

Omission of active commuting to school and the prevalence of children's health-related physical activity levels: the Russian Longitudinal Monitoring Study

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Abstract

Background Active commuting to school by walking or bicycle is a potential source of continuous moderate activity for children that has been largely ignored in surveys of physical activity. The purpose of this study was to evaluate the analytical impact of omitting active commuting to school (walking or bicycling) on conclusions about children's physical activity levels.

Methods The Russian Longitudinal Monitoring Study (RLMS) is the first nationally representative household survey in the Russian Federation. More than 6400 households from all regions of Russia were surveyed eight times between 1992 and 1998. Analysis was conducted using physical activity data (school physical education classes, out-of-school active pursuits and active commuting to school) obtained by parent-proxy on 1094 (572 boys, 522 girls) school-aged Russian children (mean age 10.2 ± 1.9 years) participating in the November 1998 round of the RLMS. Data were examined according to prevalence of achievement of health-related physical activity guidelines, active commuting to school behaviours included then omitted.

Results Omitting active commuting to school resulted in a statistically significant decrease in the prevalence of achievement of health-related guidelines from 12% to 20%, similar for both genders. Likewise, the prevalence of sedentarism (defined as not meeting any of the guidelines) was increased by 17–22%.

Conclusions The present findings suggest that, in order to avoid misclassification bias of children's physical activity levels, it is necessary to include questions about mode of commuting to school. The findings also carry practice implications: the commonplace need to get to and from school may be a missed opportunity for children's health-related physical activity in motorized societies.

Keywords

walking, transportation, exercise

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Introduction

Health-related physical activity continues to be identified as a target behaviour for youth in the US

Department of Health and Human Service's *Healthy People 2010* physical activity and fitness objectives (US Department of Health & Human Services 2000). Although chronic disease is not

prevalent among youth, there is growing concern that childhood physical activity participation has important consequences as children transition into adolescence and adulthood (Raitakari *et al.* 1994). Looking beyond increasing opportunities for daily physical education, the *Healthy People 2010* objectives for children now include increasing the proportion of trips made by walking or bicycling (US Department of Health & Human Services 2000). Although often overlooked as a contributor to total physical activity, active commuting to school is a potentially important source of health-related physical activity (Sleap & Warburton 1993), parallel to the concept of active commuting to work in adults (Vuori *et al.* 1994).

There is evidence suggesting that walking as a mode of commuting has declined for both adults and children (US Department of Transportation 1994). Unfortunately, the contribution of young children's (i.e. under 15 years of age) active commuting to school (by walking or bicycle) has not been well assessed in surveillance studies of physical activity in the US or elsewhere (Pratt *et al.* 1999). In Great Britain, transportation data indicate that there has been an almost fourfold increase in children's travel to school by motorized vehicle between 1971 and 1990 (Hillman 1993). In the US, inferences are limited to survey data collected on high school students indicating that only 20.4% walk or bicycle at least 5 days a week, regardless of purpose (Kann *et al.* 1998). Bicycling is the most common mode of commuting, regardless of destination, for American 7–11 year olds (US Department of Transportation 1994). This changes, however, when driving age (16 years of age) is reached, and motorized transportation becomes the predominant mode of commuting. Walking becomes more popular for middle to older age groups (45–64 years of age).

The Russian Longitudinal Monitoring Study (RLMS), the first nationally representative household survey in the Russian Federation (Popkin *et al.* 1996, 1997), collected parent-proxy reports of school-aged (7–13 years of age) Russian children's physical activity behaviour, including active commuting to school. The purpose of the present study was to evaluate the analytical impact of omitting active commuting to school (walking or bicycling)

behaviour on the prevalence of health-related physical activity determined using three commonly accepted guidelines for young people. The first two guidelines were developed during an international conference focused on adolescent physical activity (Sallis & Patrick 1994). As no similar guidelines exist specific to younger children, we included these two guidelines in our analysis with a third guideline (Biddle *et al.* 1998) originally worded to be more inclusive of all young people.

Guideline 1: All adolescents should be physically active daily, or nearly every day, as part of play, games, sports, work, transportation, recreation, physical education or planned exercise, in the context of family, school and community activities (Sallis & Patrick 1994).

Guideline 2: Adolescents should engage in three or more sessions per week of activities that last 20 min or more at a time and that requires moderate to vigorous levels of exertion (Sallis & Patrick 1994).

Guideline 3: All young people should participate in physical activity of at least moderate intensity for one hour per day (Biddle *et al.* 1998).

In addition, the prevalence of sedentarism, that is meeting none of the above guidelines, was assessed when active commuting to school was alternately included and omitted.

Methods

A complete description of the sampling design for the RLMS can be found elsewhere (Popkin *et al.* 1996, 1997). The RLMS is the first nationally representative household survey in the Russian Federation. The second phase of this survey (1994–98) collected data from approximately 3000 households. Children's physical activity was obtained through parent-proxy. Fertility rates are very low in Russia — the median number of children is 1 (Entwisle & Kozyreva 1997); hence, there were only 1099 school-aged (7–13 years) Russian children in the November 1998 RLMS sample.

Data were recorded for 1171 children aged 7–13 years. For the purposes of these analyses, data for subjects not attending school (15 boys, 12 girls)

were deleted. Children not attending school were more likely to be younger (8.9 ± 2.6 years, $P < 0.05$) than the remaining subjects. Additional deletions ($n = 50$) were necessary for outlier physical activity data (above the 99th percentile of distribution). The mean age of the remaining study subjects (572 boys and 522 girls) was 10.2 ± 1.9 years. Age (10.3 ± 1.9 years) and gender proportion (29 boys and 21 girls) of the deleted subjects were not significantly different from those remaining.

Parents of study subjects were asked a series of questions about their children's physical activity behaviour, focusing on in-school physical education classes, out-of-school physical activities and active commuting to school. These physical activity questions have been published previously (Levin *et al.* 1999). Questions queried participation (yes/no/I don't know), frequency (days/week) and duration (hours/week) of in-school physical education classes and other physical activity engaged in outside school. Additional questions were asked to assess typical mode of commuting to school (car, walk or bicycle) and total duration of commute (minutes/day) both to and from school. Frequency and duration of reported activities were used to construct minutes/week spent in physical activity by intensity levels. Recorded activities were assigned a metabolic equivalent (MET) value using the *Compendium of Physical Activities* (Ainsworth *et al.* 2000). Classification of intensity level was based on a 1993 CEC-ACSM consensus panel: light (< 3 METs), moderate (3–6 METs) and vigorous (> 6 METs) (Pate *et al.* 1995). Active commuting (walking or bicycling) was considered a moderate intensity activity (Ainsworth *et al.* 2000).

Data are presented as the proportion of Russian school-aged children meeting guidelines 1–3 for health-related physical activity, with and without active commuting included, for the entire sample and for each gender. As reported previously (Levin *et al.* 1999), guideline 1 was defined as youth participating in any type of physical activity (other than sedentary leisure activities) for 150 min/week or longer or approximately equivalent to 30 min/day five days/week in line with minimal public health guidelines (Pate *et al.* 1995) and *Healthy People 2010* objectives (US Department of Health & Human Services 2000). Guideline 2 was defined

as any moderate or vigorous activities engaged in for at least three sessions per week. As structured activities during and after school were reported in hours/week, one hour was identified as one session. Therefore, engagement in moderate or vigorous activities for at least three hours/week (on at least three separate days) was necessary to meet guideline 2. Similarly, only those children reportedly participating in moderate or vigorous activities at least seven hours/week were classified as having met guideline 3. Children who did not meet any of the minimal requirements were considered to be sedentary. Confidence intervals were calculated for the difference in the proportion of youth meeting the respective guidelines with active commuting to school first included then omitted.

Results

With regard to children's modes of commuting to school, 91.6% of parents reported children walking to school, 12.7% reported transportation by car to school, and 0.2% reporting bicycling to school. Table 1 presents the prevalence of school-aged Russian children (for each gender) who met the three health-related physical activity guidelines when active commuting to school was alternately included and omitted from the survey total score. Difference proportions and their 95% confidence intervals are also presented in Table 1. Omitting active commuting to school resulted in a statistically significant decrease in the prevalence for guideline 1 (by 17–19%), for guideline 2 (by 16–20%) and for guideline 3 (by 12–13%), similar for both genders. The prevalence of sedentarism, defined as not meeting any of the guidelines (and equivalent to not meeting guideline 1), was increased by 17–22% when active commuting to school was omitted from the survey total score.

Discussion

The purpose of this paper was to examine the analytical impact of omission of active commuting to school on the prevalence of children meeting minimal health-related physical activity guidelines and the prevalence of sedentarism. The present findings suggest that, in order to avoid misclassification bias

Table 1. Prevalence of school-aged Russian children meeting health-related physical activity guidelines with active commuting to school included and omitted from the total physical activity score ($n = 1094$)

| | Active commuting included (%) | Active commuting omitted (%) | Difference proportions (%) | 95% confidence intervals |
|-------------|-------------------------------|------------------------------|----------------------------|--------------------------|
| Guideline 1 | | | | |
| Boys | 94 | 77 | 17.0 | 13.9–20.0 |
| Girls | 93 | 74 | 19.9 | 16.5–23.3 |
| Guideline 2 | | | | |
| Boys | 86 | 69 | 16.3 | 13.2–19.3 |
| Girls | 74 | 54 | 19.7 | 16.3–23.1 |
| Guideline 3 | | | | |
| Boys | 55 | 43 | 12.4 | 9.7–15.1 |
| Girls | 49 | 36 | 13.0 | 10.1–15.9 |

Guideline 1, moderate or vigorous activities 150 min/week or longer.

Guideline 2, moderate or vigorous activities 3 h/week.

Guideline 3, moderate or vigorous activities at least 7 h/week.

of children's physical activity levels (including sedentarism), it is necessary to include survey questions about mode of commuting to school. Omission of active commuting to school decreased the prevalence of school-aged children meeting recommended levels of physical activity by 12–20%, depending on the guideline used. Omission of active commuting to school had least impact on guideline 3, which represented higher minimal levels of time in physical activity, but not intensity, than either of the other two guidelines. Achievement of guideline 3 by active commuting to school alone would require the equivalent of 10 one-way 42-minute trips during the school week. Omission of active commuting to school also elicited a higher prevalence of sedentarism, increasing from 7% to 25% of the total sample.

Although the focus of this study was on active commuting to school, it is likely that the Russian children walked out of necessity to other destinations as well, although this was not assessed. There are no school buses, and only 33% of the households sampled reported owning a car. There are very few surveys of children's commuting behaviours with which comparisons can be made. In the US, the National Children and Youth Fitness Study I and II asked no specific questions about mode of commuting to school (Ross & Pate 1987; Gilbert *et al.* 1992). The Youth Risk Behaviour Survey (YRBS) included a single question asking high school respondents (in grades 9–12) to indicate on how many of the past seven days they walked or

bicycled for at least 30 min, including time spent actively commuting to school (Heath *et al.* 1993). In Great Britain, transportation surveys indicate that children walking to school dropped from 80% in 1970 to almost 60% in 1991 (Hillman 1993). The reasons for this apparent decrease include increased car ownership, community planning changes that favour motorized vehicles over pedestrians and increased concerns for children's personal safety.

This paper represents a secondary analysis of a nationally representative data set; the design of the questionnaire was shaped, in part, by pragmatic issues of conducting a large epidemiological study over a great geographical landmass. Although children's physical activity was obtained through parent-proxy, this is considered a preferred method compared with self-report from young children (Armstrong & Welsman 1997). Some of the questions required estimates of time in hours/week (specifically structured activities during and after school), a time frame that could lead to overestimates of active time in these activities and bias prevalence estimates. Finally, the cross-sectional design of this study limits conclusions about causality or generalizability.

Beyond the epidemiology of physical activity, the present findings suggest important public health intervention implications. Obviously, the relative importance of active commuting to school to total physical activity will be reduced in populations where children are transported to school by

public transport, school buses or private vehicles. Of concern, it is plausible that childhood commuting patterns may carry over into adult life. In 1996, Roberts (1996) expressed his concern about children's changing transportation patterns in an editorial letter in which he said, 'it may be unrealistic to expect the chauffeured children of today to become the ambulant adults of tomorrow'. In support of this view, evidence suggests that inactive behaviours adopted in childhood track better than active behaviours through the transition from adolescence to young adulthood (Raitakari *et al.* 1994). In the US, data on transportation use among adults has shown a marked shift towards increased use of cars, and we would expect the same for children (US Department of Transportation 1999). The preference for motorized transport in some societies should be weighed against the loss of an important opportunity for health-related active commuting to school. The routine of travelling to school on foot may provide health and economic benefits (Hillman 1993). Community-based practices of potential importance include walking school buses (Go For Green 1999), an active commuting system that involves volunteer parents/caregivers taking turns walking/cycling with groups of children to get them safely to and from school. Policy and environmental decisions should be weighed to determine their potential impact on child-pedestrian commuting over the convenience of motorized vehicles.

The present findings suggest that it may be important to conduct surveillance studies of children's habitual modes of commuting to school, in addition to school physical education classes and out-of-school active pursuits. Researchers need to continue to evaluate the impact of measuring active commuting to school on children's total physical activity and on important health outcomes; this study does not provide evidence to indicate whether or not active commuting to school is an appropriate or health-related form of physical activity. The validity of assessing active commuting to school information must also be studied before universal adoption in surveillance studies. Continued research in this area may have important health and transportation policy implications.

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