

LEVEL OF PHYSICAL ACTIVITY OF THE STUDENTS AT THE UNIVERSITY OF TUZLA ACCORDING TO IPAQ

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Abstract The study was conducted using the long version of the International Physical Activity Questionnaire (IPAQ) and the aim of this research is to determine the level of physical activity and differences among students, of the University of Tuzla, in relation to gender. The study was conducted on a sample of 813 students (321 male and 492 female) 1st cycle of studies at the University of Tuzla. The results of present study showed that average level of total physical activity for male students was 6,013.493 MET-minutes/week, while female students showed average level of total physical activity was 4,619.381 MET-minutes/week. We conclude that the total data indicates that in this group of students the physical activity level is sufficient and that there is a lower physical activity among females than males. Also there is a need to continuously take measures for promoting the sports at Universities with the aim of raising the health status of students to a higher level.

Key words IPAQ-long, physical activity, male and female students

Introduction

The level of physical activity (PA) in the adolescent age is declining, and excessive body mass and obesity are growing and are one of the biggest global problems around the world. Low levels of PA and overweight annually take 2.8 million lives (World Health Organization, 2013). Therefore, it is no surprise that physical activity and obesity has lately been one of the most common research subjects and challenges of many international scientists (Wang, Lobestein, 2006). The need of human for physical activity today is certainly one of the main conditions for his survival.

Physical activity is defined as any body movement derived by activating skeletal muscles and resulting in energy consumption (Caspersen, Powell, Christenson, 1985). Defined by the World Health Organization (WHO, 2017), PA includes activities undertaken while working, playing, carrying out household chores, travelling, and

engaging in recreational pursuits and is categorized by intensity levels from low to moderate to high intensity. Previous research consistently shows that inadequate PA is a risk factor for the development of several chronic diseases (Reiner, Niermann, Jekauc, Woll, 2013). Despite the efforts of public health, the level of physical activity of the population of Croatia and other European countries is still low (Jurakić, Pedišić, Andrijašević, 2009; Sjostrom, Oja, Hagstromer, Smith, Bauman, 2006; Van Tuyckom, Van De Velde, Bracke, 2013), which points to the need for a more focused approach to this problem. Some international studies show a high rate of physical inactivity represented in leisure time, in the European countries, which move in the range of 35% to 89% (Haase, Steptoe, Sallis, Wardle, 2004). Additionally, the worrying fact is that physical behavior of students in Europe is not improving because recent studies show similar high rates of inactivity (Bergier, Kapka-Skrzypczak, Bilinski, Paprzycki, Wojtyła, 2012; Romaguera et al., 2011; Sigmundova, Chmellk, Sigmund, Feltlova, Fromel, 2013; Varela-Mato, Cancela, Ayan, Martin, Molina, 2012). Also, previous studies have shown that transition from secondary school education to college may be associated with a significant fall in PA (Bray, Born, 2004).

Sexual differences are interesting because many of the research done so far suggests a different relationship between male and female towards PA and that females are far less willing to participate in different programs of regular PA than males. Namely, the rate of female participation in more active programs, which should be initiated and accepted in early childhood as much as possible, is far below the average (Markuš, Andrijašević, Prskalo, 2008).

Freshman year in this new life chapter faced with numerous university challenges, such as the orientation of the studying system, exams and partial exams, the presence of lectures, change of residence during the study, independent financial budget, interest activities, and all these are just some of the potential new topics in their life they encounter. Thus, such research can be helpful in solving similar problems (Mir, Lichtenberger, Pichler, Wegscheider, 2015). Students sit in the amphitheater, classrooms, libraries, listen to lectures, read and work in groups or on a computer. Continuous, uninterrupted sitting is a sign of today, the way of life and work that is learned very early, no later than we go to elementary school. This structured attitude towards life continues to largely go on through the life profession (Dreger, Huber, 2013). Uniform attitudes towards PA not only bring negative consequences to health but also affect learning ability and learning capacity at all stages of life. Responsible relationships of physical activity are with the development of synapses, the distribution of alertness, the stimulation of neurotransmitter and the oxygen supply to the brain (Gligoroska, Manchevska, 2012; Graf, Koch, Dordel, 2003; Hollmann, Struder, 2003).

International Physical Activity Questionnaire (IPAQ) has been developed to help solve the problems of physical activity or inactivity by experts in 1998 in order to facilitate monitoring of PA based on the global standard (Craig et al., 2003). Since then, this questionnaire has become one of the most used for PA (Van Poppel, Chinapaw, Mokkink, van Mechelen, Terwee, 2010). IPAQ is particularly preferred due to its strictly uniform terms and concepts, which are translated into multiple languages for use on a global scale (Bednarek, Pomykała, Bigosińska, Szyguła, 2016). Croatian version of the long IPAQ self-evaluation questionnaire is reliable for measuring the level of specific activity for different areas and intensity of physical activity (Pedišić, Jurakić, Rakovac, Hodak, Dizdar, 2011).

In accordance with the stated, the aim of this research is to determine the level of physical activity and differences among students, of the University of Tuzla, in relation to gender.

Material and methods

Participants

The study was conducted on a sample of 813 students 1st cycle of studies at the University of Tuzla. All students were healthy with no previous medical condition to prevent them from being physically active and to complete the surveys. Out of the total number of students 321 were male (mean age 20.07 ± 1.027) and 492 female (mean age 19.91 ± 0.637) of the first year of study. At the beginning of the academic year, students through the subject physical education are offered a range of sports which could be recreationally engaged in, by free choice, with the aim of maintaining health and preventing injury and illness, as well as a happier life span. Student's freshmen at the Faculty of Physical Education and Sports, are not included in this study due to the fact that their faculty program is focused on physical education and sports and they have an advantage over hours spent in PA, at least 4 times a week. The survey protocol was approved by the Scientific Committee of Faculty of Physical Education and Sports, University of Tuzla. The study was voluntary and no incentives were paid to the students.

Instrument

In order to determine the level of physical activity among adolescents at this age, the International Physical Activity Questionnaire long form (IPAQ) was used. IPAQ describes physical activity in energy expenditure units – minutes per week (MET). Metabolic equivalent of task (MET) is used to estimate the metabolic cost (energy expenditure as reflected by oxygen consumption) of PA – resting metabolic rate. According to scientific reports, one MET is equal to approx. $3.5 \text{ ml oxygen kg}^{-1} \text{ body weight per min}^{-1}$. It was determined that the cost of an intensive physical effort is 8 MET per minute, a moderate effort – 4 MET, walking (march, quick walking) – 3.3 MET. The energy cost of the PA is calculated as the MET level multiplied by the standard resting metabolic rate (1.0 kcal/kg/h). Only the PA lasting longer than 10 minutes was estimated, without rest breaks, and within the last 7 days prior to survey.

The specific types of activity that are assessed in the study are walking (W), moderate-intensity activities (M) and vigorous-intensity activities (V) (assuming that an vigorous-intensity PA is a hard physical effort which forces strongly intensified respiration and considerably accelerated heart rate, a moderate-intensity PA means physical effort with slightly accelerated and make you breathe somewhat harder than normal and slightly accelerated heart rate. Weekly PA was calculated by summing-up the MET obtained during vigorous-intensity PA, moderate-intensity PA and while walking during the entire week. In the methodology of the assessment of the category score of weekly PA of the IPAQ, the following 3 categories were selected:

1. LOW PA - when the total energy expenditure does not reach 600 MET in/week.
2. MODERATE PA - assuming that this expenditure is the effect of 3 or more days of vigorous-intensity PA for a minimum of 20 minutes daily; 5 or more days of moderate-intensity PA and/or walking for at least 30 minutes per day; 5 or more days of any combination of walking, moderate-intensity or vigorous-intensity activities achieving a minimum total PA of at least 600 MET-minutes/week.
3. HIGH PA – assuming that this expenditure is the effect of vigorous-intensity activity on at least 3 days achieving a minimum total PA of at least 1500 MET-minutes/week; 7 or more days of any combination of walking, moderate-intensity or vigorous-intensity activities achieving a minimum total PA of at least 3000 MET-minutes/week.

Procedure

The measurement protocol was the same for all faculties. When arriving at the sports hall participants took the survey questionnaires and after explanation and detailed information about the research, objectives and mode of implementation, and that at any moment can turn to for help with possible ambiguities they started to answer the questions. The participants faculty, age and sex were also recorded. Since the survey was anonymous, prior to the start of the survey, respondents were asked to complete the questionnaire as accurately and honestly as possible.

Data analysis

Analysis of the data was processed using a software system for data. Descriptive statistics (Mean – arithmetic mean, SD – standard deviation, Median and Frequencies in percent (%)) were calculated for each university's participants. Data sets were checked for normality using KS-Kolmogorov-Smirnov test (KS). Significance (p) for all statistical tests was set at $p \leq 0.01$. Significant differences between groups were assessed using Mann-Whitney U tests.

Results

The results (Figure 1, Table 1) of the indicators for category score of PA per gender indicate that of the total number of male students 58.9% of them shows a high level of PA, 32.1% of them shows a moderate level of PA and 9% of them shows a low level of PA. Unlike male students, the results of the female students indicate that of the total number of female students 53.7% of them shows a high level of PA, 33.3% of them shows a moderate level of PA and 13% of them shows a low level of PA.

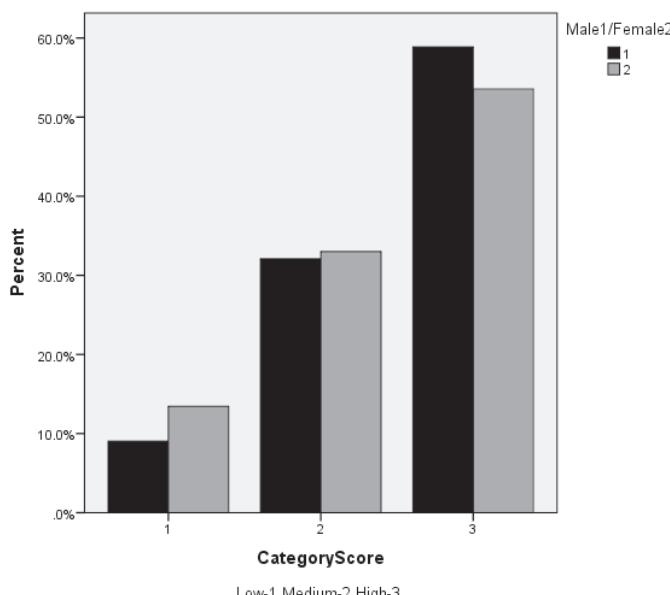


Figure 1. The distribution of physical activity based on IPAQ survey data for category score

Table 1. Frequency results of physical activity based on IPAQ survey data for category score (%)

Category score	Male	Female	Total sample
1	9.0	13.0	11.7
2	32.1	33.3	32.6
3	58.9	53.7	55.7
Total	100.0	100.0	100.0

Kolmogorov-Smirnov test (KS) was used to assess the normality of distribution of results for PA of male and female students. The results of the KS test (Table 2), given the significance level, show that the distribution of all the applied variables for assessment of PA for male and female students is statistically significantly different from the normal distribution ($p = 0.000$). It is important to check the normality of the obtained distributions in all the tests performed since the results of the KS test allow the selection of a suitable analysis to determine the difference between the results obtained in all the applied variables in the participants of different groups. As noted above, when computing statistically significant differences between groups of classified by gender, the non-parametric Mann-Whitney U test was used.

Table 2. The level of PA of male and female students expressed in MET-minutes/week and statistically significant level of KS test

Physical activity	Walking		Moderate-intensity		Vigorous-intensity		Total	
	male	female	male	female	male	female	male	female
Mean	2,530.540	2,265.221	2,501.290	1,942.488	981.680	411.540	6,013.493	4,619.381
Median	1,815.00	1,724.25	1,260.00	1,080.00	80.00	0.00	4,252.50	3,502.50
Std. Deviation	2,401.991	1,973.874	3,446.701	2,521.064	1,511.525	970.494	5,585.680	3,837.973
KS-test	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Table 3. Results of Mann-Whitney U test between male and female students for PA

Physical Activity	Male1/ Female2	N	Mean Rank	p-level
Walking	1	321	414.48	0.433
	2	491	401.28	
Moderate-intensity	1	321	416.85	0.308
	2	491	399.73	
Vigorous-intensity	1	321	465.30	0.000
	2	491	368.06	
Total	1	321	433.66	0.008
	2	491	388.74	

Considering the results of Mann-Whitney U test (Table 3) for variables for assessment of PA we see that there were statistically significant differences between male and female students in two of the four variables. A statistically significant difference was obtained in the variable for assessment of vigorous-intensity PA at the

level of significance $p = 0.000$ and in variable for assessing total PA at the level of significance $p = 0.008$. When we analyze the results of the Mean Rank we find that in these statistically significant variables, the value of the results is in favor of the male students, respectively, in the aforementioned variables male students have achieved greater levels of PA at a statistically significant level.

Discussion

The present study was conducted using the long version of the International Physical Activity Questionnaire (IPAQ). The main aim of the presented research was to determine the level of PA and differences among students, of the University of Tuzla, in relation to gender. The results of present study showed that average level of total PA for male students was 6,013.493 MET-minutes/week, while female students showed average level of total PA was 4,619.381 MET-minutes/week. Total data indicates that in this group of students the PA level is sufficient. Also, we found statistically significant differences between genders in our study in favor of male students, while other studies (Kaupužs, 2013) show no significant differences between genders.

Research of Pedišić, Rakovac, Bennie, Jurakić, Bauman (2014) showed a high prevalence of insufficient PA among Croatian university students, 25.1% of females and 24.6% of males, with average level of total PA for male students of 3,241.8 MET-minutes/week and with average level of total PA for female students of 2,979 MET-minutes/week. Students in our study in comparison with Croatian university students have higher levels of PA. However, we must note that students from our study have compulsory course of physical education in the duration of two school classes per week during the academic year. Also students from our study don't live in campus so they need to walk to classrooms, libraries, sport facilities, supermarkets etc., which are located separately, or use various means of transportation, which can affect the level of PA (Zhao, Sigmund, Sigmundová, Lu, 2007).

Similar results as in our study and above mentioned were obtained in study of authors Bednarek et al. (2016) where students from the University of Physical Education in Krakow, Poland get 6,308 MET-minutes/week for male students and 5,599 MET-minutes/week for female students while students from Adnan Menderes University in Aydin, Turkey get 4,527 MET-minutes/week for male students and 2,539 MET-minutes/week for female students, where sample size of students was taken from university programs focused on physical education and recreation.

Here we see a lot of variations between different university programs, and the reason for this may be sport cultural differences (Zhao et al., 2007) or may be driven by a complex suite of interwoven socioeconomic development, technology and urbanization factors (Bednarek et al., 2016).

Since PA can improve health, in order to increase PA WHO (2017) recommends for adults aged 18–64 years to involve in the realization at least 150 minutes of moderate-intensity PA throughout the week, or do at least 75 minutes of vigorous-intensity PA throughout the week, or an equivalent combination of moderate and vigorous-intensity PA, and also for additional health benefits, adults should increase their moderate-intensity PA to 300 minutes per week, or equivalent, and in order to be beneficial for cardiorespiratory health, all activity should be performed in bouts of at least 10 minutes duration. Based on the above mentioned and considering the category score scale we can say that category 2-moderate PA and 3-high PA meeting the above criteria. Accordingly, based on the results obtained in this research we can see that of the total number of male students 91% of them shows sufficient level of PA as well as of the total number of female students 87% of them shows sufficient level of PA, and we can also say that males are more active than females. Study from authors Bergier et al. (2012) and

Bergier (2015) confirm our findings that women engage in less physical activity than men, which may be driven by perception of overarching exercise (Bednarek et al., 2016).

The organization of physical education tailored to the interests of students in higher education helps students to maintain an active lifestyle. Results of this study show that through such activities students can have a higher level of PA which can positively affect their health.

Conclusion

The obtained results of the presented study indicate a lower physical activity among females than males, but we can conclude that PA level of majority of students from University of Tuzla could be considered as adequate. The results presented in this study show that it is necessary to continuously take measures for promoting the sports at Universities with the aim of raising the health status of students to a higher level. We recommend that in the future other universities should incorporate PA programs among their students in order to raise the overall level of PA.

Potential limitations of this study may be that the sample was limited to first year students who had compulsory course of physical education, while students from other years of study did not have compulsory course of physical education and they also did not participate in the study.

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