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# PHYSICAL ACTIVITY LEVELS AND GENDER DIFFERENCES IN ELEMENTARY SCHOOL PUPILS

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## Abstract

As a result of decreased levels of physical activity (PA) during growth and development, a number of health complications can occur. Therefore, the aims of this study were to provide preliminary PAQ-C scores among public school children and compare them by gender. 110 pupils from Sarajevo elementary schools aged  $10,16 \pm 1,2$ , who did not participate in additional trainings and/or organised physical activities were included in this study. Croatian version of Physical Activity Questionnaire for older children (PAQ-C) was used to evaluate respondent's physical activity levels. A total summary PAQ-C score was calculated by averaging the scores of the questions, whilst the differences between mean of nine scores were analysed using independent samples T-test and 5-point questionnaire differences using Mann Whitney U test. This study showed that pupils from Sarajevo elementary schools reported moderate and high activity levels. Gender analysis showed statistically significant differences between girls and boys PA scores

**Key words:** body mass index, obesity, exercise, nutrition

## Introduction

Physical activity is one of the key factors in health problems prevention from an early age. The World Health Organization (WHO) recommendation for children and youth aged 5-17 to accumulate at least 60 minutes of moderate- to vigorous-intensity physical activity daily.

As a result of decreased levels of physical activity during the stages of growth and development, a number of psychological and physical health complications can occur. It is no coincidence that antisocial behaviour is synonymous with overcrowded urban environments combined with neglect of educational values by all factors of upbringing. It is noted that systematic, science-based exercise can significantly influence not only the regulation of morphological, motor and functional characteristics, but also to a significant extent the cognitive functions and conative dimensions responsible for behavioural modalities and effect young people socialization (Chan et al., 2019). There is no such activity that can simultaneously affect as many human traits like professionally designed physical exercise program (Alamdari et al. 2019), but it is important to emphasize that the total amount of physical activity in the education system is insufficient and does not ensure optimal transformational effects (Prskalo et al. 2010).

Physical activity has many positive effects on skeletal (Julián-Almarcegui et al. 2015), cardiovascular (Andersen et al. 2011), mental health (Biddle et al. 2011), both the adaptive and innate immune system (Fernandez et al., 2018) and life of children, so regular physical activity plays a big role in child's growth and development. It is known that a certain level of physical activity helps to lower incidence of certain modern civilization diseases such as obesity, cardiovascular diseases, metabolic syndrome and diabetes (Cordova et al. 2012; Alonso-Fernández et al. 2015). Physical activity habits, can, to a certain degree, help young people to properly develop their musculoskeletal and cardiovascular system, their neuromuscular function, social development, build self-confidence, develop social interaction and, what is most important, help in maintaining a healthy body weight, however, it is earlier noted that youth, especially females, are often not enough active (Alonso-Fernández et al. 2015). As a consequence of global trends in physical inactivity and sedentary behaviour (Pratt et al., 2020), the obesity pandemic, as stated by Meldrum et al. (2017) is becoming a large-scale public health problem which needs to be treated and more importantly prevented (especially in children) owing to its significant comorbidities, mortality, and costs, and, because of the fact that many obese adolescents stay obese until adulthood, which eventually leads to greater problems

later in life (Weihrauch-Blüher et al. 2019). Earlier studies showed an increase in sedentary lifestyle (Anderson et al., 2008; Janssen & LeBlanc, 2010) which is one of the main causes in obesity prevalence increase (Herman et al. 2014). In accordance with aforementioned, physical activity time amount and its quality has been of interest to sport scientists for long time. Nowadays, for example, pedometers and accelerometers are the first choice for long term physical activity tracking (Colbert & Schoeller, 2011), whilst, for studies including bigger samples questionnaires are still used (Smith et al., 2020). While there are a lot of questionnaires for adults, most commonly used while assessing children physical activity is PAQ-C (Physical Activity Questionnaire for Children) which is appropriate for elementary school-aged children (grades 4-8; approximately ages 8-14) who are currently in the school system and have recess as a regular part of their school week (Crocker et al., 1997). The PAQ-C was developed for the purpose of having a standardized cost-effective tool to assess physical activity patterns during childhood that would be valid across different nations and cultures.

According to a Meta-analysis by Owen et al. (2014), both PAQ-C and PAQ-A (A stands for adolescents) were used in more than 100 scientific articles worldwide. Couple years ago, Vidaković Samardžija & Mišigoj-Duraković (2013) have validated a Croatian version of PAQ-C. Furthermore, a study from Croatia (Kvesić et al. 2015) showed that only 40% of elementary school pupils are enrolled in sports activities during free time.

Till this day, as to authors knowledge, there has not been a study using PAQ-C from Bosnia and Herzegovina, and, therefore, the first aim of this study was to provide preliminary PAQ-C scores among public school children, whilst, considering the results from previous studies (Crocker et al. 1997; Wenthe et al. 2009) which indicate that boys have higher scores than girls, the second aim was to compare scores by gender.

## Methods

### Sample

The research included 110 pupils from Sarajevo elementary schools aged  $10,16 \pm 1,2$ , who do not participate in additional trainings and/or organised physical activities. Respondents parents gave their written consent after receiving informations concerning the study. Full ethical approval for this study has been obtained from the Research Ethics Committee.

## Measures

Physical Activity Questionnaire for older children (PAQ-C) designed by Crocker et al. (1997) and translated to Croatian by Vidaković Samardžija and Mišigoj-Duraković (2013) was used to evaluate respondent's physical activity levels. PAQ-C is self-administered, 7-day recall questionnaire comprised of nine items designed (eight of which were used to calculate the average total activity score) to assess general, moderate to vigorous physical activity over the previous 7 days in children older than the third-grade level. Respondents check a list of activities for frequency of participation on a 5-point scale with higher scores indicating more activity. The responds contain information about physical activity in PE lessons, recess, lunch time, right after school, evenings and the weekend before filling up the questionnaire. The questionnaire showed satisfactory reliability in assessing younger school age children physical activity (Vidaković Samardžija and Mišigoj-Duraković, 2013).

## Statistical analysis

Normality of the findings was analysed using the Kolmogorov Smirnov (KS) test. Respondents characteristics were described as Mean (SD) and additionally, 5-point scale frequencies were tabulated as well. A total summary PAQ-C score was calculated by averaging the scores of the questions. Differences between mean of nine scores were analysed using independent samples T-test whilst 5-point questionnaire differences were analysed using Mann Whitney U test among groups. Results were analysed using SPSS 25 (IBM, Armonk, NY, USA) for Windows. The level of significance was set at  $p < 0,05$ .

## Results

Using the KS test none of the variables deviated significantly from the expected normal distribution ( $p > 0,20$ ). Table 1 indicates descriptive statistics and gender differences in respondents PA level whilst Table 2 contains frequencies. There were statistically significant differences between average of all items in girls and boys and after school and evening PA time.

Table 1 Observed PAQ results for male and female participants

Item	Females	Males	All
PE class	4.23±1.17	4.26±1.03	4.25±1.1
Recess	2.35±1.15	2.46±1.26	2.4±1.2
Lunch	2.5±1.17	2.92±1.29	2.69±1.24
After school	2.67±1.19	3.26±1.1*	2.94±1.18
Evenings	2.75±1.1	3.2±1.05*	2.95±1.09
Last weekend	2.97±1.18	3.3±0.95	3.12±1.09
Free time	2.92±1.12	3.28±0.97	3.08±1.07
Week summary	2.8±1.1	3±0.95	2.89±1.03
PAQ-C	2.90±1.15	3.21±1.08*	3.04±1.13

PAQ-C item values (Mean±SD) in females, males and all respondents. PAQ-C represents average of all items

As it can be seen from Table 1. PE classes had highest average values on a 5-point scale in both girls and boys. Furthermore, while girls did not exceed the average score of 2,97 except for the PE classes, boys had <3 average score only during school breaks (recess and lunch).

Table 2 Observed frequencies and percentages of PAQ results for male and female participants

Item	Female					Male					All				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
PE class	8.3	/	8.3	26.7	56.7	2	8	6	30	54	5.5	3.6	7.3	28.2	55.5
Recess	20	50	13.3	8.3	8.3	22	42	16	8	12	20.9	46.4	14.5	8.2	10
Lunch	13.3	53.3	15	6.7	11.7	12	32	26	12	18	12.7	43.6	20	9.1	14.5
After school	16.7	31.7	30	11.7	10	6	16	40	22	16	11.8	24.5	34.5	16.4	12.7
Evenings	13.3	30	30	21.7	5	6	18	36	30	10	10	24.5	32.7	25.5	7.3
Weekend	13.3	20	33.3	23.3	10	4	14	38	36	8	9.1	17.3	35.5	29.1	9.1
Free time	15	16.7	35	28.3	5	4	14	42	30	10	10	15.5	38.2	29.1	7.3
Week summary	11.7	28.3	36.7	15	8.3	4	26	42	22	6	8.2	27.3	39.1	18.2	7.3

Frequencies table show that highest percent of the respondents (56.7% girls and 54% boys)

reported highest PA score during PE classes and lunch breaks (11.7% girls and 18% boys).

The highest percent of lowest PA score was reported during recess for both girls (20%) and boys (22%).

Further on, lowest percent of the highest PA score was reported during PE classes for both girls (8.3%) and boys (2%).

## Discussion

The aims of this study were to 1) provide preliminary PAQ-C scores among public school children and 2) compare scores by gender.

As stated earlier, regular PA level has many benefits and therefore, it is of great importance to evaluate and, furthermore, motivate children to involve in moderate physical activities daily. Previous authors have proposed different methods for PA categorisation among whom Ogunleye et al., (2011) and Bailey et al., (1999) used z-scores. but, considering a relatively small sample size this study used methodology proposed by Chen et al. (2008). according to whom the PA level can be determined according to the mean scale of the nine items as low ( $\leq 2$ ), moderate ( $> 2$  and  $\leq 3$ ), and high activity ( $> 3$ ).

This study showed that pupils from Sarajevo elementary schools reported moderate and high activity levels. Highest score was reported during PE classes, and besides PE classes, weekend and free

time PA levels were classified as high. Further on, Recess had the lowest score, and, besides Recess, lunch time, time after lunch and during the evenings were classified as moderate. Week summary was classified as moderate while general PAQ-C score was 3.04 which is classified as high activity level.

Although relatively good scores were self-reported, the results show that PE classes as one and only organised physical activity had the highest PA score. Furthermore, when comparing this score with weekend and free time PA score, whom are only two results within "high activity" range results are 1.13 & 1.17 higher, respectively. These results emphasize the importance of organised physical activities during childhood.

Concerning current COVID-19 situation. These findings can help in understanding the importance of organised physical activities as well as PE classes. Additionally, Cordova et al. (2013) concluded that children with

higher levels of physical activity presented more favourable anthropometric profiles whilst Sigmund et al. (2012) stated that increased school-based PA had positive impact on schooldays leisure time PA, weekend PA, contributed to achieving 1) >10500 steps and 2) >10.5 Kcal/Kg per school day and led to a stop of the decline in general PA that

is known to be associated with the increasing age of children. Also, pupils who do not spend leisure time in PA at least 60 minutes a day, have less developed motor skills (Badrić et al. 2015).

To emphasize the importance of improving recess and lunch break PA level, it is important to quote some previous authors (Mahar, 2011) who stated that physical activity during the school day improves attention-to-task in elementary school students, and that it is recommended that elementary school teachers consider implementing physical activity sessions throughout the school day in the form of recess physical activities.

Gender analysis showed statistically significant differences between girls and boys PA scores 1) immediately after school, 2) in the evenings, as well as the mean questionnaire score. This study PAQ-C mean scores of 3.21 & 2.90 support Crocker et al. (1997) findings which indicate that boys were more active than girls respectively. Mean scores reported by the PAQ-C author (Crocker et al., 1997) were 2.96 for females and 3.44 for males whilst some other authors, for example, Chen et al. (2008). only stated PA level

frequencies (Low – 29; Moderate – 45; High – 19). This is due to the fact that the mean of these nine items form a composite activity score (Bailey et al., 1999). These results were similar to those found by Yu et al., (2006). but cultural difference between this study sample and the one by Yu et al. are enormous. especially considering the fact that this author stated that, in China, physically active girls were seen as less well-behaved students than similarly active boys and too much physical activity is commonly regarded by parents as an energy-drainer that affects concentration on academic work and has therefore been discouraged. Possibly, reasons for such differences could be explained by the fact that 11–12-year-old boys display significantly higher levels of moderate-to-vigorous physical activity during play than girls at same age.

## Conclusion

This paper addressed children's physical activity assessment using self-report instruments. The results showed that pupils from Sarajevo elementary schools reported moderate and high activity levels. especially during PE classes. weekend and free time. Lowest score was reported during Recess. Week summary was classified as moderate while general PAQ-C score was 3.04 which is classified as high activity level. Furthermore. this study PAQ-C mean scores of 3.21 & 2.90 indicate that boys were more active than girls respectively.

## Limitations and Future Research

Considering current Coronavirus disease (COVID-19) crisis. studies like this could be a valuable tool for physical activity levels evaluation. and could answer many questions about the effects of "lockdown" and besides that. guide kinesiologists and other interested parties in creating individual physical activity plans. not just for pupils. but for the whole population. We can also suggest an increase in sample size which increases significance level of the findings.

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