

## Physical Activity Among Sarajevo Medical Secondary School Students

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### Abstract

#### Introduction

Physical activity is directly linked to improving quality of life and health, contributing to a reduction in various diseases. Higher levels of physical inactivity tend to cluster with other adverse health practices. The growing use of technology in daily life is combined with increase of sedentary lifestyle in all age group. Additionally, physical activity patterns are changed through life course. The most physically active time of life is childhood. During adolescence, particularly between 15 and 18 years, physical activity declines. That trend continues through young adulthood (ages 18-29). In general, males have better patterns of physical activity. As regular exercise is important to maintain a healthy lifestyle, understanding the context of physical activity during adolescence is essential in developing effective health-promotion intervention. The aim of this research was to determine the level of

physical activity among students of second grade of the Secondary Medical School Jezero, Sarajevo.

### **Methods**

The study was designed as a cross-sectional survey conducted at the Secondary Medical School Jezero, Sarajevo during May 2019. A sample included 118 students who attended the second class during the study. A mean age of sample was  $16.68 \pm 0.043$ . The trial was approved by Ministry of Education, Science and Youth of Sarajevo Canton. The research was performed in accordance with the Declaration of Helsinki. Physical activity was assessed using The Fels Physical Activity Questionnaire for children 7-19 years of age. Statistical analyses were performed using the Statistical Package for Social Sciences software (IBM, version 23.0).

### **Results**

Study revealed that 32.43% of male students and even 61.73% of female students do not meet the recommendations regarding physical activity.

### **Conclusion**

Results of this study has revealed that large proportion of school students do not achieve satisfactory levels of physical activity. Early and continued intervention is necessary to offset declines in physical activity throughout adolescence and in schools relatively stable environments that support exercise should be established.

## **Abbreviations (if used)**

PA - physical activity

PAQ - Physical Activity Questionnaire

SD - standard deviation

Min - minimum value

Max - maximum value

## **Introduction**

Physical activity is defined as any bodily movement produced by skeletal muscles that results in energy expenditure [1]. The nature of PA, as complex behavior, can be categorized as type of PA. Type describes the specific physical actions taking place. Examples of types of PA are running, walking, swimming, cycling, kicking, throwing, carrying etc. [2].

PA helps to maintain a healthy body composition and prevent chronic diseases [3]. PA patterns are related to health behaviors like diet, smoking and alcohol misuse [4]. There are erosions in PA patterns among adolescents, most from ages 15 through 18. This continues through young adulthood (18-29 year), whereas middle adulthood (30-64 year) is characterized by relatively stable patterns. A stabilization, or even an

improving of PA patterns occurs at retirement age (65 year), and it is usually followed by further erosion through the final period of life [5].

Different methods can be used to assess PA. These methods have been made through longitudinal studies during which changes in physical activity/inactivity, adiposity, and disease risk within individuals have been examining. The Fels Longitudinal Study was designed in 1929 (Ohio, USA) to study growth and development. Serial measurements have been collected in individuals from birth throughout adulthood. Since 1988, annual measurements of PA have been followed from 8 to 18 year of age using a questionnaire (Fels physical activity questionnaire (PAQ) for children). The Fels PAQ for children is a self-administered questionnaire assessing habitual PA without reference to a particular time frame. Questions reflect children's activity patterns through three domains - sport, leisure, and work (or chore). Besides indices of sport, leisure, and work (or chore) activity it provides a total PA score. The sport index is good measure of PA among high school students [6].

The aim of this research was to determine the level of physical activity among students of second grade of the Secondary Medical School Jezero, Sarajevo.

## Materials and Methods

### Study Subjects and Design

The study was designed as a cross-sectional survey conducted at the Secondary Medical School Jezero, Sarajevo during May 2019. A sample included 118 students who attended the second class during the study. The trial was approved by Ministry of Education, Science and Youth of Sarajevo Canton. The research was performed in accordance with the Declaration of Helsinki [7].

### PA Assessment

PA was assessed using The Fels PAQ for children 7-19 years of age [6]. It contains eight questions. Three questions are "open" questions for which the activities are given by respondents. The data about the frequency of participation in each of these activities were obtained (regularly, often, sometimes). The Likert scale for assessment of physical activity was applied to the remaining five questions (very often, often, sometimes, seldom, never).

PA is categorized into three domains: sports, leisure, household. Through these domains the overall level of physical activity is obtained.

For all activities given in "open" questions 1 and 2 scores are calculated as intensity x frequency.

Intensity of type of PA is given through the metabolic equivalent for task (MET). MET is a unit that estimates the amount of energy used by the body during PA, as compared to resting metabolism. The unit is standardized. It can be applied to people of varying body weight. PA intensity is uniform during activities and can be compared between different activities.

After calculation total score was converted into a Likert scale based on the scale: 0 (no sports listed) =1; 0.01-3.99=2; 4-7.99=3; 8-11.99=4; and  $\geq 12=5$ .

Results 4 and 5 corresponds with recommendations, and values 2 and 3 are connected with physical inactivity.

**Data Analysis**

Statistical analyses were performed using the Statistical Package for Social Sciences software (IBM, version 23.0). Results were expressed as percentages and means±standard deviations. Student’s t test was used to examine differences in level of PA indexes between male and female students. Differences were considered statistically significant at  $p<0.05$ .

**Results**

A sample included 118 students with a mean age of  $16.68\pm 0.043$ . A more detailed profile of the students’ characteristics is presented in Table 1. The study includes 37(31.36%) of male students and 81(68.54%) of female students.

*Table 1: Characteristics of total sample*

Number included students 118	Male	37 (31.36%)
	Female	81 (68.54%)
Mean age (mean±SD)		16.68±0.043

For male participated students the average value of the sport index was  $3.32\pm 1.19$ , the leisure index  $3.32\pm 0.77$ , and work index  $2.24\pm 0.86$ , which led to the average total results of physical activity being  $8.51\pm 2.40$ . For female participated students the average value of the sport index was  $2.04\pm 1.17$ , the leisure index  $2.82\pm 0.73$ , and work index  $2.81\pm 0.66$ , which led to the average total results of physical activity being  $7.08\pm 2.20$ . For all participated students the average value of the sport index was  $2.44\pm 1.32$ , the leisure index  $2.98\pm 0.77$ , and work index  $2.63\pm 0.83$ , which led to the average total results of physical activity being  $7.53\pm 2.35$  (Table 2).

*Table 2: PA indexes*

Fels PAQ for children	Male students			Female students			P
	mean±SD	Min	Max	mean±SD	Min	Max	
Total index	8.51±2.40	1	12.67	7.08±2.20	2.67	11.33	0.003
Sport index	3.32±1.19	1	5	2.04±1.17	1	4.5	0.000
Leisure index	3.32±0.77	1	4.67	2.82±0.73	1.33	4.67	0.002
Work index	2.24±0.86	1	4,5	2.81±0.66	1	4	0.000

Male students compared to female declared higher level of total index (t test:  $p=0.003$ ;  $p<0.05$ ); sport index (t test:  $p<0.0005$ ;  $p<0.05$ ); leisure index (t test:  $p=0.002$ ;  $p<0.05$ ). Only work index was higher at female students (t test:  $p<0.0005$ ;  $p<0.05$ ).

Likert values of total indexes were analyzed (0 (no sports listed) = 1; 0.01-3.99 = 2; 4-7.99 = 3; 8-11.99 =4; and  $\geq 12 = 5$ ) (Table 3).

**Table 3:** Likert values of total indexes

Total index			Male students	Female students
no sports listed	1	N	1	-
		%	2.70	-
physical inactivity	2	N	-	4
		%	-	4.94
	3	N	11	46
		%	29.73	56.79
recommendations	4	N	22	31
		%	59.46	38.27
	5	N	3	-
		%	8.11	-
All		N	37	81
%		100.00	100.00	

Converted value of total index according to a Likert scale revealed that 25 (67.57%) male students, and at 31(38.27%) female students met the recommendations regarding physical activity.

## Discussion

The purpose of this study was to assess level of PA among students of second grade of the Secondary Medical School Jezero, Sarajevo by using means of the self-report questionnaires, so called the Fels PAQ for children 7-19 years of age.

The findings of this study indicate that males reported significantly higher the sport index than females ( $3.32\pm 1.19$  vs.  $2.04\pm 1.17$ ), as the leisure index ( $3.32\pm 0.77$  vs.  $2.82\pm 0.7$ ), and total index ( $8.51\pm 2.40$  vs.  $7.08\pm 2.20$ ), while work index was smaller ( $2.24\pm 0.86$  vs.  $2.81\pm 0.66$ ).

Other researches support these findings that school-aged male students take more part in sports activities during physical education classes and during leisure time, while the female students are more active when working around the house, as in a study carried out by Pantelic [8] which had the aim to evaluate the physical activities of school age students. It was found following average values of the separate indexes between males and females: the sport index (4.09 vs. 3.52), the leisure index (3.81 vs. 3.53), work index (3.00 vs. 3.37), total index (10,91 vs. 10,42).

NHANES survey (2003-2004 and 2005-2006) which included ambulatory children who were 6 to 17 years old pointed that boys were more active than girls, and activity levels were lower at older ages. Younger children met daily recommendations for physical activity, whereas older children, especially girls, did not [9].

The evidence of loss of motivation in older school students to participate in PA tasks could guide future policy regarding the promotion of PA in school-based contexts. PA engagement in compulsory contexts, such as physical education lessons, is insufficient, so students ought to be encouraged to achieve health-related PA levels during their free time [10].

Based on classification of PA level findings of this study indicate that adequate level of PA was more prevalent among males (67.57%) as compared to females (38.27%). Generally secondary school aged male students are much more involved in sports than girls of the same age, and significant difference in PA level is reported in other studies. A cross-sectional survey of Qatari adolescents conducted from April 22 through 17 May 2017 showed that males reported significantly higher daily activity than females (60.9% vs. 41.4%) [11].

Results of this study has revealed that large proportion of school students do not achieve satisfactory levels of PA. PA directly linked to improving quality of life and health, contributing to a reduction in various diseases [3]. There is the need of reducing sedentary during school time for future interventions, especially when children grow older and for girls [12]. A better understanding of the sociodemographic, psychological, social, and environmental variables contribute to the establishment of recommendations for additional physical activity [13]. Fromel emphasized importance of outdoor PA in the efficient promotion of the physical and mental health of adolescents [14].

## Conclusion

Since the study found that 32.43% of male students and even 61.73% of female students do not meet the recommendations regarding PA, there is need to implement measures that would improve such activities and increase their frequency. Regular PA in school age can be encouraged in a number of ways such as active transportation, participation in sport activities and reduction of time spent in sedentary activities. For these reasons, it is important that there are adequate health programmes to carry out education with the aim of adopting a healthy life style that relate to PA of young people during their development. Knowledge, beliefs, and acquired healthy habits during the development period will determine the lifestyle in later life.

## Supplementary File

### Appendix a. Fels PAQ for children (5)

1. What sports did you play in school?

I played \_\_\_\_\_ regularly often sometimes  
3 2 1

I played \_\_\_\_\_ regularly 3 often 2 sometimes 1

I played \_\_\_\_\_ regularly 3 often 2 sometimes 1

2. What sports or physically active games did you play outside of school?

I played \_\_\_\_\_ regularly 3 often 2 sometimes 1

I played \_\_\_\_\_ regularly 3 often 2 sometimes 1

I played \_\_\_\_\_ regularly 3 often 2 sometimes 1

3. When I play sports or games I sweat

very often 5 often 4 sometimes 3 seldom 2 never 1

4. During leisure time I play sports

very often 5 often 4 sometimes 3 seldom 2 never 1

5. During leisure time I watch television or read

never 5 seldom 4 sometimes 3 often 2 very often 1

6. How often do you walk and/or bicycle per day to and from school?

very often 5 often 4 sometimes 3 seldom 2 never 1

7. What chores you do at home that are physically active and how often you do them?

Chore \_\_\_\_\_ regularly 3 often 2 sometimes 1

Chore \_\_\_\_\_ regularly 3 often 2 sometimes 1

Chore \_\_\_\_\_ regularly often sometimes  
 3 2 1

8. When I do chores I sweat

never seldom sometimes often very often  
 5 4 3 2 1

**Appendix b. Scoring of the Fels PAQ for Children (5)**

Scoring of the physical activity questionnaire refers to the Baecke questionnaire scoring system.

*Sports index* summarized scores of questions 1-3 (in Likert scales).

*Note:* Scores of questions 1 and 2 = sum of (intensity x frequency) to all activities.

There are three levels of intensities for the sports:

1. Low-level sports (METs ≤4.5) such as biking, dog walking, and bowling. Intensity = 0.76
2. Medium-level sports (4.5 < METs <7.9), such as aerobics, jogging, basketball, and skateboarding. Intensity = 1.26
3. High-level sports (METs ≥8.0), such as running, football, and field hockey. Intensity = 1.76

For frequency, there are three levels: regularly (4.5), often (2.5), and sometimes (0.5). This is then converted into a Likert value based on the scale: 0 (no sports listed) = 1; 0.01-3.99 = 2; 4-7.99 = 3; 8-11.99 = 4; and ≥12 = 5.

Score of question 3 = the value under the frequencies (e.g., very often (5), often (4), sometimes (3), seldom (2), and never (1)).

*Leisure index* = mean score of questions 4 and 6.

*Note:* Scores of 4 and 6 = the value under the frequencies (e.g., very often (5), often (4), sometimes (3), seldom (2), and never (1)).

*Work (chore) index* = mean scores of questions 7 and 8.

There are three levels of intensities for the chores (question 7):

1. Low-level chores (METs ≤3), such as cleaning kitchen, carrying laundry baskets, watering flowers, feeding pets, picking up trash. Intensity = 0.76
2. Middle-level chores (3 < METs <4.9), such as cleaning bathroom, carrying food bags, weeding garden, walking large animals, sweeping, picking up sticks. Intensity = 1.26

3. High-level chores (METs  $\geq 5.0$ ), such as cleaning barn, mowing lawn, heavy lifting. Intensity = 1.76

*Note:* Score of question 7 = sum of (intensity x frequency) to all chores. There are three levels of frequency: regularly (4.5), often (2.5), and sometimes (0.5). This is then converted into a Likert value based on the scale: 0 (no sports listed) = 1; 0.01-3.99 = 2; 4-7.99 = 3; 8-11.99 = 4; and  $\geq 12 = 5$ .

Scores of question 7 of all activities after conversion to Likert value are summarized with score of question 8, and mean score is calculated.

**Total score** = sport index + leisure index + work index.

### Example (5)

Sport

Q1. Basketball sometimes	$1.26 \times 0.5 = 0.63$
Baseball often	$1.26 \times 2.5 = 3.15$
Football regularly	$1.76 \times 4.5 = 7.92$
Kickball sometimes	$1.26 \times 0.5 = 0.63$

$0.63 + 3.15 + 7.92 + 0.63 = 12.33 = 5$  (after conversion to Likert value)

Q2. Football regularly	$1.76 \times 4.5 = 7.92$
Baseball sometimes	$1.26 \times 0.5 = 0.63$
Basketball often	$1.26 \times 2.5 = 3.15$
Kickball sometimes	$1.26 \times 0.5 = 0.63$

$7.92 + 0.63 + 3.15 + 0.63 = 12.33 = 5$  (after conversion to Likert value)

Q3. Sweat often = 4

Sport index =  $(5 + 5 + 4)/3 = 4.7$

Leisure

Q4. Leisure sport	seldom = 2
Q5. Watch television or read	often = 2
Q6. School walk	very often = 5

Leisure index =  $(2 + 5 + 2)/3 = 3$

Work

Q7.

Sweep often  $1.26 \times 2.5 = 3.15$

Pick up trash regularly  $0.76 \times 4.5 = 3.42$

Pick up sticks often  $1.26 \times 2.5 = 3.15$

Cut weeds sometimes  $1.26 \times 0.5 = 0.63$

$3.15 + 3.42 + 3.15 + 0.63 = 10.35 = 4$  (after conversion to Likert value)

Q8. Chore sweat sometimes = 3

Work index =  $(4 + 3)/2 = 3.5$

Total score = sport + leisure + work =  $4.7 + 3 + 3.5 = 11.2$

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