

# School Travel Modes: Factors Influencing Parental Choice in Four Brisbane Schools

CLAIRE RIDGEWELL\*, NEIL SIPE\*\* & NICK BUCHANAN\*\*\*

*\*Sustainability Unit, New South Wales Department of Planning, Sydney, NSW, Australia, \*\*School of Environment, Griffith University, Brisbane, Queensland, Australia, \*\*\*GHD, Sydney, New South Wales, Australia*

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**ABSTRACT** *This study investigates school travel from four schools in Brisbane, Queensland, Australia. Documented evidence reveals that far fewer children are cycling or walking to school than in previous generations, and that more and more are being driven to school by car. This shift in travel behaviour is claimed to be contributing to declining levels of physical activity in children, and the associated detrimental effects on health. Regular cycling or walking to school is held up as providing an important opportunity for children to stay active. In this study, links between school travel modes and the built environment are investigated. The study additionally investigates the role that parents play in determining the mode their children travel by. Results show that the majority of students travelled by car both to and from school. Further analysis was able to demonstrate that children in schools in different locations have different travel patterns, with those in suburban areas having higher percentages of car travel, compared to those in the inner city and in a master planned development. However, despite the influence of the built environment, the most common reasons for car use cited in parental surveys related to parental safety concerns.*

**内容摘要：**本文考察了澳大利亚昆士兰州布里斯班四所学校学生上下学的交通问题。记录表明，这一代学生骑自行车或步行上下学的人数，远远少于上几代人。越来越多的学生上下学是车接车送。有人认为这种变化导致儿童运动水平下降，并有损于健康。有人提出经常骑车或步行上下学是保持学生身体活跃的一个重要机会。本研究考察了上下学模式与人造环境的关联，以及家长对儿童上下学模式的影响。研究结果表明，大多数学生上下学是车接车送。不同地段学生上下学的模式有所不同，家住郊区的学生，上下学车接车送的比例高于家住市中心或配套居民小区的学生。不过，除了人造环境的影响之外，家长调查显示，父母开车接送孩子上下学的最主要原因，是出于安全考虑。

**KEY WORDS:** Schools, travel modes, Brisbane, parental choice

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*Correspondence Address:* Neil Sipe, School of Environment, Griffith University, Brisbane, Queensland, 4111, Australia. Email: n.sipe@griffith.edu.au

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## Introduction

Few would disagree that children today lead lives that are very different from the childhoods of their parents and grandparents. Changes in school travel patterns, different recreational opportunities, reduced independent mobility and physical activity, and the associated impacts on children's physical and psychological health are just some of the lifestyle changes that have occurred in recent decades. There are several reasons behind these changes, but many have been traced to increased car use and what has been referred to as the culture of car dependence (Newman & Kenworthy, 1999). This term describes a culture where driving has become a habit and often a perceived necessity. In this car culture, the urban environment adapts to reflect and perpetuate car use through land use patterns and transport policy. Planning policies and schemes tend to cater primarily for cars and car users, while alternative modes—public transport, cycling and walking—have become increasingly marginalised (Mees, 2000).

This dependency on car use is evident in recent research into modes of school travel undertaken in a number of Western countries. Research in the UK (DETR, 1998; Sleep & Warburton, 1993; Sustrans, 1999), USA (Transportation Alternatives, 2002; Tudor Locke *et al.*, 2001), Australia (Seaton & Wall, 2001) and Canada (Kowey, 1999) has indicated that the proportion of children being chauffeured to school by parents has increased over the past few decades. This trend has been noted with concern by environmental groups, health authorities and schools across many Western countries. While there has been less research in Australia, growing levels of congestion around schools in peak times suggest that the situation is similar to other Western countries.

As a result of an increased reliance on the car for school travel, children are missing out on the benefits of walking or cycling, or using public transport, which may be having serious effects on children's physical health. This lack of freedom restricts children's personal, intellectual and physical development and has recently been linked to increasing child obesity and other health-related problems (Frank *et al.*, 2003). The journey to and from school is a convenient and accessible opportunity for the benefits of active travel to be realised. It is one of the most frequent journeys that a child makes and also accounts for a large proportion of all trips made by children. Hence, the choice of travel mode to and from school can have significant impacts on a child's health. As Frumkin *et al.* (2004) have argued, a child who is unable to walk or cycle to school may have few opportunities for regular physical activity, while an adult in a similar predicament could join a sports club or drive to a recreational destination.

Efforts to reduce car use and to allow children more independent mobility and associated health benefits may be better directed if the factors that affect school travel are more fully understood. To work towards a better understanding of these issues, the specific aims of this study were twofold: (1) to determine the use of different modes for school travel and how they vary between different urban locations; and (2) to identify what factors attract and deter children and their parents to choose specific modes of transport to travel to and from school.

## Factors Influencing School Travel

There are many factors that affect how children get to school. For this research these factors have been grouped into three categories: the built environment and urban form, social influences, and perceptions about safety and danger.

### *The Built Environment*

Many studies have been undertaken which examine the relationship between certain aspects of the built environment and choice of school travel mode (see Black, Collins & Snell, 2001; Boarnet *et al.*, 2005; Braza, Shoemaker & Seeley, 2004; Catford & Caterson, 2003; Ewing, Schroeder & Greene, 2004; Kerr *et al.*, 2006; McMillan, 2005, 2007; O'Brien, 2003). There are some urban environments where conditions have made transport modes other than the car virtually impossible or prohibitively inconvenient to use. Since the 1970s, new residential areas have been created that are primarily oriented toward car use (Newman & Kenworthy, 1999). These neighbourhoods tend to be separated from shops, services and schools, with poor public transport and few safe footpaths, bicycle paths or other bicycle facilities. This kind of urban form is usually characterised by high car ownership, low-density development and homogenous land uses. In an environment centred around the car for transportation, children and young people are at a distinct disadvantage. They are either completely reliant on parents for transportation, or they are limited to a highly restricted number of destinations that are accessible by non-motorised means (Frank *et al.*, 2003).

In some circumstances, the location of the school can present a barrier to alternative travel modes for students. For example, instead of being set within neighbourhoods, new schools in the USA are being built along major thoroughfares to accommodate buses and cars (Paik, 1998). The situation for pedestrians is so dangerous that schools advise parents not to allow their children to walk to school. A study conducted by Tranter (1993) in Canberra confirms the relationship between the location of the school and school travel modes. In the study it was found that schools at which children have the most freedom to travel independently (walk or cycle) are the ones located in the middle of a neighbourhood unit.

An additional factor influencing school travel modes can be identified as the design of an urban area or suburb. Tranter (1993) has found that the design of suburbs can either enable or deter walking and cycling. For example, designs where movement networks are circuitous and without convenient linkages create longer distances, which tend to discourage transport by foot or bicycle. In addition, urban design which prevents passive surveillance, such as paths cutting across deserted places, contributes to the perception of danger and deters young pedestrians and cyclists.

Several scholars have positioned the blame for a decline in children's health on urban sprawl (Frumkin, 2002; Burchell & Mukherji, 2003; Ewing *et al.*, 2003; Jackson, 2003; Killingsworth & Lamming, 2001; Krizek, 2003; Krizek *et al.*, 2004; Sturm & Cohen, 2004; Waters & Bauer, 2003). However, studies in the USA have noted that the urban environment does not fully explain the inactivity and obesity that plagues American children, as changes in food, increased television and computer time, and cutbacks in school-based physical education programs have also been cited as possible reasons (Frumkin *et al.*, 2004; Vojnovic *et al.*, 2006).

### *Social Influences*

One of the biggest barriers to walking and cycling is a widespread cultural preoccupation with cars. The terms car culture and car dependence are used to explain how the car goes beyond its role as a mode of transport to one of image, social status and self-expression. Alternative modes, such as walking, cycling or public transport, are commonly viewed as less attractive choices. Car dependence is ingrained in all levels of society, including

children. Research has found that social conditioning of children into a car culture is evident in the minds of children as young as seven, and is well established by the time they are 13 years old (Meaton & Kingham, 1998).

Car culture also influences school culture. Wenban-Smith (1997) found that levels of walking and cycling tend to be lower where a walking/cycling culture has not been fostered at the school. Another compounding factor in the mix is the perception of what constitutes being a good mother. Dowling (2000) found the view that car use was a key element in perceptions of what constitutes being a good mother. This, along with car culture, reinforces the motivation to drive children to and from school. The mothers interviewed by Dowling also frequently undertook multipurpose car journeys, many linking their drive to work with dropping children at school. Collins & Kearns (2001) argue that the chauffeuring of children was depicted as a social practice which involved managing complex daily routines while ensuring that children were provided with as many educational and extracurricular opportunities as possible while using the car to travel between destinations.

### *Perceptions of Safety and Danger*

Previous research indicates a range of reasons why more school trips are being made by car and fewer by foot or bicycle. By far the most significant determinants are perceived 'stranger danger', or danger of assault, and danger from increased traffic (Joshi & MacLean, 1995; Tranter & Doyle, 1996; Tranter & Pawson, 2001; Timperio *et al.*, 2004). This sense of stranger danger is explained by Wenban-Smith (1997), ironically, as being a product of less walking and cycling, which is brought about by increased traffic: "As roads and footpaths are deserted by walking or cycling school children (and others), the car becomes more dominant and remaining pedestrians and cyclists become isolated and exposed" (p. 12). With more children being driven to and from school, traffic problems escalate near schools. Around schools, car congestion during peak arrival and departure times creates a dangerous environment for those children who walk, cycle or catch public transport (Morris *et al.*, 2001). This danger may compel yet more parents to drive their children as an increasing number of parents feel that the only safe way for their children to travel to school is by private motor vehicle (Tranter & Pawson, 2001). Engwicht has identified this as a vicious cycle, which leads to ever increasing levels of car use by parents to transport their children to and from school: "Parents drive their children to school because it is too dangerous for them to walk. This increases traffic, forcing other parents to drive because it is now too dangerous for their children to walk" (Engwicht, 1992, p. 143). Collins & Kearns (2001) believe that this retreat by children into the car, and indoors, has been motivated in large part by adults' concerns for their children's safety, and this phenomenon has increasingly been linked to sedentary lifestyles, declining fitness and weight problems, increased levels of diabetes and loss on local neighbourhood community.

## **Methodological Approach**

### *Scope of the Research*

Research for the current study centred on a survey of students ranging between 8 and 11 years of age and their parents at four Brisbane (Queensland, Australia) state primary schools in 2000. It was decided to look at primary schools rather than secondary schools due to the

likelihood that primary schools would have a more 'walkable' catchment. Secondary schools tend to serve much larger areas than do primary schools. In addition, while an increase in non-car travel modes for school trips would be just as desirable at secondary schools, it is arguably primary schools, with their comparatively small catchment sizes, that have the greatest potential for reducing school trips made by car. This age group was chosen because it was considered that at this age parents may consider allowing their children to travel to school without adult supervision. This age group was also within the range of age groups that had been included in previous studies (see Cooper *et al.*, 2003, 2005).

### School Selection

The schools selected for the study are located in a variety of urban environments within the city of Brisbane. This was done to test whether school location and the surrounding environment influenced travel modes. Suburb age was considered to be an accurate predictor of a range of urban characteristics and other factors that might influence school travel habits, for example, urban density, land use mix and public transport provision. Private schools were excluded from the study because the choice involved with attending private schools could result in pupils travelling greater distances to school; thus influencing travel modes. The schools selected were New Farm State School, Ashgrove State School, Kenmore State School and Forest Lake State School (Figure 1). New Farm

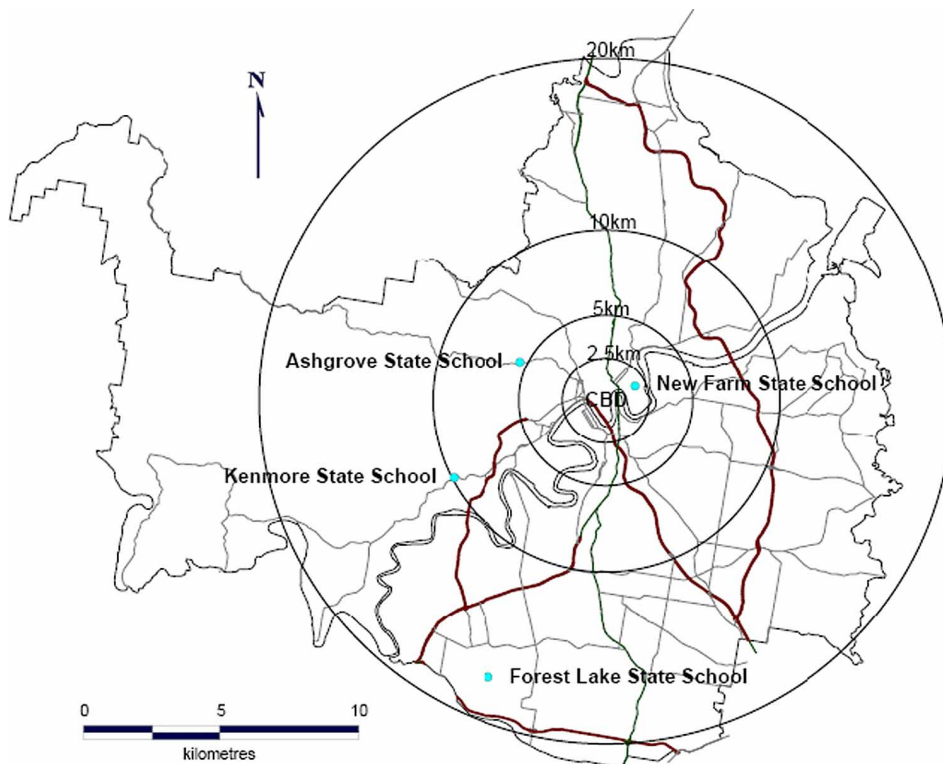


Figure 1. School locations in Brisbane.

State School was a small school, with only 192 students at the time of the research. Ashgrove State School had approximately 528 students, while Kenmore State School had 362 students. Forest Lake State School was large in comparison to the other schools, with 1047 students when the research was undertaken.

New Farm is an inner suburb of Brisbane, first developed between the late 1800s and early 1900s. The suburb is characterised by old, closely built 'Queenslander' style houses and corner shops, which offer a mixture of professional offices, art galleries, gift shops and traditional convenience stores. The streets are laid out in a predominately grid-like pattern, with traffic calming devices installed near many of the main intersections. Owing to the suburb's location in a bend of the Brisbane River, there is little through traffic. Most New Farm streets have footpaths on both sides. New Farm is well serviced by public transport with frequent bus and ferry services. For example, the bus service from New Farm to the CBD is provided approximately every 10 minutes between 7 a.m. and 7 p.m. with less frequent service at other times. Car ownership is relatively low with 20.5 per cent of the households not owning a car. The median weekly family income in New Farm was the lowest of the four study areas at \$700–799.

Ashgrove was developed from the early to mid-1900s. It lies approximately five kilometres north-west of the CBD and consists mostly of low-density housing and some strip shopping areas. Several busy roads, including the one on which Ashgrove State School is located, dominate the suburb. Most of the suburb is hilly, and this has influenced the design of suburban streets, which are set out in irregular patterns. Ashgrove is also serviced by bus and has a walking/bicycle path that connects a string of recreational land uses. Car ownership is high with 91.2 per cent of the households in the suburb owning at least one car. The median weekly family income was equal highest of the four study areas at \$1000–1199.

Kenmore is located about 10 kilometres south-west of the CBD and was mainly developed during the 1960s and 1970s. Like Ashgrove, it is centred on a busy road with high volumes of traffic. The suburb is made up of low-density housing, with a shopping strip and an enclosed suburban shopping centre close to the school. The land is hilly and many of the streets are curved or have culs-de-sac. Buses also serve the area, however, car ownership is high with 97.0 per cent of the households owning at least one car. The median weekly family income for Kenmore was the same as that for Ashgrove at \$1000–1199.

Forest Lake is a large-scale master planned development on the outskirts of Brisbane. Roughly 17 kilometres south-west of the CBD, Forest Lake has been developed since the early 1990s with extensive landscaping and provision for schools, shops, child care and sporting facilities. The planning of the suburb was undertaken with the notional aim of discouraging through traffic and creating 'liveable' environments, featuring narrow cul-de-sac and loop streets, traffic islands and other traffic calming measures. An extensive network of paths also link green spaces to the main streets. Walking and cycling are promoted as one of the benefits of the suburb. Only the main entrance road to Forest Lake was serviced by bus at the time of research. This is one of the reasons why 97.9 per cent of the households own at least one car—the most of the four study areas. Forest Lake's median weekly family income was the second lowest of the four study areas at \$800–999.

### *Survey Method*

Travel surveys were completed by the students either at home or in class, depending on teacher preference. To assist teachers administering the survey, explanatory notes and



instructions regarding the purpose of the research and the meanings of questions were provided, should the students have any difficulties. In addition, a parent survey was also administered. In this case the survey was taken home by each student to be given to their parents and was accompanied by an explanatory letter and a reply paid envelope.

### *Survey Responses*

A total of 248 student surveys (a response rate of 100 per cent) were completed and returned. Owing to variation in the sizes of schools and classes involved, there was not an even representation from each school. Overall results showed that 23 student surveys were completed at New Farm, 61 at Ashgrove, 53 at Kenmore and 111 at Forest Lake.

The overall response rate for the parent survey was roughly 52 per cent, or 128 responses. The highest response was received from Forest Lake (60.3 per cent), while the lowest was from New Farm (21.7 per cent). Ashgrove and Kenmore schools had response rates of 42.6 and 56.6 per cent, respectively. Ages of children ranged from 8 to 11, with 98 per cent of student respondents aged 9 or 10. Approximately 56 per cent of student responses were from girls (140 responses) and 44 per cent (108 responses) from boys. The results from the surveys were compiled and categorised by school and by sex. The addresses from the student survey (street and suburb name only) were mapped (or 'geocoded') using *MapInfo* to derive the distance students lived from their school by the straight-line or 'as the crow flies' distance.

## **Key Findings**

### *Modes of Travel*

From the student survey, it was found that children from the four schools travelled predominantly by car, both to and from school. The results showed that the car was the primary mode of travel for the journey to school (71.7 per cent) and the journey from school (65.2 per cent). The second most common mode was walking, again for both the journey to (21.0 per cent) and from (25.3 per cent) school. Overall, few school children regularly used a bicycle for school trips (4.7 per cent to school and 4.3 per cent from school). There was minimal bus use travelling to school in the morning (1.7 per cent), however, a higher level was present in the journey home (5.1 per cent). There was a trend across all schools for more children to be driven in the morning, with less car travel undertaken in the afternoon, likely explained by some parents being unable to finish work early enough to pick up their child. Thus, the child travels by an alternative mode home.

The transport modes to and from each of the four schools are shown in Figures 2 and 3, respectively. The students could only choose one mode per trip. Kenmore had the highest percentage of students travelling by car (84.9 per cent to school and 83.0 per cent from school), while the lowest proportion of students being driven was found at New Farm (52.2 per cent to school and 43.5 per cent from school), illustrating differences of over 30 percentage points between a suburban school and a school located near the CBD. This difference can also be attributed to the levels of car ownership with New Farm having by far the highest percentage (and absolute number) of non-car households. The highest incidence of walking was also found at New Farm (39.1 per cent to school and 43.5 per cent from school), with the lowest at Kenmore (11.3 per cent to school and 15.1 per cent from school). The greatest percentage of cyclists was recorded at New Farm (8.7 per cent

both to and from school), while no children cycled to or from Kenmore. Buses were not commonly used for school travel at any of the schools, although Ashgrove did have some bus travel from school (10.7 per cent).

Answers obtained from the detailed parent survey provided a more complete picture of school travel patterns. For ease of comparison, these results were grouped into those students who used a mode at least once during a typical week, and those who always used a particular mode. Again, Kenmore was found to have the highest car use, with 76.5 per cent of students (whose parents returned a survey) always being driven to school. Adding the students who were sometimes driven to school during the week increased the figure to 85.3 per cent. The lowest incidence of car use was recorded for New Farm where 52.2 per cent of students usually travel to school by car, although the poor response rate of the parent survey makes the figures unreliable.

Suburban Kenmore also recorded the lowest use of non-car modes, with only 14.7 per cent of respondents' children using an alternative mode at least once a week to travel to school. The figure was higher (22.2 per cent) for the return journey from school, but still lower than the other schools surveyed. The highest use of alternative modes was at New Farm, with 66.7 per cent of students, whose parents responded, walking to and from school. The corresponding figures to school for Forest Lake and Ashgrove were 37.2 and 35.9 per cent, respectively, while higher on the way home from school (45.0 and 41.5 per cent). Not surprisingly, the inclusion of students who use alternative modes some of the time serves to increase substantially the proportions of children walking or cycling to school from the student survey (which asked for the usual mode); for example, where only 4.7 per cent of students recorded that they usually cycle to school, 10.2 per cent cycled at least once a week to school.

### *Trip Length*

Time spent on school travel was similar for all schools surveyed. The most common trip length in terms of time was five minutes or less, and the second most common time was 6–10 minutes (see Table 1). Seventy-six per cent of students took less than 11 minutes to travel to or from school. Kenmore had the highest percentage of students travelling for less

**Table 1.** Time and distance travelled to school (%).

	New Farm	Ashgrove	Kenmore	Forest Lake	Total
Time (min)					
<5	52.2	44.1	41.2	52.8	48.1
6–10	13.0	28.8	41.2	25.0	28.2
11–15	21.7	22.0	13.7	7.4	13.7
16–20	0.0	5.1	3.9	9.3	6.2
>21	13.0	0.0	0.0	5.6	3.7
Distance (m)					
<300	26.1	1.7	0.0	3.1	4.4
300–600	34.8	16.9	12.2	16.3	17.5
600–900	17.4	40.7	18.4	23.5	26.2
>1000	21.7	40.7	69.4	57.1	52.0



than 11 minutes, while New Farm had the highest percentage of students travelling for over 11 minutes, most likely determined by the mode of travel.

The distance students travelled to and from school was also calculated. Students at New Farm generally had the shortest distance to travel, with 60.9 per cent of students living within 600 metres of the school (see Table 1). Forest Lake had the second highest percentage of students living within 600 metres, however, this percentage was only 19.4 per cent, with 57.1 per cent of students living more than one kilometre away from the school. Kenmore School had just 12.2 per cent of students within 600 metres, distance being a likely reason for high car use. As Tranter (1993) has noted, distance from the school is an important variable in mode choice.

### *The Parents' Perspective*

For parents who drove their children to and/or from school, the most common reason for doing so was that they did not allow their children to use other modes (23.2 per cent of all parent respondents), implying a level of fear or concern with their children using alternative modes (see Table 2). Another popular reason was parents being on the way to somewhere else (21.7 per cent). Distance as a reason for car travel did not receive many responses, just 2.9 per cent. In regard to specific schools, the advantage of quick travel was important to Kenmore parents (22.2 per cent), while the parents of children at Ashgrove School were more concerned with convenience (19.2 per cent). The only replies for the distance being too far to travel without a car came from Ashgrove and Kenmore, while no parents with children at New Farm or Forest Lake thought it would be too far for their child to travel. This finding illustrates differences between suburban locations, the inner city and a master planned development.

In answer to why some parents did not allow their children to walk, cycle or use public transport, to travel to and from school, the most common response was that the child might be assaulted (32.5 per cent of all responses) (see Table 3). The second most common response overall (with the exception of New Farm) was that their child might be hit by a car (22.5 per cent). By comparison, just 9.3 per cent of all parents did not allow their children to walk, cycle or use public transport to and from school because the distance was too far. It was also notable that 48.3 per cent of parents in Forest Lake prevented their child from travelling by alternative modes to school because they feared their child would be assaulted, while none of the parents at New Farm listed this as a reason.

Parents were asked to select up to two conditions under which they might allow their child to walk, cycle or use public transport, or under which they would feel more

**Table 2.** Parental concerns about school travel.

Reason	New Farm (%)	Ashgrove (%)	Kenmore (%)	Forest Lake (%)	Total (%)
Don't allow child to use other modes	20.0	19.2	27.8	22.2	23.2
On the way somewhere else	0.0	26.9	19.4	22.2	21.7
Faster	0.0	11.5	22.2	11.1	13.8
More convenient	0.0	19.2	8.3	13.9	13.0
Distance is too far	0.0	7.7	8.3	0.0	2.9
Other	0.0	15.4	11.1	6.9	9.4
N/a	80.0	0.0	2.8	23.6	15.9

**Table 3.** Parental reasons for not allowing child to use non-car modes for school trips.

Reason	New Farm (%)	Ashgrove (%)	Kenmore (%)	Forest Lake (%)	Total (%)
Too young	20.0	13.9	15.9	1.7	8.6
Distance is too far	0.0	8.3	18.2	6.9	9.3
Might be hit by car	0.0	19.4	22.7	29.3	22.5
Might be assaulted	0.0	22.2	29.5	48.3	32.5
Might be bullied	0.0	2.8	0.0	13.8	6.0
N/a	80.0	33.3	13.6	0.0	21.2

comfortable with their child using these modes. Across the four study areas, the highest rating answer was “if I or another responsible adult could go with my child” (23.7 per cent overall), followed by “less traffic” (19.9 per cent) (see Table 4). However, if the two categories of ‘less traffic’ and ‘slower traffic’ were combined, the joint category of calmer traffic would account for 33.3 per cent of answers. In New Farm more than two-thirds of the parents picked “less traffic” as their main concern. This is in contrast to the other three areas where “less traffic” was a concern for less than one-third of parents. An interesting result given the disparity in car ownership rates between New Farm and the other three study areas. It shows that in suburbs where car ownership is high, parents do not blame traffic for their unwillingness to let children walk or cycle to school.

Another common concern was the age of the child. “If my child were older” was a popular answer at all schools except New Farm. The prospect of allowing their child to travel by alternative modes if more children were walking and cycling was also attractive to parents. The least chosen answer overall was “if my child knew more about road safety/cycling/public transport”.

## Discussion

The most striking finding from this study is the extent to which cars are used for school travel. Previous research overseas has also revealed this trend towards an increased reliance on cars for school trips, however, not to the same extent shown in this study. Even the school with the lowest level of car use, New Farm State School, had more children usually travelling by car to school than averages recorded in the UK and Canada (see Department of Transport, 2004).

As expected, the research also found significant differences between the four schools. In terms of modes used for school travel, two extremes were found in New Farm and

**Table 4.** Parental conditions under which non-car modes would be allowed.

Reason	New Farm (%)	Ashgrove (%)	Kenmore (%)	Forest Lake (%)	Total (%)
Less traffic	64.7	6.9	27.3	12.2	19.9
Slower traffic	11.8	24.1	11.4	11.2	13.4
If more others did it	11.8	20.7	9.1	18.4	15.6
If child knew more	5.9	6.9	6.8	11.2	9.1
If I or another adult went with the child	5.9	13.8	27.3	27.6	23.7
If child were older	0.0	27.6	18.2	19.4	18.3

Kenmore, a typical inner and outer suburb, respectively. New Farm had the lowest proportion of students travelling by car and the most using alternative modes, while Kenmore had the highest proportion of students being driven and the lowest proportion using other modes. The results for Forest Lake, a development designed to accommodate walking and cycling, were somewhat surprising, with the proportion of students being driven to school only slightly lower than that of Kenmore and Ashgrove.

By far the most common sentiment expressed by parents was that it was too dangerous for children to walk, cycle or bus to and from school. Child safety was a major concern, consistent with previous research findings. The fact that parents who escort their children do so by car and not by alternative modes is influenced by many factors, the most important one being time. Also existing as a disincentive, particularly in the outer suburbs, is that the distance between home and school is often perceived as being too great to use non-car modes, although surprisingly this was not a regularly cited reason by parents. Instead, concerns about safety had a higher priority over travelling distance.

The purpose of selecting schools from different locations across Brisbane to participate in this study was to investigate the relationship between the built environment and modes of school travel. New Farm and Kenmore represent the two extreme positions of the survey results, which may be partially attributable to the built environment of each suburb. It is widely theorised in the planning literature that car use is necessitated in the outer suburbs, where shops and services are less integrated into residential areas, resulting in longer travelling distances. Based on this theory, the reliance on private vehicles for school travel in Kenmore can be explained, which was built during a car-dominated era. In contrast, New Farm was developed before the advent of the car and is characterised by higher densities, narrower streets (which help to reduce traffic speeds) and a diversity of land uses. This kind of environment, which is similar to many New Urbanist communities that have been built over the past decade, is purported to promote a higher degree of non-car travel and encourage more walking and cycling, which was found to be the case in New Farm. However, there are other factors, including income and car ownership levels, which may be contributing to the higher degree of non-car travel in New Farm.

Based on this planning theory, the creation of new suburban environments has in some cases given a high priority to walking and cycling, as is the case in the design of Forest Lake. This suburb was selected for the study because it was a master planned community, and as such incorporated pathways and streets based on contemporary design principles. In part, these design principles attempt to make it safer for walking and cycling by limiting conflicts with motor vehicles. Based on urban design alone, it was expected that travel behaviour to and from school in Forest Lake would have reflected a higher proportion of non-car travel modes when compared with conventional housing estates.

Despite this, expected high levels of walking and cycling were not evident in the survey results. Parental surveys at Forest Lake suggest an explanation for this result may be parental concern for child safety, as “child might be hit by a car” and “child might be assaulted” were the most common reasons cited for not allowing a child to use non-car modes. One reason for parental concern about traffic at Forest Lake could have been the size of the school (almost twice the size of the next largest school) and the amount of car-based activity that a school of that size generates.

## **Conclusion**

The current research has documented significant car use in school travel, which is consistent with the increasing car dependence in cities. The findings show that parental fear of strangers and the dangers of traffic are preventing children from travelling by more sustainable modes such as walking and cycling. An important contributor to the dangers (and volume) of traffic is the overall poor level of public transport service in all of the study areas except New Farm. Characteristics of urban design and land use planning have some influence on this trend, but they were not found to be the most important factors influencing parents' decisions for school travel modes. Concerns over safety were much more prominent in the current research, although the key safety concern was with traffic, which is determined to a large extent by the type of planning that has been implemented in a specific area. Poor planning can generate more traffic, which in turn reduces safety.

This finding combined with results from previous research raises the issue that children have become disadvantaged members of society in terms of their ability to fully use public space. Traffic and car-focused planning have made many streets too dangerous for children, or at least dangerous enough that they are not allowed out without supervision. These findings point to a change in society, and not only to school travel, but to levels of fear and feelings of the need to protect children generally. The impact of fear on children's travel has been recognised not only by transport scholars, but increasingly by the popular media:

As a general rule, too many Australian children are overweight because they don't get the required half-hour of physical exercise each day. Driven to school, picked up from school, kept off the dangerous streets and away from the dangerous parks, they are the cotton-wool generation and, often, the only physical exercise they get is when their parents have time to supervise. (Powell, 2000, p. 6)

This quotation highlights the effect that the real and perceived dangers of the streets have on parents' decisions over school travel modes: an issue that was reflected in the results from the survey. The implications of this for children are varied, but perhaps the most concerning is the effect such a lack of independence is having on children's health. How transport planning and urban design can address this issue is the challenge for planners, industry professionals and policy makers. Future planning demands that the needs of children be considered and met in the design of urban landscapes and transport infrastructure. Two key questions emerge from this research. The first is whether the problems of childhood mobility are best addressed through local level urban design and transport planning initiatives or with broad scale metropolitan policies aimed at reducing the overall level of car use. The second is how to best address personal safety given its importance in parental decision making. Will having more children walking to school ally parental fears?

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