

*Health Promoting Community Design*

# Associations Among Individual, Social, and Environmental Barriers and Children's Walking or Cycling to School

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## Abstract

**Purpose.** To examine associations among individual, social, and environmental barriers and children's walking or cycling to school.

**Design.** Exploratory cross-sectional study.

**Setting.** All eight capital cities in Australia.

**Subjects.** Parents ( $N = 720$ ) of school-aged children (4–13 years; 27% response rate; 49% parents of boys).

**Measures.** Multivariate-adjusted odds ratios (OR) and 95% confidence intervals (CI) for parental reporting of barriers to their children's walking or cycling to school, based on a computer-assisted telephone interview.

**Results.** Forty-one percent of children walked or cycled to school at least once per week. Multivariable analyses found inverse associations with individual ("child prefers to be driven" [OR = 0.4, 95% CI = 0.3–0.6], "no time in the mornings" [OR = 0.5, 95% CI = 0.3–0.8]); social ("worry child will take risks" [OR = 0.6, 95% CI = 0.3–0.9], "no other children to walk with" [OR = 0.7, 95% CI = 0.4–0.99], "no adults to walk with" [OR = 0.6, 95% CI = 0.4–0.9]); and environmental barriers ("too far to walk" [OR = 0.1, 95% CI = 0.0–0.1], "no direct route" [OR = 0.4, 95% CI = 0.2–0.7]) and positive associations with "concern child may be injured in a road accident" (OR = 1.9, 95% CI = 1.1–3.1) and active commuting.

**Conclusion.** Working with parents, schools, and local authorities to improve pedestrian skills and environments may help to overcome barriers. (*Am J Health Promot* 2007;22[2]:107–113.)

**Key Words:** Active Commuting, Barriers, Social Ecologic Models, Walking Distance, Prevention Research; Format: research; Research purpose: descriptive; Study design: nonexperimental; Outcome measure: behavioral; Setting: transport; Health focus: physical activity; Strategy: skill building/behavior change; Target population age: youth; Target population circumstances: education/income level

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## PURPOSE

Walking or cycling to school may make an important contribution to children's overall physical activity.<sup>1</sup> Some<sup>2,3</sup> but not all<sup>4</sup> studies show that

children who walk or cycle to school are significantly more active than those who are driven to school by car. Further, children who walk or cycle to school regularly tend to be more active than other children.<sup>5</sup> However, U.S. data show that approximately one-third

of children aged 5 to 15 years walked to school,<sup>6</sup> and trend data from Australia<sup>7</sup> suggest that the rates of active transport for the school journey declined by up to 50% in some areas between 1985 and 2001. The factors that influence this behavior and the reasons for these declines are not well understood.

Parents commonly report environmental barriers such as the distance to school,<sup>8,9</sup> traffic danger, adverse weather, and crime<sup>8</sup> as barriers to their child walking to school; however, few studies have examined whether these barriers are associated with children's active travel to school. Individual factors such as the importance of physical activity to parents and the parents' own experiences of walking or cycling to school as children;<sup>10</sup> social factors such as there being no other children living nearby;<sup>11,12</sup> and environmental factors such as the distance to school,<sup>10,12,13</sup> there being few lights or crossings nearby,<sup>12</sup> the roads en route to school being unsafe,<sup>13</sup> and there being a busy road or steep hill en route to school<sup>12</sup> are negatively associated with active transport among children. U.S. children whose parents reported no barriers to their children walking or cycling to school were six times more likely to walk or cycle to school at least once per week than other children.<sup>9</sup> Other research has shown positive associations between walking or cycling to school and school size and population density.<sup>14</sup>

Although several correlates of children's active travel to school have been identified in previous research, few studies have concurrently examined individual, social, and environmental

influences on children's walking or cycling to school. It was hypothesized that children whose parents reported barriers to walking or cycling to school would be less likely to commute actively to school. In addition, few studies have identified barriers for those children who could walk to school but do not. The current study aimed to describe individual, social, and environmental barriers to walking or cycling to school and to examine associations among these barriers and walking or cycling to school within the whole sample and among those children who live within a 15-minute walk to school.

## METHODS

### Design

This was an exploratory cross-sectional study and was based on data collected as part of the evaluation of the Pedestrian Council of Australia's National Walk Safely to School Day. Data collection procedures followed the ethical principles for research outlined by the World Medical Association.<sup>15</sup>

### Sample

In April 2004 random-digit dialing was used to recruit families with children of primary or elementary school age from all capital cities in Australia. Parents were invited to participate in a telephone-based survey if they had a child of 4 to 13 years living in the home who attended primary school. The survey was conducted on behalf of the Pedestrian Council of Australia. Minimum quotas applied to the number of eligible parents identified were based on city-based population weighting.

### Survey Administration

Using a computer-assisted telephone interview (CATI) technique, a survey was administered over the phone by a commercial survey company. A standard script and training was provided for the interviewers. The survey contained questions about sociodemographic information, modes of transport to and from school in a typical week, travel time to school by walking, and barriers to walking or cycling to school for their child. This was an anonymous survey; contact telephone

numbers were not recorded and no identifying information was collected.

### Measures

**Sociodemographic Information.** Parents were asked to report the number and age of all primary school-aged children living at home under their care. If more than one child of primary school age lived in the home, parents were instructed to respond on behalf of one child randomly selected by the CATI system. Parents were then asked the sex and age of the selected child, which city they live in, their own sex and age, and their own highest level of education. Child age was collapsed into two categories (4–9 years and 10–13 years) for the purposes of analysis, as previous research suggests that children under the age of 10 years do not have the skills and experience needed to cross roads unaccompanied by an adult.<sup>16</sup> The responding parent's education, used as a proxy measure for family socioeconomic status (SES), was collapsed into three groups for analysis: low (no school/some high school), medium (high school, technical or trade certificate, or apprenticeship), and high (university or tertiary qualification).

**Transport to School.** Parents were asked to report their child's usual mode of transport (car, public transport, cycling, or walking) to and from school in a typical week during the current school term and how many times in a usual week the child used each mode (home to school = 1 trip; maximum possible trips = 10). These items were derived from the Children's Leisure Activities Study Survey (CLASS) questionnaire, a previously validated and reliability-tested proxy-report measure of children's physical activity.<sup>17</sup> Two variables were created: "usual" mode of transport to school, defined as the mode used for at least 50% of trips per week and "active commuting to school," defined as walking or cycling to school at least once per week.

**Travel Time to School by Walking.** As an estimate of proximity to school, parents were asked how long it would take for their child to walk from home to school, regardless of whether or not the child had ever walked to or from

school. The time needed to walk to school was collapsed into two categories: (1)  $\leq 15$  minutes or (2)  $> 15$  minutes. This decision was based on previous research suggesting that parents consider an appropriate walking distance for children to be a round trip of 1 mile or 1.6 km (800 meters would take a child approximately 15 minutes to walk).<sup>18</sup>

**Barriers to Walking to School.** In keeping with social ecologic models of health behavior,<sup>19</sup> parents were asked to report their level of agreement with a series of 21 statements about their child's travel to and from school. The items encompassed individual (e.g., preference for being driven to school), social (e.g., not having other children with whom to walk to school), and environmental barriers (e.g., proximity to school). These items were modified from the CLASS questionnaire.<sup>18</sup> The order in which the statements were presented to parents was randomized for each interview. Response options on a five-point scale ranged from strongly disagree to strongly agree; however, for the purpose of analysis, responses were collapsed into two categories: (1) strongly agree and agree or (2) strongly disagree, disagree, neutral, and don't know.

### Analysis

Data were analyzed using SPSS 11.5.<sup>20</sup> Descriptive statistics were used to portray the demographic profile of participants and to examine perceived barriers to walking to or from school for the subset of children whose reported travel time to school by walking was  $\leq 15$  minutes and for the whole sample (including those within walking distance). Pearson's  $\chi^2$  analyses were used to examine differences in usual mode of transport to or from school according to the child's sex and age, parental education, and travel time to school by walking.

Logistic regression models examined which barriers were associated with active commuting to school for the whole sample, with "disagree" as the referent category for each barrier statement. Initially each barrier was entered into separate models that also adjusted for SES and the child's age and sex. Separate analyses were not conducted for the two age groups due

to small numbers of older children or for boys and girls as the usual modes of transport were similar between the sexes. All barriers that were significantly associated with active commuting to school in these models were then entered into a forced-entry multiple logistic regression model, which also included the child's age, sex, and SES. All logistic regression analyses were repeated for the subset of children who lived within a 15-minute walk to school. As there were several independent variables that may have been measuring related concepts (e.g., too much traffic, drivers exceeding the speed limit), tests for multicollinearity were performed. With a variance inflation factor (VIF) of 10.0 as the upper acceptable limit, VIF was below 3.0 for all variables.<sup>21</sup>

## RESULTS

### Sample Characteristics

In total, 2634 telephone calls were made to eligible participants, and 722 parents of primary school-aged children participated in the survey (27% response rate). Data from two participants were omitted due to incompleteness (inability to respond to some of the questions), resulting in a final sample of 720. Table 1 shows the demographic characteristics of the sample, which comprised similar proportions of boys and girls. Two-thirds of the children in the sample were aged 4 to 9 years (mean age = 8.1, SD = 2.3 years). Approximately 70% of parents who participated in the telephone interview were mothers, and about 80% of participating parents had a medium- or high-level of education. Almost 50% of parents reported that it would take their child 15 minutes or less to walk to school.

### Usual Mode of Transport and Active Commuting to School

The mean number of trips made to school in a typical week by walking was 2.48 (SD = 3.80); by cycling, 0.44 (SD = 1.75); by car, 6.40 (SD = 4.29); and by public transport, 0.68 (SD = 2.22). Table 2 presents the children's usual mode of transport to and from school. Usual mode of transport did not differ by the child's sex or SES. However, greater proportions of older children usually cycled or used public transport,

**Table 1**  
Demographic Profile of the Sample by Boys and Girls

	Sex	
	Boys (%) (n = 354)	Girls (%) (n = 366)
Overall	49	51
Age group		
4-9 years	66	67
10-13 years	34	33
Sex of responding parent		
Male	29	26
Female	71	74
Education level of responding parent		
High	44	42
Mid	39	40
Low	17	18
School ≤ 15-minute walk	49	51

while a greater proportion of younger children were driven to school. In addition, a higher proportion of children living within a 15-minute walk to school usually walked to or from school compared with those living farther away, while greater proportions of those living more than 15 minutes

away usually used public transport or were driven.

A total of 41% of parents reported that their child engaged in active commuting, defined as usually walked or cycled to or from school at least once per week. There were significant differences in the proportion of chil-

**Table 2**  
Usual Mode of Transport Used for Trips to/from School by Sociodemographic Characteristics and Estimated Time Needed to Walk to School†

Characteristic	n	Usual Mode of Transport (%)			
		Walk	Cycle	Public Transport	Car
Total	720	26	4	8	67
Sex of child					
Boys	354	24	3	9	68
Girls	366	28	5	7	66
Age group					
4-9 years	477	24	1	7	71
10-13 years	243	29	10**	11*	59**
Education level of responding parent					
Low	125	28	4	7	63
Medium	284	25	4	9	69
High	308	26	4	8	66
Time to walk to school					
≤15 minutes	368	47	3	4	50
>15 minutes	352	4**	5	13**	85**

Rows do not add up to 100% because some children had two usual modes of transport (e.g., walked 2.5 days/week and traveled by car 2.5 days/week).

\*  $p < 0.05$

\*\*  $p < 0.001$ : Pearson's  $\chi^2$  tests within each mode of transport

† Usual mode of transport is the mode used for  $\geq 50\%$  of trips to/from school.

**Table 3**  
**Prevalence (%) of Barriers to Walking to School and Odds of Active Commuting to/from School More than Once per Week†**

Perceived Barriers	Overall Sample (n = 717)			≤15-minute Walk to School (n = 366)		
	Agree (%)	OR‡ (95%CI)	Adjusted OR§ (95%CI)	Agree (%)	OR‡ (95%CI)	Adjusted OR§ (95%CI)
<b>Individual barriers</b>						
My child prefers to be driven to school by car	48.3	0.3 (0.2–0.5)**	0.4 (0.3–0.6)**	41.6	0.3 (0.2–0.4)**	0.3 (0.2–0.6)**
My child hasn't got the pedestrian skills needed to walk to school	42.4	0.5 (0.3–0.6)**	0.8 (0.5–1.2)	32.6	0.6 (0.4–0.9)*	1.1 (0.6–1.9)
There is not enough time in the mornings for my child to walk to school	39.2	0.2 (0.2–0.3)**	0.5 (0.3–0.8)**	24.2	0.3 (0.2–0.5)**	0.5 (0.3–0.8)**
My child is too lazy to walk to school	11.1	0.6 (0.4–1.0)	—	9.5	0.5 (0.3–1.1)	—
<b>Social barriers</b>						
I'm concerned my child might be assaulted or molested by an adult on the way to school	59.7	0.6 (0.4–0.8)**	1.0 (0.6–1.5)	53.8	0.8 (0.4–1.0)	—
I'm worried my child will take risks when walking to school with friends	59.3	0.5 (0.4–0.7)**	0.6 (0.3–0.9)*	54.9	0.4 (0.3–0.7)**	0.6 (0.4–1.1)
There are no other children for my child to walk to school with	48.5	0.3 (0.2–0.4)**	0.7 (0.4–1.0)*	33.7	0.3 (0.2–0.5)**	0.6 (0.3–0.98)*
There are no adults for my child to walk to school with	40.3	0.3 (0.2–0.4)**	0.6 (0.4–0.9)*	31.3	0.3 (0.2–0.5)**	0.5 (0.3–0.9)*
Other children might bully my child on the way to school	29.9	0.8 (0.6–1.2)	—	26.1	1.2 (0.7–2.0)	—
I don't trust the people in our neighborhood	24.6	0.8 (0.6–1.1)	—	23.6	0.7 (0.4–1.1)	—
<b>Environmental barriers</b>						
I'm concerned my child might be injured in a road accident walking to school	69.2	0.7 (0.5–0.9)*	1.9 (1.1–3.17)*	64.4	0.7 (0.5–1.2)	—
Most drivers exceed the speed limits in my nearby streets	64.2	0.8 (0.6–1.0)	—	63.6	0.8 (0.5–1.2)	—
Car parking is difficult at my child's school	60.3	1.1 (0.8–1.5)	—	63.0	1.0 (0.6–1.6)	—
There is too much traffic in our neighborhood	53.2	0.5 (0.4–0.7)**	0.7 (0.5–1.1)	45.1	0.6 (0.4–0.95)*	0.9 (0.6–1.6)
There are not enough pedestrian crossings or lights for my child to use	43.9	0.5 (0.4–0.7)**	1.2 (0.8–1.9)	34.5	0.8 (0.5–1.3)	—
My child's school is too far to walk to	42.5	0.04 (0.0–0.1)**	0.1 (0.0–0.1)**	7.9	0.2 (0.1–0.4)**	0.3 (0.1–0.7)**
My child's school bag is too heavy to carry	36.3	0.6 (0.5–0.9)**	1.2 (0.7–1.8)	31.0	0.8 (0.5–1.3)	—
There is no direct route for my child to walk to school	29.3	0.1 (0.1–0.2)**	0.4 (0.2–0.7)**	12.8	0.2 (0.1–0.4)**	0.3 (0.2–0.7)**
Our neighborhood is not safe for my child to walk to school	27.1	0.4 (0.3–0.6)**	0.8 (0.5–1.4)	19.6	0.6 (0.3–0.95)*	0.9 (0.5–1.8)
My child's school does not encourage the children to walk to school	16.3	0.7 (0.4–1.0)	—	13.3	0.6 (0.3–1.0)	—
There are no footpaths in my neighborhood	15.7	0.6 (0.4–0.9)*	1.3 (0.7–2.2)	10.9	0.7 (0.3–1.3)	—

\*  $p < 0.05$ .

\*\*  $p < 0.01$ .

† OR indicates odds ratio and CI, confidence interval.

‡ Adjusted for age, sex, and socioeconomic status (SES); referent category = "disagree."

§ Adjusted for age, sex, SES, and significant barriers from separate logistic regression models; referent category = "disagree."

dren who actively commuted to school according to age (36% of those aged 4–9 years vs. 50% of those aged 10–13 years,  $\chi^2 = 14.17$ ,  $p < .01$ ) and proximity to school (66% lived ≤15 minutes away by walking vs. 14% lived >15 minutes away,  $\chi^2 = 202.66$ ,  $p < .01$ ).

#### Barriers to Active Commuting to School

Table 3 shows the proportion of parents who agreed with the 21 statements about barriers to their child's

active commuting to school, as well as the results of the logistic regression analyses predicting the likelihood of active commuting. More than 60% of parents reported several environmental barriers to their child's active commuting to school, including their being concerned about a road accident injury, cars exceeding speed limits in nearby streets, and difficulty in car parking at school. More than 50% of parents reported social barriers such as concerns about their child being as-

saulted or molested on the way to school and worry about their child taking risks on the school journey. More than 45% of parents reported individual barriers, including their child's preference for being driven to school and their child lacking pedestrian skills.

Logistic regression analyses examining associations between these barriers and the child's active commuting showed that across the entire sample, 15 barriers were associated with a de-

creased likelihood of active commuting in the separate regression analyses, which were adjusted for age, sex, and SES (Table 3). In the multiple logistic regression model, two individual (the child prefers to be driven by car and child does not have enough time in the mornings), three social (there are no other children for the child to walk with, there are no adults for their child to walk to school with, and they are worried their child would take risks), and two environmental barriers (the school is too far for their child to walk to and there is no direct route to school) remained significantly inversely associated with active commuting. One environmental barrier (concerned child might be injured in a road accident walking to school) was positively associated with active commuting in the multivariable model.

When the subset of children living within a 15-minute walk to school was examined separately, 10 of the 21 barriers were associated with a reduced likelihood of active commuting to school in the separate logistic regression models (Table 3). Two individual (child preference for being driven to school by car and not enough time in the mornings), two social (no other children or adults to walk to school with), and two environmental barriers (direct route to school and school too far for child to walk to) remained significant when these barriers were entered into the multiple logistic regression model.

## DISCUSSION

This study sought to describe parents' perceptions of the individual, social, and environmental barriers to their children's walking or cycling to school and to examine cross-sectional associations among these barriers and active commuting to school. More than two-thirds of parents were concerned about traffic safety (e.g., drivers exceeding the speed limit) and their child being injured in a road accident while walking to school or being assaulted or molested by an adult while walking to school. There were several inverse associations among individual, social and environmental barriers and children's walking or cycling to school; however, children whose parents re-

ported being concerned their child might be injured in a road accident while walking to school were almost two times more likely to walk or cycle to school. As these are cross-sectional associations, it may be that parents whose children walk or cycle to school are more aware of the potential hazards their children face. Previous cross-sectional studies have also reported positive associations between perceived barriers (e.g., concerns about traffic) and young children's walking or cycling to school<sup>12</sup> and walking or cycling in the neighborhood.<sup>18</sup>

Approximately two-thirds of children traveled to school by car, which was more common than any other mode of transport among children in the current study and supports previous findings from Australia and the United States.<sup>8,13,22</sup> This is in spite of the fact that approximately half of the sample in the current study live within a 15-minute walk of their school and half of these again reported usually traveling to or from school by car (i.e., 50% of children were driven to or from school by car even though they lived within walking distance). However, 47% of those living within a 15-minute walk to school usually walked compared with 4% of those living farther than 15 minutes away, which is consistent with earlier research.<sup>10,12,13</sup> Interestingly, the proportion of parents who reported individual, social, and environmental barriers to children's walking or cycling to school was similar regardless of the proximity from home to their child's school.

Adjusted regression analyses suggested that both child preference for being driven (reported by almost half of the parents in the sample) and lack of time in the mornings (reported by more than one-third of parents) were inversely associated with children's active commuting for the school journey, both among the whole sample and among those who live within walking distance to school. How parents interpret their child's preference is not well understood. Some parents may perceive that their child lacks the energy to walk, although a recent study found no associations among perceptions of energy levels and enjoyment of physical activity and active commuting

for the school journey.<sup>12</sup> Factors such as the weight of the child's schoolbag or whether the child perceives it as unfashionable to walk or cycle to school may also influence preference for being driven to school. A lack of time as a barrier to walking to school was not explored in detail in the current study; therefore, it is not known whether parents perceived that by walking to school, their child might not arrive on time, or whether the parents themselves did not have time to accompany their child. The latter scenario is particularly relevant since many parents may transport their child to school en route to work. Indeed, Merom and colleagues<sup>13</sup> found that children were half as likely to walk or cycle to school regularly if their parent took the car to work, compared with those whose parents did not. Further research is required to elucidate the underlying meanings of some of these individual constructs (preference and time).

Several social barriers to walking or cycling to school were inversely associated with active commuting to or from school. Results from the current study support previous findings<sup>12,14</sup> showing that children whose parents reported that there were no other children for their child to walk to school with were less likely to walk or cycle to school. It may be that parents feel that their child is safer in the company of other children. However, it is also noteworthy that more than half of the parents in the sample were concerned that their child would take risks while walking to school with friends, a perception that was associated with reduced likelihood of active commuting to school in the overall sample. Adult supervision may be one way of overcoming such parental safety fears. Indeed, children whose parents reported that there were no adults for their child to walk to school with were 40% to 50% less likely to walk or cycle, a finding that was consistent among children in the whole sample and those who lived within a 15-minute walk to school. These findings highlight the potential benefits of walk to school initiatives such as Walking School Bus, which provides adult supervision, involves groups of children, and seeks to develop children's pedestrian skills.

Environmental barriers were also found to be significantly associated with children's active commuting to school. Children whose parents perceived the distance to school was too great for their child to walk were significantly less likely to walk or cycle to school, even among those who lived within a 15-minute walk to school. Although fewer parents who lived within a 15-minute walk reported this as a barrier (43% compared with 8%), this item was still negatively associated with their child's active commuting. Previously, parents have identified a 15-minute walk as "walking distance" for their child;<sup>18</sup> however, factors such as the directness of the route or having a safe route to school (both of which were inversely associated with actively commuting to school) may play a role in a parent's decision to allow their child to actively commute. Directness of the route to a destination has previously been shown to be positively associated with adults' walking and cycling<sup>23</sup> but is in contrast to other research showing that children were less likely to walk or cycle to school if their route to school was direct.<sup>12,14</sup> These inconsistent findings may be attributed to different methods of assessing children's neighborhood environments. For example, previous studies have used objective measures,<sup>12,14</sup> whereas the current study used perceived measures of the neighborhood environment. Evidence from recent initiatives in the United States suggests that working with local authorities to improve the pedestrian environment and bicycle safety around schools may increase the likelihood of children walking or cycling to school.<sup>24</sup> Future initiatives that address parental concerns about the directness of the route to school, incorporating awareness of the actual distance of the school journey, may also increase the likelihood of children actively commuting for the school journey.

Strengths of the current study include the use of a large, randomly selected sample of families and the fact that the sample was population weighted from all capital cities in Australia. This sampling technique is likely to provide an accurate snapshot of the barriers associated with Australian children's active commuting for

the school journey. Additionally, parents responded to questions examining a comprehensive range of barriers for their child's active commuting, including individual, social, and environmental barriers. Limitations of the study include the cross-sectional design, which prevents inferences about the causality of the findings. The telephone interview method of survey administration may generate socially desirable responses. All families recruited resided in metropolitan areas of capital cities, and the sample also contained a high proportion of parents from middle to high SES backgrounds which, with the low response rate, limits the generalizability of the findings to such populations. Environmental barriers to walking to school may differ for those living in metropolitan compared with rural areas, and children in the current study may be more likely to actively commute to school compared with children in the general population, given the high proportion of parents from middle to high SES backgrounds in our sample. The fact that several significant associations were identified between barriers and children's walking or cycling to school in what is likely to be a more active sample, suggests that the results may be even stronger if more low SES families had been recruited into the study.

Interventions designed to increase active commuting to school should focus on individual, social, and environmental barriers to children's walking or cycling to school. A key finding of this study is that similar barriers were associated with active commuting to school regardless of whether families lived within walking distance to school or not, suggesting that it may not be necessary to tailor future interventions according to walking distance to school. Several programs and initiatives are currently being implemented which may address some of the barriers identified in this study. For example, in Australia and many other countries the Walking School Bus program<sup>25</sup> and the Walk Safely to School Day campaign<sup>26</sup> both aim, in part, to address individual and social barriers to active commuting to school by providing or promoting adult supervision and other children with whom to walk and teaching

children appropriate pedestrian skills. However, additional research is required regarding parental perceptions of child preferences for car rather than active travel and of children's and adults' perceptions of time and distance for travel to school by different modes. Working with local authorities to improve pedestrian environments may help to overcome barriers in the built environment through strategies such as direct and safe routes to school.

#### **SO WHAT? Implications for Practitioners and Researchers**

Similar barriers were associated with active commuting to school regardless of whether families lived within walking distance to school or not, suggesting that it may not be necessary to tailor future interventions according to walking distance to school. Strategies that address these barriers, such as providing supervision for the school journey, may increase children's active commuting to school. The challenge is to overcome the perceived barriers to walking to school among families who live close enough to school to walk; such barriers include parental perceptions of child preferences for car rather than active commuting, the lack of time to walk to school, and what constitutes an acceptable walking distance to school. Providing safe and accessible pedestrian environments may also help to overcome barriers in the built environment.

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