



Title: School Travel Plans: Barriers and underlying causes, relating active school transport to increased physical activity

Abstract:

A recent Public Health Service Agent survey determined that across Canada that 51% of primary school children are traveling to school through non active transportation methods. This paper determines and discusses the important issues identified through a secondary data analysis and a literature review. These are: (1) barriers to active school transport (AST), (2) the underlying cause for the barriers to active school transport, and (3) the relationship of active school transport to increased physical activity in children. Qualitative and quantitative data were collected using surveys distributed through a Canadian health service agency. A comparative methods design was used to determine barriers to AST across four provinces and twenty schools. The findings from the research provide a baseline for discussion on the underlying causes of the barriers. A review of literature then compares the results of the survey to rates of physical activity in children and their preferred transportation to and from school. Overall, conclusions state distance as the dominating barrier to AST and found that youths who participate in AST are significantly more physically active.



## Executive Summary

Since 2005, Canada has received its fourth consecutive D grade in 2008 for physical activity in children as determined by Active Healthy Kids Canada. This situation has made the area of transportation to and from school of emerging interest as a means to reincorporate physical activity into the lives of children and youth. Active school transport (AST) programs have a potential interest among youth, a wide reach impact, and low cost with school based programming and promotion. The purpose of STP is to increase active school transport to and from school.

Walking and cycling to school provides a convenient way to incorporate physical activity into the lives of children. Green Communities Canada issued a survey which was used to determine quantitatively the rate, frequency, methods of active school transport (AST) and barriers. The surveys were distributed to twenty elementary schools across four provinces (Nova Scotia, Alberta, Ontario and British Columbia). The survey was given to the students to take home and have a parent/guardian complete. The surveys were distributed as a pre- implementation of STP to determine baseline data.

This paper is a secondary data analysis that directly analyses the results of a strictly Canadian study conducted by Green Communities a rarity in the field of AST. Without this study successful implementation of an AST program in Canada would not be possible. This paper will (1) identify the barriers to active school transport and will through means of a literature review and comparison of the results of the Canadian study determine (2) the underlying causes for the barriers of AST and (3) the relationship of active school transport to increased physical activity in children.

### Methods

This is a cross-sectional study using data collected in the form of surveys from the parents of elementary students (JK-grade 8) across Canada. Overall, 20 schools were surveyed, 12 identified as pilot schools and 8 as control schools. A total of 5553 students were sent home with surveys for their parents to complete.

### Data Analysis

The initial analysis of data was conducted as a secondary data review to a pre- existing data set. Analysis of this pre- existing data set provided the best approach to determining the perceived barriers of AST in Canada. A typological approach was used to analyze the qualitative data from the dataset. Analytic induction was used in comparison of the findings from the secondary data set and that of previous literature. A comparative methods design was used to determine barriers to ACT across four provinces and twenty schools.

### Results: Description of Survey

The primary response across all four provinces by parents as barriers to AST is; fast cars, busy road, and cannot cross easily. The second response of choice varied in British Columbia the response was unsafe drivers, in Alberta crosswalks were needed and inclusion of lines at the cross walk, in Ontario



icy or snow covered paths were of concern and in Nova Scotia sidewalks being absent or in poor condition were of concern.

In British Columbia 149 (51%) to school and 307 (59.7%) from school selected an active mode of transportation. Alberta had 227 (39%) respond with active transportation to school and 373 (47.3%) from school. In Ontario 166 (51%) responded with active to school and 326 (59.9%) actively commute from school. Finally in Nova Scotia 111 (50.1%) actively commute to school and 231 (52.7%) from school.

### **Description of Studies**

The reviewed studies displayed socioeconomic factors in determining modes of transportation to and from school (Pabayo, 2008., McDonald, 2008) and distance (McDonald, 2007., Nelson et al, 2008) as the major barriers to active school transport (AST). One American study (Boarnet et al, 2005) associated traffic dangers and crosswalk inadequacies with reduced AST.

Through a thorough review of literature and analysis of the results of the Green Communities Canada survey the predominant underlying barriers to AST in Canada are traffic concerns, unsafe or inadequate crosswalk and sidewalk conditions, weather and distance. The literature supports these findings as with previous AST programs when eliminating or reducing these barriers AST increases. The underlying causes for low AST among children as identified by the literature originate from socio-economic status, gender, and ethnicity. Finally, this review of literature as demonstrated through substantial evidence of the ability for AST to increase daily physical activity levels among children.

### **Discussion**

It has been identified throughout this essay that the predominant barriers to AST are; distance, traffic issues, socio-economic factors, and gender. The latter not directly addressed in the survey conducted by Green Communities Canada so are therefore in need of further research in a strictly Canadian study. With the support of existing literature this essay will move onto identifying the underlying causes for the barriers and describe the relationship between AST and increased physical activity.

Despite these limiting factors to AST, studies on AST are showing growing evidence that AST increases the levels of physical activity in children. AST improves the average daily step count among adolescent girls as measured by accelerometry studies. Girls who use active transport averaged 1,052 more weekday steps than those who did not (Duncan et al, 2008). The increased amount of walking can accumulate to the levels of moderate to vigorous physical activity (MVPA) recommended by the Surgeon General (Sirard et al, 2005). It has also been noted that children are able to maintain increased physical activity levels if the additional activity is integrated into life routines (Sirard et al, 2005). Male youths who walked to school were shown to be significantly more active during the entire day and afterschool than boys who did not use AST (Boarnet et al, 2005). Sirard et al have shown through examples of studies from across the USA and Europe that support AST in its ability to increase total daily physical activity. There is an accumulation of 8.5% more minutes and 8.5% more minutes in MVPA in students who use AST to a total of 24 additional minutes a day (Sirard et al, 2005). These findings suggest that AST has a mediating role in increasing physical activity levels in children.



## **School Travel Plans: Barriers and underlying causes, relating active school transport to increased physical activity**

Since 2005, Canada has received its fourth consecutive D grade in 2008 for physical activity in children as determined by Active Healthy Kids Canada. This grade is the measurement of how Canada is collectively demonstrating its responsibility in providing physical activity opportunities for children and youth (AHKC, 2008). This proposes an urgent need to incorporate physical activity into daily living. For previous generations active modes of transport (walking, cycling) were the predominant. But, for today's generation private vehicle transportation is dominant as the rates of travelling to school by car are doubling (Baslington, 2008).

This situation has made the area of transportation to and from school of emerging interest as a means to reincorporate physical activity into the lives of children and youth. Active school transport (AST) programs have a potential interest among youth, a wide reach impact, and low cost with school based programming and promotion. School Travel Planning (STP) has been devised as a solution to the increasing amount of primary school children being driven to school (Baslington, 2008). The purpose of STP is to increase active school transport to and from school.

Walking and cycling to school provides a convenient way to incorporate physical activity into the lives of children. Green Communities Canada issued a survey which was used to determine quantitatively the rate, frequency, methods of active school transport (AST) and barriers. The surveys were distributed to twenty elementary schools across four provinces (Nova Scotia, Alberta, Ontario and British Columbia). The survey was given to the students to take home and have a parent/guardian complete. The surveys were distributed as a pre- implementation of STP to determine baseline data.

Most importantly this paper is a secondary data analysis that directly analyses the results of a strictly Canadian study conducted by Green Communities a rarity in the field of AST. Without this study successful implementation of an AST program in Canada would not be possible. This paper will (1) identify the barriers to active school transport and will through means of a literature review and comparison of the results of the Canadian study determine (2) the underlying causes for the barriers of AST and (3) the relationship of active school transport to increased physical activity in children.

## **Method**

### **Study Context**

This is a cross-sectional study using data collected in the form of surveys from the parents of elementary students (JK-grade 8) across Canada. Overall, 20 schools were surveyed, 12 identified as pilot schools and 8 as control schools. A total of 5553 students were sent home with surveys for their parents to complete. Schools were both public (non-private, publically funded, non religious) and separate (non-private, publically funded, religious). The data for this study was collected by the public health service agent, Green Communities Canada for the purposes of implementing active school transport programs into the pilot schools. This study represents a secondary data analysis.



## **Community Partnerships**

Green Communities Canada was the initial public health service agent who conducted and organized the implementation of the data collection and the school travel plans. Prior to the study, Green Communities collaborated with Active and Safe Routes to School (ASRTS) Programs run by its provincial partners. In British Columbia the community partner is Way to Go, in Alberta SHAPE (Safe Healthy Active People Everywhere), in Ontario Go for Green and in Nova Scotia Ecology Action Center. Collaboration with these non-profit organizations aided in the implementation of the school transport plans. These community partners provided valuable information on the areas development and geography, recruitment strategies, implementation plans, and support.

## **Participants**

Provinces were selected as partners based on the provinces representation of a region distinct from other selected provinces, differences in climate, demographic and location (east, west and central) were integral. The provinces chosen were British Columbia, Alberta, Ontario and Nova Scotia.

Pilot and control schools were determined based on the readiness to contribute parent and staff time, location in relationship and value to the commitment and the monetary issues required for implementation, have geographically and demographically diverse areas but are also representative of the community. These schools have little or no experience with school travel initiatives and are located in different municipalities throughout the province. There were a total of 12 pilot schools chosen 3 in each province and 8 control schools, 2 in each province.

Students were in elementary school ranging from JK-grade 8. The surveys were completed by the parents of the students. There were a total of 769 students from British Columbia, 1260 students from Alberta, 823 students from Ontario and 519 students from Nova Scotia.

## **Data Collection**

The public health service agent Green Communities Canada issued a survey which was used to determine quantitatively the rate, frequency, methods of active school transport (AST) and barriers. Aside from the traditional closed ended question component, the survey consisted on an open ended component that determines any issues or problems with using an active method to and from school. The surveys were distributed to twenty elementary schools across four provinces (Nova Scotia, Alberta, Ontario and British Columbia). The survey was given for students to take home and have a parent/guardian complete. The surveys were distributed as a pre-implementation of STP to determine baseline data.

## **Data Analysis**

The initial analysis of data was conducted as a secondary data review to a pre-existing data set. Analysis of this pre-existing data set provided the best approach to determining the perceived barriers of AST in Canada. A typological approach was used to analyze the qualitative data from the dataset. Once the common barriers were determined the typological approach allowed for a deeper



understanding of their underlying causes. Underlying causes were determined through any patterns in barriers appearing in distinct regions and schools.

Analytic induction was used in comparison of the findings from the secondary data set and that of previous literature. This allows for establishing common similarities between the findings of existing literature and that of the secondary data set. As the secondary data set is the first of its kind addressing the issues of only Canadian student's comparison against existing literature is important to stress its validity in the realm of AST.

A comparative methods design was used to determine barriers to ACT across four provinces and twenty schools. The findings from the research provide a baseline for discussion on the underlying causes of the barriers. A review of literature then compares the results of the survey to results found in existing literature and allows for a liaison into the future benefits of active school transport such as increased participation in physical activity by children.

## Results

### Description of Survey

This section reports the findings from the analysis of the 2405 completed surveys across the four provinces of British Columbia, Alberta, Ontario and Nova Scotia.

In response to the question of the most often used mode of transport walking, cycling and walking part way are categorized as active modes of transport while public transport, school bus, car and carpool are categorized as non active modes of transport. The question was further divided into two categories; to and from school. In British Columbia 149 (51%) selected an active mode of transportation and 144 (49%) with non active of the total 294 who responded to "to school". In response to "from school" 307 (59.7%) selected active and 201 (39.1%) selected non active of the 514 total responses. Alberta had 227 (39%) respond with active and 344 (61%) responded with non active of the 582 responses to "to school". In response to "from school" 373 (47.3%) selected active and 400 (50.1%) selected non active of the 789 responses. In Ontario 166 (51%) responded with an active mode and 157 (48%) as non active of the total 324 responses. In response to "from school" 326 (59.9%) selected active and 212 (38.9%) selected non active of a total 544 responses. In Nova Scotia 111 (50.1%) responded as active and 110 (49.9%) responded with non active of a total 221. In response to "from school" 231 (52.7%) selected active and 200 (45.7%) selected non active of the 438 responses. Other was included in the survey but not classified under active or non active. A total of 13 (0.9%) of the total responses to school in all four provinces and 33 (1.4%) from school were identified as other.

The primary response across all four provinces by parents as barriers an active mode of transportation was; fast cars, busy road, and cannot cross easily. The second response of choice varied in British Columbia the response was unsafe drivers, in Alberta crosswalks were needed and inclusion of lines at the cross walk, in Ontario icy or snow covered paths were of concern and in Nova Scotia sidewalks being absent or in poor condition were of concern.



Distance was categorized as; less than 3 blocks, 3-6 blocks, 0.5km-1km, 1-3km, and more than 3km. In British Columbia (28% [143 of 509]), Ontario (28.9% [156 of 259]) and Nova Scotia (27.2% [116 of 427]) the majority of responses selected less than 3 blocks. In Alberta 1-3km distance from school was selected most often (28.7% [230 of 802]). The majority response for travel time among the four provinces was in the category of between 10-20min with 41.5% (959 of 2313 total responses).

The primary response across all four provinces for the reason to drive to and from school was weather with 26% (777 of 3002 total responses). The second most common response was that the parents were en route with 21.5% (644 of 3002). The third response varied among provinces with distance in British Columbia (15.9% [100 of 630]) and Ontario (15.7% [104 of 664]) safety issues in Alberta (16.8% [176 of 1050]) and traffic dangers in Nova Scotia (14.4% [95 of 658]).

### **Description of Studies**

Several of the reviewed studies were conducted in the USA (N=6) with one Canadian study, three European studies and two Australian studies. The studies ranged in focus on children from elementary school to high school grades. One study focused primarily on girls (Duncan et al, 2008). The studies primarily sampled based on social- ecological correlates; demographic, behavioural, social/psychological, ethic and environmental (Wilson, 2008., Pabayo, 2008., Nelson, 2008., McDonald, 2007). All studies looked at the possible barriers to implementation and success of STP except one European study (Rowland et al, 2003) which evaluated the impact of advice given by school travel coordinators on school travel patterns.

The reviewed studies associated socioeconomic factors (Pabayo, 2008., McDonald, 2008) and distance (McDonald, 2007., Nelson et al, 2008) with determining modes of transportation to and from school as the major barrier to active school transport (AST). One American study (Boarnet et al, 2005) associated traffic dangers and crosswalk inadequacies with reduced AST.

Weather was not addressed by any of the studies, for the most part the locations of the studies did not have weather concerns such as one American study (Boarnet et al, 2005) which was conducted in the state of California. The majority of studies used self reporting surveys and journals which can be associated with bias. The studies failed to follow a cohesive definition of active transport for multiple studies active transport included walking, biking and mixed while others defined active as strictly walking (Pabayo et al, 2008). In the one Australian study active commuters were defined as students walking part way to or from school at least five times per week (Wen et al, 2007). While a European study (Nelson et al, 2008) eliminated the return journeys mode of transportation from their study.

### **Discussion**

It has been identified throughout this essay that the predominant barriers to AST are; distance, traffic issues, socio-economic factors, and gender. The latter, not directly addressed in the survey conducted by Green Communities Canada so are therefore in need of further research in a strictly Canadian study. With the support of existing literature this essay will move onto identifying the



underlying causes for the barriers and describe the relationship between AST and increased physical activity.

### **Distance**

All studies addressed the barrier of distance the study by Nelson et al (2008) describes distance as an important barrier to an active community supported by the evidence found the majority of AST by adolescents decreases as the distance from school reaches above an average 1.62miles (2.6km). This is consistent with the results of the Green Communities Canada (GCC) study. In Alberta the majority of responses were in the 1-3km range and distance appeared as a major issue with walking to school. The study conducted by McDonald (2007) declared that a 1minute increase in walk travel time leads to a 0.2% decline in the probability of walking. McDonald's results while concurrent with that of the GCC survey were conducted using multinomial logit model (McDonald, 2007). This mathematical calculation is applied to a census to assume the common mode of transport based on distance from school. This fails to recognize any partial active transport to and from school that is recognized in the GCC survey and the study by Nelson et al (2008). Although distance was recorded in the results of the GCC survey as a barrier to AST it is not the primary limiting factor, as the articles by McDonald (2007) and Nelson et al (2008) have declared.

### **Traffic Issues**

Traffic issues appeared repeatedly throughout the four provinces as the primary issue with AST in the GCC survey. Boarnet et al (2005) focused predominantly on this barrier. It was stated that poor conditions of sidewalks, crossings and traffic control reduces AST to and from school. This study was independent from the rest as it included a post intervention follow-up. The SR2S project was implemented in the ten schools participating in the study to which new sidewalks and walking paths were constructed, curbs and curb cuts as well as crossing improvements with added lights, lines and signals of the surrounding areas. Subsequently, these improvements did not alter the percentage of children who used active transport to and from school. But a 5% increase in the amount of children who used the SR2S improved routes to school was noted. It is also noted in the study that parents and children favored these improved routes and as a result reported that they walked more often (Boarnet et al, 2005).

### **Socio-economic status**

Socio-economic status (SES) constitutes the area in which the student lives and the availability of a car. In neighbourhoods with high densities the likelihood of walking increases (Baslington, 2008). Within the research of McDonald, 2007 a notable result was that of household characteristics, with an increasing income by 10% there is a decline in walking to school by 2.6% and a 2% increase in being driven to school (McDonald, 2007). In her 2008 study she found that families earning less than \$30,000 walked more than twice as much as students from households earning more than \$60,000 (McDonald, 2008). Earlier hypothesis set out to prove that rates of AST varied among different racial groups,



McDonald argued that differences in observed rates of active transportation result from differences in the underlying distribution of explanatory factors such as SES which control for if the family is able to own a car to drive their children to school (McDonald, 2007).

### **Gender**

A limitation of the survey by GCC was it did not require the participant to specify if their child was male or female. Almost all studies looked at males and females as one except for; (Duncan et al, 2008., Pabayo et al, 2008., Nelson et al, 2008). Duncan et al (2008) directed the question that being a girl reduces your physical activity level. According to (Nelson et al (2008) 41.1% of males and 33.8% of females chose an active mode of transport and in Pabayo et al (2008) 24.7% of males and 21.8% of females used active transportation. Yet, 11.2% of males and 13.1% of females used mixed transport. Mixed transportation combines active and non active mode. Although girls are using mixed modes of transportation to school they are still averaging less daily steps when gender is controlled for (Nelson et al, 2008).

### **Increased Physical Activity as a result of AST**

Despite these limiting factors to AST, studies on AST are showing growing evidence that AST increases the levels of physical activity in children. Secondary to the increased participation in sport programs and physical activity outside of school, AST improves the average daily step count among adolescent girls as measured by accelerometry studies. Girls who use active transport averaged 1,052 more weekday steps than those who did not (Duncan et al, 2008). The increased amount of walking can accumulate to the levels of moderate to vigorous physical activity (MVPA) recommended by the Surgeon General (Sirard et al, 2005). It has also been noted that children are able to maintain increased physical activity levels if the additional activity is integrated into life routines (Sirard et al, 2005). Male youths who walked to school were shown to be significantly more active during the entire day and afterschool than boys who did not use AST (Boarnet et al, 2005). Sirard et al have shown through examples of studies from across the USA and Europe that support AST in its ability to increase total daily physical activity. There is an accumulation of 8.5% more minutes and 8.5% more minutes in MVPA in students who use AST to a total of 24 additional minutes a day (Sirard et al, 2005). These findings suggest that AST has a mediating role in increasing physical activity levels in children.

Through a thorough review of literature and analysis of the results of the Green Communities Canada survey the predominant underlying barriers to AST in Canada are traffic concerns, unsafe or inadequate crosswalk and sidewalk conditions, weather and distance. The literature supports these findings as with previous AST programs when eliminating or reducing these barriers AST increases. The underlying causes for low AST among children as identified by the literature originate from socio-economic status, gender, and ethnicity. Finally, this review of literature has through substantial evidence demonstrated the ability for AST to increase daily physical activity levels among children.



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