

PHYSICAL ACTIVITY AND SEDENTARY BEHAVIOR IN 14–15 YEAR OLD STUDENTS WITH REGARD TO LOCATION OF SCHOOL

Josef Mitáš, Jiří Nykodým*, Karel Frömel

Faculty of Physical Culture, Palacký University, Olomouc, Czech Republic

* Faculty of Sports Studies, Masaryk University, Brno, Czech Republic

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Decline in physical activity and the increased number of overweight and obese children are alarming. These factors can influence, together with the passive role of schools in lifestyle education and unhealthy urban planning, the future lifestyle of adolescents and adults.

The main objective of this study was to analyze the physical activity and sedentary behaviors of adolescents aged 14–15 with regard to the size of the community where adolescents go to school.

The short version of the “IPAQ” questionnaire was used to collect data in this study. The research was conducted in three selected regions of the Czech Republic. In each region, 3 schools were randomly selected. The research was carried out with all pupils of the ninth grade (aged 14–15) of selected schools. For data analysis we used basic statistical characteristics and binary logistic regression (SPSS).

Based on the findings from the questionnaire, we have found that girls were significantly more likely to be sitting than boys. Children living in a middle-sized to large sized community, and living in an apartment, are significantly more likely to be sitting.

Boys are still less “sedentary” than girls. Respondents who meet PA recommendations are also sitting more, usually based on the time needed for rest. The results of our study show that small communities offer better conditions to their inhabitants to be more physically active, however the differences between small and large locations are not that extensive.

Keywords: Questionnaire, school, environment, sedentary behavior, physical activity recommendation.

INTRODUCTION

A decline in physical activity and the increased number of overweight and obese children are apparent according to research. These factors influence the future lifestyle of adolescents and adults (McGuinness, 2006; Pate et al., 2002; Sallis, Prochaska, & Taylor, 2000; Richmond, Hayward, Gahagan, Field, & Heisler, 2006). A better understanding of the correlates of physical activity (further only PA) and a sedentary lifestyle is needed to reduce sedentary behavior (Epstein, Raja, Gold, Paluch, Pak, & Roemmich, 2006; Norman, Schmid, Sallis, Calfas, & Patrick, 2005; Simon, Wagner, DiVita, Rauscher, Klein-Platat, Arveiler, Schweitzer, & Tribby, 2004; Van der Horst, Paw, Twisk, & Van der Mechelen, 2007). Among factors determining PA, eating and lifestyle habits, in adolescents the major ones are environment and a variety of locations (Badland & Schofield, 2006; McGuinness, 2006; Nelson, Gordon-Larsen, Song, & Popkin, 2006; Sallis & Glanz, 2006). The built environment in smaller communities enhances easier safer walking to schools, work, shops and services and allows people to socialize (de Bruijn, Kremers, Lensvelt-Mulders, de Vries, van Mechelen,

& Brug, 2006; Kerr, Rosenberg, Sallis, Saelens, Frank, & Conway, 2006). Larger cities have more barriers in a built up environment to support a healthy lifestyle (high speed roads, long distances, more unsafe neighborhoods, etc.) and residents' PA integrated into daily activities is diminished (Epstein, Raja, Gold, Paluch, Pak, & Roemmich, 2006; Frank, Kerr, Chapman, & Sallis, 2007; McGuinness, 2006). Children spend a lot of time sitting in school, watching TV, using computers, and playing games; therefore they have less time to be physically active. Competition between PA and inactivity shows that PA is losing the race. The environment can be a possible factor that influences sedentary habits in adolescents (Jago, Baranowski, & Baranowski, 2006; Mota, Gomes, Almeida, Ribeiro, & Santos, 2007). Schools should play an important role in establishing healthy lifestyle habits in adolescents, but adoption of a more “active environment” in schools still has barriers. Along with parental care, these factors contribute to personality development and lifestyle habits in adolescents.

The main objective of this study was to analyze the physical activity and sedentary behavior of adolescents aged 14–15 with regard to the size of the community where adolescents go to school.

MATERIALS AND METHODS

The standardized short version of the "International Physical Activity Questionnaire" IPAQ (Craig et al., 2003) translated into Czech was used to assess PA levels. The results from the questionnaire were processed in compliance with the guidelines by "IPAQ Research Committee" (www.ipaq.ki.se). Objective data about PA were measured by using ActiGraph accelerometers and selected results are presented in this study. This study was participated in by 140 boys and 162 girls aged 14–15. The data were collected in Winter 2006.

The research was conducted in three selected regions of the Czech Republic. In each region, 3 schools were randomly selected that matched these criteria: 1. a school in a town over 100.000 inhabitants (large city), 2. a school in a town with 10.000–30.000 inhabitants (middle sized community), 3. a school in a town with less than 10.000 inhabitants (small community). The research was carried out with all pupils of ninth grade (aged 14–15) of selected schools. For data analysis we used basic statistical characteristics and binary logistic regression (SPSS). Odds ratio calculations were adjusted by age, gender, BMI, location and participation in an organized PA (the last group in each category was the reference group in each binary logistic regression).

RESULTS

Based on the findings concerning PA characteristics in questionnaires, we have found that girls were significantly more likely to be sitting than boys. BMI and participation in any organized or unorganized PA (TABLE 1) did not influence time spent sitting neither in girls nor in boys. There was a difference found in time spent sitting according to the size of the community. Both girls and boys living in communities with more 10.000–30.000 residents were significantly more likely to be sitting than those living in a small community (less than 10.000 inhabitants) or in a large city.

An interesting finding was that those students who met the recommended level of PA based on walking were significantly more likely to be sitting than those who did not meet these criteria. In accordance with our assumption, students living in an apartment were significantly more likely to be sitting than those living in a house.

Most students met the criteria for the category "highly active"; however the level of PA is slightly decreasing. The amount of PA (expressed in steps from accelerometers) during weekend days (boys – 9254 steps/school day, 6353 steps/weekend day; girls – 9124 steps/school day, 6671 steps/weekend day) shows decrease in comparison with recommended level (Frömel, Novosad,

& Svozil, 1999). Students do not meet the criteria on school days, either.

TABLE 1

The influence of the PA and other factors on sedentary behavior in students (n = 302) aged 14–15

	n	%	OR	CI
Gender				
Boys	140	46.3		
Girls	162	53.7	1.72*	1.03–2.87
BMI (kg/m²)				
< 25	78	25.8		
25–29.99	207	68.5	1.38	.78–2.46
≥ 30	17	5.6	1.93	.58–6.42
Walking (30 min./5 days)				
Minimally active	86	28.5		
Moderate active	97	32.1	2.06*	1.09–3.88
HEPA active	80	26.5	2.12*	1.09–4.13
Highly active	39	12.9	1.57	.68–3.65
Vigorous PA (20 min./3 days)				
Meet the recommendation	165	54.6		
Did not meet the recommendation	137	45.4	.59	.34–1.02
Housing				
Single family house	54	17.9		
Multiple family house	75	24.8	1.40	.66–2.98
Apartment	131	43.4	2.45*	1.10–5.46
Town house	31	10.3	1.56	.55–4.44
Other	11	3.6	1.31	.33–5.20
Location (in thousands)				
> 100	64	21.2		
30–100	43	14.2	.28**	.12–.70
1–29.9	83	27.5	.35**	.16–.75
< 1	103	34.1	.50	.21–1.16
Did not answer	9	3.0	.69	.15–3.27
Participating in organized PA				
0–1 per week	124	41.1		
2 times per week	81	26.8	1.02	.52–2.00
> 2 times per week	97	32.1	1.57	.81–3.06
Participating in any PA				
No	41	13.6		
Yes	261	86.4	.90	.40–2.05

Legend:

OR – odds ratio

CI – confidence interval

* p < .05

** p < .01

DISCUSSION

Students aged 14–15 in this study still meet the recommended level of PA to maintain their health. Based on the monitoring in the randomly selected schools, this study shows that young people, especially girls, who showed more time spent sitting during a week long monitoring of lifestyle habits than boys, do not get enough exercise. We expect that this is caused mainly by the school system and type of curricula implemented and the environment where the students live. It was proven that girls are less active than boys (Frömel, Novosad, & Svozil, 1999) and if there is not a physical education (further only PE) class or other organized PA we can expect girls tend to sit more.

Students are sitting most of the time they spend at school. The only chance to be physically active is to participate in PE classes. A school environment does not usually allow students to be active on school playgrounds or in yards during breaks. This poses a challenge to school principals and PE teachers to create an active environment at schools. It is apparent that smaller schools are more likely to adopt these systems of PA promotion, but the evidence is rare. Teachers should apply more interdisciplinary teaching approaches which would help to avoid sedentary behavior. However, not only school but also parents should adopt more active lifestyle habits in general since they are major figures who determine the direction and understanding of lifestyle in their children.

Students who met the recommended level of PA based on walking were more likely to be sitting. This might be caused by a number of factors. One of them could be the overestimation of data presented in the questionnaire. Another possibility is that people who are more physically active need more time for resting, especially if they have more vigorous activities.

The difference found in time spent sitting according to the size of the community shows that the environment might significantly influence lifestyle and thus PA habits. There were differences between adolescents living in a small community and those living in large cities. In small communities both girls and boys were walking to school, in large cities they were transported to school by car or by means of public transportation. This was due to environmental conditions in each community. In a small community, where there are not such large distances between school and residence, there is usually less traffic on the streets, and so students were more often encouraged to walk or bike to school without safety restrictions. Middle sized communities and especially large cities have longer distances between school and students' homes, thus adolescents have to commute. Few of them are able or willing to bike or walk to school. These are usually students living close to school. The

traffic on the road is much busier than in small communities especially during rush hours, biking to school is thus dangerous and walking usually too time consuming. Similar results were found for the adult population (Frömel, Mitáš, & Kerr, 2009) whereas people in small communities were more likely to meet recommended levels of PA.

Lifestyle patterns and behavioral habits adopted in adolescence may overlap into adulthood. However the evidence of that adherence is not that often explained (Bergman, Grjibovski, Hagstromer, Bauman, & Sjöström, 2008). But the sedentary behavior in children and adolescents should be prevented anyway, because PA can reduce risk factors for chronic diseases (U.S. Department of Health and Human Services, 2000).

There are several limitations of this study that have to be identified. The questionnaire does not ask about the structure of inactivity, therefore we only identify the amount of time when respondents are inactive. The questionnaire was standardized for the age group 15–69, however not all students reached the age of 15 during the data sampling. Students were monitored for one week and wore accelerometers, too. This could be a motivational factor that might have caused an increase in their total PA. The school environment was not specifically monitored. An additional study will be needed to determine other factors influencing sedentary behaviors within the lifestyle of adolescents.

CONCLUSIONS

Sedentary behavior and the decline of PA are trends that are rapidly increasing throughout the whole society. Boys are still less “sedentary” than girls, however, the current school system promotes long time sitting for 4 or more hours a day. This form of schooling, along with a sedentary lifestyle and inactivity (watching TV, playing computer games, etc.), causes the decrease of PA in adolescents. More studies on understanding the correlates of sedentary behavior are needed. This could help to promote intervention on PA that should reduce the negative impact of sedentary behavior on health. Adherence to PA or sedentary behavior from childhood to adulthood requires more relevant research, too.

Respondents who meet PA recommendations are also sitting more, usually based on the time needed for rest.

Overweight, obesity and other diseases related to an unhealthy lifestyle are rapidly growing. The environmental factors play a significant role, too. The results of our study show that small communities offer better conditions to their inhabitants to be more physically active, however the differences between small and large locations are not that extensive. The findings of this study

and other similar studies should be applied in interventional changes in school programs enhancing PA and healthy lifestyle in students in their common life and by urban planners to promote more active environments.

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**POHYBOVÁ AKTIVITA A SEDAVÝ ZPŮSOB
ŽIVOTA 14-15LETÝCH STUDENŮ S OHLEDEM
NA SÍDLO ŠKOLY**
(Souhrn anglického textu)

Pokles pohybové aktivity a zvyšování počtu dětí s nadváhou a obeznicí je alarmující. Tyto faktory, společně s pasivní rolí škol ve vzdělávání směrem ke zdravému životnímu stylu a „nezdravým“ územním plánováním, mohou ovlivnit budoucí životní styl dospívajících a dospělých obyvatel.

Hlavním cílem této studie bylo analyzovat pohybovou aktivitu a sedavý způsob života dospívajících ve věku 14–15 s ohledem na velikost obce, kde dospívající docházejí do školy.

Pro sběr dat byla použita krátká verze dotazníku „IPAQ“. Výzkum byl realizován ve třech vybraných regionech České republiky. V každém regionu byly náhodně vybrány 3 školy. Výzkumu se zúčastnili žáci devátých tříd (ve věku 14–15) z vybraných škol. Pro analýzu dat jsme použili základní statistické charakteristiky a binární logistickou regresi (SPSS).

Na základě výsledků z dotazníků jsme zjistili, že dívky vykazovaly podstatně častěji než chlapci delší dobu sezení. Děti, které žijí v malých a velkých sídlech a žijí v bytě, častěji tráví čas sezením.

Chlapci mají méně „sedavý“ způsob života než dívky. Studenti, kteří plní zdravotní doporučení pro pohybovou aktivitu, vykazují také delší dobu strávenou sezením. Zpravidla se jedná o čas, kdy potřebují odpočinek. Výsledky studie ukazují, že malá sídla nabízejí svým obyvatelům lepší podmínky pro pohybovou aktivitu, ale rozdíl mezi malými a velkými sídly nejsou tak velké.

Klíčová slova: dotazník, škola, prostředí, sedavý způsob života, doporučení pro pohybovou aktivitu.

Mgr. Josef Mitáš, Ph.D.



Palacký University
Faculty of Physical Culture
tř. Míru 115
771 11 Olomouc
Czech Republic

Education and previous work experience

2005 Since – research worker, Center for Kinanthropology Research, Faculty of Physical Culture, Palacký University, Olomouc.

2001–2004 – Ph.D. study program at Faculty of Physical Culture, Palacký University, Olomouc.

1996–2001 – Mgr. – high school teacher, approbation Geography and PE, Faculty of Physical Culture, Palacký University, Olomouc.

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