming pools, or gyms are certainly (as has already been noted) very important factors encouraging the decision to undertake PA. This is confirmed by a high PA of the students from the Czech Republic and the Netherlands regardless of their sex. But as indicated by the results obtained by German students, good technical facilities may be an insufficient motivator. The level of PA of German PE students was, likewise, higher than that of their Polish peers but lower than Czech and Dutch PE students.

Men have usually presented a higher level of general and intense PA than women [22, 28]. In our study, we observed that nearly all female participants, except for the students from Germany, had a lower level of

intense PA than male participants. Identification of the reasons for differences in PA intensity between the sexes might help eliminate the barriers and increase the level of PA in all countries. The results of Choi et al. [9] showed that a higher PA social support score was significantly associated with a higher PA participation rate. Concordant with our findings, other authors argue that social support might not directly impact PA. But social support may have indirectly predicted the PA of students. Thus, further studies are required to identify the direct and indirect PA determinants of students, specifically those concerning PE and health-related professions. However, other studies report that the PA environmental factors such as footpaths safe for walking and access to local facilities are significantly associated with PA level [20]. However, we observed lower PA among German students than from other countries (e.g. Czech Republic, Netherlands). Thus, further studies are necessary to clarify the relationship between the PA environment and PA levels. This study has several limitations. First, this study was cross-sectional in 4 universities, and participation was based on the voluntary base, which precludes analyses of some of PA determinants among the full range of the PE student sample. In addition, PA data were self-reported, meaning they may be over- or underestimated. Future studies should incorporate prospective designs. Therefore, future research that includes empirical measurements using objective methods is needed.

Conclusions

We observed that nearly all female participants, except for the students from Germany, had a lower level of intense PA than male participants. Identification of the reasons for differences in PA intensity between the sexes might help eliminate the barriers and increase the level of PA in all countries. We observed that social support may have indirectly predicted the PA of students.

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