Main Submission

Can active school transport prevent overweight and obesity in children and youth?

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Several studies have shown that children and youth who engage in active school transport (AST)[i] accumulate greater amounts of daily physical activity and have superior cardiovascular fitness than those who are driven to school.[1,2] Not surprisingly, this has led some to wonder whether increasing AST (which is very low among young Canadians, especially adolescents)[3] may prevent overweight and obesity in pediatric populations. However, the most recent systematic review on the topic, including papers published up to December 2009, identified only two longitudinal studies with inconsistent findings.[2] Thus, the available evidence remains inconclusive. The current commentary aims to provide an overview of prospective studies published since this systematic review and to summarize important gaps in current knowledge.

A recent intervention study assessed the impact of walking school buses[ii] on indicators of body composition among elementary school children over a two year period.[4] After adjusting for age and gender, frequent walkers (defined as participants who walked ≥ 50% of the time) had significantly smaller increases in body mass index (BMI), waist circumference, and skinfold thickness than "infrequent" walkers and passive travelers.

Other studies have also shown positive associations between AST and body weight. Participants from the Québec Longitudinal Study of Child Development who consistently used AST from kindergarten to Grade 2 had significantly lower BMI indices in Grades 1 and 2 than passive travelers, despite a lack of difference in kindergarten.[5] Similarly, Bere and colleagues[6] assessed the impact of cycling to school on the risk of becoming overweight in adolescents from two cohort studies in Norway and the Netherlands. Compared to individuals who did not cycle at baseline and/or follow-up, participants who cycled both at baseline and follow-up had a significantly lower risk (OR=0.44; 95% CI=0.21-0.88), while the odds of becoming overweight was higher among those who stopped cycling at follow-up (OR=3.19; 95% CI=1.41-7.24).

While the above studies provide evidence that AST may contribute to the prevention of weight gain, other recent prospective studies lasting two to six years in length have failed to detect significant differences in anthropometrics between children using active versus passive modes of transport.[7,8,9] Possible explanations for these inconsistent findings include the lack of adjustment for compensatory behaviours and confounding variables, as well as varying definitions of AST.

Individuals may compensate for the additional energy expended through AST over the course of a day by: 1) engaging in less physical activity; 2) engaging in more sedentary behaviour (e.g., waking activities with energy expenditures ≤ 1.5 metabolic equivalents); and/or 3) increasing their energy intake. For instance, a recent review of studies employing doubly-labeled water (a criterion measure of energy expenditure) found that increases in energy expenditure are often offset by compensatory increases in food intake.[10] While the majority of studies that examined differences in physical activity found active travelers to be more active overall than passive travelers, most studies did not account for potential differences in energy intake or sedentary behaviour.[1]

Previous findings of the association between AST and anthropometrics may also be affected by confounding variables. For example, low socioeconomic status has

[i] AST involves using active modes of transport, such as walking and cycling, to travel to and from school.

[ii] A walking school bus is a group of children walking to and from school on a set route under the supervision of at least one adult.[4]

been found to be associated with both increased BMI and AST.[3] AST may also cluster with other energy balance-related behaviours (e.g., consumption of snacks, fruits and vegetables, physical activity, screen time, etc.). Several studies failed to adjust for the effect of these and other important variables, such as age, sex and ethnicity, on the relationship between AST and anthropometrics.[2]

Another important limitation of current AST-related studies is the inconsistency in the classification of individuals as active or passive travelers. For example, in some studies, only participants who used AST at least 50% of the time were classified as "active travelers" while in others, children using AST only once or twice a week have been classified as "active travelers".[1] The latter definition is likely to lead to greater variance in anthropometric indicators among those labeled as active travelers, thereby biasing the results toward the null hypothesis.[1] The use of a continuous measure of AST (i.e., frequency * duration) could address this limitation, while also allowing for the assessment of dose-response relationships.

Given the contradictory nature of the available evidence and the above limitations, the potential role of AST in preventing childhood obesity remains unclear. To increase the quality of evidence, future studies should: 1) measure and account for potential compensatory behaviours and confounding variables; and 2) adopt more consistent definitions of AST, while also considering the use of continuous measures of AST that include both frequency and duration. Studies with longer follow-up periods and stronger study designs (i.e., controlled trials and quasi-experimental studies) are also warranted. However, even in the absence of favourable changes in anthropometrics, AST should be promoted as a way to increase physical activity[1,4] and cardiovascular fitness[2,8] in children and youth.

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References

1. Faulkner GEJ, Buliung RN, Flora PK, Fusco C. Active school transport, physical activity levels and body weight of children and youth: a systematic review. *Prev Med*. 2009 Jan;49:3-8.
2. Lubans DR, Boreham CA, Kelly P, Foster CE. The relationship between active travel to school and health-related fitness in children and adolescents: a systematic review. *Int J Behav Nutr Phys Act*. 2011 Jan 26;8(5).
3. Pabayo R, Gauvin L, Barnett TA. Longitudinal changes in active transportation to school in Canadian youth aged 6 through 16 years. *Pediatrics*. 2011;128(2):e404-13.
4. Heelan KA, Abbey BM, Donnelly JE, et al. Evaluation of a walking school bus for promoting physical activity in youth. *J Phys Act Health*. 2009 Sep;6:560-567.
5. Pabayo R, Gauvin L, Barnett TA, et al. Sustained active transportation is associated with a favorable body mass index trajectory across the early school years: Findings from the Québec Longitudinal Study of Child Development birth cohort. *Prev Med*. 2010 Jan;50(Suppl. 1):S59-S64.
6. Bere E, Oenema A, Prins RG, et al. Longitudinal associations between cycling to school and weight status. *Int J Pediatr Obes*. 2011 Aug;6:182-187.
7. Aires L, Mendonca, D, Silva G, et al. A 3-year longitudinal analysis of changes in body mass index. *Int J Sports Med*. 2010 Feb;31(2):133-137.
8. Andersen LB, Wedderkopp N, Kristensen P, et al. Cycling to school and cardiovascular risk factors: a longitudinal study. *J Phys Act Health*. Forthcoming.
9. Lofgren B, Stenevi-Lundgren S, Dencker M, et al. The mode of school transportation in pre-pubertal children does not influence the accrual of bone mineral or the gain in bone size – two year prospective data from the paediatric osteoporosis preventive (POP) study. *BMC Musculoskelet Disord*. 2010 Feb 3;11:25.
10. Westerterp KR. Physical activity, food intake, and body weight regulation: insights from doubly labeled water studies. *Nutr Rev*. 2010 Mar;68(3):148-154.

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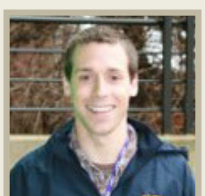

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