

# TRENDS IN ACTIVE COMMUTING TO SCHOOL AMONG CZECH SCHOOLCHILDREN FROM 2006 TO 2014

Jan Pavelka<sup>1</sup>, Dagmar Sigmundová<sup>1</sup>, Zdeněk Hamřík<sup>2</sup>, Michal Kalman<sup>1</sup>, Erik Sigmund<sup>1</sup>, Frida Mathisen<sup>3</sup>

<sup>1</sup>Institute of Active Lifestyle, Faculty of Physical Culture, Palacký University Olomouc, Olomouc, Czech Republic

<sup>2</sup>Department of Recreation and Leisure Studies, Faculty of Physical Culture, Palacký University Olomouc, Olomouc, Czech Republic

<sup>3</sup>Department of Health Promotion and Development, Faculty of Psychology, University of Bergen, Bergen, Norway

## SUMMARY

**Objective:** Active commuting (AC) is an important factor in increasing the total daily physical activity (PA) in children, which is significant for their health and positive physical behaviour in adulthood. The objective of the study was to describe trends in active commuting to school among Czech girls and boys aged 11–15 years from 2006 to 2014, using data from the Health Behaviour in School-aged Children (HBSC) study.

**Methods:** To investigate trends in AC among Czech children of school age data obtained from the HBSC surveys carried out in 2006, 2010, and 2014 was used. The study sample comprised 12,273 respondents, out of whom 5,992 (48.8%) were boys and 6,281 (51.2%) girls. The overall trends in AC were evaluated using logistic regression analysis.

**Results:** Compared with 2006, there was an overall decrease in AC among the 13-year-old boys and 13-year-old girls (boys – 71.8% in 2006 to 50.1% in 2014, girls – 69.3% in 2006 to 46.3% in 2014). The proportion of children AC (walking and cycling) to school significantly decreased from 74.3% in 2006 to 53.4% in 2014.

**Conclusion:** This study demonstrated that AC to school decreased sharply among Czech children of school age from 2006 to 2014. However, walking was the most frequently used mode of travel. The boys were significantly more likely to cycle to school compared to the girls. PA interventions for youth should encourage participation in AC to school in the Czech Republic.

**Key words:** trends, active commuting, physical activity, HBSC

**Address for correspondence:** J. Pavelka, Faculty of Physical Culture, Palacký University Olomouc, třída Míru 111, 771 11 Olomouc, Czech Republic. E-mail: jan.pavelka@upol.cz

<https://doi.org/10.21101/cejph.a5095>

## INTRODUCTION

Active commuting (AC) is most often defined as walking, cycling, or other human-powered modes of transport (in-line skating, skateboarding) used for the practical purpose of getting from one place to another in everyday life (1). AC is also perceived as an easy and effective tool to increase the level of daily PA among school-aged children (2, 3). Active commuting to school was independently associated with greater levels of PA and lower levels of body fatness and obesity in adolescents. However, further research, especially longitudinal or trend-related studies, is necessary in order to better quantify these relationships (4). Generally, as a result of the global decline in PA and an increase in sedentary behaviour in the last decade, promoting AC has been becoming a major topic which is an integral part of international initiatives aimed at increasing the level of PA within the population (4–6).

However, a number of European studies indicate that international trends in childhood overweight and obesity in many countries across Europe are still increasing (7–9). Together, reduced levels of PA are one of the factors influencing an increased prevalence of overweight and obesity among children (10, 11).

Strategies to increase PA, such as promoting active school travel, are important (2, 4, 7). Concurrently, a large body of research has indicated that AC plays an important role in increasing the overall level of PA in children and youth (4, 12–15), that the promotion of AC should focus on children who spend too much time using a computer, and that attention should also be drawn to safety concerns associated with AC to and from school (12, 16). Furthermore, AC is also perceived as an easy and effective tool to increase the level of daily physical activity on school days, and, therefore, to enhance fitness (17), which is a marker of health in young people (18, 19).

Despite the potential health benefits of AC, studies from Switzerland, Canada, Australia, the United States, the United Kingdom, the Netherlands, and Brazil have reported declining proportions of children walking and cycling to school in recent decades (7, 14, 20–25).

Moreover, it is expected that changes in modes of transport will be different in countries where cycling is much more common (e.g. the Netherlands, Denmark, Germany) (24, 26, 27).

Dygryn et al. (28) confirmed the findings of previous international studies about decreasing levels of AC among children of school age in the Czech Republic between 2001 and 2011 and

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emphasizes the increasing number of adolescents using passive modes of transportation to school (city transport, bus, and as a car passenger).

In recent research a wide spectrum of correlates for AC has been identified. It includes family and household characteristics, which have been identified as correlates of walking or cycling to school in Australian and US studies. Having no adult at home after school was associated with a greater likelihood of walking or cycling (29–31), and children and adolescents in households with no vehicles were more likely to walk or cycle to school (32). Concurrently, another important factor influencing AC is associated with the characteristics of the building environment on the way to school (the presence of pavements, traffic safety, and the number of roads to cross) and may influence how parents choose to have their children commute from home to school (33, 34). Moreover, the level of AC in school-aged children can be influenced by the location of the school and distance from the place of residence (12, 20, 28). These findings are important for policymakers aiming to maximize the use of active forms of transport (e.g. for public health reasons) or to minimize car use (e.g. for environmental or congestion reasons) (35).

The aim of this study is to investigate trends in AC to school among Czech girls and boys aged 11–15 years from 2006 to 2014, using data from the cross-national Health Behaviour in School-aged Children (HBSC) study.

## MATERIALS AND METHODS

The present survey follows the international HBSC study and its methodology is identical (10). The HBSC is performed in cooperation with the World Health Organization and is an international school-based study focusing on the health and health behaviour of 11-, 13-, and 15-year-old schoolchildren in their respective social environments. School-based anonymous surveys were conducted during April, May, and June in 2006, 2010 and 2014 and were approved by the Ethical Committee of the Faculty of Physical Culture. The completion of the HBSC questionnaire by children was voluntary; no incentives were provided in return for participation. All the Czech schools participating in the study had a general permission granted by all parents at the beginning of the school year. The final data check was performed by the International Databank, University of Bergen, Norway, in compliance with the international HBSC standards (36).

### Sample

For the purposes of this article data from 12,273 respondents was analyzed, out of whom 5,992 (48.8%) were boys and 6,281 (51.2%) girls. In 2006, the final dataset for this analysis included 4,029 children (50.3% of boys) (response rate 88.5%). In 2010, a total of 3,956 children (47.7% of boys) were eligible for the analysis (response rate 89.2%). The latest survey in 2014 included 4,288 children (48.4% of boys) for the analysis (response rate was 89.2%). Age categories were governed by the HBSC protocol: the 11-year-old age category included children aged 11.0–11.99 years, the 13-year-old age category included children aged 13.0–13.99 years, and children aged 15.0–15.99 years were regarded as the 15-year-old age category (37).

## Survey Items

### Assessment of Active Commuting to and from School

In 2006, 2010 and 2014 two items related to AC on school days were used. The adolescents were asked the following questions concerning mode of transport to and from school – the respondents were asked to indicate in the questionnaires their usual mode of transport to and from school during the current week. The question was: “What is your main mode of transport to school and from school on a typical day?” Five response options were available for either direction: walking, cycling, bus/train/tram/underground (here called ‘public transport’, including school bus), car/motorcycle/moped, and other. The respondents could select only one type of transport for each direction. AC is operationalized as reporting either walking or cycling to school, from school, or both.

### Statistical Analyses

All the data was analyzed using IBM SPSS (Version 22 for Windows; IBM, Armonk, NY, USA) for all the schools together because the TwoStep cluster analysis found no indicator for clustering by school. To determine the trends logistic regression analysis (Enter method) was used with a dependent variable – AC to and from school and an independent categorical variable, which was the year that the survey was completed, i.e. the years 2006, 2010 and 2014. To describe differences in AC by gender and age categories in more detail we applied an Analysis of Variance approach with a dependent variable – AC to school and independent variables gender (boys, girls) and age categories (11, 13, and 15 years old).

## RESULTS

Table 1 presents the proportions of school-aged children using AC to and from school by age and gender. The trends over the 2006–2014 period were, however, generally similar for adolescents of all ages. Across the whole sample, there was a decrease in the use of AC between 2006 and 2014. The largest differences were reported between the two measurement points 2006 and 2014, when there was a significant decrease in the use of active commuting among 13-year-old boys and girls (boys – 21.7%, girls – 23.0%). AC to and from school was the most common mode of transportation for 11-year-old boys and girls of the same age in 2014. The lowest rate of prevalence of AC was observed among 13-year-old girls in 2014.

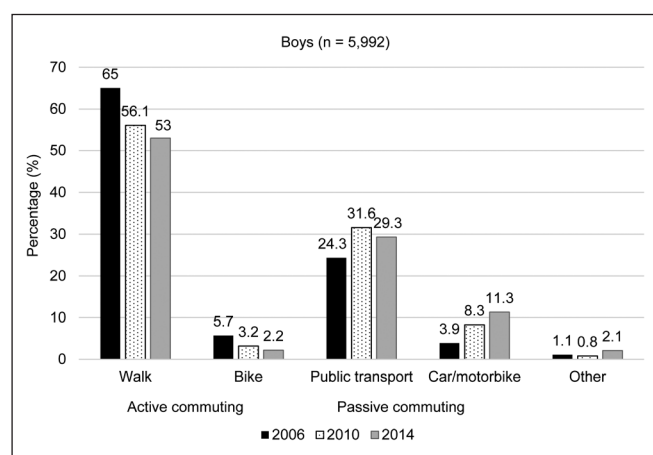
The percentages of commuting modes to school in the study population by measurement point for the whole sample and for the boys and girls are shown in Figures 1 and 2. These figures also present the specific proportion of children who walked, cycled, used public transport, or rode in a car. The proportion of children actively commuting (walking and cycling) to school significantly decreased from 74.3% in 2006 to 53.4% in 2014. Walking to school declined from 67.5% in 2006 to 50.8% in 2014 and the use of public transport increased among the girls. Concurrently, some increase was observed for using public transportation and the percentage of girls riding in a car or on a motorbike is also increasing. Equally, the use of cars or motorbikes increased from 5.7% to 7.7% and then to 11.9% at the 2006, 2010 and 2014

**Table 1.** Prevalence and trends of active commuting (walking, cycling or both) to and from school among Czech children between the years 2006 and 2014 (N= 12,273)

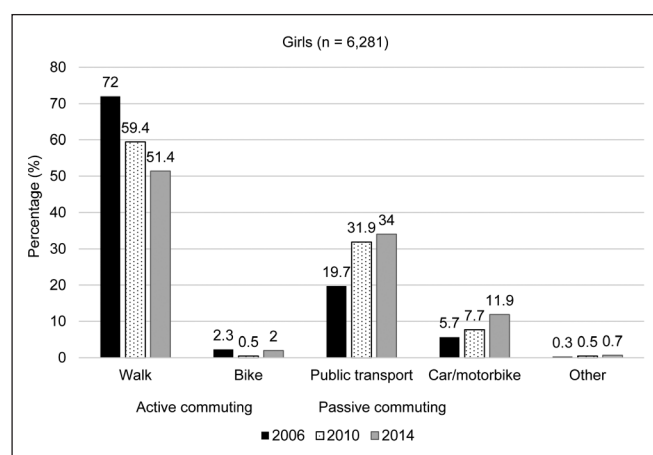
Variable	2006	2010	2014	2010 vs. 2006			2014 vs. 2006		
	%	%	%	OR	CI		OR	CI	
					Lower	Upper		Lower	Upper
Boys									
11–11.99 years	71.9	62.9	58.4	0.67	0.53	0.84	0.55	0.44	0.70
13–13.99 years	71.8	54.6	50.1	0.47	0.37	0.60	0.39	0.32	0.49
15–15.99 years	69.5	58.5	52.5	0.62	0.49	0.77	0.48	0.39	0.60
Girls									
11–11.99 years	73.5	60.2	54.2	0.55	0.43	0.69	0.43	0.34	0.54
13–13.99 years	69.3	52.6	46.3	0.49	0.39	0.61	0.38	0.31	0.48
15–15.99 years	70.1	54.5	51.4	0.51	0.41	0.64	0.45	0.36	0.56

Results from logistic regression; (%) percentage of participants who walked or cycled to and from school; OR: odds ratio (the cohort from the year 2006 is the reference group); CI: 95% confidence interval; all ORs are at the level of statistical significance  $p \leq 0.001$ .

measurement points. Cycling was used very little by the girls: 2.3%, 0.5% and 2.0% in 2006, 2010 and 2014, respectively. The proportion of children using AC to school decreased, while the percentage of children using public transport or riding in a car increased from 28.2% in 2006 to 40.6% in 2014.



**Fig. 1.** Specific proportion of boys who walked, cycled, used public transport, or rode in a car/on a motorbike to school.



**Fig. 2.** Specific proportion of girls who walked, cycled, used public transport, or rode in a car/on a motorbike to school.

## DISCUSSION

This study investigated trends in AC to school among Czech girls and boys aged 11–15 years from 2006 to 2014, using data from the cross-national HBSC study. We found that the use of AC (walking or cycling) by Czech schoolchildren decreased between 2006 and 2014. Concurrently, during the same time period, significantly more children used passive modes of transport. Increases were observed in the use of public transportation and riding in a car or on a motorbike as well.

Our results are in line with the findings of several previous studies focused on Czech schoolchildren (8, 28). The same overall decline in reported AC to school has been found in studies conducted in high-income countries such as Australia (from 57.7% in 1971 to 25.6% in 2003) (21), Canada (from 55.7% in 1986 to 43.4% in 2006) (14), the United States (from 40.7% in 1969 to 12.9% in 2001) (32), the United Kingdom (from 82.0% in 1971 to 64.0% in 2010) (38), Germany (primary school children from 88.0% in 1990 to 67.0% in 2010, and secondary school children from 42.0% in 1990 to 22.0% in 2010) (38), and Switzerland (from 78.4% in 1994 to 71.4% in 2005) (7).

However, although the overall reported levels of AC of Czech schoolchildren are still high, the decline is greater than in observed in other countries (14, 21, 32, 38). The decrease was mainly due to a reduction in walking to school, and in a less pronounced way to a reduction of bike use over time. The decrease in walking and cycling to school is also influenced by the location of the school and its distance from the place of residence (12), as well as the actual traffic safety conditions around the school location (39).

Nevertheless, walking was the most common mode of AC on the way to school. These results were consistent with other studies (24, 41).

There has been an increase in the use of public transport or riding in a car/on a motorbike, which accounted for the decrease in the proportion of children walking or cycling to school. The reasons for this difference would be interesting to explore in terms of different environmental factors which influenced the trend of bike and car use over time (27, 41). Moreover, future research should continue to analyze the influences of the many other correlates of school travel (household and environmental

characteristics, social support, travel distance and/or time, safety, traffic) that were not part of our study.

There are few differences between boys and girls in the modes used to travel to school and their preferred mode. On the journey to school more boys than girls cycled. However, our findings were consistent with those of other studies (35, 42) where gender effects were identified. Johansson et al. (43) also found that Swedish boys were significantly more likely to cycle than girls. On the other hand, other published studies (12, 15, 28) show no gender differences in AC to school. However, more data is needed in order to better understand these findings and future studies should continue to deeply analyze gender differences in AC among school-aged children and bring better understanding of the changing patterns of this behaviour over time.

## Strengths and Limitations

This study has several important strengths. The most important strength is the methodology of the international HBSC study that was used in our study, which has managed to adapt to developments in the research areas within and around public health and policy (44). For all the surveys that are conducted, a standardized research protocol providing a theoretical framework for the research topics and data collection and analysis procedures has been developed (36). On the basis of this protocol, the metrics used in this paper were included in 2006, 2010 and 2014, adding to the quality of the data used for analyzing time trends. In addition, the regional Central European comparisons provide baseline data which could be useful for the future investigation of health-related behaviour.

On the other hand, the study also has some limitations. One limitation of this study is that it is based on self-reported data, so the reported prevalence may be biased as a result of over- or underreporting. Additionally, while dichotomous classifications of the preferred way of commuting might be considered somewhat crude, such classification is less vulnerable to reporting errors. Another limitation may lie in the reporting of honest responses. However, all the participants were assured of the anonymity of the study and that neither their parents nor their teacher would find out about their individual answers or get any access to the study data. Second, the descriptive nature of this paper only refers to the prevalence of different means of transportation to school, and does not take into account important correlates of AC found in previous research. Thus, the results of this study cannot contribute to the understanding of why fewer children walk or cycle to school. The results of this study are, however, in line with previous research and add knowledge about the declining trends of this health-related behaviour. Finally, it should be emphasized that the findings presented here refer to cross-sectional trends that may not accurately reflect the findings of true longitudinal study approaches.

## CONCLUSIONS

AC to school among Czech children of school age decreased sharply from 2006 to 2014. This trend represents a critical loss of everyday physical activity for young people and could be part of the comprehensive explanation of the increase in childhood obesity in the Czech Republic. PA interventions for youth should

encourage participation in AC to school. As highlighted by previous research, there is a need for stakeholders to work together for a successful initiative that promotes AC in children with the aim of reducing the environmental and structural barriers to the adoption of this behaviour among school-aged children.

## Acknowledgements

This work was supported by the research grant of the Czech Science Foundation Reg. No. 17-12579S and by the Czech Ministry of Education, Youth and Sports (MEYS) under Contracts No. LG 14043.

## Conflict of Interests

None declared

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Received March 9, 2017

Accepted in revised form June 19, 2017