

Risk assessment and level of physical activity of students in Poland

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Abstract

Purpose: The aim of the study was to determine the risks of activity by using Physical Activity Readiness Questionnaire (PAR-Q) and describe the PA profile using the short-version of the International Physical Activity Questionnaire (IPAQ-SF) among selected groups of sport science students.

Material: The study covered 99 students – 61 females aged 21.08 ± 1.43 and 38 males aged 21.24 ± 1.22 y. In order to assess and stratify the risk of PA the Polish short version of the IPAQ-SF was used.

Results: The total level of physical activity of the male students was 3460.039±2502.207 MET- min/week and was higher than in the case of female students (3388.107±2204.290 MET- min/week). The dominant type physical activity of female and male students was intensive effort. Among 22 men and 39 women, risk factors for cardiac events, pulmonary and musculoskeletal injuries were reported. The relationship between PAR-Q results and the on the IPAQ-SF results was no statistically significant.

Conclusions: This study demonstrates that students achieve the level of physical activity recommended by experts for the prevention of chronic diseases. This research allows sports science students to understand their own health issues through self-assessments of personal risk factors for cardiac events, pulmonary and musculoskeletal injury.

Keywords: Health, Risk of Injury, PAR-Q+, IPAQ-SF, Physical Activity, University Students

Introduction

Globally, premature mortality from four main non-communicable disease (NCDs) decreased by 15% between 2000 and 2012. This rate of decline is insufficient to meet the 2030 target of a one third reduction (WHO, 2016). The development of new technologies associated with professional work or communication progressing in the last several years is causing social restraint from Physical Activity (PA) and decreasing health. Then the lack of trained habits healthy life style and the disappearance of the natural need of the movement causes untimely aging and at the same time deteriorates health. Nieman (1998) showed that low fitness level has become the main indicator of all the risk factors for early death.

Physical activity is a biological human need, contributing to a healthy relationship status and should be a necessary component of human's lifestyle. Strategies to promote PA have become an important public health approach for the prevention of chronic diseases (Bonevski et al. 2014). In the past in Poland, less than 10% of all students took part in PA outside the statutory duty. In the same time in some European universities this percentage reached the limit of 50-60% (Korpak 2005).

Study of Glays Shuk-Fong Li *et al.* (2009), stressed that inactivity among students is prevalent. They conclude that participation in PA might be an effective way to improve the health of college students (their mental health, better social skills, higher levels of emotional intelligence). Thus, the importance of increasing exercise participation at the university level should be implemented and reinforced. The university students are considered prospective professionals with important roles in the future. For this reason, their attitudes in terms of PA level and health behaviors are of a higher importance (Varela-Mato et al. 2012). Active people live longer, are healthier and are more productive, more likely to avoid

injury and illness.

The role of PA in maintaining health is undertaken for several decades (Pasek et al. 2006, Szark-Eckardt et al. 2012, Szark-Eckardt et al. 2015, Żukowska et al., 2013, Pasek et al. 2016, Buśko et al. 2016, Kochanowicz et al. 2016). Studies show that PA should accompany since early childhood. PA suitable for gender, age, health and level of PF constitutes a necessary part of the health promotion.

Current recommendation of WHO, American Heart Association (AHM) and American College of Sport Medicine (ACSM) for adults 18–64 years old are that they should do at least 150 minutes of moderate-intensity aerobic PA or do at least 75 minutes of vigorous-intensity PA throughout the week or an equivalent combination of moderate- and vigorous-intensity PA. Muscle-strengthening activities should be done involving major muscle groups on 2 or more days a week, and flexibility training every day (WHO 2010, ACSM 2011). The prevalence of achieving physical activity recommendations declines rapidly between the ages of 18 and 24 when many young people are undertaking tertiary education (Grim et al. 2011).

Scientists involved in the study of the level of PA of various socio-professional groups are faced with major methodological problem according to the non-unified research tools (Wareham et al. 1998). Several methods are available to measure level of PA eg. self-reported questionnaires, direct observation, indirect calorimetry, movement sensor and heart rate telemetry (Lee, 2011). This situation has prompted researchers to develop a unified tool, resulting in the development of the International Physical Activity Questionnaire (IPAQ). Initial pilot testing using IPAQ was performed during 1998–1999, and further method was developed resulting in the eight versions of the IPAQ, including four long and four short versions (Craig et al., 2003), and then IPAQ was used in different countries (Hagstromer et al. 2006, Biernat et al. 2007, Bauman et al. 2009). The IPAQ

consists of various questions including times spent on walking and moderate- and vigorous-intensity PA of at least 10 min duration. During this study assess level of PA among selected groups of sport science students was used in the short form of International Physical Activity Questionnaire (IPAQ-SF).

To ensure an optimal benefit to health ratio before performing an exercise program the risk assessment should be carried out. Widely used tool for prescreening health assessment is the PAR-Q. The PAR-Q was developed by the Canadian (British Columbia) Ministry of Health to identify the number of adults for whom the PA might be inappropriate. The pre-participation of health screening is to provide information relevant to the safety of beginning physical exercise and to identify known diseases and risk factors for NCD by self-guide methods, so the appropriate lifestyle can be initiated (Allen, 2014). PAR-Q should be a first step before initiating an exercise program or planning to increase the amount of PA.

To measure pre-participation health hazard and risk assessment several instruments are available, eg. standardized forms are PAR-Q, and AHA/ACSM Health/Fitness Facility Pre-participation Screening Questionnaire. These questionnaires can be completed in a few minutes and identifies moderate- and high-risk individuals. The American College of Sports Medicine (ACSM) exercise pre-participation health screening recommendations stipulates that persons at moderate risk for NCD should undergo a medical examination prior to starting a vigorous. ACSM also recommends that persons at high risk for CVD should undergo a medical examination and diagnostic exercise testing before beginning either a moderate-intensity (Pescatello et al. 2014). The ACSM recommendations are not a replacement for sound clinical judgment.

The aim of this article was to identify the types of risk factors associated with the PA among sport science university students, to assess their level of PA using the IPAQ-SF and guide the future efforts to minimize the health risk and improve PA level.

Therefore, we designed that study with a twofold aims. Firstly, we verified if the use of PAR-Q reduces the barriers to physical activity participation for physical

exercise sport science students and the populations, which become more physically active. Secondly, we verified if sports science students understand their own health issues through self-assessments of personal risk factors for NCD.

This was the first examination of university students which associated types of risk factors with the level of PA carried out in Poland.

Materials and methods

Participants: The study was conducted at University of Physical Education and Sport in Gdansk, Poland. The research was done on a sample of voluntary 61 women (21.08±1.43 years old) and 38 men (21.24±1.22 years old). Before training all subjects were informed and gave consent for study procedures. Anthropometric parameters of the group at the beginning of the study are presented in Table 1.

Organization of the research: The research method was a diagnostic survey. The study used two validated research tools: PAR-Q and IPAQ-SF. PA level was assessed by means of the Polish short IPAQ-SF. This questionnaire is currently recognized as one of the most commonly used polling tools for monitoring the level of PA (Biernat et al. 2007).

The polish version of IPAQ-SF was published as early as in 2007 (Biernat et al. 2007). In this version, there are determined separately the number of days and the time devoted to PA: intensive, moderate, and walking. The questionnaire also allows determining the overall time devoted to sitting. The measure of energy consumption during PA is the so-called MET (Metabolic Equivalent). One MET equals to consumption of one kilocalorie of energy by one kilogram of body mass during one hour of calm sitting (kcal/kg/h). PA expressed in MET-min/week is calculated by multiplying the number of days a certain effort was performed by the value of MET for this effort and by the average number of minutes the effort was performed a day (Mrozik i Stupnicki, 2015; Zuzda et al., 2015). Abu-Moghli (2014) concluded that Health education and promotion professionals can confidently use IPAQ questionnaire to assess college students' participation in physical activity.

PAR-Q is applicable for people aged 15 to 69 years.

Table 1. Anthropometric characteristics of participants at the beginning of the study

Gender	Statistics	Age[year]	Height [cm]	Body mass [kg]	BMI [kg/m ²]
Female (n=61)	X	21.08	167.94	58.08	20.58
	SD	1.43	3.31	3.67	1.09
	Min	19.0	159.00	46.00	17.53
	Max	25.0	175.00	63.50	23.82
Male (n=38)	X	21.24	180.95	76.50	23.37
	SD	1.22	3.97	4.16	1.25
	Min	19.0	173.00	68.00	20.99
	Max	24.0	190.00	86.00	26.75

n—number of subject; x—average; SD—standard deviation; BMI—Body Mass Index.

The purpose of preparticipation in risk assessment through the use PAR-Q is to provide information relevant to the safety of beginning exercise training, increase the intensity PA and to identify known diseases and risk factors for cardio-vascular diseases or musculoskeletal injury so that appropriate lifestyle interventions can be initiated. PAR-Q includes questions about diagnosed heart disease, stress and resting chest pain, dizziness, diseases of bones and joints, prescribed medications, elevated blood pressure or heart disease, and other causes which may be a contraindication to undertake PA.

Statistical analysis. Completed questionnaires were analyzed statistically using the package SPSS 23 (IBM, USA). It established the characteristics of distributions response based on the Shapiro-Wilk and the significance of differences on the basis of a test Chi², Mann-Whitney test and t-Student test. The probability values less than 0.05 (p<0.05) were considered as statistically significant.

Results

The IPAQ_SF allowed determining the number of days and the time devoted to intensive, moderate activity, walking, and the time spent in a sitting position during the previous 7 days among female and male sport sciences students. The distribution of vigorous, moderate and walking PA based on the number of MET-min/weeks is shown in Table 1. The total level of physical activity among the male students was 3460.039±2502.207 MET-min/weeks and was higher than among the female students (3388.107±2204.290 MET-min/weeks; p>0.05). The dominant type of activity was intense effort, for female students (4731.528±1813.091 MET-min./week). Among the male students the intense (5246.917±2524.52MET-min./week) and moderate efforts (1956.472±822,381MET-min/week) were dominant types of activity.

The male students obtained higher values in the area of moderate efforts than females (1470.250±822.381

Table 2. Level of physical activity of male (n=38) and female students (n=61)

Activity type	Students	Average Value	Median	Lower Quartile	Upper Quartile	Standard Deviation	p (F vs. M)
Total	Male (n=38)	3460.039	2821.500	2064.00	4158.000	2524.52	p>0.05
	Female (n=61)	3388.107	3066.00	1653.000	4545.000	2204.290	
Intensive	Male (n=18)	5246.917	4545.000	3759.000	6318.000	2579.278	p>0.05
	Female (n=36)	4731.528	4407.000	3631.500	5050.500	1813.091	
Moderate	Male (n=18)	1956.472	2310.000	1039.500	2586.000	822.381	p>0.05
	Female (n=17)	1812.971	1653.000	1356.000	2079.000	806.747	
Walking	Male (n=2)	910.25	910.25	758.0	1062.5	215.314	-
	Female (n=8)	689.875	758.500	537.000	904.500	309.630	
Sitting	Male (n=38)	419.459	390.000	300.000	480.000	167.663	p>0.05
	Female (n=61)	364.081	360.000	240.000	480.000	174.868	

Table 3. Correlation PAR-Q test result vs. activity level

PAR-Q	Level I Intensive		Level II Moderate		Level III Low		Total		Chi2	p
	n	%	n	%	n	%	n	%		
Q1- Has your doctor ever said that you have a heart condition and that you should only do physical activity recommended by a doctor?	8	100	35	94.6	50	92.6	54	54.5	0.716	0.699
Q2- Do you feel pain in your chest when you do PA?	7	87.5	33	89.2	51	94.4	54	54.5	1.045	0.593
Q3- In the past month, have you had chest pain when you were not doing PA?	6	75	32	86.5	51	94.4	54	54.5	3.659	0.161
Q4- Do you lose your balance because of dizziness or do you ever lose consciousness?	8	100	33	89.2	49	90.7	54	54.5	0.934	0.627
Q5- Do you have a bone or joint problem (for example, back, knee or hip) that could be made worse by a change in your PA?	4	50	21	56.8	39	72.2	54	54.5	3.115	0.211
Q6- Is your doctor currently prescribing drugs (for example, water pills) for your blood pressure or heart condition?	8	100	37	100	54	100				
Q7- Do you know of any other reason why you should not do PA?	8	100	34	91.9	54	100	54	54.5	5.184	0.075

Table 4. Correlation of the age, weight, height, and BMI vs. level of activity

Parameter	N	X average	SD	Median	Range	p		
						1 vs. 2	2 vs. 3	1 vs. 3
Age	99	21.1	0.1	21	19 – 25	0.782	0.549	0.983
Age Lev 1	8	21.1	0.4	21	20 – 23			
Age Lev 2	37	21.1	0.2	21	19 – 25			
Age Lev 3	54	21.2	0.2	21	19 – 25			
Mass	99	65.1	1	62	46 – 86	0.027	0.123	0.179
Mass lev1	8	59.2	2.8	58.8	50 - 75.5			
Mass lev 2	37	67.7	1.6	69	52 – 83			
Mass lev 3	54	64.3	1.3	61	46 – 86			
Height	99	172.9	0,7	171	159 - 190	0.072	0.113	0.406
Height lev1	8	169.8	2	168	165 - 182			
Height lev2	37	174.5	1.2	173	162 - 186			
Height lev3	54	172.3	1.0	170	159 - 190			
BMI	99	21.7	0.2	21.3	17.5 - 26.8	0.040	0.168	0.147
BMI lev1	8	20.4	0.6	20.7	18.1 - 22.8			
BMI lev2	37	22.1	0.3	22.3	19.0 - 26.1			
BMI lev3	54	21.5	0.2	21.0	17.5 - 26.8			

MET–min./week and 1812.971±806.747 MET–min./week respectively; $p>0.05$). The average declared time spent in a sitting position was 419.459±167.663 minutes a week for the male students and 364.081±174.868 minutes a week for the male students.

Analyzing the relationships in test results in case of the level of activity no statistically significant difference in the range of questions from 1 to 7 was found. The most frequently observed response was the answer = 0. In the case of Question 6 all respondents gave this reply, hence the inability to quantify the statistical dependence (Table 3).

The assessment of correlation between age, weight, height, and BMI and the level of PA showed statistically significant relationship for activity level 1 to the second level of activity with the body mass and BMI. Body mass and BMI of about 2 activity were significantly higher than respondents declaring activity level 1 (respectively: 59.2 vs. 67.7, $p= 0.027$ and 20.4 vs. 22.1, $p=0.040$) (Table 4).

Discussion

Physical activity is a basing biological human need, contributing to a health status and should be a necessary component of human’s lifestyle. Plotnikow (2015) stressed that university students are ideal targets lifestyle interventions aimed at improving health behaviors. Universities have the potential to engage large numbers of students in health behavior change interventions (UNESCO, 2009). The number of students enrolled in higher education worldwide will reach 262 million by 2025, a marked increase from 178 million in 2010 (Davis et al., 2012).

On the other hand students wishing to change his

lifestyle and to be physically active are deflected by face numerous barriers: demographic, biological, cognitive, emotional, sociocultural, and environmental factors (Pescatello et al., 2014). One of them may be health screening, which may involve a visit to a medical doctor (Warburton et al., 2011). While the benefits of PA are evident, PA may present health risks to people with NCD (Ewing et al., 2015). It is important to make sound decisions to identify which exercise interventions are chosen appropriate and safe for them (Sallis et al., 2015; Bredin et al., 2013).

Sports executives possess higher than average knowledge about the importance of risk assessment in the prevention of NCD. Unfortunately, when they became trainers and instructors, they do not implement their theoretical knowledge to the practice of everyday life in a satisfactory manner. It is important to pay more attention and scope passed in the training of student’s knowledge on risk assessment in the prevention of NCD.

The PAR-Q serves as a screening tool to quickly and easily identify adults for whom PA might not be appropriate (Pescatello et. al., 2014). PAR-Q can minimize barriers in adopting a physically active lifestyle (Balady et al., 1998; Thomas et al., 1992). The PAR-Q contains a 7-question battery designed to determine whether individuals are able to become more physically active (Allen et al, 2014, <http://eparmedx.com/>). When a person responds positively to 1 or more questions on the PAR-Q, he or she is advised to consult a physician for physical activity participation clearance. Risk assessment using the PAR-Q is undertaken to facilitate participation in regular physical activity by all, but should not replace sound clinical judgment.

The process is easy to complete and administer and reduce the barriers to PA participation for asymptomatic and symptomatic populations which becoming more physically active. The PAR-Q tools are evidence-based, meeting the requirements recognized by the medical community. (Bredin, 2013). They simplify the prescreening process especially when low-to moderate intensity exercise is performed. This is implemented in some countries, e.g. allows for pre-exercise screening use the PAR-Q+. This was reducing the number of individuals seeking clearance by a physician (Israeli Ministry of Health, 2015).

It is estimated that 1% of people who fill out the questionnaire PAR-Q will require a further assessment by a physician before taking the systematic exercise (Bredin et al. 2013). However, in the near future, this number may increase as the diseases of civilization are more and more common. For example prevalence of pre-diabetes status is increasing worldwide and experts have projected that more than 470 million people will have pre-diabetics by 2030. On the other hand for pre-diabetic individuals, lifestyle modification is the cornerstone of diabetes prevention, with evidence of a 40–70% relative-risk reduction (Tabák et al., 2012),

Declarations of our students filling the questionnaire PAR-Q indicate the incidence of symptoms memorialized at this relatively early stage of life. It should be noted, however, that the indications on individual symptoms were quite common, as concerned 22 men out of 39 tested. Among women, 60 respondents confirmed those 29 students. Efforts should be undertaken to facilitate participation in regular PA by university students and the hazards of exercise-related NCD events are likely to be reduced by careful attention to a reduce barrier and a safe and effective exercise prescription.

Plotnikoff et al. (2015) stressed that the university students which are represents a significant proportion of our population are ideal targets improving health behaviors. They are still at an age where health behaviors that impact on health later in life can be improved that a variety of activities, designed to highlight PA and health factors with immediate feedback, is experience allows a hands-on approach to learning as it increases the students' understanding of their own health issues. The results of research conducted by Snetselaar et al. among 88 medical students whose aim was a self-assessment of their personal risk factors concluded that have succeeded in providing students with a valuable educational tools, which they can use in a future work.

From international studies evaluating the level of PA residents 15 EU countries and 6 countries participating in the program CINDI WHO conducted in the late 90s it shows that the percentage of the guiding secondary amounted to between 40-80%. The largest percentage of women and men giving of a shallow PA was found in Portugal (Varo, 2003).

The Eurobarometer survey of the European Commission (http://europa.eu/rapid/press-release_IP-14-300_pl.htm) published in March 2014 indicate that

59% of European Union citizens never perform physical activity, play sport or do it only rarely, and while 41% take this kind of activity at least once a week. Residents of Northern Europe are more physically active than people in Southern and Eastern Europe. In Sweden, 70% of respondents said they practice or play sport at least once a week. Right behind Sweden the following countries are placed in the ranking: Denmark (68%) and Finland (66%), followed by the Netherlands (58%) and Luxembourg (54%). At the opposite end of the rankings were: Bulgaria (78% who never practice or play sport), followed by Malta (75%), Portugal (64%), Romania (60%) and Italy (60%). Nearly 35% of survey participants Multi-Centre Nationwide Health Survey Project - WOBASZ (37% of women and 32% men) do not perform any physical exercise lasting at least 30 minutes a day during free time from work or study. Among the people who perform this type of exercise, they do it irregularly or rarely (Dryglas et al, 2005).

Results from the Australian Bureau of Statistics of the Australian Health Survey 2011-2012 show that higher education students are more likely to meet recommended guidelines for exercise (58%) compared with 45% of non-higher education students (ABS,2012).

Hasse et al (2004) stressed that 73% of male and 79% of female university students Reduce barriers to regular PA, by eliminating unnecessary medical evaluations which replace use of the PAR-Q. All adults should be encouraged to be physically active.

University students from UK do not meet physical activity guidelines. The same is the USA where nearly half of all university students are not achieving recommended levels of PA (Weinstock, 2010).

Our study confirms the assumption that students of physical education will be characterized by increased and high physical activity resulting from lead an active lifestyle. It demonstrates that the total level of PA of the male students was 3460.039 ± 2502.207 MET- min/week and was higher than in the case of female students (3388.107 ± 2204.290 MET- min/week). The dominant type PA activity of female students was intensive effort male students was intensive effort (5246.917 ± 2579.27 MET- min/week) and moderate effort (1956.472 ± 822.38 MET- min/week respectively). This data were higher than that of students from Bialystok Medical University where average total PA of students amounted to 3014.5 MET- min/week ± 1564.8). Most of the students presented a moderate level of physical activity.

Kościczuk (2016) stressed that dietetics students were characterized by a higher average value of MET- min/week 1304.37 ± 1082.32 compared with students of physiotherapy (MET- min/week 1016.75 ± 715.5).

In Poland another data from study done by Starościk (2016) stressed that Physical Education students undertake PA on a high and moderate level more often than students of other pedagogical sciences. Mroziak (2015) assessed the overall performance of PA of students from College of Physical Culture and Tourism in Pruszkow (Poland) showed that the level of PA is satisfactory. Sport science

students, as future prospective coaches and instructors, should be well prepared to promote health behaviors, and after the completion of their studies stand as authority in those areas.

Conclusions:

1. This study demonstrates that sport science students achieve the level of PA recommended by experts for the prevention of NCD.
2. The indications on individual symptoms were quite

common, as concerned 22 men out of 39 tested and 29 women out of 60 tested. It was found that students participating in this analysis initially did not understand their own health issues.

3. Use of the PAR-Q can reduce barriers that students encountered before taking regular physical activity

Conflict of interests

The authors declare that there is no conflict of interests.

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