Walking, riding or driving to school: what influences parents' decision making?

Phase 1: Literature review

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Contents

Preface

This report has been prepared by Dr Jan Garrard, Research, Evaluation and Active Transport Consultant, for the South Australian Department of Planning, Transport and Infrastructure (DPTI), September 2016. The report comprises the first component of a three-stage project aimed at providing an evidence-based understanding of parental supports and barriers to primary school children's active travel choices for the school commute. The three phases are as follows.

Phase I (this report) comprises a review of research related to children's active school travel in Australia and comparable overseas locations, with a focus on the role of parents in determining the school travel mode of primary school children. The focus is on the personal, social/cultural, and policy/regulatory factors that facilitate and constrain parents/carers permitting their children to travel actively to school, either accompanied or independently.

Phase 2 uses these review findings to develop and administer an in-depth qualitative study aimed at exploring (i) parents' perspectives on factors that influence how their child(ren) travel to school with a focus on motivations for, and constraints on active travel to school; and (ii) parents' suggestions for increasing primary school students' active travel to school, with a focus on addressing parent-identified barriers.

Phase 3 uses the findings from Phases 1 and 2 to develop and conduct an online survey of parents of primary school age children in South Australia aimed at quantifying the key factors identified in Phases 1 and 2.

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Tables

Figures

Part A: SUMMARY OF KEY FINDINGS

1 INTRODUCTION

This report comprises a review of research findings on parental barriers to children's active travel to and from primary school. The report commences with a summary of rates of primary school age children walking and cycling to school in Australia and South Australia, followed by a review of Australian and international data on children's accompanied and independent active travel to school. Subsequent sections review factors that impact on children's active travel to school and independent mobility, and initiatives and mechanisms to increase levels of active travel for primary school age children that focus on overcoming parental barriers.

Physical activity is important for the growth and development of children, but only 19.4% of Australian children aged 5-17 years achieve the recommended 60 minutes or more of physical activity each day (Australian Bureau of Statistics, 2013). Recent research indicates that incidental physical activity such as walking and cycling to get to local destinations such as school, play an important role in children meeting recommended levels of physical activity (Davison et al., 2008; Lubans et al., 2011; Smith et al., 2008). However, in recent decades, Australian children's rates of active travel to school have declined markedly. In the 1970s the majority of children walked or cycled to school, but currently, most children are driven to school (Garrard, 2010) (Australian Bureau of Statistics, 2013).

Many factors have contributed to the decline in active travel among children in Australia. These can be categorised into the four segments shown in Figure 1, which portrays a social-ecological model of four mutually interactive domains that influence travel behaviour.

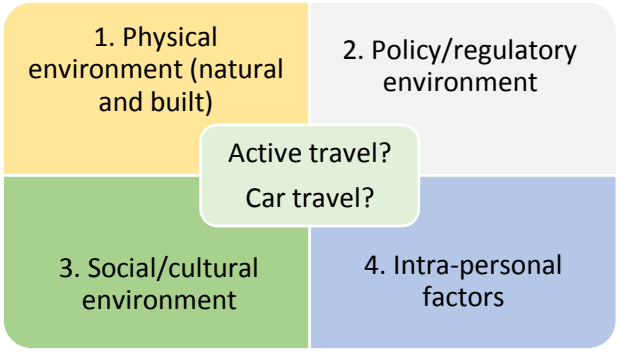

Figure 1: Social-ecological model of active/inactive travel behaviour

The focus of this report is on intra-personal factors; specifically, the role of parents in determining how their primary school age children travel to and from school. While the focus is on parental characteristics and on parents' perspectives, attitudes and circumstances, it is also important to recognise that many of these parental factors are shaped by factors within the built/natural, policy/regulatory, and social/cultural environments. In addition, there is increasing recognition that the influence of environmental factors on parental school travel behaviour is mediated by parents'

perceptions of environmental factors (eg perceived personal safety and traffic safety), in addition to actual conditions (Mitra, 2013).

Policies and programs aimed at increasing active travel to school can therefore be directed at (a) changing parental behaviour by focussing directly on intra-personal factors such as parents' perspectives, attitudes and circumstances, and/or (b) changing the physical, policy/regulatory, and social/cultural environments that shape parents' and children's travel behaviour.

2 RATES OF CHILDREN AND YOUNG PEOPLE WALKING AND CYCLING TO SCHOOL: AUSTRALIAN AND INTERNATIONAL DATA AND TRENDS

Rates of active travel to school among primary school age children in Australia and South Australia are among the lowest in OECD countries. Most active trips are for walking (about 22% of trips to and from school), with a small number of trips by bicycle (about 2-3%). Rates of active travel to school have declined substantially in Australia since the 1970s, with walking and cycling trips replaced mainly by car trips (Garrard, 2011).

Several developed countries have maintained high levels of active travel to school; for example, 98% in Japan; 87% in the Netherlands; 59% in Denmark; 61% in Finland; 58% in Norway; and 52% in Great Britain. Many of these countries have relatively high rates of both walking and cycling to school; with the exception of Great Britain, where active travel to school is mainly by walking. Establishing the conditions under which cycling becomes an appealing mode of travel to school for distances that are too far to walk substantially expands the active travel catchment area of schools, enabling many "too far to walk" trips to school to be replaced by cycling rather than driving.

The comparative Australian and international travel to school data described above indicate that high rates of car travel to school are not an inevitable consequence of living in a wealthy, developed country with high rates of car ownership, but are likely to be due to a range of factors across the four segments of Figure 1 that encourage car use and discourage active travel.

There is considerable potential for active travel to school to make a substantial contribution to Australian children meeting recommended levels of physical activity through 'incidental' physical activity, particularly in the transition from childhood to adolescence, when overall rates of physical activity decline, especially among girls (Australian Bureau of Statistics, 2013).

3 ACCOMPANIED AND INDEPENDENT ACTIVE TRAVEL TO SCHOOL

A number of studies have measured primary school students' rates of active travel to school, but few Australian studies include data on who accompanies children on active trips to school. This information is important because there are indications that different factors come into play when parents consider accompanied or unaccompanied active travel to school (Faulkner et al., 2010). A small number of studies have reported that children's active travel to primary school is mainly among children who are unaccompanied by an adult (ie

alone, or with siblings or friends). However, this varies according to a range of factors, including child age.

The above finding is consistent with studies that have found that the level of independent mobility parents allow their children is associated with active school travel. That is, children who are permitted higher levels of independent mobility appear to be more likely to walk or cycle to school, and less likely to be driven to school (Ducheyne et al., 2012; Ghekiere et al., 2016).

Most studies report that, in general, older children (commonly 10-12 years and over in English-speaking countries such as Australia) are more likely to walk or cycle to school independently. However, there is considerable variation:

- Over time in Australia - in previous decades younger children were permitted more independent mobility.
- Between countries - children in Europe and Japan are generally granted independent mobility at a younger age than in English-speaking countries such as Australia, USA and the UK (Carver et al., 2013; Fyhri, 2011; Shaw et al., 2013).
- Among parents; for example, more support for independent mobility (at a younger age) among English-speaking households in Toronto, Canada (Mammen et al., 2012), those who perceive it to be socially acceptable (Valentine, 1997), and among more disadvantaged families (Valentine, 1997).
- Depending on trip distance, whereby younger children may be permitted to move around independently for short distances in their own street, while older children are permitted a greater 'roaming distance' (Carver et al., 2014).
- According to whether or not the child attends primary or secondary school; with secondary school students permitted more independent mobility than primary school students of the same age (Carver et al., 2014).
- Based on whether or not the child is accompanied by older siblings or friends (Carver et al., 2014).
- Based on parents' perceptions of the safety of the neighbourhood (Ducheyne et al., 2012; Faulkner et al., 2010).

Child age has traditionally been seen as the key determinant of independent mobility, but other factors that are potentially modifiable are also important. These include skills, experience, confidence (child and parent) and social approval. Children's acquisition of safe walking and cycling skills plays an important role in parents permitting their children to travel to school independently (Ducheyne et al., 2012; Trapp et al., 2011).

It has been proposed that parents' decision-making about the trip to school is a two-step process involving: (i) an initial decision on whether or not to accompany the child to school (primarily influenced by assessments of the child's maturity and skills, social safety and traffic safety); followed by (ii) mode choice (ie parent-accompanied active travel or car travel), based on parents' perceptions of the easiest and most convenient way to travel, which in turn are influenced by factors such as perceptions of travel time and/or distance to/from school and whether or not parents need to complete multi-activity trip chains (Faulkner et al., 2010).

There are some indications that there may be greater potential to increase independent active travel to school than parent-accompanied active travel. A small-scale study in Victoria found that a post-program increase in active travel to school in an inner Melbourne metropolitan primary school that had participated in the Victorian Ride2School program was mainly for unaccompanied walking and cycling (ie children travelling alone, or with siblings or other children) (Garrard et al., 2009). However, this finding needs to be confirmed by additional research, as most evaluations of active school travel programs do not differentiate between accompanied and independent travel to school.

4 FACTORS THAT IMPACT ON PRIMARY SCHOOL STUDENTS' ACTIVE TRAVEL TO SCHOOL AND INDEPENDENT MOBILITY

As noted earlier, many factors impact on children's modes of travel to and from school. 'Parental barriers' to active travel to school are an important sub-set of these influences on children's active school travel, but should not be seen in isolation from the environmental, policy and social factors that shape parents' perspectives and subsequent decisions (see Figure 1). In social-ecological models such as the one in Figure 1, the segments are mutually interactive. Consequently, while this review focuses on 'parental barriers' to active school travel, it also includes environmental, policy and social factors that shape parental perceptions that can then act as barriers to active school travel.

This section also combines research into correlates of primary school students' active school travel and children's independent mobility, as the two are inter-related, with both areas providing relevant research findings.

Most of the research findings in this section are presented under sub-headings based on the four areas of influence outlined in Figure 1. However, studies that investigate parents' self-reported reasons for choosing school travel modes (usually parent surveys) generally produce reasons that span the four segments. The following section describes these overall findings, before presenting the more segment-specific data.

4.1 Parent-reported reasons for accompanying and/or driving children to school

Research findings related to reasons why parents use active/inactive and/or accompanied/independent travel for primary school students come from both parent surveys and environmental measures, with some studies combining both.

Parent surveys, which usually ask about factors spanning the four segments of the social-ecological model (Figure 1), produce mixed results depending on question wording and study location. Traffic safety and social safety concerns appear to be higher in English-speaking countries such as the UK and Australia, compared with some European countries, where the convenience of car travel appears to be more important. A possible reason for this difference is that the convenience of car travel may emerge more strongly when levels of perceived safety are relatively high.

However, the convenience, comfort and speed of car travel was important in a Victorian study which asked parents about reasons for driving children to school (Garrard et al., 2009). In Australian studies, parents appear to be more likely to express concerns about

social safety and traffic safety when asked about barriers to active travel to school, rather than when asked about reasons for driving children to school.

Australian and international research indicates that parents' reasons for using active/inactive and/or accompanied/independent travel for primary school students are complex and multi-faceted. Care needs to be taken with the wording of survey questions designed to obtain this information, and in the interpretation of survey findings, as findings are influenced by the framing of survey questions as well as contextual factors.

Nevertheless, safety concerns (both social safety and traffic safety) and the convenience of car travel (especially for longer trips to school, and trip-chaining) are important barriers to active school travel. The two-step active school travel decision-making process proposed by Faulkner et al. (2010) suggests that perceived safety is the key influence on whether or not parents allow independent travel to school (step 1), with considerations such as the perceived benefits of driving, walking or cycling important for mode selection (step 2).

The following four sections describe findings categorised according to the four segments of the social-ecological model of school travel described in Figure 1.

4.2 Individual factors

4.2.1 Child demographic and psycho-social factors

Child demographic factors include age and gender; and child psycho-social factors include children's perceptions, attitudes, preferences, and behaviours.

Children's age (consistently), gender (inconsistently) and birth order are associated with active school travel. Shaw et al. (2013) report that the gender 'gap' appears to be reducing over time, with some studies indicating that girls may achieve boys' levels of independent mobility by travelling in groups. Maturity and birth order (whereby second children are given more independence) have also been identified as influences on independent mobility (Johansson, 2006).

In surveys conducted as part of evaluations of active school travel programs, students express a strong preference for walking and cycling to school over traveling to school by car. The main reasons students give for preferring active school travel are the benefits of fitness and exercise; enjoyment of walking or cycling; the opportunity to socialise with friends; and quick travel time (for cycling). In a UK study, most primary school students felt safe in their neighbourhoods (though girls less so than boys), with social safety a greater concern for children than traffic safety. Primary school age students shared parents' concerns about their social safety, but were less concerned than parents about traffic safety.

In summary, primary school students appear to prefer active travel to school over car travel, suggesting that barriers to active school travel reside primarily with parents and their circumstances rather than with children.

4.2.2 Parental demographic factors

Parent demographic factors that have been associated with children's active school travel include car ownership, ethnicity, socio-economic position, and parents' needs for trip-chaining. Socio-economic position is inconsistently associated with children's independent mobility and active travel to school (Shaw et al., 2013), as is location (urban or rural). There are also mixed findings for ethnicity, though there appears to be a tendency for parents from minority ethnic groups in Australia, the UK and other European countries to place greater restrictions on their children's independent mobility (Crawford, 2015; Mammen et al., 2012; Shaw et al., 2013).

In their study of 'parental fear' in Victoria, Crawford et al. (2015) reported that children were less likely to be independently mobile if they were:

- Younger (9-10 years old)
- Female
- Living in a metropolitan area (compared to a rural or regional area)
- Living with a disability
- Living with a younger parent
- Speaking a language other than English at home
- Had a parent with lower educational attainment (ie, not a tertiary qualification)
- Living in a more disadvantaged neighbourhood.

Household access to a private motor vehicle is associated with driving to school, as is having a parent available for escorting, and trip-chaining requirements, including parents' travel to work and other destinations, and parents driving children to after-school activities (Mitra, 2013; Lu et al., 2014; Wen et al., 2008; Fyhri et al., 2011).

On the other hand, parents' flexible working arrangements (including working hours and work from home options); parents themselves travelling actively to work; and parents travelling actively to school when they were children are associated with children's active travel to school (Mitra, 2013; Ghekiere et al., 2016; Wen et al., 2008).

4.2.3 Parental psycho-social and behavioural factors

Parental psycho-social influences on active school travel include factors such as perceptions, attitudes, trust in others, habits and social norms. One or more of these factors are often included in research into correlates of children's active travel to school and independent mobility, with concerns about 'stranger danger' (ie social safety) and traffic safety comprising key parent-reported constraints on children's active school travel and independent mobility (Carver et al., 2008; Crawford et al., 2015; Shaw et al., 2013). Parents' *perceptions* of the local environment are important, as the relationship between quality of the travel environment and independent travel has been found to be mediated by parents' perceptions of the safety of the travel environment (Fyhri and Hjorthol, 2009; Mitra, 2013).

Deciding when, where, how, and under what circumstances to allow their children independent mobility is a difficult decision for parents. A large Victorian study found that parents were more likely to restrict their child's independent mobility if they were concerned about being judged by other parents, family or teachers; if they did not perceive

independent mobility to be beneficial; and if they believed that their child lacked the necessary skills to be safely independently mobile (Crawford et al., 2015).

Two important interactive influences on parents' decision-making are: (i) concerns about being 'blamed' for not being a 'good' parent by allowing levels of independence not considered by others to be appropriate or 'normal'; and (ii) parents basing their risk assessments on the attitudes and behaviours of family members, other parents, and the wider community; rather than quantitative estimates of the risks of child assault or traffic injury.

The risk perception and risk communication literature also makes the important distinction between risk perceptions and actual risks. Consideration of the qualitative components of risk perceptions relevant to independent active travel to school can assist in understanding and addressing parents' concerns about social safety and traffic safety. Short walking and cycling trips are no more risky in terms of traffic injuries than many (longer) car trips[1], but are often perceived to be more risky due to a number of 'qualitative' perceptual factors, such as sense of control over the safety outcome (personal control increases perceptions of safety), and frequency of exposure to the potential risk (frequent behaviours such as driving can be perceived to be safer that more infrequent behaviours such as walking or cycling).

In the risk perception and risk communication literature, improved understanding of people's risk perceptions can be used to develop 'fear reduction' measures. A Victorian study of parental fear as a barrier to children's independent mobility reported wide variations in parents' fear scores, and identified a number of factors that influence parents' fear ratings, some of which are amenable to change (Crawford et al., 2015). Increased understanding of the wide variations in parental concerns about social safety and traffic safety, and the reasons for differences among parents, will assist in the development of strategies to address these concerns.

In order to address parents' concerns about social safety and traffic safety, dual strategies are required that reduce both the actual and perceived risks of children walking and cycling to school independently.

Parental use of active transport as a child, or currently as an adult, are both associated with children's active school travel. Possible reasons for this association include parents' positive attitudes to active transport; familiarity with active transport enabling parents to teach children safe walking and cycling skills; and parents being able to assess (through observation) when their children are ready for independent active school travel. When children are in the habit of being driven to school when they are young, it may be harder for

[1] When focussing solely on a school trip of, say, one kilometre, the relative risk of injury is greater for walking or cycling than for driving, although the absolute risk (ie risk of injury per population, time spent travelling, or distance travelled) is relatively low for all modes of transport (see full report for more detail). Longer car trips (to various destinations) can be associated with an absolute risk of injury similar or greater to the risk of injury associated with a short walk or cycle to school, but longer car trips tend to elicit lower levels of concern than short active trips to school. That is, parents appear to express more concern about short exposures to a higher risk/km than long exposures to a lower risk/km, even though the absolute risk might be the same or higher.

them to transition to active school travel when they are at an age when it is feasible, due to parents' and children's inexperience with walking or cycling to school.

In car-oriented countries like Australia, driving a car to most destinations most of the time can become habitual behaviour for many people, including parents. Guidelines should be developed to assist parents to break the habit of regular car use for trips that are potentially walkable or bikeable. Measures are likely to include preparation and planning for active school travel that make the active travel choice an easier choice (eg readily accessible bicycles; secure and accessible bike storage at school; identifying and practising safe, pleasant routes to school; establishing informal walking or cycling groups along common routes to school).

4.3 Environmental factors

Distance to school is a key constraint on active travel to school, but evidence from a range of sources indicates that "too far to walk or cycle", needs to be understood not just in terms of quantitative distance but also in terms of the environmental, psychological, cultural and lifestyle factors that shape perceptions of "too far". "Too far" might also serve as a proxy for "too unsafe"; as the risk of assault or injury is perceived to increase with increased exposure to unsafe walking or cycling conditions over longer distances. That is, if active school travel routes are considered to be safe, the trip to school may be less likely to be perceived by parents to be "too far" to walk or cycle.

In several European and Asian countries, not only do children walk longer distances to school than in Australia, but they are also more likely to cycle to school as trip distance increases. In Australia, car trips largely replace walking trips for trip distances greater than about one kilometre, but in several European countries, cycling replaces walking for many trips greater than 1 km.

There is potential to increase active school travel by reducing trip distance to school by establishing more compact urban form, local schools of uniformly high quality, and school enrolment zones. In addition, understanding why potentially walkable/bikeable distances are considered "too far" may assist in expanding the perceptual walkable/bikeable catchment areas of schools.

A component of "too far to walk/cycle" is likely to be "takes too long". Reducing both the time advantage of car travel to school (eg limited car parking near schools, "no vehicle zones" around schools, and reduced speed limits in residential areas surrounding schools) and the *perceived* time advantage of car travel to school (which may be greater than the actual time advantage) is likely to contribute to increased active trips to school by reducing the perceived 'convenience' advantage of car travel for busy parents.

There is also considerable potential to expand active school travel distances by encouraging more cycling to school, including by establishing safe cycling conditions.

Other environmental constraints on active school travel that were summarised in a recent systematic review include:

- Traffic safety (eg speed, volume)
- Freeway/highway/crosswalks

- Road safety
- Bad weather
- Busy street
- No direct route
- Lack of footpaths
- No/insufficient lights or crossings.

(Lu et al., 2014)

4.4 Social/cultural factors

Social/cultural factors include social safety[2], behavioural norms, and social/cultural beliefs, attitudes and expectations. Social factors also include a number of household characteristics and parental psycho-social factors that were summarised in Section 4.2.

Concerns about social safety are a frequently reported constraint on children's independent mobility in Australia, the UK and USA; but less so in European and Asian countries that often have high rates of active school travel (Bringolf-Isler et al., 2008; D'Haese et al., 2015; Fyhri et al., 2011; Johansson, 2006). It has been suggested that in these countries, parents with high levels of social/community connections (a component of social capital) may rely on 'diffused social control' in the form of passive observation and support from other neighbours (Shaw et al., 2013). This form of community oversighting of children's wellbeing in public spaces has also been reported as a support for active school travel in Germany and Japan (see Section 5).

Social distrust in the form of 'stranger danger' has been well-researched as an influence on active school travel, but 'trust in others' has been less well-researched. There are indications that parents are more concerned about stranger danger when trust in others is low.

Parents' concerns about traffic safety also have a number of social elements. As described above in Section 4.2, parents' risk perceptions and views on appropriate levels of independent mobility for their children are, to some extent, socially constructed. In addition to (a) trusting strangers not to pose a threat to children; and (b) trusting other community members to keep an eye out for children; parents need to trust drivers to take care to avoid harming children who are walking or cycling to school.

While the physical aspects of road safety as a barrier to active school travel are well-researched (ie walking/cycling infrastructure, traffic speed/volume); the social/behavioural aspects of road safety are less commonly investigated. In car-oriented countries such as Australia, parents and children themselves are largely held responsible for the safety of children moving about in the public domain. In contrast, in the high-active school travel countries in Europe and in Japan, drivers are required to exercise a high duty of care to avoid collisions with children walking and cycling (eg through driver education, 'strict liability', and social norms that are highly critical of driver behaviour that places children at risk of injury).

[2] 'Social safety' is a term used to describe protection or the feeling of being protected against the dangers caused by human actions in public spaces. Examples of these incidents are aggressive behaviour, public drunkenness, vandalism, drug trading and use, assaults and murder (Zwerts et al., 2010).

Parents express concerns about their children making “one false move”, even when parents are confident their children have good walking and cycling skills. Parents’ concerns about “one false move” can be addressed by measures that protect children in the event of the child making a mistake. Avoiding injury in the event of road user error is an underlying principle of Safe System road safety strategies; but in Australia, this principle has been applied more consistently to motor vehicle occupants than for child pedestrians and cyclists (Lydon et al., 2015).

Parents who can trust in drivers to (a) obey road rules, and (b) take extra care around child pedestrians and cyclists, will be more likely to allow their children to travel independently to school, possibly for longer distances, and by bicycle. Developing a Safe System strategy that focusses on children’s active travel to school sends the (social change) message that the safety of children walking and cycling to school has higher priority than motor vehicle through traffic around schools.

Due to the influence of schools on social norms of appropriate travel to school behaviour, further research is warranted into the extent and degree to which schools support/promote active school travel; reasons for support or lack of support; and parents’ perceptions of whether or not schools support active school travel.

4.5 Policy/regulatory factors

Policy/regulatory factors include policies from the three tiers of government (local, state and federal) across the multiple sectors that impact on active school travel (transport, planning, education, health and the environment). Policy/regulatory factors are under-researched but potentially important influences on active school travel, including via the influence that policy/regulatory factors have on the built environment, including road networks, school location, and school size and enrolment zones.

At the local level, school active travel policies have the potential to influence children’s active school travel, including by helping to establish a ‘culture’ of active travel that supports parents to allow their children to travel to school independently.

In terms of road safety policies, studies that have investigated the impact of interventions aimed at lowering traffic speed on walking and cycling rates provide some evidence of increased walking and participation in ‘street life’. More consistently reported (and measured), were improved perceptions of traffic safety among residents following the introduction of traffic calming measures.

Based on consistent evidence that traffic safety concerns are a major barrier to children walking and cycling (see Section 4.2), residents’ perceptions of increased traffic safety are likely to lead to increased walking and cycling in traffic calmed areas, including for children walking and cycling to school.

There are also some indications that while short reduced speed zones (eg 250m school zones, and traffic calming in some residential streets) can reduce traffic injuries for pedestrians and cyclists in these areas, it is likely that more extensive reduced speed areas (ideally ≤ 30km/h in all residential areas) are required to increase safety, perceived safety and walking and cycling for transport within neighbourhoods. This is likely to be particularly important for increasing children’s cycling trips to schools for intermediate trip distances (eg

1-3 km) that in Australia are largely undertaken by car; but, in extensively traffic-calmed neighbourhoods in Europe and Japan are cycled (see Section 2).

Another policy-driven factor that is a key determinant of active school travel is the distance from home to school (also see Section 4.3). Several policy-related factors influence trip distance, including population density, street connectivity, school location, and whether or not educational policies require that children attend their nearest public school.

School amalgamations, siting relatively large schools outside residential areas, and the policy of public school choice can contribute to longer trip distances and consequently increased car travel (Active Healthy Kids Australia, 2015). Requiring children to attend their nearest public school reduces trip distance and may lead to an increase in active school travel. This policy reduces parents' choice of schools; however, in countries such as Switzerland and Japan, that have adopted this policy, efforts are made to ensure that all public schools provide high quality education, so that parents are not disadvantaged (and do not feel disadvantaged) by the lack of school choice (see full report for details).

While these state-level educational policies are beyond the scope of the present study, they nevertheless highlight the intersectoral nature of influences on active travel to school, and point to possible long-term collaborative efforts to improve child health and wellbeing by adopting policies that contribute to making active school travel safer, easier and more appealing for parents and children. Examples of countries and cities that have done this are described in the full report in the form of international case studies of Japan, Zurich (Switzerland) and Munich (Germany).

There is also potential for individual schools to adopt policies and related programs and activities that support active travel to school. For example, an over-arching "Active travel to school policy" (along the lines of school Healthy Eating Policies, or SunSmart policies) could be developed by School Councils, and communicated to parents. Such a policy could state an overall commitment to encouraging active travel to school, together with some combination of programs (eg Bike Ed), activities, curriculum, 'school rules' (eg parking, school uniforms/bags/books), and infrastructure (eg secure bike storage) that support active travel to school. An Active Travel to School policy could also include working with other agencies (eg DPTI, local councils) to, for example, improve traffic safety around the school. A school Active Travel policy could also assist in removing barriers to active school travel and provide a 'lens' through which other school decision-making could be viewed, asking, for example, "Is decision X consistent with encouraging active travel to school?"

5 INITIATIVES AND MECHANISMS TO INCREASE LEVELS OF ACTIVE TRAVEL FOR PRIMARY SCHOOL AGE CHILDREN THAT FOCUS ON OVERCOMING PARENTAL BARRIERS

Evaluated active school travel programs have demonstrated mixed success in increasing active school travel rates (Chillon et al., 2011; Macmillan et al., 2013; McDonald et al., 2013; Ogilvie et al., 2007; Sirard and Slater, 2008; Yang et al., 2010). While few of these programs address parental barriers to active school travel directly, many active school travel programs commonly include strategies that address some parental barriers to active school travel. In terms of the social-ecological model of school travel behaviour (see Figure 1), most programs focus on intra-personal and physical environment factors, with fewer addressing social/cultural factors and policy/regulatory factors.

Comprehensive models of the determinants of active school travel have recently been developed that include a number of these 'missing' factors (Mitra, 2013), and future active school travel interventions will benefit from giving increased attention to these factors. For example, social norms associated with school travel and being a 'good' parent are important influences on parents' school travel behaviour, but few active school travel programs include measures specifically aimed at changing these social norms, for example, by effectively communicating messages such as:

- "This is an active transport school"
- "Active transport in our school is high and/or increasing"
- "We have made it safer for children to walk or ride to school"
- "The whole school community supports active travel to school, ie, school principal, teachers, local government, police, community leaders, parents".

In terms of changing social norms in support of active school travel, the more voices that parents hear expressing these views, the greater the influence on parents' beliefs, attitudes and behaviours. Based on the evidence described in this review (see Sections 4.2 and 4.4), the voices of *other parents* who permit their children to travel actively and/or independently to school are likely to be particularly influential; as are consistent messages from school principal, teachers, local government, police, community leaders, and the media.

School policies are another relatively neglected area in active school travel research, evaluation and practice. School policies can change behaviour directly and also indirectly by supporting social norms of active school travel as described above. Measures taken to reduce motor vehicle volume, speed and access around schools are direct behaviour change policies that also send the (social change) message that the safety of children walking and cycling to school has higher priority than motor vehicle through traffic around schools.

Another example of supportive school policies is the provision of readily accessible, secure bike parking at school, which has been shown to increase cycling to school in Victoria (Garrard et al., 2009). Once again, the change process is likely to involve both direct and indirect mechanisms. That is, directly by improving bicycle security, and also indirectly by sending the message that the school supports cycling to school, and that an increasing number of children are cycling to school, as evidenced by the well-used bicycle storage area in a readily accessible area in the school grounds.

As occurs in Japan, Zurich, Munich and several other high active school travel countries in Europe, there may also be a role for state education, planning, transport and law enforcement authorities to develop policies and guidelines that support active school travel and improve traffic safety around schools.

The proposal by Faulkner et al. (2010) that parents' decision-making about mode of travel to school is a two-step process, with different factors influencing independent/escorted travel (step 1) and travel mode (step 2), provides an opportunity to more effectively target parental barriers to active school travel.

In step 1, traffic safety and social safety are important considerations. Traffic safety includes all four components of the Safe System approach to road safety, including the child's

capabilities and skills for walking or cycling safely on footpaths, trails and roads. Both schools and parents have a role in providing children with the skills and experience needed for safe, independent active travel (Garrard, 2016).

The other crucial component of safe road users is safe drivers. Increasing the responsibility of drivers for the safety of child pedestrians and cyclists is likely to improve actual and perceived road safety. Parents are aware of the benefits, but also the limitations, of children acquiring safe walking and cycling skills. Knowing that drivers are also looking out for their children provides an additional layer of safety and perceived safety.

Safe roads, safe speeds and safe vehicles are the other three components of the Safe System approach, and improvements can be made in all these areas to increase the safety and perceived safety of children walking and cycling to school.

Another aspect of parents' step 1 decision-making is non-parental accompaniment. This is an under-researched area, though the available evidence indicates that children who travel to school independently frequently do so accompanied by friends or siblings (Carver et al., 2014; Garrard et al., 2009). In some cases, parents who live nearby might share accompanying their children to school, though there appears to be little data on these informal walk-to-school groups. While there is limited research on these forms of accompaniment, it seems likely that non-parental accompaniment may reduce parents' concerns about social safety. Support for these forms of accompaniment is therefore likely to increase parents' scope for permitting independent travel to school.

Another recent development with the potential to influence step 1 decision-making is the use of mobile technology to: (a) monitor children's movements en route to and from school; (b) notify parents when they arrive at school or home; and (c) enable children to seek assistance in the event of an incident on the way to or from school (Faulkner et al., 2010). The Ride2School program conducted by Bicycle Network Victoria is currently trialling the use of an "Active Tag" swipe card which students touch on at school to record their active trip to school. The Ride2School program is also aiming to introduce email functionality which will inform parents that their child has successfully arrived to school (https://www.bicyclenetwork.com.au/general/programs/2283/).

These technological innovations address parents' desire to know that their children have arrived safely, and their availability and use may assist parents to allow their children greater independent mobility on the trip to school (Faulkner et al., 2010). In their study of 'parental fear', Crawford et al. (2015) reported that parents were more likely to allow their child independent mobility if they provided their child with access to a mobile phone, though the directionality of this relationship is uncertain. As noted above, this study also developed comprehensive guidelines for parents: "*How to help your kids get around safely on their own"* (https://www.vichealth.vic.gov.au/media-and-resources/publications/parental-fear).

Step 2 in the active school travel parental decision-making process involves travel mode selection based on parents' prior decision regarding independent or parent-accompanied travel to school. Most independent travel to primary school is active (mainly walking or cycling), but parent-accompanied travel can be active or inactive. In the context of

increasing children's rates of active travel to school, the key consideration here is understanding parental supports and barriers to walking or cycling to school with their children, which include parents' perceptions of the advantages and disadvantages of car travel.

These factors are numerous, and are described in more detail in the full report. Factors can be categorised into those that support and constrain walking or cycling to school with children, and those that support and constrain driving children to school. Some of these factors are amenable to change and others are not. Examples of potentially modifiable factors (ie excluding a number of socio-demographic factors) are included in the full report.

6 CONCLUDING COMMENTS

Active travel to school is an important source of regular physical activity for children, however Australian children's rates of active travel to school have declined markedly in recent decades. In the 1970s the majority of children walked or cycled to school, but currently, most children are driven to school (Garrard, 2011; Australian Bureau of Statistics, 2013).

Rates of active travel to school among primary school age children in Australia and South Australia are among the lowest in OECD countries. Most active trips to and from school are for walking (about 22% of trips to and from school), with a small number of trips by bicycle (about 2-3%).

Parents and carers are the key decision-makers for primary school students' mode of travel to school. It is therefore important to identify the factors that support and constrain parents' decisions to use active or inactive modes of school travel.

Walking and cycling to school are seemingly simple activities, but the factors that influence these behaviours are complex. The social-ecological model of school travel mode choice (see Figure 1), which describes four mutually interactive domains that influence travel behaviour (intra-personal factors, and factors within the built/natural, policy/regulatory, and social/cultural environments), provides both an explanatory model and a framework for developing interventions aimed at increasing rates of active travel to school, including independent and parent-accompanied active school travel.

Policies and programs aimed at increasing active travel to school can be directed at (a) changing parental behaviour directly by focussing on intra-personal factors such as parents' perspectives, attitudes and expectations, and/or (b) changing the physical, policy/regulatory, and social/cultural environments that influence parents' and children's travel behaviour. The full report contains more detailed information on these potential interventions, incorporating measures that have been demonstrated to be effective as well as those that show promise of potential efficacy through addressing the parental barriers to active travel to school that have been identified in this review.

PART B: LITERATURE REVIEW REPORT

1 INTRODUCTION

Physical activity is important for the growth and development of children, but only 19.4% of Australian children aged 5-17 years achieve the recommended 60 minutes or more of physical activity each day (Australian Bureau of Statistics, 2013). Recent research indicates that incidental forms of physical activity such as walking and cycling to get to local destinations such as school play an important role in children meeting recommended levels of physical activity (Davison et al., 2008; Lubans et al., 2011; Smith et al., 2008). However, in recent decades, Australian children's rates of active travel to school have declined markedly. In the 1970s the majority of children walked or cycled to school, but currently, most children are driven to school (Garrard, 2010; Australian Bureau of Statistics, 2013).

Many factors have contributed to the decline in active travel among children in Australia. These can be categorised into the four quadrants shown in Figure 1, which portrays a social-ecological model of four mutually interactive domains that influence travel behaviour.

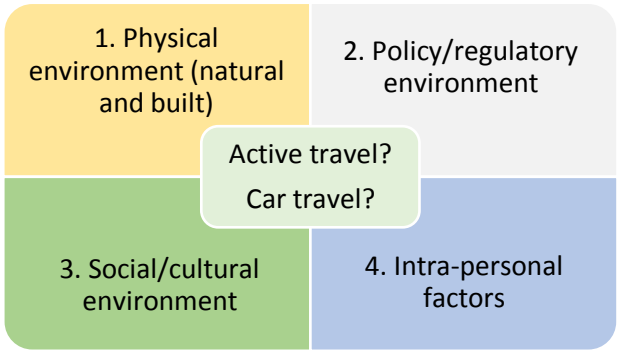

Figure 1: Social-ecological model of active/inactive travel behaviour

The focus of this report is on intra-personal factors; specifically, the role of parents in determining how their primary school age children travel to and from school. While the focus is on parental characteristics and on parents' perspectives, attitudes and circumstances, it is also important to recognise that many of these parental factors are shaped by factors within the built/natural, policy/regulatory, and social/cultural environments. In addition, there is increasing recognition that the influence of environmental factors on parental school travel behaviour is mediated by parents' *perceptions* of environmental factors (eg *perceived* personal safety and traffic safety, in additional to actual conditions) (Mitra, 2013).

Policies and programs aimed at increasing active travel to school can therefore be directed at (a) changing parental behaviour by focussing directly on intra-personal factors such as parents' perspectives, attitudes and expectations, and/or (b) changing the physical, policy/regulatory, and social/cultural environments that shape parents' and children's travel behaviour.

Primary school age children's methods of travelling to school are largely determined by parents, so understanding parents' reasons for using active or inactive school travel modes is a crucial step in the change process. While it is likely that changes in all four quadrants in Figure 1 will be required to achieve substantial and sustainable increases in active travel to school at a population-level in Australia, there are indications that individual-focused behaviour change programs can be effective in some settings, at least in the short-term (Chillon et al., 2011; Hosking et al., 2010; Macmillan et al., 2013; Sloman et al., 2009).

This report comprises a review of research findings on parental barriers to primary school age children's active travel for the school commute. The report commences with a summary of rates of primary school age children walking and cycling to school in Australia and South Australia, followed by a review of international and Australian data on children's accompanied and independent active travel to school. Subsequent sections review factors that impact on children's active travel to school and independent mobility, and initiatives and mechanisms to increase levels of active travel for primary school age children that focus on overcoming parental barriers.

2 RATES OF CHILDREN AND YOUNG PEOPLE WALKING AND CYCLING TO SCHOOL

2.1 Australian children's rates of active travel to school

There are no recent national data on Australian children's rates of walking and cycling to school. However, the Australian Bureau of Statistics "*Australian Health Survey*" includes data on children's overall levels of active transport (Australian Bureau of Statistics, 2013). Figure 2 shows that more than half of Australian children participated in some form of active transport in the seven days prior to the survey. In contrast to other forms of physical activity, participation in active transport increases steadily with age, with 15-17 year-olds more likely to participate in active transport in the past seven days than either organised or non-organised moderate/vigorous physical activity. A similar pattern is evident for the amount of time per day spent on physical activity (see Figure 3).

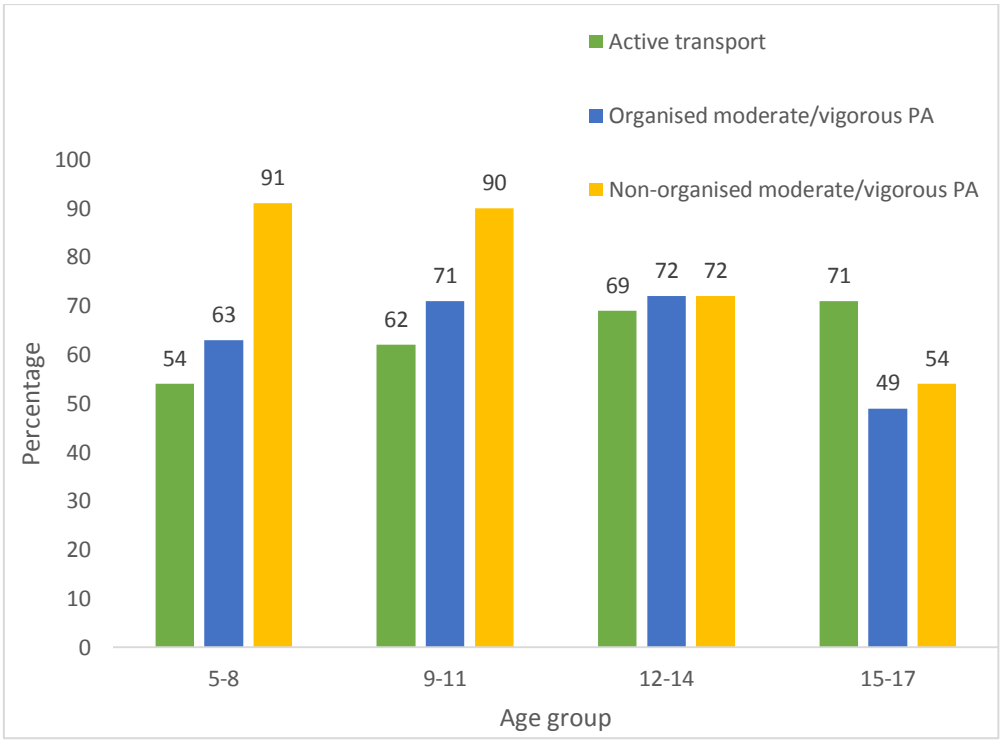

Figure 2: Type of physical activity: participation in last seven days (Source: ABS, 2013)

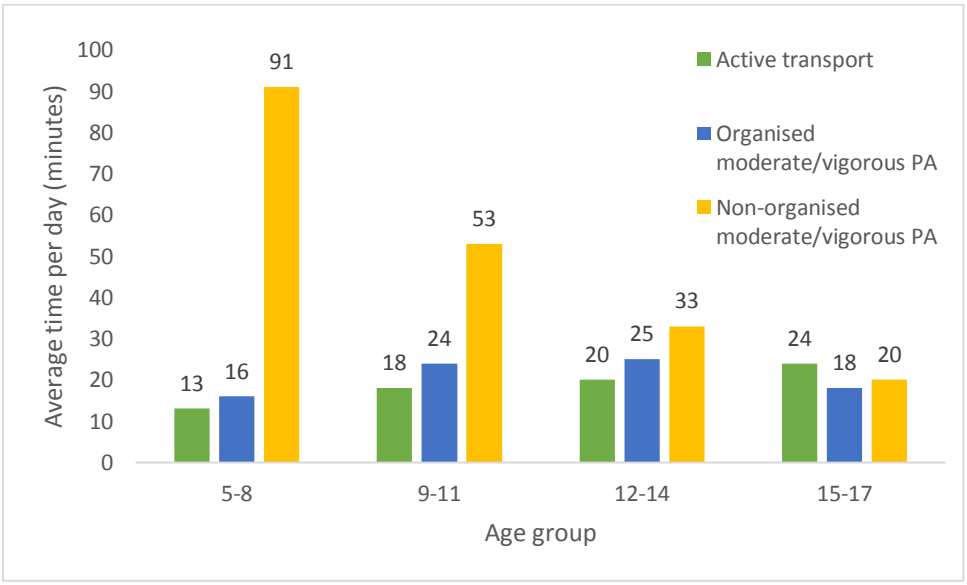

Figure 3: Type of physical activity: average time per day (minutes) (Source: ABS, 2013)

These data indicate that 'incidental' physical activity in the form of active transport provides an opportunity for health-enhancing physical activity among a growing proportion of young people who 'drop out' of organised and non-organised physical activity as they move from childhood into adolescence. The increasing disengagement with leisure-time physical activity among young Australians is reflected in the rapid decline with age of young people who meet the recommended 60 minutes or more of physical activity each day (Australian Bureau of Statistics, 2013) (see Figure 4).

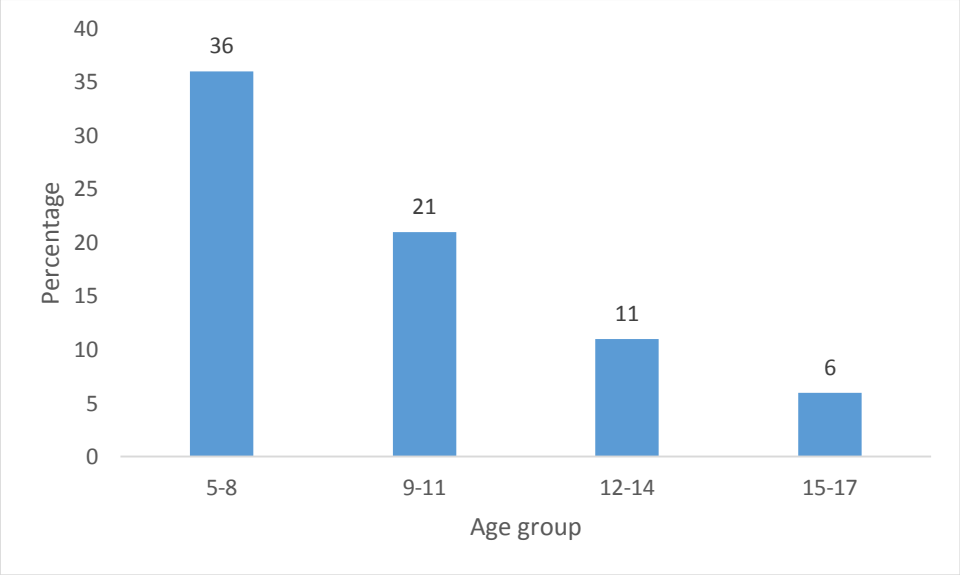

Figure 4: Proportion of Australian young people meeting recommended levels of physical activity on all seven days (Source: ABS, 2013)

These data indicate the potential for increased levels of active transport to contribute to Australian young people's currently low levels of physical activity. Increasing the level of active transport among young people in Australia is not unrealistic, as active transport rates are historically low, and many other developed countries have considerably higher rates than in Australia (see Table 1).

Table 1: Active travel among children: international comparisons (Source: Garrard, 2009)

Country	Distance walked per child per year (km)	Distance cycled per child per year (km)	Proportion of total distance travelled using active modes (%)
USA	123	-	0.8
UK	396	79	6.8
NZ	-	232	-
Norway	550	370	9.7
Sweden	275	424	7.4
Germany	431	518	13.8
Switzerland	773	535	14.4
Netherlands	180	2200	33.5
Melbourne[3]	182	26	4.6

[3] National data on active travel distance are unavailable. Melbourne data are likely to be indicative of Australian data.

Young people who walk or cycle to school are more likely to meet physical activity guidelines that those who are driven to school (Davison et al., 2008), especially among population segments such as adolescent girls who have low levels of leisure-time physical activity. In one large UK study, adolescent girls were 6-8 times more likely to meet recommended levels of physical activity if they actively commuted to school (Smith et al., 2008).

While national, representative data on Australian students' rates of active travel to school are not available, data are available from a non-probability sample of Australian school students (from the ABS *Censusatschool* project), and from household travel surveys (based on probability samples) in some states and territories. These various data sources produce similar patterns of school travel behaviour among Australian school students.

The ABS *Censusatschool* project comprised students (N = 23,745; mainly in grades 4-10) self-selecting to participate in the project, and self-reporting their method of travel to school. As shown in Table 2, active travel rates are low in all states and territories. In South Australia, 23.6% of students reported travelling actively to school, predominantly by walking (19%).

Table 2: Method of travel to school (Source: ABS *Censusatschool*, 2013)

Method of travel to school	ACT	NSW	NT	Qld	SA	Tas	Vic	WA	Aust
Bicycle	6.1	2.0	4.2	2.9	3.2	1.5	3.9	5.9	3.4
Boat/Ferry	1.3	0.6	1.1	0.4	0.3	1.2	0.3	0.5	0.5
Bus	28.3	29.2	31.3	26.6	20.6	38.4	19.0	26.2	25.4
Car	46.1	38.1	44.6	49.7	53.9	42.2	50.5	41.1	46.0
Skateboard/Scooter/ Rollerblades	0.8	1.3	1.8	0.8	1.4	0.4	1.3	2.7	1.3
Train/Tram	0.4	10.2	0.0	3.8	0.9	0.1	5.0	2.4	4.8
Walk	16.9	18.3	16.6	15.2	19.0	15.9	19.8	20.5	18.2
Other	0.0	0.3	0.4	0.5	0.7	0.3	0.2	0.6	0.4
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

State household travel surveys show similar patterns of active travel to primary school. 2007-08 VISTA (Victorian Integrated Survey of Travel and Activity) data for the greater Melbourne Metropolitan area indicated that 22.2% of children walked to primary school and 2.8% cycled. The 2009 Victorian Child Health and Wellbeing Survey reported that 20.4% of primary school age children walked to school and 3.8% cycled (Garrard, 2010). The 2006-08 Sydney Household Travel Survey reported that 19.0% of students walked to primary school and 1% cycled, and the 2009 ACT Physical Activity and Nutrition Survey (ACTPANS) reported that 24.3% of Year 6 students walked or cycled to school every day (Garrard, 2011a).

Internationally, these school travel data place Australia at the low end of rates of active travel to school among OECD countries, along with the USA (13% active school travel), Canada (24% active school travel) and New Zealand (27% active school travel) (Active Healthy Kids Global Alliance, 2014 Global Summit Report Cards and Related Documents,

http://www.activehealthykids.org/2014-global-summit/report-cards-and-related-documents/). UK rates (44% in England) are about midway between the high active travel rates in several European and Asian countries, and the low rates in Australasia and North America.

2.2 Children's rates of active travel to school: changes over time, Australia and internationally

Rates of walking and cycling to and from school in Australia have declined markedly in recent decades. Data from the ABS (collected between 1970 and 1994) show that, in Victoria, 49% of students walked to school in 1970 and 16% travelled by car. By 1994, these rates were effectively reversed, with 20% of students walking, and 52% driven to school. In the same time period, cycling to school more than halved (from 11.8% to 5.2%) (see Figure 5).

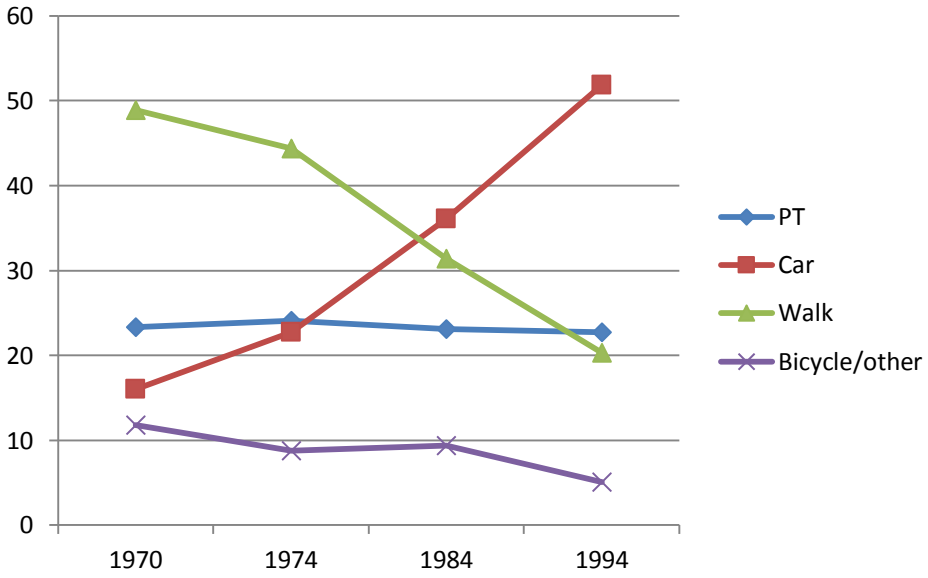

Figure 5: Travel to education, Victoria, students (%)
(Source: Garrard 2010, based on ABS data)

Note 1: 1970 and 1974 data are for travel to education (school, university, TAFE); 1984 and 1994 are for travel to school. Primary and secondary school students comprised about 86% of all students travelling to education.
Note 2: Time periods on horizontal axis are not uniform.

Data for the Greater Sydney Metropolitan Area[4] show a similar trend to that in Victoria. ABS surveys that included travel to school in NSW ceased in 1991-2, and were replaced by annual household travel surveys conducted by the Ministry of Transport's Transport Data Centre, commencing in 1997. Travel to school data have been analysed and published for students aged 5-14 years. These data show a more than three-fold increase in car use

[4] Trends in travel to school in the Greater Sydney Metropolitan Area are likely to reflect NSW state data as 77% of the NSW population resides in the survey area.

between 1971 and 2003, accompanied by halving of walking rates (van der Ploeg et al., 2008) (see Figure 6).

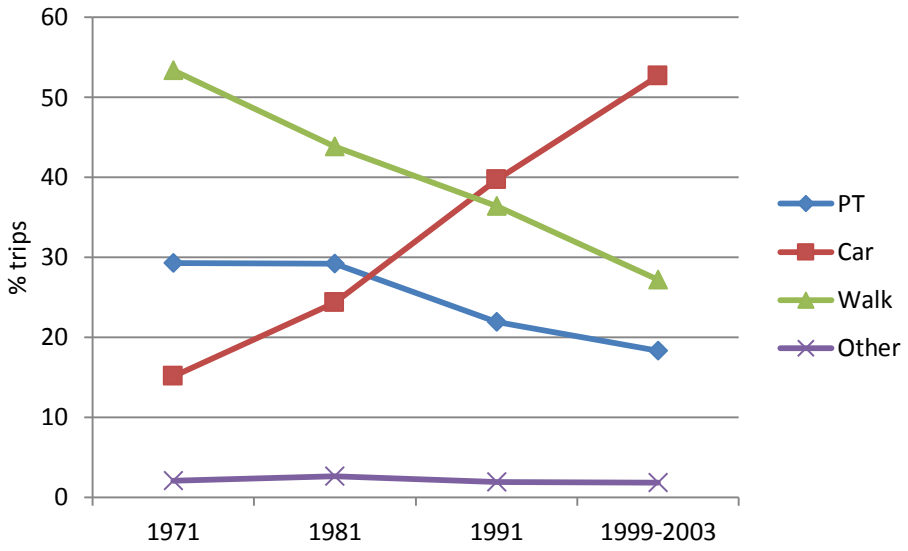

Figure 6: Travel to school, Sydney, age 5-14, between 1971 and 2003
(Source: Van der Ploeg et al., 2008)

More recent data for Victoria (between 2006 and 2009) and the Greater Sydney Metropolitan Area (between 2003-05 and 2006-08) indicate few significant changes in young people's rates of walking and cycling to and from school in Victoria and the greater Sydney Metropolitan area (Garrard, 2010).

Drawing on available state-based survey data, the 2014 Active Healthy Kids Australia (AHKA) Report Card reported a decrease of about 42 percentage points in young Australian's use of active transport between 1971 and 2013, with the trend line in Figure 7 based on time trend data from New South Wales, South Australia and Victoria.

The 2014 AHKA Report Card also noted some declines in children's use of active transport internationally, though in some cases (eg Switzerland and the UK) the decline has been from a higher base and at a slower rate than in Australia, resulting in current levels that are substantially higher than in Australia.

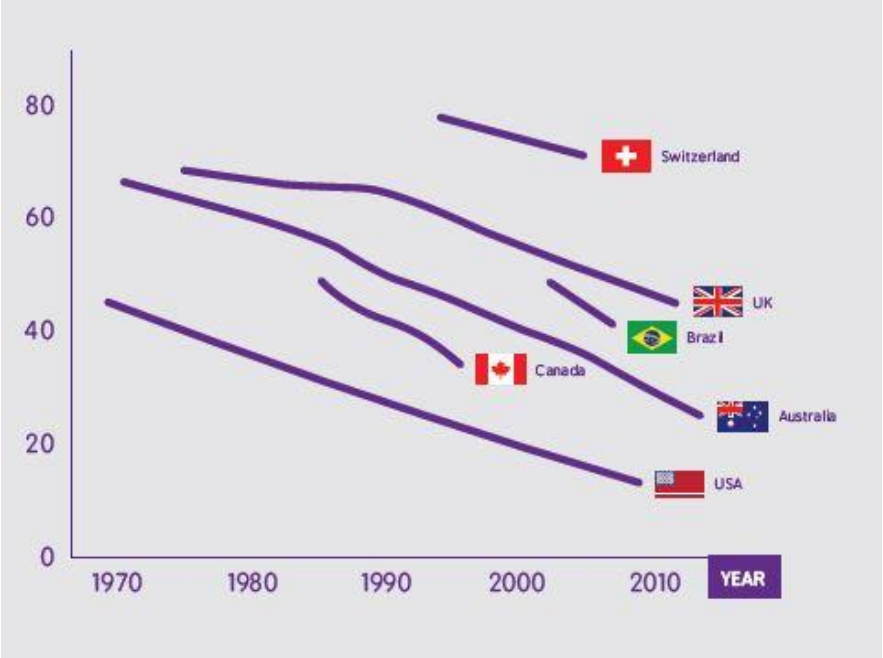

Figure 7: Time trends in the percentage of children and young people who use active transport to and/or from school
(Source: Active Healthy Kids Australia (2015). *The Road Less Travelled: The 2015 Active Healthy Kids Australia Progress Report Card on Active Transport for Children and Young People.* Adelaide, South Australia: Active Healthy Kids Australia. http://www.activehealthykidsaustralia.com.au/siteassets/documents/ahka_reportcard_2015_web.pdf)

Fyhri et al. (2011) used longitudinal travel data from Denmark, Finland, Norway and the UK to compare rates of travel to school over time across these four countries. More than half of 5-12 year-olds walked or cycled to school in all four countries in 2002-2005[5] (see Table 3). However, there were marked differences in rates of car travel, with the UK (41%) having about double the rates in Denmark (23%), Finland (20%) and Norway (22%). Public transport and travel by school bus were higher in the latter three countries. These three countries also had much higher rates of cycling to school that in the UK, where active travel to school was predominantly walking (51%) (Fyhri et al., 2011). These rates of active travel to school are substantially higher than in Australia.

Table 3: Transport mode for trips to and from school in Denmark, Finland, Great Britain and Norway, children aged 6–10, Great Britain aged 5–10 (percentage).
(Source: Fyhri et al., 2011)

	Denmark	Finland	Great Britain	Norway
Walk	23	36	51	46
Bicycle	36	25	1	12
Private car	23	20	41	22
Public transport	17	20	6	18

[5] The year of data collection varied somewhat between countries.

In all four countries, rates of active travel to school in 2002-2005 were lower than in previous decades, and rates of travel to school by car were higher; though still less than half the Australian rate (for Denmark, Finland and Norway) (Fyhri et al., 2011). These changes were associated with a reduction in children's independent mobility and an increase in accompanied travel. The authors also reported that, in the UK, average distance to school for 5-10 year-olds increased from 1.8km in 1985/86 to 2.6 km in 2008, possibly contributing to increased car use and reduced active travel to school and independent mobility.

Zwerts et al. (2010) also reported relatively high rates of active transport trips in Flanders, Belgium, for young people aged 10-13 years. The data in Table 4 are for all trips.

Table 4: Mode of travel, all trips (%)
(Source: Zwerts et al., 2010)

	Boys	Girls
Walk	12	14
Bicycle	32	22
Car	37	46
Public transport	7	7

For the school trip, the most frequent mode of travel was bicycle (about 40%[6]), followed by car (about 30%) and walk (about 10%). Cycling was the most frequent mode of travel to school for young people in all four home locations: (a) in a town in a built up area (30%), (b) in a town outside a built-up area (38%), (c) in the country in a built-up area (46%), and (d) in the country outside a built-up area (48%). These data indicate that high rates of cycling to school can be achieved in a range of urban and regional locations through the establishment of safe cycling conditions. This is also the case in the Netherlands (with 86% of primary school students walking or cycling to school) (Ministry of Transport Public Works and Water Management, 2009) and Japan (98%) (Mori et al., 2012).

These international data indicate that walking and cycling to school is not dependent on high density living, as is sometimes assumed. In fact, in a study in the city of Izegem in Belgium, which included inner city and suburban neighbourhoods, longer trip distances to school resulted in greater time spent travelling actively to school, not less, as occurs in Australia and the US (van Dyck et al., 2009). In urban locations in Izegem, young people aged 12-19 years mainly walked (13%) or cycled (66%) to school. In suburban locations, young people were less likely to walk (2%), but more likely to cycle (79%) (van Dyck et al., 2009).

These international differences in modes of travel to school indicate that in many high active travel countries (with the exception of the UK), cycling trips tend to replace walking trips as trip distances increase (also see Figure 12), while in countries such as Australia and the US, driving largely replaces walking for trips of about 1km or more, and cycling to school remains low for all distances. Establishing area-wide conditions supportive of young people cycling to school (and other locations) has the potential to greatly expand active travel beyond the current short walking trips to school in Australia.

[6] Estimated from Figure 3 in Zwerts et al. (2010).

Rapidly declining rates of active travel to school in Australia, North America, the UK and New Zealand, have been accompanied by a parallel decline in children's independent mobility in general, and in independent active travel to school. These closely related issues are discussed in the following section.

Summary:

- Rates of active travel to school among primary school age children in Australia and South Australia are among the lowest in OECD countries. Most active trips are for walking (around 22%), with a small number of trips by bicycle (about 2-3%).
- Rates of active travel to school have declined substantially in Australia since the 1970s, with walking and cycling trips replaced mainly by car travel.
- Several wealthy, advanced countries have maintained high levels of active travel to school, usually including high rates of cycling to school.
- Establishing the conditions under which cycling becomes an appealing mode of school travel for distances that are too far to walk greatly expands the active travel catchment area for schools, enabling longer trips to school to be replaced by cycling rather than driving.

Implications:

- The data summarised above indicate that high rates of car travel to school are not an inevitable consequence of living in a wealthy, developed country with high rates of car ownership, but are likely to be due to a range of factors across the four segments of Figure 1 that encourage car use and discourage active travel.
- There is considerable potential for active travel to school to make a substantial contribution to Australian children meeting recommended levels of physical activity through 'incidental' activity, particularly in the transition from childhood to adolescence, and for girls.

3 ACCOMPANIED AND INDEPENDENT ACTIVE TRAVEL TO SCHOOL

3.1 Rates of accompanied and independent active travel to school

It is likely that the substantial decline in active travel to school in Australia in recent years has been partly due to parents restricting children's independent active travel due to concerns about the safety of children travelling to school without adult supervision. However, because most surveys of Australian children's methods of travel to and from school do not include data on whether children's active travel is accompanied or independent it is difficult to quantify this trend.

Distinguishing between accompanied and independent active travel, and the factors that influence them, is potentially useful information for a number of reasons. Many parents cite the convenience of car travel as a key reason for driving children to school. However, unescorted active travel is arguably more convenient than car travel because it avoids the

need for parents to spend time chauffeuring children, and provides greater flexibility in the timing of parents' own travel requirements and other commitments (Faulkner et al., 2010). However, the convenience of children traveling to and from school independently will only be realised if independent travel is considered by parents to be a safe option for their children.

In a study of parents' travel mode decision-making using semi-structured interviews with 37 parents from four primary schools in Toronto, Canada, Faulkner et al. (2010) reported that parents' decision-making about the trip to school is a two-step process: (i) an initial decision on whether or not to accompany the child to school (primarily influenced by assessments of the child's maturity and skills, and social and traffic safety); followed by (ii) mode choice, based on parents' perceptions of the easiest and most convenient way to travel, which in turn are influenced by perceptions of travel time and/or distance to/from school and whether or not parents need to complete multi-activity trip chains.

As noted by Faulkner et al. (2010):

> *"From a behavioural economics perspective, the option with the least behavioural cost for parents was allowing their child to travel independently to school. However, this was the option that parents had most difficulty with because many of them felt that it was not safe for their child to commute independently."*

Consequently, understanding the circumstances and conditions under which parents are comfortable with their children travelling independently can inform strategies aimed at increasing active travel to school, as independent active travel addresses a key barrier to active travel in the form of the convenience of car travel for busy parents.

A recent study documented changes in English and German students' levels of independent mobility between 1971 and 2010, and also included a review of the literature on children's independent mobility[7] (including active travel to school) (Shaw et al., 2013).

Shaw et al. (2013) examined the results of surveys of children's independent mobility conducted in England and Germany in 2010 and compared them with similar surveys conducted in 1990 and 1971. In 2010 in England the majority of both primary (60%) and secondary (56%) students walked to school, and few students cycled (3% and 2% respectively). A third of primary school children were driven to school, compared to 16% of secondary school students. Few primary school students used public transport or a school bus, while 25% of secondary students did so.

As shown in Table 5, the proportion of English primary school students (aged 7-11 years) who travelled home from school alone[8] declined markedly between 1971 (86%) and 1990 (35%) and continued to decline in 2010 (25%). German primary school students had substantially higher rates of travelling home from school alone than English students in both

[7] Defined as "freedom to move around their neighbourhood – or similar – without adult accompaniment" (Carver et al., 2013).

[8] "Alone" was defined as without adult supervision, and includes being in the company of friends or siblings.

1990 and 2010 (about 3 times the English students' rates), though there was also a decline among German students between 1990 (91%) and 2010 (76%).

Data in Table 5 also show that nearly all German secondary school students (aged 11 – 15 years) travelled home from school alone in both 1990 and 2010. Most (though fewer) English secondary school students also travelled home from school alone in both 1990 and 2010.

Table 5: Proportion of English and German primary school students (aged 7-11 years) who travelled home from school alone, 1971-2010 (Source: Shaw et al., 2013)

	England 1971 (% students)	England 1990 (% students)	England 2010 (% students)	Germany 1990 (% students)	Germany 2010 (% students)
Travel home from school alone (primary students)	86	35	25	91	76
Travel home from school alone (secondary students)	-	87	88	99	99

Hillman et al. (1990), commenting on the 1971 and 1990 data, proposed that the change in England was largely due to parental concern about traffic danger due to increases in road traffic volume in England during the 1970s and 1980s (Hillman et al., 1990). Higher levels of independent mobility among German children were thought to reflect (a) higher population densities of the study areas in Germany compared with the corresponding areas in England; (b) smaller homes in Germany, with greater provision of outdoor recreational facilities; and (c) "*…a cultural difference between England and Germany regarding 'collective responsibility'. In Germany, unaccompanied children were generally overseen by other adults who would act in loco parentis where necessary, but this was less common in England.*" (Hillman et al., 1990, cited in Carver et al., 2013, p.462). A similar 'collective responsibility' (among other factors) is considered to contribute to 98% of Japanese children travelling actively to school unescorted by adults (see Section 5).

Data from the UK Department for Transport study "*Young people and transport: understanding their needs and requirements*" also indicate a reduction in children's independent mobility between 2002 and 2009, with the proportion of children aged 7-10 years who are "almost always" or "sometimes" allowed to cross roads alone decreasing from 59% in 2002, to 49% in 2009. Age-specific data from the same source indicate that between the ages of 10 years to 12 years, children are granted increased levels of independent mobility (see Figure 8) ([UK] Department for Transport 2006, cited in Carver et al., 2013), which may translate into parents being more willing to allow children in this older age group to travel to school independently.

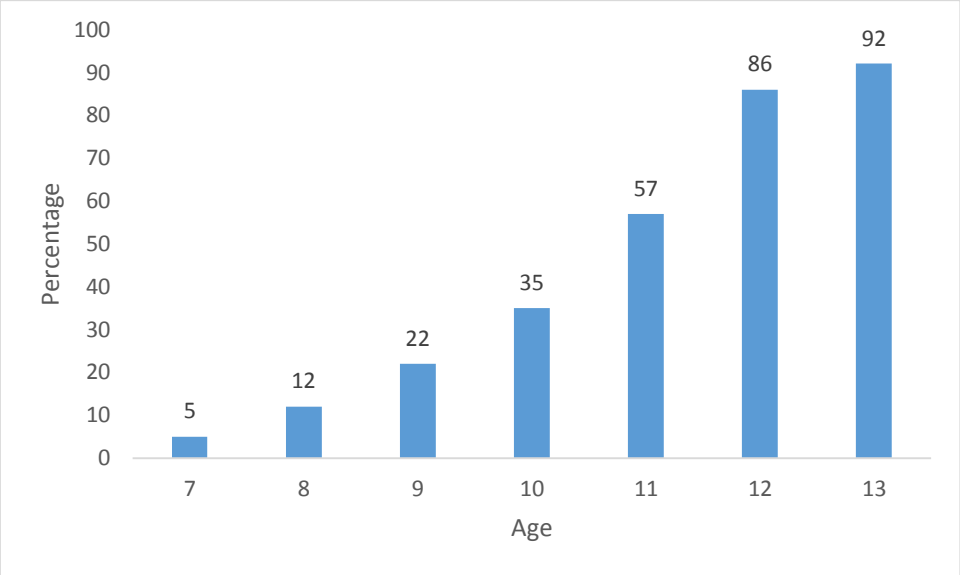

Figure 8: Percentage of children allowed to cross road alone, 2002/3, by age (Source: [UK] Department for Transport 2006)

An Australian study (Garrard et al., 2009) conducted in 2008 in 13 Victorian primary schools participating in the Ride2School program found similar rates of active travel to school and independent travel as in England (Shaw et al., 2013), though the findings are not directly comparable (see footnote 7). A survey of parents (n = 409) of students in grades 4-6 with an average age of 10 years found that the majority of students who walked or cycled to or from school regularly (8-10 trips per week) (40% of students[9]) were not accompanied by an adult (77%). These students were accompanied by siblings (26%), friends (26%), or travelled alone (24%) (Garrard et al., 2009). Parents were twice as likely to accompany students who regularly walked to school (27%) than students who regularly cycled to school (13%), with regular cyclists more likely to travel alone (32%) than regular walkers (19%). An earlier phase of the study (a pre-post evaluation of the pilot phase of Ride2School program), found that, for four Melbourne metropolitan primary schools (two program schools and two comparison schools), increased participation in active travel to school post-program was associated with more children travelling to school unaccompanied by an adult (ie alone or with siblings or friends). More girls than boys were accompanied by adults on active trips to school, suggesting that boys may be permitted (and/or prefer) greater independent mobility than girls (Garrard et al., 2009).

In a study of independent mobility among Australian and English school children, parents reported on 'mobility licences'[10] granted to their children, and independent travel to school

[9] This is about twice the rate of active travel to school among primary school students in Victoria. This may be due to the sample of 13 schools that self-selected to participate in the Ride2School program having an interest in active travel to school (and possibly higher rates than a representative sample of Victorian schools). The students were also an older cohort of primary school students (aged 8-13 with a mean age of 10 years). Older students are more likely to travel actively to school, and more likely to travel to school independently.

[10] 'Mobility licences' refer to children being allowed to do the following six things on their own: (i) cross roads; (ii) go to places other than school; (iii) come home from school; (iv) go out after dark; (v) use buses; and (vi) ride a bicycle on main roads (Hillman et al., 1990). Each one of these actions is considered a 'mobility licence'.

and for other local trips. Among 10 to 12 year-olds, English children had more licences than Australian children, but this may have been partly due to the impact of English children attending secondary school at a younger age than Australian children. After controlling for age and sex of the child, household car access and for clustering by school attended, children who were granted more 'mobility licences' had higher levels of independent walking or cycling trips to or from school (for primary school students only, as increased distance to secondary schools appeared to lead to less walking and cycling to secondary school, and more car, public transport and school bus trips), and also higher levels of independent mobility on non-school local trips (Carver et al., 2013).

Interestingly, the study found that both age and school stage (ie attending primary or secondary school) are important correlates of children's independent mobility. That is, the transition from primary to secondary school was associated with increased independent mobility independently of age. Other studies have found that major changes in children's autonomy coincide with the transition from primary to secondary school which is accompanied by changes in school location and peer groups (Valentine, 1997).

In their study of parental fear as a barrier to children's independent mobility, Crawford et al. (2015) reported a similar easing of parents' restrictions on children's mobility associated with swimming pools in two regional areas in Victoria granting children a 'ticket' to enter the pool without an adult when they turn 10 years old; with the authors reporting that "*This policy was a catalyst for independent travel to and from the pools, as well as independent active play at the pools"*.

These findings suggest that while child age is an important factor for parents granting children increased independent mobility, so too are social norms. That is, if parents and the wider community 'expect' that attending secondary school is associated with increased independent mobility, or that it is acceptable for children aged 10 years and over to swim alone at the local pool, then parents are more likely to allow their children to travel to school or to local destinations independently. As more parents adopt this perspective, more children travel to school independently, and the social norm of greater independent mobility is reinforced. International differences in levels of children's independent mobility (eg in Australia, England, Germany and Japan – see above and also Section 5) also point to the importance influence of social norms (via their parents) on children's levels of independent mobility. The influence of social norms on children's independent mobility and active school travel is discussed further in Section 4.4.2.

A recent study conducted in the Greater Toronto and Hamilton Area (GTHA) in Canada investigated the factors associated with accompanied and independent walking to school (Mammen et al., 2012). The study investigated socio-demographic and parental attitude differences between children's accompanied and independent walking to school, and also differences in escorted walking and escorted driving for children who live less than 2km from school. The GTHA has much in common with large capital city areas in Australia. It is a large and socially and culturally diverse urban area, with similar variations in urban form and street design found in most Australian cities. A cross-sectional survey conducted by Metrolinx, the regional transportation agency for the GTHA, with an original probability sample of 1,016 households, was reduced to 564 in order to analyse responses from parents

whose children (aged 6-14 years, attending elementary schools covering kindergarten to grade 8) lived within 2km of school.

Parents were asked to report how their child usually travels to/from school, and with whom. The prevalence of the various transportation modes among those living within 2 km from school were: walking (n=344; 61%), driving (n=146; 26%), school bus (n=73; 13%), public transport (n=6; 1%), cycling (n=6; 1%), and other (n=10; 2%). Because only 1% of the sample living within 2 km from school cycled to school, cycling was excluded from the analysis. The final sample (n = 490) comprised unescorted walkers (n=111), escorted walkers (n=233), and escorted drivers (n=146) living within 2 km from school.

In addition to child and parent socio-demographic variables, the survey asked about parental attitudes to active school travel safety, perceived active school travel advantages, and suggestions for increasing active school travel. With regard to active school travel safety, parents were asked to respond to a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree) assessing constructs that related to: route safety, traffic safety, bullies/strangers, and discussions about active school travel safety with their child. Parents were also asked to report the age (child) at which they (the parent) would feel comfortable allowing their child to travel to school unsupervised.

Perceived active school travel advantages were assessed by asking parents to rate the importance of exercise during the school trip and the importance of travelling to school in an environmentally friendly way. Finally, parents were asked to what extent certain strategies would increase the likelihood of their child travelling actively to/from school. These strategies included: a walking school bus organised by the school, before/after school supervision, a school closer to home, slower speed around school area, well-maintained footpaths, school zone cautionary signs, police presence around school, and crossing guards/marked crossing by school.

The study found that unescorted walkers were older (mean age 11.9 years) than escorted walkers (mean age 7.6 years) and children who were driven to school[11] (8.1 years). This finding is consistent with previous research indicating that older children are permitted greater independent mobility than younger children (Fyhri & Hjorthol, 2009). Unescorted walkers were more likely to have older parents in full-time employment, possibly reflecting the older age of unescorted walkers. Unescorted walkers (73% < 1km; 27% 1-2km) and escorted walkers (71% < 1km; 29% 1-2km) lived closer to school than children who were driven (36% < 1km; 64% 1-2km), which is consistent with the well-established inverse relationship between travel distance and walking in North America and Australia.

Unescorted walkers were more likely than both escorted walkers and children who were driven to school to come from households where English was the predominant language spoken at home. Both unescorted walkers (79%) and escorted walkers (81%) were more likely than children who were driven to school (66%) to have parents who walked to school when they were children, suggesting that familiarity with walking to school may influence parents' decisions to allow their own children to walk to school. The relationship between

[11] The authors used the term 'escorted drivers' for children who were driven to school.

parental attitudes to, and participation in active transport, and children's active transport is discussed in more detail in Section 4.2.4.2.

Interestingly, rates of walking (both escorted and unescorted) and being driven to school were similar for boys and girls. A number of other studies have reported higher rates of independent mobility for boys than for girls, indicating inconsistent evidence for the association between gender and active school travel (see Section 4.2.1).

Parents who accompanied their children walking to school indicated that they would allow their child to travel to/from school unescorted at a mean age of 11.5 years, while the parents of unescorted walkers allowed their child to walk unescorted at the mean age of 10.1 years. This substantial difference appears to reflect differences in parents' attitudes to children's independent mobility and their assessments of children's abilities to walk to school independently.

The authors also conducted multivariate analyses comparing (a) escorted walkers with unescorted walkers; and (b) car passengers with unescorted walkers. As was the case for the descriptive data summarised above, unescorted walkers were older than escorted walkers, and more likely to come from English-speaking homes. In terms of parents' perceived active school travel safety, agreement with "I worry about strangers/bullies approaching my child" was associated with children walking escorted, and agreement with "I have discussed how to walk/bike safely with child" was associated with children walking unescorted. None of the active school travel safety factors "There are safe bike routes/paths around the school", "People drive safely enough in my neighbourhood" or "There are too many cars in the morning around my school" differed significantly for escorted and unescorted walkers. However, agreement with "People drive safely enough in my neighbourhood" was border-line significant (OR = 0.84; 95% CI = 0.70-1.00), suggesting that parents who agreed with this statement may be more likely have children who walked to school unescorted.

Interestingly, an Australian study of barriers to children's walking or cycling to school found a positive association between parents' "concern child may be injured in a road accident" and active commuting (OR = 1.9, 95% CI = 1.1-3.1), indicating the need for caution when interpreting associations between parent-reported 'barriers' and children's active school travel (Salmon et al., 2007). Possible explanations for this finding are that, due to safety concerns, parents might accompany children walking to school. It is also possible that some parents may have greater safety concerns *because* their children walk or cycle to school independently; suggesting that they allow their children to walk or cycle to school despite having safety concerns.

In the Canadian study described above, the authors also conducted a multivariate analysis comparing children who are driven to school with unescorted walkers (Mammen et al., 2012). In this analysis, being driven to school was associated with child age (younger), number of cars in the household, a non-English speaking household, and greater distance to school. For perceived active school travel safety factors, "There are too many cars in the morning around my school" and "I worry about strangers/bullies approaching my child" were associated with children being driven to school, while agreement with "I have discussed how to walk/bike safely with child" was associated with unescorted walking. For

perceived active school travel advantages, agreement with "Importance of child exercising on route to/from school" and "I chose to live in my area so my child could walk to school" were associated with unescorted walking, while "Importance of child travelling to school in an environmentally friendly way" was not.

Parents who drove their children to school were also asked about potential strategies for increasing their children's active school travel. Their responses are shown in Figure 9. Interestingly, the strategy with the greatest level of support ("A walking school bus organised by school") is a strategy that has not been found to be consistently effective in increasing walking to school in Australia (Moodie et al., 2009). "Slower speeds around school area" was the least-supported strategy, but one for which there is considerable evidence of effectiveness in reducing child traffic injuries, increasing people's perceptions of neighbourhood safety, and some evidence of effectiveness in increasing active school travel.

In a review of the impact of reduced traffic speed on the prevalence and safety of active travel behaviour, Garrard (2015) reported evidence indicating that 20 mph (32 km/h) areas in the UK have contributed to increased walking and cycling (including for children travelling to school), improved traffic safety, and an increase in residents' perceptions of traffic safety and support for lower speeds. These findings suggest that parents' perceptions of what might encourage them to choose active school travel modes need to be considered along with other evidence-based strategies for increasing active school travel.

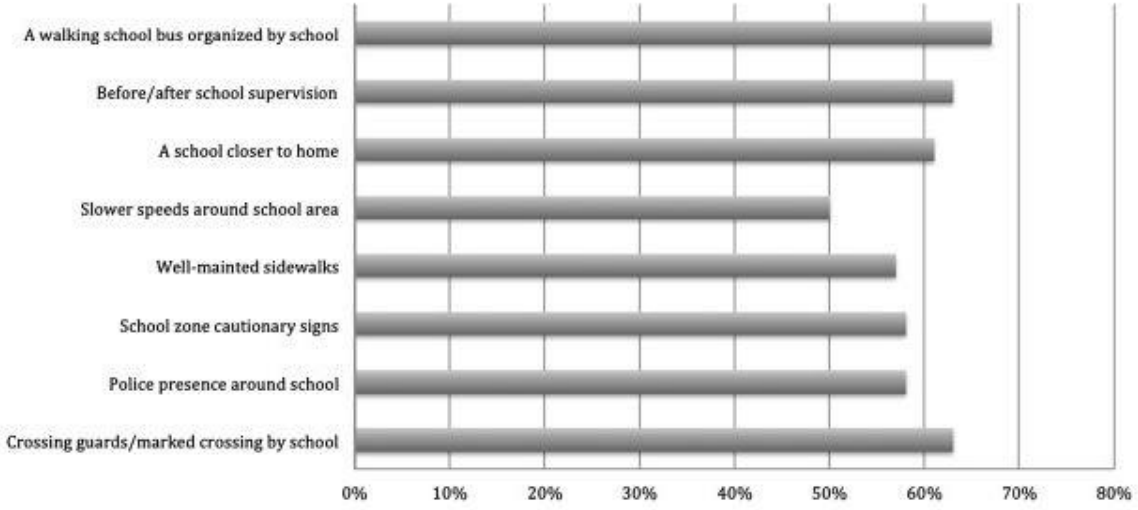

Figure 9: Strategies to increase active school travel among drivers (Proportion of parents who drive their children to/from school indicating that the strategy would increase the likelihood of their child practising active school travel) (Source: Mammen et al., 2012)

3.2 Independent and active travel and age of child

Australian and international data on the relationship between independent and active travel and child age was included briefly in the section above, with most studies in English-speaking countries such as Australia reporting that, in general, older children (commonly 10-

12 years and over) are more likely to walk or cycle to school independently. However, there is considerable variation:

- over time in Australia - in previous decades younger children were permitted more independent mobility
- between countries - children in Europe and Japan are generally granted independent mobility at a younger age than in English-speaking countries such as Australia, USA and the UK (Carver et al., 2013; Fyhri et al., 2011; Shaw et al., 2013)
- among parents; for example, more support for independent mobility [at a younger age] among English-speaking households in Toronto, Canada (Mammen et al., 2012), those who perceive it to be socially acceptable (Valentine, 1997), and among more disadvantaged families (Valentine 1997)
- based on trip distance, whereby older children are permitted a greater 'roaming distance' than younger children (Carver et al., 2014)
- according to whether or not the child attends primary or secondary school, with secondary school students permitted more independent mobility than primary school students of the same age (Carver et al., 2014).
- based on whether or not the child is accompanied by older siblings or friends (Carver et al., 2014).
- based on parent's perceptions of the safety of the neighbourhood (Faulkner et al., 2010).

The VicHealth-funded, La Trobe University study into parental fear as a barrier to children's independent mobility reported (based on focus group discussions with parents) that the transition from dependent to independent mobility involves a staged process, with parents and children negotiating and reviewing the boundaries, rules and conditions as children's levels of independence increased. It was also found that maintaining communication with parents via mobile phones played an important role in parents 'letting go':

> *Often, children would take a mobile phone with them and let their parents know when they had arrived safely at the destination. It was important that children were contactable when they didn't have adult accompaniment, and both parents and children viewed mobile phones as a safety measure." (Crawford, 2015)(p.14)*

In the survey component of the study, the proportion of children's unaccompanied trips to school increased steadily up to age 12, followed by a jump at age 13, which then levelled off (see Figure 10). In Victoria, children move from primary school to secondary school at about age 12, a transition that is associated with an increase in independent travel to school (Carver et al., 2013; Valentine, 1997).

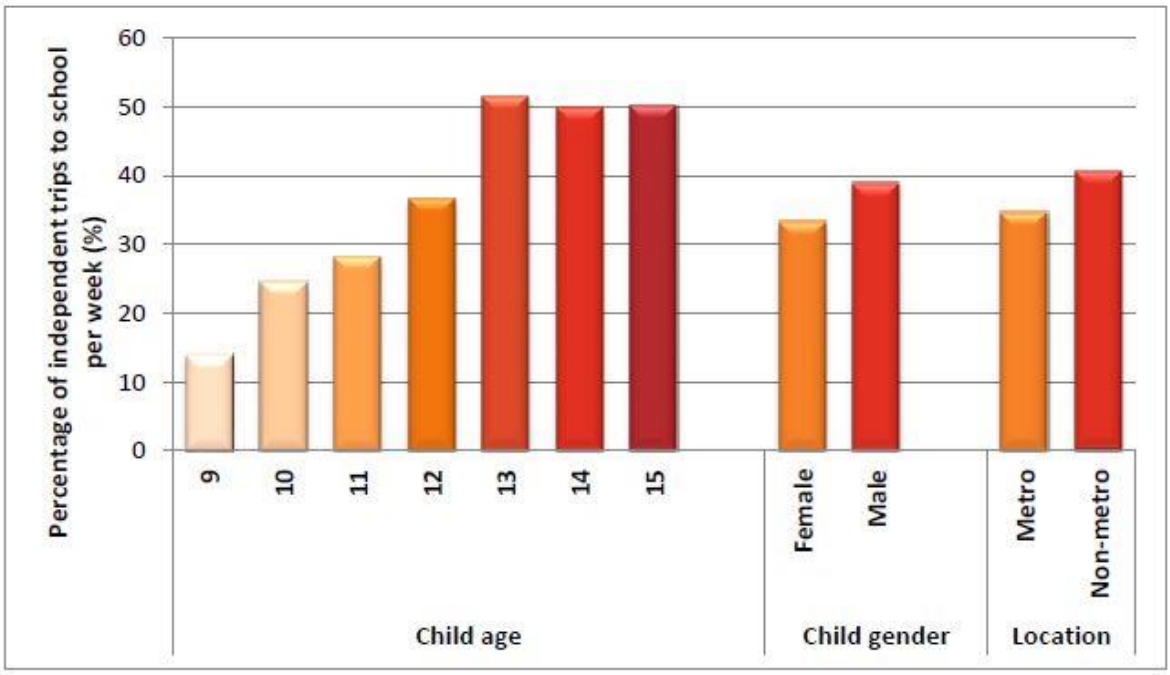

Figure 10: Percentage of trips to school (%) that children make per week unaccompanied by an adult by child age, child gender and geographic location.
(Source: Crawford et al., 2015)

While age is a predictor of independent travel to school, children's capabilities, and parents' assessments of them also play an important role. Analysis of qualitative data from primary school parents who were surveyed as part of the evaluation of the ***Way2Go*** **Bike Ed** program in South Australia indicates that parents' assessment of their children's ability to consistently cycle safely is key to their decision-making about allowing their child to cycle independently (Garrard, 2016).

In response to two items requesting parents to complete the sentences: "I will allow my child to ride on the footpath [road] without adult supervision when…", parents predominantly referred to their children having the awareness, skills, competence, confidence and experience to cycle safely on their own. Parents rarely mentioned a specific age, though the two are clearly associated. These findings suggest that programs such as school bicycle education (which provide children with cycling knowledge and skills) may contribute to parents allowing their children to travel actively to school. Indeed, one of the findings from the evaluation of the ***Way2Go*** **Bike Ed** program in four primary schools in South Australia was a post-program increase in the proportion of parents who considered that their children (aged 11-13 years) were able to ride safely on the road (with or without adult supervision) (Garrard, 2016).

These Australian study findings, together with large variations internationally in the age at which parents allow their children to travel to school independently, indicate that child age is an important predictor of independent travel to school, but so too are children's capabilities, parents' assessments of them, parents' experiences with gradually granting their children increased independence (as described in Crawford et al. [2015]), and social norms associated with children's independent mobility (see Section 4.4.2).

Summary:

- Children's independent mobility is associated with active school travel. That is, children who are permitted higher levels of independent mobility are more likely to walk or cycle to school, and less likely to be driven to school.
- Children's levels of independent mobility vary internationally. In England and Germany, children's independent mobility has declined over time, and this has probably also occurred in Australia (though no longitudinal data are available).
- The limited number of studies that assess accompaniment on the journey to school indicate that most active travel to primary school in Australia is unaccompanied by an adult (ie alone, or with siblings or friends).
- An evaluation of the pilot stage of the Victorian Ride2chool program involving two primary schools in metropolitan Melbourne found that the post-program increase in active school travel in the inner metropolitan school was mainly for unaccompanied walking and cycling (there was no increase in active school travel in the outer metropolitan school).
- In Victoria, children's independent mobility and independent travel to school increase steadily as parents negotiate, trial and review granting children increased independence, though transitions such as to secondary school appear to contribute to increased independent travel to school.
- Children's acquisition of safe walking and cycling skills plays an important role in parents' permitting their children to travel to school independently.

Implications:

- It is important to distinguish between independent and escorted active travel to school in terms of factors that influence escorted or unescorted active school travel, and strategies for addressing these factors.
- Child age has traditionally been seen as the key determinant of independent mobility, but other factors that are potentially modifiable are also important. These include skills, practice, confidence (child and parent) and social approval.

4 FACTORS THAT IMPACT ON PRIMARY SCHOOL STUDENTS' ACTIVE TRAVEL TO SCHOOL AND INDEPENDENT MOBILITY

As noted earlier, many factors impact on children's modes of travelling to and from school. 'Parental barriers' to active travel to school are an important sub-set of these influences on children's active school travel, but should not be seen in isolation from the environmental, policy and social factors that shape parents' perspectives and subsequent decisions (see Figure 1). In social-ecological models such as the one in Figure 1, the segments are mutually interactive. For example, distance to school is an objective environmental factor, but parents' (subjective) perceptions of "too far to walk/cycle to school" reflect personal perceptions of appropriate or 'normal' travel distances (see Section 4.3.2). Similarly, parents' assessments of "too risky" to travel actively to school result from complex

interactions between environmental, policy, social and intra-personal factors (see Section 4.2.4.1). For these reasons, while this review focuses on 'parental barriers' to active school travel, it also includes factors that shape parental perceptions that can then act as barriers to active school travel.

This section also combines research into correlates of primary school students' active school travel *and* children's independent mobility, as the two are inter-related, and both areas provide relevant research findings.

Most of the research findings in this section are presented under sub-headings based on the four segments of influence outlined in Figure 1. However, studies that investigate parents' self-reported reasons for choosing school travel modes (usually parent surveys) generally produce reasons that span the four segments. The following section describes these overall findings, before presenting the more segment-specific data.

4.1 Parent-reported reasons for accompanying and/or driving children to school

In their comparative study of children's mobility in Denmark, Finland, Great Britain and Norway, Fyhri et al. (2011) reported reasons why parents accompany their children to school in Great Britain, and reasons for driving children to school in Norway (see Tables 6 and 7). The main reasons given by parents in Great Britain, "Traffic danger" and "Fear of assault/molestation", are those that are commonly reported in English-speaking countries. In contrast, in Norway the main reason for driving children to school was "Same route as to parents' work", and "Dangerous traffic" was reported by far fewer parents. Also in contrast to the UK parents, 'Social safety' (eg fear of assault/molestation) was mentioned by few Norwegian parents.

Table 6: Reasons for parents accompanying their children to school, Great Britain (Source: Fyhri et al., 2011)

Reasons adults give for accompanying their children to school, respondents could give more than one answer, Great Britain 2008 (percent).
Source: British National Travel Survey (cf. the Methods section).

	Children aged 7–10 years	Children aged 11–13 years
Traffic danger	58	34
Fear of assault/molestation	29	23
Convenient to accompany child	21	30
School too far away	22	29
Child might not arrive on time	18	15
Child might get lost	19	7
Fear of bullying	6	6
Other	12	15

Table 7: Reasons for driving children to school, Norway
(Source: Fyhri et al., 2011)

Reasons to be taken by car, children aged 6–12 years, Norway 2006 (percent).
Source: Fyhri and Hjorthol, 2006.

Reasons to be taken by car	Percent
Same route as to parents work	58
Dangerous traffic	21
Fastest/easy	18
Other siblings are taken by car	17
Saves time for the parents	15
Too far to walk/cycle	14
Saves time for the child	14
The child wants it	12
Have much to carry	12
Unsafe of other reasons	5
Friends are taken by car	2

There are several possible reasons for these differences, including the different wording of the questions. In the evaluation of the Ride2School program in Victoria, Garrard et al. (2009) asked parents why they drive children to primary school (rather than asking why their children don't walk or cycle to school, which is the wording used in many similar parent surveys). The former question resulted in a high proportion of responses about the convenience, speed and comfort of car travel (similar to the Norwegian data in Table 7), with social safety and traffic safety less frequently mentioned (Garrard et al., 2009).

On the other hand, studies that ask about barriers to active transport (or why parents accompany their children, as in the UK data in Table 6) tend to produce higher levels of safety concerns. Clearly, both are important, with these study differences highlighting that travel mode choices involve (often implicitly) weighing up the advantages and disadvantages of active travel with the advantages and disadvantages of car travel. The community-based social marketing model (CBSM) presents a framework for fostering the desired behaviour (ie active school travel) by changing the balance of perceptions in these four areas (ie the advantages and disadvantages of active travel assessed relative to the advantages and disadvantages of car travel) in favour of active school travel (McKenzie-Mohr, 2011).

In their survey of 353 primary school parents and 196 secondary school parents from five areas in England in 2010, Shaw et al. (2013) also reported mixed findings for reasons why parents pick up their children from school (see Figure 11). Two key factors is response to this question were parents wishing to spend time with their children, and the opportunity for exercise or to get out of the house. While no breakdown was provided, many of these accompanied school trips from primary school are likely to be active trips (mainly walking), though for secondary school students a higher proportion are likely to be car trips.

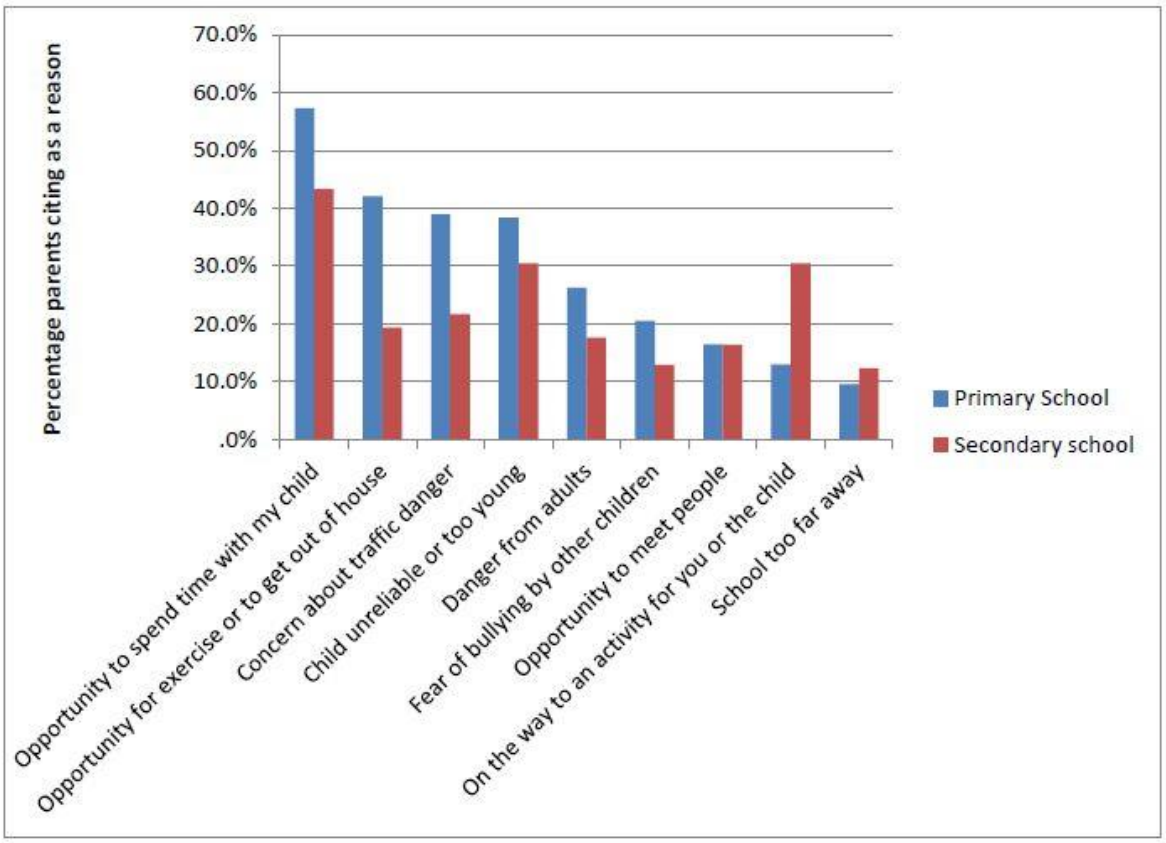

Figure 11: Percentage of parents responding to the question: 'What are the main reasons for picking your child up from school (even if you no longer do)?' by prompted responses.
(Source: Shaw et al., 2013)

In addition to question wording, it is also likely that the differences in responses by parents in Great Britain and Norway reported in Fyhri at al. (2011) and Shaw et al. (2013) are at least partly due to real differences in perceived safety for parents in these two countries. International differences in parents' concerns about social safety and traffic safety have been documented, with Bringolf-Isler et al. (2008), for example, reporting that 'stranger danger' is not a major concern for Swiss parents.

In a systematic review (incorporating 65 studies) of the relationship between active school travel and a wide range of correlates of active transport for 6- to 12-year-old children across different continents, D'Haese et al. (2015) reported that general safety[12] and traffic safety were associated with active school travel in North America and Australia but not in Europe. The authors suggested that these cross-country differences might be due to higher levels of safety for walkers and cyclists in Europe, particularly around schools. When most neighbourhoods have relatively high levels of safety (and perceived safety), active school

[12] Safety was subdivided into general safety, traffic safety and crime safety. Traffic safety consisted of items measuring safety aspects of the traffic situation such as the presence of traffic lights, speed bumps, traffic hazards and traffic volume. Crime safety consisted of the items measuring stranger danger, concerns of crime and violence. When safety was not further specified as traffic or crime safety (e.g. "it is safe to play outside"), items were classified under 'general safety' (D'Haese et al., 2015).

travel is less likely to be constrained by safety concerns. Similarly, in a Swedish study, independent travel was weakly associated with 'stranger danger', possibly due to higher levels of perceived security in Scandinavian countries (Johansson, 2006).

Safety concerns (social safety and traffic safety) featured prominently as barriers to children's active school travel in a recent systematic review of perceived barriers to children's active school travel (Lu et al., 2014) (see Table 8). Studies included both students' and parents' perceptions; and the authors defined 'perceived barriers' as "*a person's estimated level of challenges related to personal, environmental, social, and policy obstacles to active school travel*" (Lu et al., 2014). Part of the rationale for reviewing perceived barriers to active school travel was previous research suggesting that perceptions of the travel environment (conceptualised as a series of mediating and moderating factors for the link between urban form and children's travel behaviour) may have a stronger and more direct relationship with children's active school travel than objective factors such as urban form (McMillan, 2005).

Table 8 presents a summary of all statistically significant perceived barriers to children's active school travel identified in the review by Lu et al. (2014), categorised according to 'personal', 'physical', and 'social environmental' factors. Factors in these three areas (and the additional policy/regulatory area included in the social-ecological model in Figure 1) are described in more detail in Sections 4.2 to 4.5.

Table 8: Summary of statistically significant ($p < 0.05$) perceived barriers identified in reviewed studies (n = 19)
(The number in brackets refers to the number of studies that identified the categories of perceived barriers)
(Source: Lu et al., 2014)

Personal barriers (n = 6)	Physical barriers (n = 18)	Social environmental barriers (n = 10)
▪ No time ▪ Ease of dropping child off on the way to work ▪ Heaviness of the child's backpack ▪ Child's preference for being driven to school ▪ Walking requiring too much planning ahead	▪ Traffic safety (eg speed, volume) ▪ Distance ▪ Freeway/highway/crosswalks ▪ Road safety ▪ Bad weather ▪ Busy street ▪ No direct route ▪ Lack of sidewalks ▪ No/insufficient lights or crossings	▪ Neighbourhood safety ▪ Stranger danger ▪ Crime/danger ▪ Graffiti ▪ Worried child will take risk ▪ No other child to walk with ▪ Few children around ▪ Getting lost ▪ Stray dogs ▪ Exhaust fumes ▪ Personal safety ▪ Concern about something happening to child on the way

Summary:

- Research findings related to reasons why parents use active/inactive and/or accompanied/independent travel for primary school students come from both parent surveys and environmental measures, with some studies combining both.
- Parent surveys, which usually ask about factors spanning the four segments of the social-ecological model (Figure 1), produce some consistent findings, but also some mixed results depending on question wording and study location.
- Traffic safety and social safety concerns appear to be higher in English-speaking countries such as the UK and Australia, compared with some European countries where the convenience of car travel appears to be relatively more important.
- The convenience of car travel may emerge more strongly when levels of perceived safety are relatively high.
- However, the convenience, comfort and speed of car travel was important in a Victorian study which asked about parents' reasons for driving children to school, rather than 'barriers' to active transport.

Implications:

- Parents' reasons for using active/inactive and/or accompanied/independent travel for primary school students are complex and multi-faceted.
- Care needs to be taken with the wording of survey questions designed to obtain this information, and in the interpretation of survey findings.
- Nevertheless, perceived safety concerns (both social safety and traffic safety) and the perceived convenience of car travel are important barriers to active school travel.
- The 2-step active school travel decision-making process proposed by Faulkner et al. (2010) suggests that perceived safety is the key influence on whether or not parents allow independent travel to school (step 1), with considerations such as the benefits of driving, walking or cycling important for mode selection (step 2).

The following four sections describe findings categorised according to the four segments of the social-ecological model of school travel described in Figure 1.

4.2 Individual factors

Individual factors include demographic and psycho-social characteristics of children and parents.

4.2.1 Child demographic factors

Child demographic factors include age and gender, which were described in more detail in Section 3. In summary, studies consistently report higher rates of active school travel and independent mobility among older children, though the evidence for gender differences in active travel and independent mobility is not consistent. Shaw et al. (2013) report that the

gender 'gap' appears to be reducing over time, with some studies indicating that girls may achieve boys' levels of independent mobility by travelling in groups. Maturity and birth order (whereby second children are given more independence) have also been identified as influences on independent mobility (Johansson, 2006).

4.2.2 Child psycho-social factors

Child psycho-social factors include children's perceptions, attitudes, preferences, experiences, behaviours and habits.

Australian primary school children consistently report a preference for walking or cycling to school rather than travelling to school by car (Garrard et al., 2009; Wellness Promotion Unit, 2003). However, these findings may be influenced by the context of the surveys, which are often evaluations of active school travel programs.

Baseline (N = 479) and post-program (N = 358) surveys of students in years 4 to 6 conducted as part of the evaluation of the Victorian Ride2School program indicated very positive attitudes to active travel to school. For walking to school, the proportion of students who responded that they "Really like a lot" or "Like" walking to school was 69.9% at baseline and 71.7% at follow-up. Baseline and follow-up attitudes to cycling (81.3%, 80.8% respectively) and scooting/skating (55.4%, 53.8% respectively) were also positive (especially for cycling). Students' attitudes to car travel were less positive (37.2% "Really like a lot" or "Like" at baseline and 43.0% at follow-up) (Garrard et al., 2009).

Students' reasons for preferring active travel, based on qualitative data obtained from open-ended questions on the student survey, centred on (i) the benefits of fitness and exercise; (ii) enjoyment; (iii) the opportunity to socialise with friends; and (iv) quick travel time (cycling only). Responses were similar for walking and cycling (with the exception of quick travel time for cycling). Conversely, reasons for disliking car travel centred on (i) not enjoying car travel; (ii) lack of physical activity; and (iii) environmental concerns.

The review by Shaw et al. (2103) also noted the importance children placed on socialising with friends on the trip to and from school, with similar findings reported in the evaluation of the Victorian Walking School Bus program, where the preferred method of travelling to school for grades 3-6 students was walking to school with another child (48% of students, compared to 5% for walking with an adult, and 7% for walking alone) (Wellness Promotion Unit, 2003). In their study of parental fear as a barrier to children's independent mobility in Victoria, Crawford et al. (2015) also reported than children enjoy the social and emotional aspects of independent mobility.

In addition to enjoying active travel to school, students (in a limited number of studies) also report feeling safe travelling independently. In the survey component of their study, Shaw et al. (2013) reported that most English students felt 'very safe' or 'fairly safe' in their neighbourhoods (73 per cent of primary school girls and 77 per cent of primary school boys). Perceptions of safety were even higher for secondary school students, where 90 per cent of secondary school girls and 91 per cent of secondary school boys stated that they feel 'very safe' or 'fairly safe' in their neighbourhoods. However, for both primary and secondary

school students, more girls than boys stated that they feel 'fairly safe' rather than 'very safe'. The main concern for both primary and secondary students when they were outside on their own or with friends was 'strangers', particularly for girls. Traffic concerns were the least worrying (out of 6 prompted concerns) for primary school age children, and second least for secondary students (least was "Do not feel that I am old enough to go about on my own.").

Overall, these findings indicate high levels of enjoyment of active travel, awareness of the benefits of active travel and disbenefits of car travel, and relatively high levels of feeling safe when moving around in their neighbourhoods (in the English study conducted by Shaw et al., 2013). The latter finding for students is in contrast to the high levels of safety concerns often reported by parents. The findings also suggest that many students' active travel preferences are over-ridden by parents' choices of travel mode, often due to safety concerns and the convenience of car travel. These findings highlight differences between children's and parents' perspectives, indicating that one of the main barriers to active travel to school from students' perspectives appears to be parents' preferences for car travel.

Summary:

- Children's age (consistently), gender (inconsistently) and birth order are associated with active school travel.
- In surveys conducted as part of evaluations of active school travel programs, students express a strong preference for walking and cycling to school over traveling to school by car.
- The main reasons students gave for preferring active school travel were the benefits of fitness and exercise, enjoyment, the opportunity to socialise with friends, and quick travel time (cycling only).
- In a UK study, most primary school students felt safe in their neighbourhoods (though girls less so than boys), with social safety a greater concern than traffic safety.

Implications:

- Primary school students appear to prefer active travel to school over car travel, suggesting that barriers to active school travel reside with parents rather than children.
- Primary school age students (in the UK) shared parents' concerns about their social safety, but were less concerned than parents about traffic safety.

4.2.3 Parent demographic factors

Parent demographic factors that have been associated with children's active school travel include car ownership, ethnicity, socio-economic position, and parents' needs for trip-chaining. Socio-economic position is inconsistently associated with children's independent mobility and active travel to school (Shaw et al., 2013), as is location (urban or rural). There are also mixed findings for ethnicity, though there appears to be a tendency for minority

ethnic groups in Australia, the UK and other European countries to place greater restrictions on their children's independent mobility (Crawford, 2015; Mammen et al., 2012; Shaw et al., 2013).

In their study of 'parental fear', Crawford et al. (2015) reported that children were less likely to be independently mobile if they were:

- Younger (9-10 years old)
- Female
- Living in a metropolitan area (compared to a rural or regional area)
- Living with a disability
- Living with a younger parent
- Speaking a language other than English at home
- Had a parent with lower educational attainment (i.e. not a tertiary qualification)
- Living in a more disadvantaged neighbourhood.

Household access to a private motor vehicle is associated with driving to school, as is having a parent available for escorting, and trip-chaining requirements (including parents' travel to work and other destinations, and parents driving children to after-school activities) (Mitra, 2013; Lu et al., 2014; Wen et al., 2008; Fyhri et al., 2011).

On the other hand, parental flexible working arrangements (including working hours and work from home options), parents themselves travelling actively to work, and parents travelling actively to school when they were children are associated with children's active travel to school (Mitra, 2013; Wen et al., 2008).

4.2.4 Parent psycho-social and behavioural factors

Parental psycho-social influences on active school travel include factors such as perceptions, attitudes, trust in others, habits and social environments. One or more of these factors are often included in research into correlates of children's active travel to school and independent mobility, with concerns about 'stranger danger' (ie social safety) and traffic safety comprising key parent-reported constraints on children's active school travel and independent mobility (Carver et al., 2008; Crawford et al., 2015; Shaw et al., 2013). As noted by Fyhri (2009), parents' *perceptions* of the local environment are important, as the relationship between quality of the travel environment and independent travel has been found to be mediated by parents' perceptions of the safety of the travel environment (Fyhri & Hjorthol, 2009; Mitra, 2013).

4.2.4.1 Concerns about child safety

While parents' concerns about 'stranger danger' (ie social safety) and traffic risks have been consistently reported over many years, it has only been recently that attempts have been made to understand how parents assess these risks and the role they play in judgements about the level of independent mobility granted to their children.

Parental decision-making about children's independent mobility involves balancing a number of perceived risks and benefits. On the one hand, parents aim to protect their

children from harm caused by 'strangers' who share public spaces with children, and from traffic dangers. On the other hand, most parents are also aware of the physical, psychological and social benefits of children moving around actively rather than passively, and the need for children to learn independence and autonomy as they grow and develop. This can present a dilemma for parents, as they attempt to get the balance right.

Until relatively recently, the 'child safety' message has been dominant, and has undoubtedly contributed to the decline in children's active school travel in Australia in recent decades. More recently, as the benefits of active school travel have become well-established, it has been suggested that parents have become over-protective; with 'helicopter parents', 'cotton-wool kids' and 'bubble-wrapped children' (Crawford et al., 2015) now contributing to a different set of risks for the healthy development of children. This 'over-parenting' perspective proposes that in attempting to maximise child safety, we have failed to *optimise* child health and well-being; that is, when viewed holistically, we have not achieved an optimal balance of the risks and benefits of active/inactive travel and independent mobility for children. Understanding how parents view and assess these multiple and complex inputs into judgements about their children's active travel and independent mobility has been the subject of more recent research which is reviewed in this section.

A comprehensive, multi-method investigation into 'parental fear' funded by the Victorian Health Promotion Foundation (VicHealth) has recently been conducted by the Parenting Research Centre at La Trobe University. The aim of the study was to increase understanding of (i) the role that parental fear plays in shaping their children's independent activity; and (ii) factors that help parents give their children greater freedom. The study, involved students aged 8-15 years and their parents (Crawford et al., 2015).

The study found that parents were more likely to restrict their child's independent mobility if they were *"…concerned about being judged by other parents, family or teachers, if they did not perceive independent mobility to be beneficial, and if they believed that their child lacked the necessary skills to be safely independently mobile."* (Crawford et al., 2015, p.5).

Focus group discussions with parents revealed a range of personal beliefs, attitudes and social norms shaping parents' decision-making about their children's independent mobility. For example, some parents viewed children moving about the neighbourhood independently as 'lacking boundaries':

> *"I don't like the young kids that just look like they've been thrown out of their house on the weekend… They don't seem to have anywhere to go or a place to be… they kind of walk around a bit aimlessly between each other's houses and don't seem to settle. I don't like that... it annoys me that their parents wouldn't know where they are…"* (Mother of 12 year old twins & a 15 year old). (Crawford et al., 2015, p. 12)

Other parents described taking cues about appropriate 'mobility licences' from other parents:

> *"I probably wouldn't have let [my children] do it but then I think well obviously that parent is confident with their child doing it… so then I think well maybe I can instil a little*

bit more independence in them as well… so it takes sometimes another parent." (Mother of 10, 11 & 14 year olds). (Crawford et al., 2015, p.13)

The above two comments illustrate two important (and interactive) influences on parents' decision-making: (i) being 'blamed' for not being a 'good' parent by allowing levels of independence not considered by some parents to be appropriate or 'normal' (Skenazy, 2009); and (ii) basing their risk assessments on other parents' attitudes and behaviours. Both of these factors were also identified in a study in the UK (Valentine, 1997).

In relation to (i), minority behaviour is more likely to elicit 'blaming' than majority behaviour irrespective of the actual (quantitative) risks associated with the behaviour (Basford et al., 2002). Conversely, majority behaviour is less likely to attract blame, because "everyone is doing it", in which case adverse incidents are more often considered to be 'unfortunate accidents'. In countries like Australia, where active travel to school is now a minority behaviour, parents are more likely to be 'blamed' (usually implicitly) for exposing their children to the perceived risks of independent mobility; but not blamed for exposing them to the risks associated with driving children for long distances, because "everybody does it". In quantitative terms, the risks of walking or cycling for short distances are similar to the risks of driving longer distances (see below). In countries with high rates of active travel to school, the majority/minority behaviours are reversed, and so are the personal beliefs and social norms associated with active and inactive active school travel. When "everybody does active travel" parents are not 'blamed' for allowing their children to walk or cycle to school, but, on the contrary, may be criticised for driving them to school (see Section 5).

In relation to (ii), social psychologist Albert Bandura's social learning theory states that people learn from one another via observation, imitation and modelling (Bandura, 1986). In the words of Bandura, "*Of the many cues that influence behavior, at any point in time, none is more common than the actions of others*." (Bandura, 1986, p.206). Parents are unlikely to know the relative risks associated with walking, cycling or driving to school in quantitative terms, so their 'risk assessments' are based largely on risk perceptions, which in turn, are influenced by the behaviours of acceptable role models (eg other parents they respect), and other indicators of appropriate behaviour such as the school encouraging or discouraging active travel to school. Parents' perceptions of the risks of children walking or cycling to school independently may also be based on the everyday (sometimes unsafe) driving behaviours they observe and experience as drivers themselves. Surveys of Australian drivers consistently identify high rates of breaking road rules (Australian Associated Motor Insurers [AAMI], 2009).

Once again, in the high active school travel countries, driver behaviour appears to be safer than in Australia, as reflected in road fatality and serious injury rates (International Traffic Safety Data and Analysis Group, 2010). In addition, more active school travel role models are available in the form of children who use active school travel and parents who allow them to, and schools that actively promote active school travel and discourage car use.

The risk perception and risk communication literature also makes the important distinction between risk perceptions and actual risks. Actual risks comprise quantitative risk estimates, while risk perceptions include both quantitative and qualitative components (Fischhoff et

al., 2002). Drawing on the risk perception and risk communication literature, some of the qualitative components of risk perceptions relevant to independent, active travel to school compared with being driven to school are summarised in Table 9. This analysis was developed by Garrard (2011) for cycling in general (ie all ages), but is relevant for children walking and cycling to school.

Table 9: Qualitative components of risk perceptions associated with walking and cycling to school compared with driving

Components of risk perception	Driving	Walking/cycling
Sense of personal control over risk	High	Low?
Trust in others (for both personal and traffic safety) ("are they looking out for me?")	Yes	No?
Common/unusual	Common	Unusual
Discrimination: in-group/out-group	In-group	Out-group
Social cues	"Everyone is doing it"	"Not many people do it"
Vulnerability	Low (protective shell)	High (no protective shell)
Consequences	Usually minor	Potentially severe

People perceive risks to be lower when they have a sense of personal control over the behaviour. As a driver, we feel that we can keep ourselves safe by driving carefully in a relatively safe, protective vehicle; with studies showing that most drivers consider themselves "better than average" (Roy & Liersch, 2013). However, as a pedestrian or cyclist we are more dependent on the behaviour of other road users. Further, in the context of parents permitting their children to walk or cycle independently, parents are also ceding behavioural control to their children. These processes can lead to heightened risk perceptions over and above actual increased risks.

The second (related) factor in Table 9 is trust in other road users, encapsulated by the question "are they looking out for my child?" The 'looked- but-failed-to see' phenomenon that contributes to pedestrian and cyclists injuries has been partly attributed to drivers watching out for other vehicles, but 'not seeing' unexpected road users such as children moving around by foot or bicycle (Herslund & Jorgensen, 2003). This 'invisible walker/cyclist' effect may partly explain the 'safety in numbers' effect for cyclists and pedestrians, whereby larger numbers of pedestrians and cyclists are associated with lower rates of pedestrian and cyclists injuries (Jacobsen et al., 2009).

Trust in others (in relation to both personal safety and traffic safety) has been found to be associated with higher rates of active school travel (Lu et al., 2014; Mitra, 2013). In a Swedish study which investigated environmental and parental factors influencing mode choice for children's journeys to organized leisure activities it was reported that parents with a favourable attitude towards independent travel were more likely to express a strong trust in the environment and road users, while parents with a lower level of trust were more likely to judge the environment as unsuitable for independent travel (Johansson, 2006). The author also reported that different parents reacted differently to the same environment (independently assessed by five experts), highlighting the importance of parents' *perceptions* of the safety of the local environment on their willingness to allow their children to travel independently.

In relation to the third factor in Table 9, more common or frequent behaviours (ie 'everyday' behaviours such as driving) tend to be perceived as less risky than more unusual behaviours such as walking or cycling. This partly explains why, for example, 'fear of flying' is more common than 'fear of driving', although the risk of death or injury is much lower for flying (Oakes & Bor, 2010). It also helps to explain why a short walk or bicycle trip is commonly perceived as more dangerous than a long car trip, although the latter may carry a greater actual risk. It has been estimated that for young people aged 9-15 years in Australia, the risk (per km) for walking relative to travelling as a car passenger is 5.5 for a fatal injury and 12.5 for a serious injury; while the risk (per km) for cycling relative to travelling as a car passenger is 4.0 for a fatal injury and 7.0 for a serious injury (Cairney, 2010). Based on these estimates, a 1km walk carries the same (low[13]) risk of serious injury as a 12.5km car trip, and a 1km cycling trip carries the same (low[14]) risk of serious injury as a 7km car trip. Interestingly, for walking and cycling, the 9-15 year-old age group had among the lowest fatality and injury rates of all age groups, though an unknown number of these trips could involve parental accompaniment. While the above estimates need to be treated with some caution, as they are based on national travel data on trip distances collected in 1984, and numbers in some categories are small, they nevertheless indicate that short walking and cycling trips may be no more risky than many (longer) car trips.

For the remaining factors in Table 9, being a member of an 'out-group' (Basford et al., 2002), where "not many people do it", and high perceived vulnerability and potentially severe consequences of collision with a motor vehicle, all add to the perceived riskiness of active school travel. Public perceptions about vulnerability to, and consequences of collisions between motor vehicles and children moving around in their neighbourhood independently, are discussed in more detail in below.

In the risk perception and risk communication literature, on which the above analysis is based, improved understanding of people's risk perceptions can be used to develop 'fear reduction' measures.

[13] 3.87 serious injuries per 10 million km walked.
[14] 2.18 serious injuries per 10 million km cycled.

In an analysis of the risks (quantitative) and fears (qualitative) of cycling and how to address them, Garrard (2011) proposed the following 'fear reduction' measures, many of which are applicable to reducing parental fear as a barrier to children walking and cycling to school.

Table 10: Addressing risk perceptions through fear reduction measures

Components of risk perception	Fear reduction measures
Sense of control	▪ Cycling/walking skills, self-efficacy and experience
Trust in other road users (general and "are they looking out for me?")	▪ Road rules, enforcement and compliance aimed at improving the safety of vulnerable road users ▪ Improved public attitudes and support for road safety for all road users (eg speed control) ▪ Drivers responsible for avoiding collisions with child pedestrians and cyclists
Common/unusual	▪ Prioritise walking and cycling in urban areas ▪ Walking and cycling promotion
Discrimination/stereotyping	▪ Establish walking and cycling as legitimate forms of transport ▪ Address public and media negative stereotyping of people who ride bicycles (as has been done to address other forms of discrimination and stereotyping) ▪ Improve image of cycling, address misperceptions ▪ Increase social acceptability
Social cues	▪ Direct observation ▪ Making the invisible visible, eg, using active school travel role models to 'spread the word' ▪ Supportive school and community active school travel policies, programs and practices which send a message that active school travel is "acceptable" behaviour.

The above discussion outlines a complex area characterised by multiple interacting factors contributing to parents' safety concerns about children's independent mobility. Accordingly, it should come as no surprise that parents vary widely in the nature and extent of their concerns. The 'parental fear' study conducted Crawford et al. (2015) developed two scales to measure parental fear among Victorian parents. A Parental Fear scale assessed general parental concerns about children's safety when children are without adult supervision, and a Parental Fear of Strangers scale assessed fear of harm to children from strangers. The

frequency distributions shown in Figure 12 indicate wide variation in parents' fear ratings, with some parents expressing very few concerns, while others had moderate or high levels of fear. Age differences among children may partly (though not completely) account for these variations (see below).

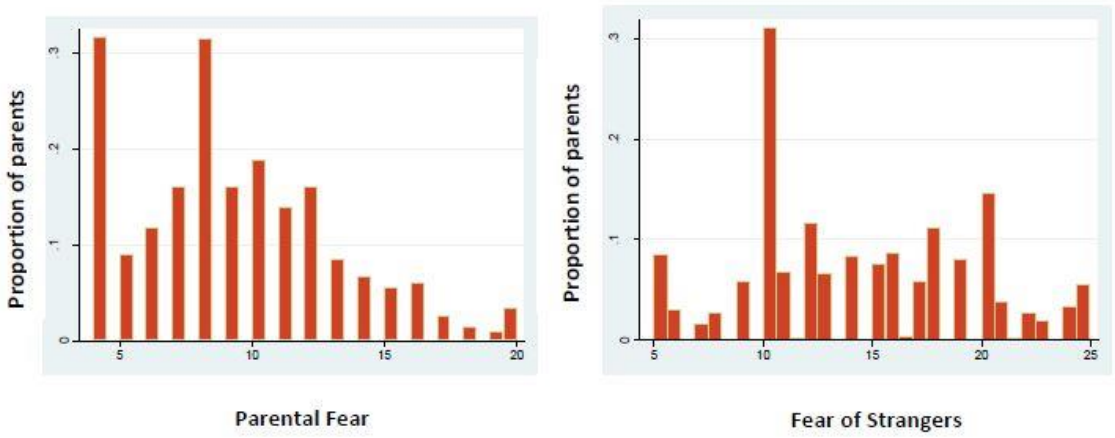

Figure 12: Distribution of scale scores for Parental Fear (4-20) and Fear of Strangers (5-25)
(Source: Crawford et al., 2015)

The study also found that in addition to the child's age (less fear for older children), gender (less fear for boys than girls) and location (less fear in non-metropolitan areas), other factors associated with greater Parental Fear and Fear of Strangers included:

- Greater parent psychological distress.
- A more protective parenting style.
- Perceiving the neighbourhood as less safe (eg child likely to get injured, bullied, lost).
- Having doubt in the child's abilities to travel competently (eg responsibly, careful in traffic).
- Being concerned that others (parents, school teachers/principal, family members) might disapprove of the child travelling to school independently.
- Placing less value on the benefits of children's independent mobility (eg making friends, learning independence, getting exercise).

(Crawford et al., 2015, p. 23)

Addressing concerns associated with vulnerability and adverse consequences (see Table 9)

Vulnerability and adverse consequences associated with active school travel have both actual and perceived components, and reducing traffic safety concerns as a barrier to active school travel involves improving both perceptions and actual risks of injury. Traffic injury risk perceptions were discussed above in relation to people's perceptions of the risks of driving, walking and cycling. While these perceptions are not always consistent with actual risks, research in the risk perception and risk communication field indicates that 'educating' people about actual (quantitative) risk is not effective on its own for changing behaviour if the behaviour continues to *feel* risky (ie the qualitative aspects of risk are not addressed).

Accordingly, efforts must be made to reduce the actual risk, and for parents to *see* that safety measures are being implemented; that they will not be blamed for allowing their children to travel to school unescorted; and that other people and respected institutions (eg schools, police, local and state governments, and community organisations) support active school travel. The implementation of observable, widely communicated safety measures (an example of "making the invisible visible" in Table 10) has multiple interactive effects. Schools and teachers will feel more comfortable promoting active school travel when action is taken to *make* it safer. Parents can see that trusted people and authorities are supporting active school travel, making it a more socially acceptable behaviour. As parental beliefs and behaviours change, active school travel role models increase, and active school travel becomes safer and is perceived to be safer, thus initiating a 'benevolent cycle'.

Reducing the risks of walking and cycling to school can be achieved by creating a safe system that places more emphasis on the safety of pedestrians and cyclists in general and children in particular. Placing greater emphasis on the safety of vulnerable road users was a key recommendation of the 2015 review of the Australian national Road Safety Strategy, which stated that *"The Safe System philosophy for vulnerable road users is not as well developed as for vehicle occupants*" (Lydon et al., 2015). A safe system that is more protective of vulnerable road users will also help to address parents' concerns that their children might make "one false move" while walking or cycling to school. This is discussed in the following section.

Reducing the harms associated with "one false move"

Another safety issue that emerged in the parent survey data in the ***Way2Go*** **Bike Ed** evaluation, was many parents' requirement that children need to demonstrate that they can *consistently* cycle safely before they will permit them to ride without adult supervision (Garrard, 2016).

Faulkner et al (2010) reported similar concerns among parents in Toronto, Canada:

> *"I know she [my daughter] would look [both ways when crossing the street], yes, but I don't know, sometimes in a split of a second something can happen. Let's say I allow her to walk with a group of friends when she's twelve ... and they didn't see some vehicle coming ... and something happens. It's unpredictable for that."*

These parents are expressing concern about the notion of "one false move" that has been used to promote child pedestrian safety in the UK, by *''... educat[ing] parents so that they understand more fully the risks involved and therefore take responsibility for the safety of their children*.'' (Hillman et al., 1990).

For many decades, child road safety campaigns in the UK, Australia and the USA have stressed the importance of children themselves "behaving safely" despite, as noted by Hillman et al. (1990) "*the source of traffic danger is traffic".* Placing the responsibility for safety on vulnerable road users themselves, particularly children, is in contrast to the high duty of care placed on motorists for the safety of child cyclists and pedestrians in many European countries with high levels of active school travel. This is partly achieved through

driver education that stresses the importance of watching out for child pedestrians and cyclists (Pucher & Buehler, 2008), and through "strict liability", whereby drivers are assumed to be at fault in collisions with child pedestrians and cyclists. The introduction of "strict liability" provisions in Australia to improve the safety of pedestrians and cyclists is considered unlikely, and possibly inappropriate; however, other measures can be adopted that shift the onus of responsibility more towards the road network and the road users that are the source of the harm to children moving around in public places (Vincent, 2015).

Australia's National Road Safety Strategy is based on the safe system approach, comprising safe roads, safe speeds, safe vehicles and safe people. Principles that underpin the safe system approach include the acknowledgement that people occasionally make mistakes, and that *"The transport system should not result in death or serious injury as a consequence of errors on the roads*". A safe system provides a road transport system that is 'forgiving' of these errors "*so that humans are not exposed to impact forces beyond their physical tolerance*". (Australian Transport Council, 2011, p.34).

Establishing a safe system that is more forgiving of child pedestrians' and cyclists' occasional mistakes, through measures such as reduced vehicle speeds in residential areas, and establishing a high duty of care for drivers to avoid collisions with pedestrians and cyclists, will assist in addressing a major parental constraint on children's active independent mobility.

Two other findings from the evaluation of the ***Way2Go*** **Bike Ed** program also point to potential strategies for addressing parents' concerns about traffic safety. One is children's participation in education programs (such as Bike Ed) that teach safe cycling knowledge and skills. As mentioned above, parents surveyed as part of the ***Way2Go*** **Bike Ed** program evaluation were confident that the program helped to provide children with appropriate safe cycling knowledge and skills (Garrard, 2016). In response to another survey question about who is best placed to teach children how to ride a bicycle, parents nominated Bike Ed instructors as the people best able to teach children how to ride due to their specialised knowledge and expertise. However, parents also considered that parents themselves were well-placed to provide the opportunities for children to *practise* their cycling skills, as Bike Ed programs were considered too short to provide the ongoing experience children require to consistently put their knowledge and skills into practice. Parents who cycle with their children can provide this experience. They are also in a position to observe whether and when their children can consistently cycle independently and safely. These findings may help to explain why parents who cycle or walk themselves are more likely to allow their children to cycle or walk to school. The influence of parental travel behaviour is discussed in the following section.

Summary:

- A number of parental socio-demographic factors have been associated with children's active school travel, though findings are not always consistent across studies and are likely to be dependent on study location.
- One fairly consistent finding is that minority population groups appear to have lower rates of active school travel.
- Access to a motor vehicle (and driver) is negatively associated with active school travel.
- Parents' use of active travel as a child or currently appears to be associated with their children's use of active school travel
- Key constraints on children's independent active school travel are parents' concerns about social safety and traffic safety, with parents' *perceptions* of the safety of the travel environment an important mediating factor between the quality of the travel environment and children's independent mobility.
- Deciding when, where, how, and under what circumstances to allow their children independent mobility is a difficult decision for parents.
- A large Victorian study found that parents were more likely to restrict their child's independent mobility if they were concerned about being judged by other parents, family or teachers; if they did not perceive independent mobility to be beneficial; and if they believed that their child lacked the necessary skills to be safely independently mobile (Crawford et al., 2015).
- Two important interactive influences on parents' decision-making are: (i) being 'blamed' for not being a 'good' parent by allowing levels of independence not considered by some parents to be appropriate or 'normal'; and (ii) basing their risk assessments on the attitudes and behaviours of family member, other parents, and the wider community.
- The risk perception and risk communication literature also makes the important distinction between risk perceptions and actual risks.
- Consideration of the qualitative components of risk perceptions relevant to independent, active travel to school can assist in understanding and addressing parents' concerns about social safety and traffic safety.
- Short walking and cycling trips are no more risky than many (longer) car trips, but are often perceived to be more risky due to a number of 'qualitative', perceptual factors.
- In the risk perception and risk communication literature, improved understanding of people's risk perceptions can be used to develop 'fear reduction' measures.
- A number of 'fear reduction' measures are applicable to reducing parental fear as a barrier to children walking and cycling to school.
- The Victorian study of 'parental fear' reported wide variations in parents' fear scores, and identified a number of factors that influence parents' fear ratings, some of which are amenable to change.

Implications:

- Increased understanding of the wide variations in parental concerns about social safety and traffic safety will assist in the development of strategies to address them. Dual strategies are required that reduce the actual and perceived risks of children walking and cycling to school independently.
- Schools, in collaboration with road safety authorities, should be encouraged to develop a Safe System strategy that focuses on active travel to school, and is incorporated into a school active travel policy[15] (see Section 4.5).

4.2.4.2 Parental travel behaviour

There is consistent evidence that children who use active school travel are more likely to have parents who use active travel themselves. An evaluation of school TravelSmart programs in NSW reported this relationship, and recommended targeting parental travel behaviour as a means of increasing children's active school travel (Wen et al., 2008). In their investigation in Toronto, Canada, of the differences in perceptions of parents who let their children walk unescorted to school and those parents who escort (walk and drive) their children to school, Mammen et al. (2012) reported that children who walk to primary school (both escorted [81%] and unescorted [79%]) were more likely than children who were driven to school (66%) to have parents who walked to school when they were children, suggesting that familiarity with walking to school may influence parents' decisions to allow their own children to walk to school. Similarly, in Davis, California, a high-cycling city in the USA, in households where parents rode every day, 34% of children rode their bikes to soccer; while in families where parents never cycled, only 2% of children rode to soccer (Tal & Handy, 2008). Consistent with these findings, an analysis of Norwegian national travel survey data found that parents' frequent car use was associated with reduced independent mobility among their children (Fyhri & Hjorthol, 2009).

A possible mechanism for this relationship may be that parents who use active transport are more likely to walk or cycle to school with their children when the children are young, with children then transitioning to unescorted active travel when parents perceive that they are ready for more independent active travel. Parents who do not walk or cycle to school with their children at a young age, or use active travel themselves, may feel less able to teach their children safe walking and cycling, and to judge when their children are ready to walk or

[15] While many schools participate in activities and programs aimed at increasing active school travel, few appear to have developed and implemented comprehensive 'active travel to school' policies. For example, an over-arching school Active Travel policy (along the lines of school Healthy Eating Policies, or SunSmart policies) could be developed by School Councils, and communicated to parents. Such a policy could state an overall commitment to encouraging active travel to school, together with some combination of programs (eg Bike Ed), activities, curriculum, 'school rules' (eg parking, school uniforms/bags/books), and infrastructure (eg secure bike storage) that support active travel to school. A school Active Travel policy could also include working with other agencies (eg DPTI, local councils) to, for example, improve traffic safety around the school. A school Active Travel policy could also assist in removing barriers to active school travel and provide a 'lens' through which other school decision-making could be viewed, asking, for example, "Is decision X consistent with encouraging active travel to school?"

cycle independently, and therefore less likely to allow their children to do so. Also, when children and parents are in the habit of driving to school at a young age, they might be less likely to swap to active transport when the children are capable of walking or cycling independently. Travel mode 'habits' offer a possible explanation for the association between parental and child use of active travel modes (Park et al., 2013). The extent to which habitual travel behaviour influences travel mode 'choices' is a relatively under-research psycho-social factor in travel mode selection, particularly in relation to children's active travel.

4.2.4.3 Travel behaviour 'habits'

Habits refer to "*sequences of learned behaviour that are automatically carried out in response to a specific set of contextual cues*" (Johansson, 2006). In car-oriented countries such as Australia, driving is commonly the 'default' travel mode for most trips regardless of location, distance and purpose; and travel mode choices become less 'rational' and more automatic and habitual.

A recent review of the influence of social and psychological factors, such as perceptions, attitudes, habits and social environments, on cycling for transport (which included studies of both adults and children) noted a small number of studies on the role of travel habits (Willis et al., 2015). People who are in the habit of cycling are more likely to cycle in the future, while those who had never contemplated cycling have the least positive attitudes towards cycling. In the Netherlands, de Bruijn et al. (2009) found that habit strength was a major predictor of total minutes of bicycle use. Ducheyne et al. (2012) examined the role of child and parental opinions about cycling and found that a strong habit of cycling was associated with increased cycling, and Gatersleben and Haddad (2010) found a strong relationship between past cycling behaviour and intentions to cycle.

In the interview-based study conducted in Toronto, Canada, Faulkner et al (2010) reported that some parents described school travel as a habitual behaviour:

> "….a 'routine' involving 'no real thought' because it was something they did on a daily basis*:*
>
> *'I suppose it's habitual because obviously it's what we do all the time'.*
>
> One participant described the trip to school as being as routine as waking up in the morning:
>
> *'No [I don't think about it], if anything I don't even have that in my mind; it's like okay, we've got to go to school the same way - you have to stand up to wake up is the same way we have to take the car to school'."*

Faulkner et al. (2010) noted that what might start off as a considered decision to drive to school can develop into "*routinized behaviour that no longer required a conscious decision-making process.*"

A study of young people's travel to secondary school in New Zealand included insights into factors that contribute to travel habits (Frater, 2015). In this instance, in a focus group discussion, a 13 year-old girl highlighted a multitude of small factors that can add up to the perception that bike riding would "just be a pain":

> *"Yes, it's usually like just a hassle to get like you know...cause you have to open the garage, make sure the cats don't get out, get the bike, find a helmet that fits, rearrange all my stuff, cause I have my folder that I take with me everywhere [motioning to a large pink ring binder on the desk]. I'd have to sit that on my knees while biking and it would just be a pain."*

As noted by the researcher, individually, these constraints are not major or insurmountable (Frater, 2015), and similar constraints could be listed for car travel. However, when a particular travel mode becomes a habit, the constraints associated with the habitual travel mode have been addressed (by reducing or accepting them), while those associated with a change in travel behaviour can present as a major barrier.

These studies highlight the limitations of over-reliance on parents' self-reported barriers to active school travel, and reasons for driving children to school. Parents responding to survey questions rarely report that they drive their children to school or won't allow them to walk or cycle to school because they are in the habit of driving to most places; in many cases because surveys do not include this item. Acknowledging the limitations of self-reported data is important for identifying and addressing the full range of parental barriers to active travel to school. For example, when parents are asked about barriers or constraints on active travel to school, these type of 'barriers' questions consistently elicit high levels of concern about the safety of active travel. In contrast, when parents are asked why they drive their children to school, they are more likely to cite the convenience, comfort and speed of car travel more frequently than concerns about the safety of active travel (Garrard et al., 2009) (also see Section 4.1). In this sense, the convenience and habit of car travel act as constraints on active travel, though it is rarely stated as such in parental 'barriers to active school travel' surveys, and rarely addressed in interventions aimed at increasing active travel to school.

However, the perceived travel advantage of relatively short trips to school by car can be reduced through measures such as reduced speed limits in residential (and school) areas, reduced car parking in and around schools, car-free zones around schools, and shared zones around schools where cars must yield to pedestrians and cyclists (World Health Organisation, 2013). Life transitions such as the transition from kindergarten to primary school, or primary school to secondary school provide an opportunity to review and possibly change current driving habits.

Summary:

- Parental use of active transport as a child or currently is associated with children's active school travel. Possible reasons for this association include parents' positive attitudes to active transport; familiarity with active transport enabling parents to teach children walking and cycling safety; and parents being able to assess (through observation) when their children are ready for independent active school travel.
- When children are in the habit of being driven to most places when they are young, it may be harder for them to transition to active school travel when they are at an age when it is more feasible.
- In car-oriented countries like Australia, driving a car to most destinations most of the time becomes habitual behaviour.

Implications:

- Guidelines should be developed to assist parents to break the habit of regular car use for trips that are potentially walkable or bikeable.
- Measures are likely to include preparation and planning for active school travel that, over time, make the active travel choice an easier choice (eg readily accessible bicycles; secure and accessible bike storage at school; identifying and practising safe, pleasant routes to school).

4.3 Environmental factors

4.3.1 Overview of environmental factors

Mitra's (2013) review of research findings on the correlates of active school travel identified a number of neighbourhood environmental factors. Mitra (2013) reported that factors that support active school travel include shorter travel distance; living in an urban location; lower traffic volume, and absence of major street crossings. Similar environmental factors were reviewed by Lu et al. (2014).

The impact of shorter travel distance on active school travel is generally attributed to reduced travel time, but Mitra (2013) also notes that parents are more likely to allow their children to travel alone for short distances, so shorter travel distance may support independent active school travel. As Faulkner et al. (2010) note, parental decision-making about travel to school involves decisions about accompanied or unaccompanied travel, together with decisions about travel mode. Shorter distance appears to support active travel on both counts.

Mixed findings have been reported for pedestrian connectivity (eg intersection density, presence of footpaths and pedestrian crossings). Land use design, including residential density and mixed land use, are also inconsistent predictors of active school travel. These built environment factors have been more consistently associated with active travel among adults, indicating that urban form may be less important for children's active school travel. The differential impact of urban form on children's active school travel appears to be due to

the higher traffic volumes that are often associated with street connectivity, residential density and mixed land use. Giles-Corti et al (2011) reported that, after adjustment, regularly walking to school was higher for children attending schools in neighbourhoods with high street connectivity and low traffic volumes, but less likely in neighbourhoods with high connectivity but high traffic volumes (Giles-Corti et al., 2011). Other studies have reported differences in the impacts of a range of built environment factors according to young people's age and gender (Carver et al., 2008b).

Mixed findings have also been reported for the relative importance of "Too much traffic at school drop-off points" and "Too much traffic along commonly travelled school routes", with local government authorities, school and parents reporting differing perspectives. While perspectives differ, it appears that both types of "too much traffic" are likely to act as barriers to active school travel.

While a great deal of research has found relationships between environmental factors and active school travel, studies that include parental psycho-social variables in addition to environmental measures indicate that the relationship between environmental factors and independent active school travel is mediated by parents' perceptions of (traffic) safety en route to school. A study based on the Norwegian national travel survey of 2005 found that the effect of the quality of the physical environment (amount of car traffic and percentage of footpaths on the route to school) on independent travel to school was mediated by parents' perceptions of safety. The authors stated that: "…*any measure aimed at increasing walking and cycling via improved traffic safety only will be effective if parents' experience of traffic safety is improved.*" The study also found a relatively weak association with 'stranger danger' which the authors suggested may reflect the higher feelings of security in Scandinavian countries (Fyhri & Hjorthol, 2009) (also see Section 5).

Climate and weekly weather have not been associated with active school travel, though weather conditions at the time of travel can influence travel mode choice (Mitra, 2013). Terrain (eg steep slope) has also been found to influence school travel mode choice (Timperio et al., 2006).

As noted above, trip distance is a consistent determinant of active travel to school (Davison et al., 2008; Mitra, 2013), and "too far" to walk/cycle is one of the main barriers to walking or cycling to school reported by Australian parents (Salmon et al., 2007). However, differing perspectives on "too far" suggest that "too far to walk/cycle to school" is socially as well as environmentally determined. The evidence for a perceptual/social element of "too far to walk/cycle to school" is discussed in the following section.

4.3.2 Travel distance

The likely influence of social norms and expectations on feasible/appropriate distances to walk or cycle to school emerges from school travel data in Europe, Japan, and in Australia over time, which show marked variations in trip distances for active trips to school. For example, data from 10 municipalities in Denmark show that walking and cycling are the predominant modes of travel to school for distances up to 3 km, and rates of active travel remain substantial for all trip distances up to and beyond 8 km (see Figure 13).

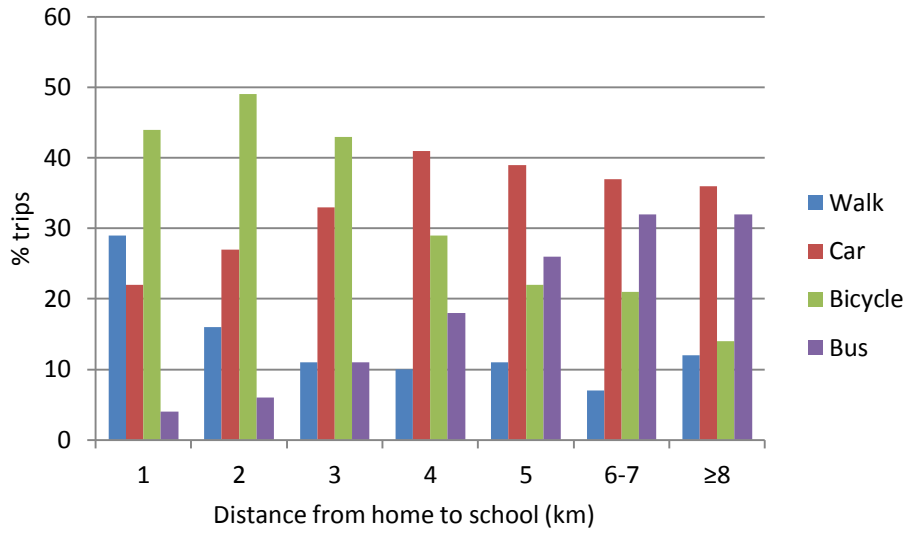

Figure 13: Mode share of all trips to/from school by distance, 10-15 year olds, 10 Danish municipalities, 1998-2000
(Source: Jensen & Hummer, 2003)

Victorian data indicate that between 1984 and 1994, walking to education declined substantially for relatively short trips up to 1km, replaced mainly by car trips (see Figure 14). There was also a marked decline in walking and cycling rates for trips between 1km and 5km (see Figure 15). These data indicate that, in Australia, car trips have replaced active travel trips for potentially walkable/bikeable distances.

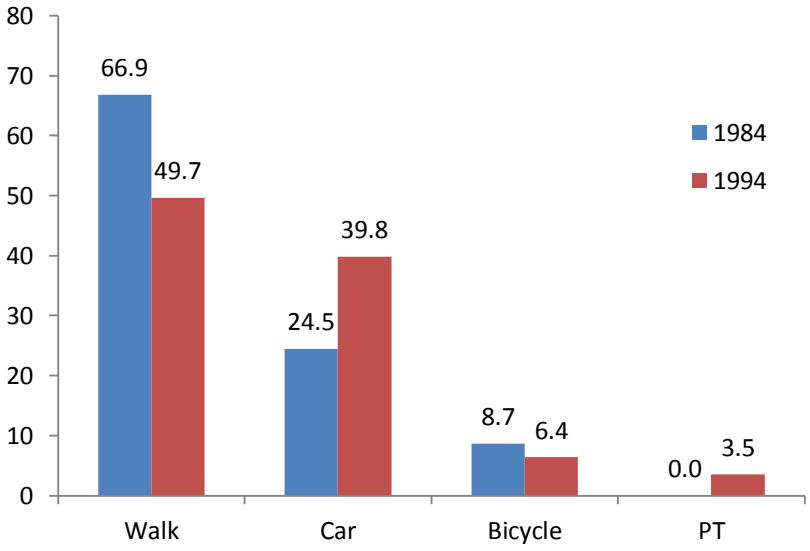

Figure 14: Mode of travel to school (1984) or education (1994) for trips less than 1 km, respondents' usual mode of travel (%), Victoria

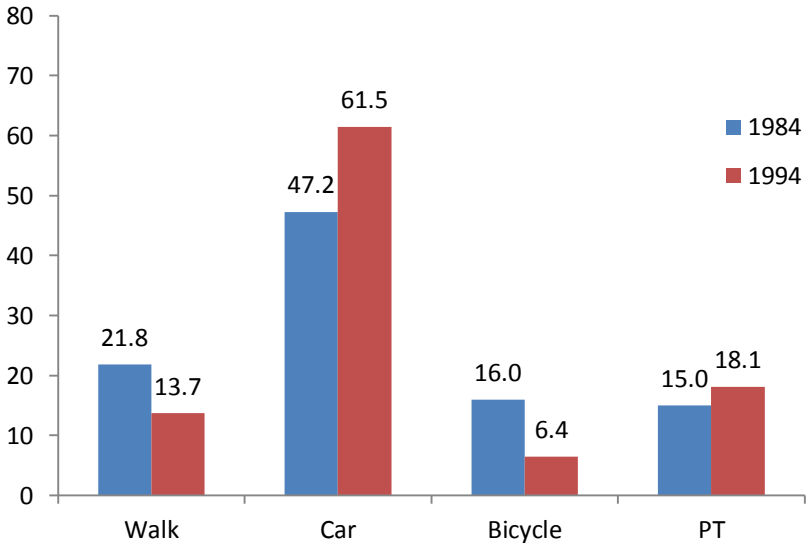

Figure 15: Mode of travel to school (1984) or education (1994) for trips between 1 km and less than 5 km, respondents' usual mode of travel (%), Victoria

Increased car use over time for short trips to school that are potentially walkable or bikeable has also occurred in the USA and Canada (Garrard, 2010). For example, based on data from the 2001 US National Household Travel Survey (NHTS), McDonald (2007) reported that in 2001, 36% of children's trips of less than one mile (1.6km) to school were by private car, compared with 7% in 1969; while the percentage of walking and bicycle trips of less than one mile to school decreased from 87% in 1969 to 55% in 2001 (McDonald, 2007). McDonald partly attributed the decline in active school travel to school consolidation resulting in increased trip distances, but the marked changes over time for similar trip distances indicate that distances that were considered walkable/bikeable in 1969 were less likely to be undertaken by foot or bicycle in 2001.

As further evidence of the perceptual component of "too far to bicycle to school", a study of secondary school students in Davis, California, found that perceptions of "too far to cycle" differed for students who cycle to school and those who don't (Emond & Handy, 2012). For trip distances greater than 2 miles (3.2km), non-cycling students were more likely to agree that "I live too far from school to bicycle" than students who cycle (see Figure 16). The authors noted that "*perceived distance is more strongly associated with bicycling than actual distance*".

In addition, as described in Section 2.2, in the city of Izegem in Belgium, which includes inner city and suburban neighbourhoods, longer trip distances to school resulted in greater time spent travelling actively to school by both walking and cycling, rather than increased driving to school, as occurs in Australia (van Dyck et al., 2009).

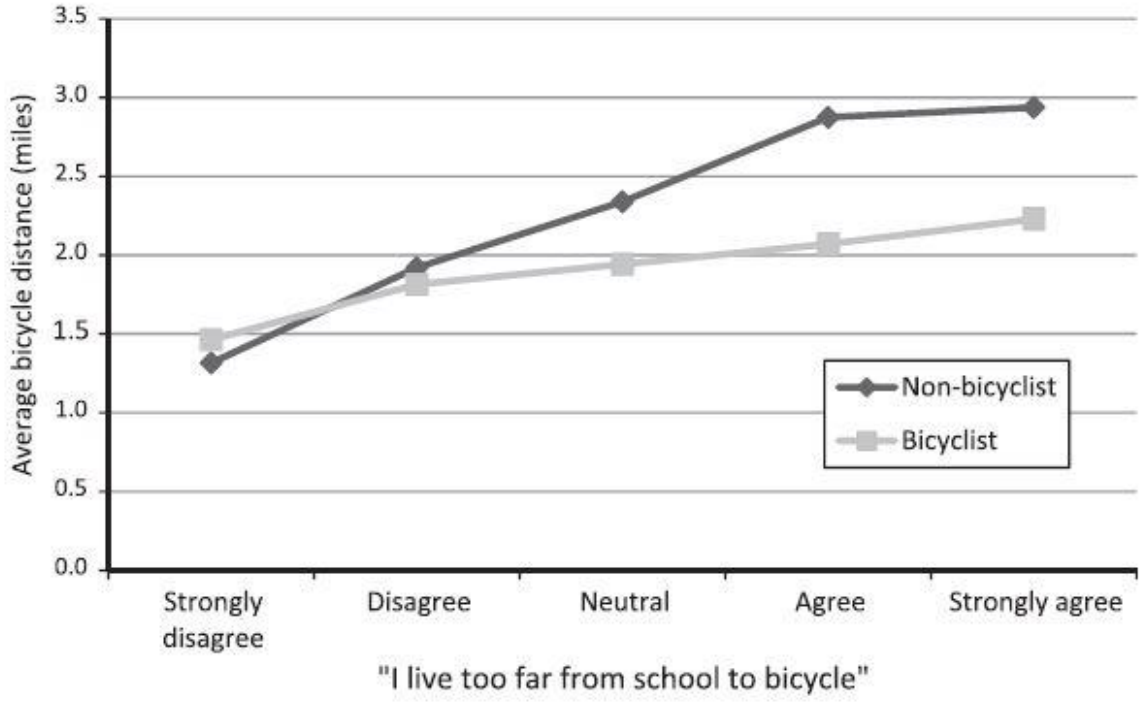

Figure 16: Actual vs. perceived bicycle distance, bicyclists vs. non-bicyclists. (Source: Emond & Handy, 2012)

As discussed in Section 5.1, many Japanese children continue to walk long distances to school (98% of Japanese children travel actively to school), through a combination of government policies requiring active travel to school, and social norms and sanctions that support active school travel and discourage car use (Mori et al., 2012). Similarly, in several European countries, active school travel has declined over time, but not to the same extent as in English-speaking countries (see Section 2.2).

These time trend and international comparative data show wide variations in the distances that children walk or cycle to school. While there has been little research into differences in parents' perceptions of a walkable/bikeable distance to school, a key factor appears to be 'competition' from driving. In a study of travel mode choices for relatively short-distance trips in Valencia, Spain, based on focus groups discussions with 23 adults, participants were asked for the maximum distance they would be willing to walk for transport. The maximum distance people were willing to walk for transport ranged from 10 to more than 60 minutes[16], and appeared to depend on car use. People who stated (in response to an earlier question) that travel by car was their first or second mode choice were relatively evenly split between willingness to walk 10-20 minutes (n = 6) and > 20 minutes (n = 5). In contrast, people who stated non-car methods as their first or second mode choice nominated 10-20 minutes (n = 1) and > 20 minutes (n = 11) (Ferrer et al., 2015). Participants also reported "no car parking at destination" as a reason for walking. These findings indicating that car use/non-use impacts on the distance people are prepared to walk; that is, a 10-20 minute trip might be "too far to walk" if car travel is an option, but not if car travel is unavailable.

[16] The study assessed travel distance based on travel time, which was considered to be more accurate.

Consistent with these findings, car ownership/access is negatively associated with active school travel (Mitra, 2013; Wen et al., 2008). This relationship has also been found for secondary school students in Davis, California (some of whom are old enough to drive to school), with Emond and Handy (2012) reporting that one of the most important predictors of cycling to school was whether or not parents provided access to a car.

Travel time appears to be a key factor in parents' school travel mode choice, with a study of parents' school travel mode choices based on interviews with parents in Toronto, Canada, reporting that when walking is time-competitive with driving, parents are more likely to walk:

> *"It's faster to walk than get the car out of the driveway".*

And:

> *"Even if we drove we'd still have to find parking and so it's basically an even balance. Walking is the fastest".*

And:

> *"I mean, especially in the winter, I mean, I know people say they don't walk because of the weather, [but] I walk because of the weather in that for me to clear the driveway, clear the car, and get it out for such a short distance, it's silly, so we just walk."*
>
> (Faulkner et al., 2010)

Another parent stated that, for her, the 'easy way' (ie by car) was more important than 'the healthy way':

> *"But again, it goes back to whether you want to do it. You always have to go back to that, if you can do it the easy way, I'm going to choose the easy way versus the best, healthy way to do it, I'm always going to choose the easy way, unfortunately*."

In contrast, some parents from high SES (socio-economic status) schools expressed the opposite perspective; that is, they walked as part of an overall "active healthy lifestyle":

> *"We're just active, there's no way that we will get into the vehicle and drive somewhere if we can walk or bike."*

However, this was a minority perspective, with most parents across all SES and built environments not perceiving the trip to/from school as an important opportunity for physical activity, because their children were already active:

> *"Well, the advantages of walking [to/from school] are health reasons, obviously - your activity. But that's not really a concern for us because we all do a lot of physical activity. For some families it's good because that may be the only physical activity their kids get, or even they get, but for us it's not a concern."*

The travel time/distance constraints/supports for active school travel described above are mainly relevant for parent-accompanied travel rather than children's independent active school travel, as it is mainly parents rather than children who face time pressures. For these and other reasons, Faulkner et al. (2010) highlights the importance of distinguishing

between escorted and unescorted travel to school; proposing a two-step process where the first decision is accompanied or unaccompanied travel, followed by travel mode selection, with different factors influencing each of the two steps. Faulkner et al. (2010) proposed that accompanied/unaccompanied travel is influenced by safety concerns ('stranger danger' and traffic safety); while travel mode selection is mainly influenced by time considerations.

It is also likely that "too far" interacts with "too risky", in that, as distance increases, perceived and actual exposure to potential hazards increases. Accordingly, while a 1km walk to school might be considered an acceptable and safe distance, a 2km walk might be considered 'too far' to walk *safely*. This is consistent with the finding that the further the distance from home, the more restrictions are placed on children's independent travel (Zwerts et al., 2010).

Summary:

- Distance to school is one of the major constraints on active travel to school, but evidence from a range of sources indicates that "too far to walk or cycle", needs to be understood not just in terms of quantitative distance but also in terms of the environmental, psychological, cultural and lifestyle factors that shape perceptions of "too far".
- Changes in urban form to reduce school trip distances (eg increased density, more local schools and better street connectivity) are long-term investments in increasing rates of active travel to school by reducing actual trip distances. However, students' and parents' perceptions of a walkable/bikeable distance for the school commute may be amenable to change in the shorter-term.
- In Australia, car trips largely replace walking trips for trip distances greater than about one kilometre, but in several European countries, cycling replaces walking for many trips greater than 1 km.
- Reduced travel time is a key reason for driving to school. When walking or cycling is quicker and/or easier than driving, parents are more likely to choose active travel.
- Similarly, lack of access to a car leads to more active travel for longer distances.

Implications:

- There is potential to increase active school travel by reducing trip distance to school by establishing more compact urban form, local schools, and school enrolment zones.
- Understanding why potentially walkable and bikeable distances are considered "too far" may assist in expanding 'perceptual walk/cycle catchments'.
- A component of "too far to walk/cycle" is likely to be "too much time". Reducing the time advantage of car travel to school (eg limited parking, area-wide reduced speed limits, or "no vehicle zones" around school areas) and the *perceived* time advantage of car travel to school might contribute to increase active trips to school.
- There is considerable potential to expand active school travel distances by encouraging more cycling to school.

4.4 Social/cultural factors

4.4.1 Overview of social/cultural factors

Social/cultural factors include social safety[17], behavioural norms, and social/cultural beliefs, attitudes and expectations. Social factors also include a number of parental and household characteristics; however, these have been described in Section 4.2.1.

Many studies have identified parental concerns about 'stranger danger' and general crime as barriers to active school travel (Lu et al., 2014) (see Table 8). The strength of the association varies substantially between countries and between neighbourhoods within countries, and for parental socio-demographic characteristics. 'Stranger danger' is a greater barrier to active school travel in English-speaking countries such as Australia compared with several European countries and Japan (Bringolf-Isler et al., 2008; D'Haese et al., 2015; Fyhri et al., 2011; Johansson, 2006).

While numerous studies ask parents about 'stranger danger', fewer studies have investigated the flip side of these concerns; namely, the role of factors such as sense of community, community engagement, and trust in others as supports for children's independent active school travel. These factors come under the umbrella of 'social capital', which has been defined as "*the links, shared values and understandings in society that enable individuals and groups to trust each other and so work together*" (OECD, nd, p.103). Research in this field commonly examines structural (social networks, associations and participation) and cognitive or attitudinal (shared norms and habits of trust and of reciprocity) components of social capital (Fieldhouse & Cutts, 2009).

Associations between social/community connections and independent active school travel have been reported in Rome, Italy, where Prezza et al. (2001) found that independent children aged 7-11 were more likely to live in apartment buildings with courtyards and near parks, with mothers who have strong neighbourhood relations. The authors suggested that these mothers may rely on 'diffused social control' in the form of passive observation and support from other neighbours (Shaw et al., 2013). This form of community oversighting of children's wellbeing in public spaces has also been reported in Germany and Japan (see Section 5).

These findings might partly explain the fairly consistent finding that minority population groups are less likely to use active school travel and allow their children independent mobility (see Section 4.2.3). Research in the field of psychology suggests that trust is more prevalent among people who resemble each other and is therefore more widespread in more homogeneous communities. Ethnic and linguistic diversity can lead to decreased levels of interpersonal trust, with the dominant groups tending to be more trusting that minority groups (Fieldhouse & Cutts, 2009).

[17] Social safety' is a term used here to describe protection or the feeling of being protected against the dangers caused by human actions in public spaces. Examples of these incidents are aggressive behaviour, public drunkenness, vandalism, drug trading and use, assaults and murder (Zwerts et al., 2010).

A key element of social influence on children's independent mobility and active school travel, as well as an important component of social capital, are social and cultural norms of behaviour. These are discussed in the following section.

4.4.2 Social norms

This section examines the evidence related to social and cultural norms about how people in the community usually behave, and/or are expected to behave, in relation to school travel behaviour. Subjective norms can be injunctive (ie how one ought to behave) or descriptive (ie how we perceive other people behaving). Descriptive norms are communicated via observation; for example, driving children to school is perceived to be 'normal' when parents see most other parents doing it.

Social norms also include those associated with 'good mothering' or parenting (Shaw et al., 2013). Valentine (1997) demonstrated through in-depth interviews with English parents how 'common-sense' understandings of the levels of independence that children can be granted develop through 'repetitive acts of parenting' and are reinforced through the interactions with other mothers.

In their study of parental fear as a barrier to children's independent mobility, Crawford et al. (2015) reported (based on data from the parent survey component of the study) that:

> *"At all ages, parents' perceptions of the views of other family members, schools and other parents influenced their decisions about children's independence. Children whose parents reported more disapproval from family, schools and other parents were less independent in their play and travel and independent trips to school."* (p. 20).

The observation and communication of social norms related to children's independent mobility and school travel behaviour can come from many additional sources besides other parents. Crawford et al. (2015) included the following example[18] of an interesting source of communication about community norms associated with children's independent travel:

> *"For example, in the two regional areas, when children turn 10 years old the local swimming pool issues them a 'ticket' granting them entry to the pool without an adult. This policy was a catalyst for independent travel to and from the pools, as well as independent active play at the pools."* (Crawford et al., 2015, p. 12)

School policies and communications with parents are another important source of influence on parents' perceptions about appropriate methods of children's travel. Often, schools reinforce messages about risks to children who travel to and from school independently. For example, at one primary school, a parent commented that:

> *"Just from reading the [school] newsletters sometimes I feel like the schools are saying that it's not okay for the kids to be walking home unless they're over a certain age. I get that vibe that they're certainly saying all kids need to wait in the courtyard and the*

[18] This is also an example of the influence of child age on independent mobility as noted in Section 4.2.1.

parent has to come in and get them. And I think, well what if you do want your child just to walk to the corner..." (Mother of 7 & 11 year olds) Crawford et al., 2015, p. 12)

The presence or absence of school policies supporting active travel to school is also likely to reinforce parents' perceptions that independent active school travel in the school community is considered acceptable or not acceptable (see Section 4.2.4.1).

Valentine (1997) investigated the role of social influences on children's mobilities in Greater Manchester, Cheshire, Derbyshire and South Yorkshire, in the UK. The study included a survey completed by nearly 400 parents of children aged 8-11 years old and in-depth interviews with 70 parents from `middle-class' and `working-class' backgrounds.

Valentine (1997) reported that many of the mothers interviewed were conscious of the pressures on them to live up to the ideal of what was constructed as `good' practice and were anxious to avoid the blame (for being too lax or too strict) and the guilt that goes with failing to keep in line with peer group behaviours and expectations. In order to fit in with community expectations of being a 'good mother', some women restricted their children' s independent mobility in ways that they did not consider necessary, whilst others gave their children greater independence than they would have preferred. In other words parenting decisions are often made not on the basis of perceived or actual risks but to conform to perceived behavioural norms:

"You think cos I'll say it sometimes to Gemma [friend], I say well, I said, is David allowed to do that or er is Simon allowed or? And you think umm, it's a difficult one, you're always checking yourself against other people I think to see what is the norm. (Mother, `middle class', urban metropolitan borough, Greater Manchester)" (Valentine, 1997).

Previous sections have described the influence of social norms on parents' perceptions of the safety of walking and cycling (Section 4.2.4.1) and appropriate distances to walk or cycle to school (Section 4.3.2).

Consistent with the research findings reported above, a review of 24 studies which summarised the literature concerning the influence of social and psychological factors on the choice to cycle for transportation reported evidence of the importance of these factors on bicycle commuting, especially:

"…*perceptions of benefits and barriers to cycling, perceptions of safety, attitudes towards cycling and other modes of transportation, habits, and the influence of family, friends and the workplace*" (Willis et al., 2015).

Summary:

- When faced with complex decision-making associated with the risks/benefits and advantages/disadvantages of independent/escorted travel to school by walking, cycling or car it is not surprising that parents look to external sources for guidance.
- These sources include family, friends, other parents, teachers, the wider community, and the media, including social media.
- Social norms associated with travel to school and parenting practices are created and recreated as part of everyday life, and are an important influence on parents' decisions about travel to school.
- Differing rates of children's independent mobility and active school travel internationally, and in Australia over time, are indicative of differing social/cultural norms of parenting practices and modes of travel to school.
- Social distrust in the form of 'stranger danger' has been well-researched as an influence on active school travel, but 'trust in others' has been less well-researched. There is anecdotal evidence that parents are more concerned about stranger danger when trust in others is low.

Implications:

- Community engagement and community-building strategies can assist in building social capital and sense of community, community engagement, and trust in others as supports for children's independent active school travel.
- Use of parents who use active travel to school as 'role models' may assist in promoting active travel to school.
- Further research is warranted into the extent and degree to which schools support/promote active school travel, reasons for support or lack of support, and parents' *perceptions* of whether or not schools support active school travel.

4.5 Policy/regulatory factors

4.5.1 Overview of policy/regulatory factors

Policy/regulatory factors include policies from the three tiers of government (local, state and federal) across the multiple sectors that impact on active school travel (transport, planning, education, health and the environment). As illustrated in the social-ecological model of travel behaviour in Figure 1, there is considerable interaction between policy/regulatory factors and built environment factors; as urban form, transport networks and school locations are largely the products of these policies.

While many government policies impact on children's travel behaviour, few have been investigated in active school travel research studies, with most focussing on distance to school, traffic safety, and, occasionally, school travel policies.

In contrast to the more immediate environmental and individual-focussed influences on active school travel, it can be difficult to assess the influence of government policies on active school travel because (a) their influence is often indirect and therefore 'invisible', and

(b) the macro-level nature of many of these policies means that there may be little variation across localities. International comparative studies can point to their influence, but at this level, many factors are often involved, making it difficult to isolate the impact of individual policy measures.

While the impact of macro-level policies on active school travel can be difficult to measure precisely, their influence is likely to be substantial because they impact on a large number of people. For example, lowering speed limits in residential areas has the potential to impact on the whole population of the area, including children walking and cycling to school. The setting of speed limits, and traffic calming in general, is a policy area with considerable potential to impact on active travel for both adults and children, as traffic speed impacts on both actual and perceived traffic safety, which are key parental barriers to active school travel (see Section 4.2.4.1). Evidence for the impact of speed reduction measures on active school travel is described in Section 4.5.2 below.

Similarly, planning, transport and education policies (eg school size, location and enrolment zones) impact on the travel behaviour of large numbers of parents and students, but travel to and from school is rarely a consideration in developing these policies in Australia. In contrast, in Japan, Zurich and Munich, these policies are based on the expectation that children will walk or cycle to school (see Section 5).

In a study of barriers to and facilitators of walking and bicycling to school in the US based on focus group discussions with parents and children, Ahlport et al. (2008) found that barriers and facilitators reported by parents and children included the policy characteristics of the school. The authors concluded that "*a supportive environment is a necessary but insufficient condition to increase walking and biking to school. Initiatives to increase active school travel may need to include multiple levels of intervention to be effective*."

A component of the 'parental fear' study conducted by Crawford et al. (2015) addressed issues around the impacts of a range of policies on children's independent mobility. The study included an expert consultation phase where 47 practitioners with an interest in children's independent mobility from a range of sectors provided recommendations and strategies to promote children's independent mobility. Participants in the workshops referred to a number of policies and legislation that potentially conflicted with attempts to facilitate independent mobility and active transport for children.

Examples included that children attending after-school care must be signed out by an adult, meaning that older siblings cannot collect younger siblings and walk them home. Age recommendations for children to walk independently (10 years) and cycle near traffic (12-13 years), with highly publicised legal implications for parents who allow their children to be independently mobile, were considered to send negative messages to parents about permitting their children 'unacceptable' levels of independent mobility. The report noted that *"The tension between legislation which tends to favour risk aversion, and the promotion of children's independence, was seen to cause confusion and conflict for parents, schools, Local Government and community workers*." (Crawford et al., 2015, p.26).

This "confusion and conflict" is counterproductive to creating consistent messages of support for active travel to school (see Section 4.4.2). As described in Section 5, consistent,

community-wide expectations of, and support for active school travel are features of achieving high rates of active school travel in Japan, Zurich and Munich.

4.5.2 Speed reduction

A small number of studies that have investigated the impact of area-level speed reduction on active transport suggest that speed reduction in residential areas can lead to increased walking and cycling. For example, there is some evidence to indicate that 20 mph (32 km/h) areas in the UK contribute to increased walking and cycling (including for children travelling to school), improved traffic safety, and an increase in residents' perceptions of traffic safety and support for lower speeds (see Appendix A for details). At a more macro level, international comparative data support the results that have been reported for local areas in the UK; with speed reduction (usually ≤ 30 km/h) considered an important component of the package of measures that contribute to high levels of safe walking and cycling in several European and Asian countries (Buehler & Pucher, 2012; Pucher & Buehler, 2012; Pucher et al., 2010).

A review of research into the associations between neighbourhood environment and physical activity among children and adolescents found some evidence of an association between traffic speed/volume and physical activity (leisure-time and transport) for children, but not for adolescents, though only a small number of studies included objectively measured speed/volume (Ding et al., 2011).

A study in Louisiana, USA, which focused on active travel to school, found that parental concern about the speed of traffic on the route to school was associated with lower rates of children walking or cycling to school in the five study schools, after controlling for distance to school (Gustat et al., 2015). In addition, sites with the highest PEDS (Pedestrian Environmental Data Scan) score had the highest percentage of students who walked or cycled to school. Environmental attributes assessed in the PEDS tool include type of pedestrian facility, path material, obstructions, sidewalk continuity, connectivity and condition, road condition, lanes, speed, parking, driveways, crossing aids, way-finding aids, shade, cleanliness, degree of enclosure, bicycle lanes, and public transport facilities (Gustat et al., 2015).

A study that investigated personal and neighbourhood environmental characteristics associated with active transport among inhabitants of disadvantaged neighbourhoods in the Netherlands found that perceived speed of traffic ("The speed of traffic in nearby streets is normally low [30 km/h or less]") was the only neighbourhood environmental characteristic that was associated with walking for transport. The authors reported that younger adults walked more when speed of traffic in nearby streets was perceived as low, but the study did not include school children (Saris et al., 2013).

Dill et al. (2014) investigated environmental and psychological correlates of walking and cycling in three neighbourhoods in Portland (OR), USA, including interactions between them. Environmental factors included the number of miles of low-traffic streets (defined as streets with daily traffic volumes of less than 3,000 vehicles and speeds of less than 25 mph [40 km/h]) (Dill et al., 2014), with the authors concluding that:

> *"…a well-connected network of low-traffic* [low-speed] *streets with sidewalks, coupled with destinations nearby, can support higher levels of walking and bicycling"*.

These are the conditions that exist in many European and Asian cities that have high levels of walking and cycling, including children walking and cycling to school (Pucher & Buehler, 2010).

An investigation of the relationship between individual and neighbourhood environmental factors and cycling for transport and recreation among adults in Perth, Western Australia, reported that the presence of traffic slowing devices (among a range of environmental attributes) was positively associated with cycling for transport (Titze et al., 2010).

Most studies of the relationships between environmental characteristics (including traffic safety and speed) and walking or cycling behaviour have been correlational analyses of cross-sectional survey data. These analyses are able to identify associations (eg between environmental walkability and walking behaviour), but are unable to establish definitively that high walkability, however defined and measured, *causes* an increase in walking behaviour.

In an attempt to address these limitations, a large Dutch study used longitudinal data to examine whether changes in perceived neighbourhood traffic safety between 2006 and 2009 were associated with changes in physical activity (Jongeneel-Grimen et al., 2013). Data were accessed from national surveys of housing in the Netherlands in 2006 and 2009. The sample comprised a total of 57,092 Dutch residents aged 18–84 years living in 320 neighbourhoods. The study found that an increase in levels of perceived neighbourhood traffic safety (level of agreement with the statement ''I think the traffic situation in this neighbourhood is safe'') was associated with increased odds of being active. Consistent with gender differences in adverse traffic conditions as a barrier to active transport, the association was stronger for women (Jongeneel-Grimen et al., 2013).

The authors concluded that "*The associations observed with these change measures provide new and stronger evidence for a causal relationship between neighbourhood traffic safety and PA [physical activity]. This new evidence supports the expectation that improving traffic safety in neighbourhoods may result in an increase in PA among neighbourhood residents."* (Jongeneel-Grimen et al., 2013).

The authors also make the important point that while the effect of improving traffic safety on individual-level physical activity may seem small, small percentage point increases in physical activity levels at the community level can represent a large number of people over a long period of time. While this study was for adults, there is consistent evidence that adult parental perceptions of traffic safety impact on children's active school travel.

A study in Switzerland examined neighbourhood interactions, use of public space and the personal feelings of belonging among residents in three types of streets in the city of Basel, Switzerland: a 50 km/h street; a 30 km/h street; and three home zones (20 km/h and pedestrian priority) (Sauter & Huettenmoser, 2008). Lower speed limits were associated with more positive perceptions of traffic safety in the neighbourhood. The proportion of residents stating that their street is quite or very dangerous for children and elderly persons decreased with street speed (85% of residents in the 50 km/h street, 51% in the 30 km/h street, and 24% in the home zones). Residents also reported more contact between neighbours in streets with slow moving traffic, limited space for parking and good environmental qualities.

A recent evaluation of a 'self-explaining roads' (SER) project in New Zealand (incorporating several elements of 'home zone' type street treatments) reported improvements in vehicle speed, crashes and pedestrian behaviour (Mackie et al., 2013). In SER treatments, the road environment effectively provides a signal for road user behaviour for the particular type of road, and there is less need for separate traffic control devices such as additional traffic signs to regulate traffic behaviour such as vehicle speed (see *Self-explaining roads*, European Commission Road Safety, available at: http://ec.europa.eu/transport/road_safety/specialist/knowledge/road/designing_for_road_function/self_explaining_roads.htm).

The New Zealand project (in a suburb of the City of Auckland) reported lower vehicle speeds (mean speed of 30 km/h), a 30% reduction in crashes, and a higher proportion of pedestrians (particularly children) on the local roads that were part of the project.

'Road diets' are another form of traffic calming increasingly being implemented internationally. Road diets reduce the number of traffic lanes on selected roads, and use the additional space to widen footpaths, introduce or widen roadside landscaping, or construct bicycle lanes. An evaluation of road diets in 45 treatment sites in California, Iowa and Washington reported a 19% to 49% reduction in total crashes relative to reference sites (Turner-Fairbank Highway Research Center, 2010). The report did not include data on walking and cycling rates.

Summary:

- Policy/regulatory factors are under-researched but potentially important influences on active school travel, including via the influence that policy/regulatory factors have on the built environment.
- At the local level, school active school travel policies have the potential to influence children's active school travel, including by helping to establish a 'culture' of active school travel that supports parents who allow their children to travel to school independently.
- Studies that have investigated the impact of interventions aimed at lowering traffic speed on walking and cycling rates provide some evidence of increased walking and participation in 'street life'.
- More consistently reported (and measured), were improved perceptions of traffic safety among residents following the introduction of traffic calming measures.
- Based on consistent evidence that traffic safety concerns are a major barrier to children walking and cycling (see Section 4.2.4.1), residents' perceptions of increased traffic safety are likely to lead to increased walking and cycling in traffic calmed areas, including for children walking and cycling to school.

- There are also some indications that while short reduced speed zones (eg school zones, and traffic calmed residential streets) can reduce traffic injuries for pedestrians and cyclists, it is likely that more extensive reduced speed areas (ideally ≤ 30km/h in all residential areas) are required to increase safety, perceived safety *and* walking and cycling for transport within neighbourhoods. This is likely to be particularly important for increasing children's cycling trips to schools for intermediate trip distances (eg 1-3 km) that in Australia are largely undertaken by car; but, in extensively traffic-calmed neighbourhoods in some European countries are cycled (see Section 2.2).
- International comparative data support the findings described above; with speed reduction (usually ≤ 30 km/h) considered an important component of the package of measures that contribute to high levels of safe walking and cycling (Pucher et al., 2010; Buehler and Pucher, 2012; Pucher and Buehler 2012).

Another policy-driven factor that is a key determinant of active school travel is the distance from home to school (also see Section 4.3.2).

4.5.3 Policy impacts on travel to school distance

Several policy-related factors influence trip distance, including population density, street connectivity, school location, and whether or not educational policies require that children attend their nearest public school. Shaw et al. (2013) report that in the UK, parents have increasingly been permitted to enrol their children in public school of their choosing, which may not be the nearest one available. Based on National Travel Survey data, trips to primary schools have increased from an average of 1.3 miles (2.1km) in 1995/97 to 1.5 miles (2.4km) in 2010 and to secondary schools from 2.9 (4.7km) to 3.5 miles (5.6km) over the same period (Shaw et al., 2013). These increases in school trip distance are likely to have contributed to declining rates of active school travel in the UK over this time period, though other factors such as increases in female participation in the workforce, and car ownership are also likely to have contributed to the decline.

Consistent with the above data, a UK study that investigated the relationship between travel distance and school travel mode cited (UK) Department of Transport National Travel Survey data for 1992/94 indicating a 28% decrease in the annual distance walked by children since 1972, together with a 20% increase in average distance travelled to school, which was partly attributed to increased emphasis on school choice (DiGuiseppi et al., 1998). School travel distance was strongly associated with travelling to school by car, and independent and faith-based schools had more children travelling to school by car than local authority schools.

Differing school enrolment policies in the USA[19] enabled an analysis of the association between school type and school travel mode. Wilson et al. (2010) found that 'choice schools' drew from larger geographic areas than schools where children were required to

[19] Many school districts in the United States allow parents to choose which school their child attends ('school choice' or 'magnet schools') while other school districts require students to attend their nearest ('neighbourhood') school. (Wilson et al., 2010).

attend the nearest 'neighbourhood' school, and rates of walking and cycling to school were lower for 'choice' schools.

Summary:

- Several policy-related factors influence trip distance, including population density, street connectivity, school location, and whether or not educational policies require that children attend their nearest public school.
- The policy of public school choice contributes to longer trip distances and increased car travel.

Implications:

- Requiring children to attend their nearest public school reduces trip distance and increases active school travel.
- This policy reduces parents' choice of schools; however, in countries such as Switzerland and Japan, that have adopted this policy, efforts are made to ensure that all public schools provide high quality education, so that parents do not feel disadvantaged by the lack of choice (see Section 5).

Section 4 has described multiple influences on rates of active travel to school across the four domains of individual characteristics and physical, social/cultural, and policy/regulatory factors. The following section describes case studies of places where addressing various combinations of these factors has resulted in high rates of active travel to school.

5 ACHIEVING HIGH RATES OF ACTIVE TRANSPORT TO PRIMARY SCHOOL: INTERNATIONAL CASE STUDIES

5.1 Active travel to school in Japan

As mentioned above, there are substantial cross-country differences in rates of active and independent travel to school. Though European countries such as the Netherlands, Denmark and Germany are often the focus of attention as role models for achieving high rates of active travel to school, Japan has one of the highest rate of active travel to school in the developed world (98% of children attending public elementary and junior high schools travel actively to school) (Mori et al., 2012). Much of this is independent travel, including at an early age. In a recent media report of a study investigating differences in children's independent travel in Japan and Australia, it was stated that:

> "*Her [the researcher] interviews with Canberra families revealed most parents began to think about letting their children walk to school aged 10, while in Japan parents were happy to let them walk alone aged six.*
>
> *'If you go to a public school in Japan you go to the closest school, so you don't have much choice and the system makes sure every school has the same quality of education,' she*

said. Traditionally there is a sense of community, so the older kids look after the younger kids on the walk and parents volunteer to watch them at busy intersections'."

(http://www.theage.com.au/act-news/academics-investigating-why-students-are-not-walking-or-cycling-to-school-20150720-gigjzy.html#ixzz3nvIL8ijQ)

Japan provides an interesting case study of how a wealthy, highly-motorised country (with an average of one car per household in the Osaka region for example [Susilo et al., 2012]) has managed to maintain very high levels of active travel to school. This case study describes the initiatives that have contributed to these very high levels of active (usually independent) travel to school.

The very high level of active travel to school in Japan has been achieved by a combination of factors across the four domains of influences on travel modes depicted in Figure 1. While several of these factors are specific to Japan (and also to several European countries with high levels of active travel to school), there are also potential lessons for countries such as Australia, where car travel has become the dominant form of travel for nearly all trips, regardless of trip distance, purpose, and location.

A key policy/regulatory factor that supports walking and cycling to school in Japan is a component of the national School Education Act (implemented in the 1950s) which specifies that, where possible, municipal authorities should ensure that children can attend an elementary school within 4km of their home, and a junior high school within 6km (Mori et al., 2012). Children are normally required to attend a local school within this catchment area, and all schools are supported and expected to provide high quality public education (to avoid parents enrolling their children in schools further from home).

Although there is no national statutory provision to walk to school in Japan, local boards of education generally make it compulsory to walk to school if the school is located within the walking distance specified above. If the school is outside this range, as is common in rural areas, boards permit the use of public transport, bicycles and school buses. It appears that this walk to school policy is enforced via school policies and social pressure rather than regulation (Susilo et al., 2012).

Although a small number of municipal authorities have reduced walk to school trips from a maximum of 4km or 6km to 2km (by establishing more local schools, in order to *"…avoid children walking for more than 1 hour to and from school*"), it is clear that, in general, Japanese children are expected to walk to school for distances that would be considered "too far to walk" in Australia, where the average walk to (primary) school trip distance is about 700 metres[20] (also see Section 4.3.2).

Improving the safety of children walking to school has been important in achieving high rates of walking to school in Japan. The safety of children travelling independently to school in Japan is a priority for the national government, municipal authorities, and boards of education. Specific initiatives (under the umbrella guidelines "*Safety of Children Walking to*

[20] Based on Victorian data collected as part of the VicHealth Walk to School program.

and from School") directed at improving the safety of children walking or cycling to school complement the overall relatively low crime rates and traffic fatality and injury rates in Japan, which are among the lowest in the OECD (OECD, 2015) (http://www.keepeek.com/Digital-Asset-Management/oecd/transport/road-safety-annual-report-2015/road-safety-performance-in-2013-and-2014_irtad-2015-5-en#page21.) Speed limits in urban areas are generally low (30-40km/h), and Japanese drivers are relatively courteous and patient, including in their interactions with pedestrians and cyclists (Mori et al., 2012).

The Japanese Ministry of Education, Culture, Sports, Science, and Technology has published the *Safety of Children Walking to and From School* as a guideline for boards of education and schools. This guideline consists of the following five components:

- Dissemination of information about suspicious areas on school routes, and conduction of safety inspections to ensure safe conditions.
- Safety management of schoolchildren when walking to and from school.
- Promotion of safety education to equip children with skills to be able to avoid risk.
- Sharing of information on suspicious individuals on a regular basis.
- Cooperation with police to promote safety measures during commuting.

(Mori et al., 2012)

Individual schools are responsible for operationalising specific safety initiatives within these broad guidelines, depending on the characteristics of the particular district. School staff, volunteers from the local community, parent-teacher associations, and local government institutions such as police may all be involved in making commuting to school safer. In many instances, parents, school staff, and local volunteers are involved in identifying potential hazards, and supervising children walking or cycling to school (eg group walking involving teachers and caregivers, guided commuting for young children, inspections of school routes, patrolling by the local volunteers, and sharing information). Other examples include:

- students preparing a sheet of safety measures and discussing these measures on the way to and from school with their parents to avoid becoming alone on the school route
- carrying a personal alarm in easy reach at all times in public
- always traveling in a group to and from school
- walking on well-lit and busy routes
- knowing how to react if threatened or approached by a stranger
- never entering a car or any other private or secluded area with a stranger or suspicious person, and
- always ensuring parents know where students are and where they are headed.

(Mori et al., 2012)

The Japanese walk to school policies outlined above are an illustration of a country taking effective action to maintain high rates of active travel to school despite the rapidly increasing rates of car ownership and use that occurred in Japan and other industrialised countries in the post-war period. While countries such as Australia have tended to view high and increasing levels of driving children to school as the inevitable by-product of urban

living in affluent countries, European countries such as the Netherlands, Denmark and Germany, and Asian countries such as Japan have not accepted the 'inevitability' of high and increasing levels of escorting children by car. Instead, they have implemented policies that make walking and cycling to school a convenient, safe and normative option for children and parents, with many benefits for children and parents, including, as argued by Mori et al., (2012), possibly contributing to Japanese children having one of the lowest rates of childhood obesity in the world.

Several European countries also have high rates of active school travel, with these countries sharing some of the strategies used in Japan. In a recent analysis, Somers and Stone (2015) examined policies and provisions for active school travel and children's independent mobility (CIM) in Zurich and Munich, compared with Melbourne. Their findings are described briefly in the following section.

5.2 Active travel to school in Zurich, Munich and Melbourne: a comparative analysis

Studies that investigate correlates of active school travel and children's independent mobility usually measure specific factors such as socio-demographic variables and environmental influences such as dwelling density, school location and distance, and walking and cycling infrastructure (see Section 4). Less frequently studied are the policies, priorities and normative expectations that underlie and shape many of these factors. In a comparative analysis of Zurich, Munich and Melbourne, Somers and Stone (2015) examine these important underlying influences, highlighting that in Munich and Zurich, transport, urban and educational planning are all based on the expectation that children will travel actively to school, while in Melbourne, the expectation is that they will travel to school by car:

> *"In contrast to Melbourne, transport and urban planners in Munich and Zurich plan and design for children's independent travel to school. The police, school, parents and transport promotion groups provide a network of support so active school travel journeys are planned, practised and expected to be the norm. The police, school, parents and transport promotion groups support and expect active school travel and CIM."* (Somers & Stone, 2015).

The authors also describe that In Zurich:

- "planning for schools is predicated on children walking";
- "it is 'completely unusual' to drive children to school; and
- "the rule really is that children walk on their own".

(Somers & Stone, 2015)

Based on these expectations, school planning is considered carefully, so that (i) there are sufficient schools to enable students to attend school within a safe, walkable distance (as is also the case in Japan, as described above), and (ii) school locations are selected so that students do not have to cross major roads. The City of Zurich also has an online mapping system that identifies safe routes to school. Somers and Stone (2015) also note that:

"Schools are expected to provide information to parents about active school travel, and school websites provide quite strong messages about children walking to school. Traffic police duties include conducting traffic classes at elementary schools and kindergartens – police in Zurich (and Munich) form part of the wider community of support for CIM and active school travel".

The provision of information and expectations about active school travel by schools to parents is likely to be effective for two reasons. Firstly, the strategy taps into the concept of 'life transitions' which provide an ideal opportunity to foster behaviour change. The transition from kindergarten to primary school is one such transition. When parents and children make this transition, they engage in a process of learning (directly and indirectly) about both the written rules and the unwritten 'social norms' of behaviour that apply in the new situation. This provides an opportunity for schools to convey to parents the school's expectations of active school travel (as described above in Zurich). This strategy has also been used in Davis, California, which has one of the highest rates of utilitarian cycling in the USA. In a historical analysis of how Davis came to be the "bicycle capital of the United States", Beuhler and Handy (2008) describe how, as part of a multi-component strategy to encourage cycling, letters were sent from the chancellor of the University of California, Davis, to new students instructing them to "*bring a bicycle to campus so you can get to classes on time*" (Buehler & Handy, 2008).

In addition to tapping into the opportunities associated with 'life transitions', clear communication that the school supports and encourages active school travel conveys important information about social norms of active school travel at the school (see Section 4.4.2).

Somers and Stone (2015) also describe how active school travel is supported in Munich through the adoption of the concept of "Munich - City for Children", which highlights the importance of establishing safe, child-friendly environments that enable children to travel to school and other destinations safely and independently. This contrasts with the approach adopted in car-oriented countries such as Australia which prioritise car travel in nearly all locations, and place most of the responsibility for safe walking and cycling on pedestrians and cyclists themselves, including children and their parents.

As described in Section 4.2.4.1, the Safe System approach, which supposedly underpins Australia's road safety strategy, acknowledges the inevitability of occasional human error, and attempts to establish a road transport system that reduces the likelihood that errors will result in death or injury. However, as noted by Somers and Stone (2015), the Safe System approach as applied in Australia does little to provide a forgiving environment for children, which in turn:

"*…does not lend itself to parents being comfortable with letting children use the streets so they gain the skills and experience to be safer. It is also reiterated that there are entirely different expectations of young children with regards to active school travel and CIM [children's independent mobility] in Zurich and Munich*."

As described in Section 4.2.4.1, the European concept of 'strict liability' also helps to provide a forgiving environment for children, and reassurance for parents that "one false move" by a child is unlikely to result in collision, injury or death.

In summary, case studies of active school travel in Japan, Zurich and Munich highlight that environments (built, social and regulatory) that support or constrain active school travel are strongly influenced by underlying assumptions about transport priorities. Australian cities and towns, which historically have prioritised motor vehicle flow for most trips in most locations, are increasingly adopting the European approach of 'hierarchies of road users' (eg http://www.portphillip.vic.gov.au). Based on the experiences of these countries (ITF/OECD, 2012), establishing safe spaces for children to move around actively, independently and safely is likely to contribute to more Australian parents allowing their children to walk and cycle to school.

6 INITIATIVES AND MECHANISMS TO INCREASE LEVELS OF ACTIVE TRAVEL FOR PRIMARY SCHOOL AGE CHILDREN THAT FOCUS ON OVERCOMING PARENTAL BARRIERS

Evaluated active school travel programs have demonstrated mixed success in increasing active school travel rates (Chillon et al., 2011; Macmillan et al., 2013; McDonald et al., 2013; Ogilvie et al., 2007; Sirard & Slater, 2008; Yang et al., 2010). However, while few of these programs address parental barriers to active school travel directly or specifically (ie for particular school communities), many programs commonly include strategies that address a number of parental barriers to active school travel. In terms of the social-ecological model of school travel behaviour, most programs focus on intra-personal and physical environment factors, with fewer addressing social/cultural factors and policy/regulatory factors.

Comprehensive models of the determinants of active school travel have recently been developed that include a number of these 'missing' factors (Mitra, 2013), and future active school travel interventions will benefit from giving increased attention to these factors. For example, social norms associated with school travel and being a 'good' parent, are important influences on parents' school travel behaviour, but few active school travel programs include measures specifically aimed at changing these social norms, for example, by effectively communicating messages such as:

- "This is an active transport school"
- "Active transport in our school is high and/or increasing"
- "We have made it safer for children to walk or ride to school"
- "The whole school community supports active travel to school, ie, school principal, teachers, local government, police, community leaders, parents".

In terms of changing social norms around active school travel, the more voices that parents hear expressing these views, the greater the influence on parents' beliefs, attitudes and behaviours. Based on the evidence described in this review (see Sections 4.2.4.1 and 4.4), the voices of *other parents* who permit their children to travel actively and/or independently to school are likely to be particularly influential. In this social media era, schools and other community organisations may be able to facilitate wider communication of these parents' perspectives and experiences. In the community-based social marketing model for fostering sustainable behaviour change, this is part of making the desirable

'invisible' behaviour 'visible' as a means of encouraging others to adopt the behaviour (McKenzie-Mohr, 2011).

School policies are another relatively neglected area in active school travel research, evaluation and practice. School policies can change behaviour directly and also indirectly by supporting social norms of active school travel as described above. Measures taken to reduce motor vehicle volume, speed and access around schools are direct behaviour change policies that also send the (social change) message that the safety of children walking and cycling to school has higher priority than motor vehicle through traffic around schools.

Another example of supportive school policies is the provision of readily accessible, secure bike parking at school, which has been shown to increase cycling to school in Victoria (Garrard et al., 2009). The change process is likely to involve both direct and indirect mechanisms. That is, directly by improving bicycle security, and also indirectly by sending the message that the school supports cycling to school, and that an increasing number of children are cycling to school, as evidenced by the well-used bicycle storage area in a readily accessible area in the school grounds.

The proposal by Faulkner et al. (2010) that parents' decision-making about mode of travel to school is a two-step process provides an opportunity to more effectively target parental barriers to active school travel. In this model, the first step is deciding between parent-escorted or independent travel (step 1), followed by travel mode selection (step 2), with different factors influencing each step. Faulkner et al. (2010) proposed that safety concerns are important in step 1, while a range of practical factors such as convenience, time, readiness/preparation, other family activity and travel commitments, access to a private motor vehicle, and travel mode 'habits' are important influences in step 2.

In step 1, safety includes traffic safety and social safety. Traffic safety includes all four components of the Safe System approach to road safety, including the child's capabilities and skills for walking or cycling safely on footpaths, trails and roads (ie children as safe road users). Both schools and parents have a role in providing children with the skills and experience needed for safe, independent active travel (Garrard, 2016). The association between parents' use of active transport (as a child and/or adult) and children's active school travel may in part reflect parents' abilities to teach and assess children's walking and cycling skills, which then enables parents to judge when their children are ready for independent travel to school. In the absence of parents' interest in, or ability to fulfil these roles, parents may be less likely to allow their children to walk or cycle to school independently due to uncertainty about whether or not their children are capable of safe, independent travel.

The other crucial component of safe road users is safe drivers. A number of current road safety measures in Australia aim to improve driver behaviour, but few are specifically focussed on the safety of child pedestrians and cyclists. Increasing the responsibility of drivers for the safety of child pedestrians and cyclists is likely to improve actual and perceived road safety. This occurs in many high-active school travel countries through 'strict liability' and other measures including driver licencing (see Section 4.2.4.1). In Australia, children and their parents are largely held responsible for ensuring that children don't make "one false move", and parents express high levels of concern about this possibility (see

Section 4.2.4.1). If drivers are trained to watch out for, and avoid, the mistakes that children occasionally make (as in Germany, for example, [Pucher, 2006]) a more balanced, shared responsibility for the safety of children walking and cycling can be established. Parents are aware of the benefits, but also the limitations, of children acquiring safe walking and cycling skills. Knowing that drivers are also looking out for their children provides an additional layer of safety and perceived safety.

Safe roads, safe speeds and safe vehicles are the other three components of the safe system approach, and improvements can be made in all these areas to increase the safety and perceived safety of children walking and cycling to school. Developing a 'Safe System' strategy for schools with a focus on children walking and cycling that is widely communicated within the school community would also assist in improving safety. In addition, informing parents that improvements are being made to road safety around the school is likely to improve perceived safety. As identified in this review, addressing parents' safety concerns requires improving both safety and perceived safety.

Another aspect of parents' step 1 decision-making is non-parental accompaniment. This is an under-researched area, though the available evidence indicates that children who travel to school independently frequently do so accompanied by friends or siblings (Carver et al., 2014; Garrard et al., 2009). In some cases, parents who live nearby might share accompanying their children to school, though there appears to be little data on these informal walk-to-school groups. Support for these forms of accompaniment is likely to increase parents' scope for permitting independent travel to school.

While there is little research in this area, it seems likely that non-parental accompaniment may reduce parents' concerns about social safety; that is, children are perceived to be safer when travelling with other children rather than alone due to a perception of "safety in numbers" (Faulkner et al., 2010). In the same study, living in an area where there is a high level of "social capital" and where "people watch out for children", were considered important by parents whose children walked or cycled to school. Regardless of whether children travel alone or with other children, teaching children the skills required to keep themselves safe is a means of addressing parents' concerns about social safety. As with traffic safety, this can be a shared parent/school responsibility, as occurs in Japan (see Section 5). These skills could also form part of schools' overall 'safe system' strategy.

Another recent development with the potential to influence step 1 decision-making is the use of mobile technology to monitor children's movements en route to and from school; notify parents when they arrive at school or home; and enable children to seek assistance in the event of an incident on the way to or from school (Faulkner et al., 2010). The Ride2School program conducted by Bicycle Network Victoria is currently trialling the use of an "Active Tag" swipe card which students touch on at school to record their active trip to school. The Ride2School program is also aiming to introduce email functionality which will inform parents that their child has successfully arrived to school (https://www.bicyclenetwork.com.au/general/programs/2283/).

These technological innovations address parents' desire to know that their children "have arrived safely", and their availability and use may assist parents to allow their children

greater independent mobility on the trip to school (Faulkner et al., 2010). In their study of 'parental fear', Crawford et al. (2015) reported that parents were more likely to allow their child independent mobility if they provided their child with access to a mobile phone, though the directionality of this relationship is uncertain.

Step 2 in the active school travel parental decision-making process involves travel mode selection based on parents' prior decision regarding independent or parent-accompanied travel to school. Most independent travel to primary school is active (mainly walking or cycling), but parent-accompanied travel can be active or inactive. In the context of increasing children's rates of active travel to school, the key consideration here is understanding parental supports and barriers to walking or cycling to school with their children, which include parents' perceptions of the advantages and disadvantages of car travel.

These factors are numerous, and many have been described in previous sections. These factors can be categorised into factors that support and constrain walking or cycling to school with children, and factors that support and constrain driving children to school. Some of these factors are amenable to change and others are not. Examples of potentially modifiable factors (ie excluding many socio-demographic factors) are included in Table 11.

Table 11: Factors that support and constrain walking or cycling to school with children, and factors that support and constrain driving children to school

	Examples	Comments
Supports for walking/cycling to school with children	▪ Health benefits (child/parent) ▪ Environmental benefits ▪ Children arrive at school more alert and ready to learn ▪ No access to private car ▪ Parent uses AT (as a child and currently) ▪ Can be quicker than car travel if distance is short, car parking at school is limited, or high levels of congestion around school. ▪ Enables social interaction with child and other children and parents. ▪ Provides an opportunity for parents to teach children safe walking/cycling to facilitate transitioning to independent mobility.	▪ Parents may not perceive active school travel as worthwhile exercise, or may believe child is already sufficiently active. ▪ Environmental benefits of active school travel are infrequently mentioned by parents. ▪ Parents way be unaware of child learning benefits of active school travel

	▪ Parents' flexible work commitments (eg flexible hours, part-time work, ability to work at home) ▪ School policy and programs that support active school travel and child pedestrian/cyclist safety	▪ In focus group discussions with parents of grades 4 and 5 students in North Carolina, parents who used active school travel said that having a flexible work schedule was the most important factor that enabled them to allow their children to walk or bicycle to or from school (Ahlport et al., 2008).
Constraints on walking/cycling to school with children	▪ May be too far to walk/cycle ▪ May take too long ▪ Parents' work and other commitments ▪ Children's after-school activities ▪ Carrying loads (large, heavy or fragile) ▪ Parent and/or child not prepared for walking or cycling (eg easy access to roadworthy bicycles) ▪ May not perceive walking or cycling to school as useful physical activity	▪ 'Too far'/'too much time' applies more to walking than cycling – making cycling safer and more appealing can substantially increase active travel catchment areas. ▪ The following is a typical statement about the importance of ease of access to bicycles: *"One of the important things about bikes is having ready access to them I find. I've just been fixing up a bike for a friend and I said you have to make it somewhere where you can get at it quickly otherwise you won't use it. It has to be somewhere where a couple of seconds and it's ready rather than having to go in the shed and have to do it and have to do this and have to do that, so it's there."* (Pooley et al., 2011). ▪ Use of activity monitoring devices may make AT to school a more 'visible' form of PA (ie its contribution to daily[21] activity levels)

[21] One of the advantages of active school travel as a form of PA is its regularity.

Supports for driving children to school	▪ Perceived to be the fastest mode of travel to school ▪ Driving 'everywhere' is a habit for many people. ▪ Perceived to be the 'normal' mode of travel to school (ie 'everybody' does it). ▪ Most urban road networks in Australia prioritise car travel over walking and cycling	
Constraints on driving children to school	▪ Lack of access to a motor vehicle ▪ Can be slow due to congestion, traffic calming, limited parking ▪ Most children prefer to walk or cycle to school ▪ Health, environmental, congestion and community liveability disbenefits of car travel	▪ Parents' dislike of the traffic conditions around schools might constrain driving for some parents, but encourage it for others (because walking/cycling is perceived to be unsafe)

7 CONCLUDING COMMENTS

Children's modes of travel to primary school are primarily decided by parents or carers. It is therefore important to understand parental barriers to children using active travel to school. Walking and cycling to school are seemingly simple activities, but the factors that influence these behaviours are complex. The social-ecological model (Figure 1) describes mutually interacting individual, built environment, social environment and policy environment factors that influence school travel mode; and similar, more detailed models have also been developed (Mitra, 2013).

The overall pattern of evidence from a wide range of sources indicates that addressing multiple factors across the four segments of influence is more likely to result in substantial, sustained behaviour change than measures that focus on one segment alone. For example, education and encouragement programs aimed at increasing active travel to school in Eugene, Oregon, were more effective when accompanied by Safe Routes to School infrastructure measures (McDonald et al., 2013). Similarly, it is important to both improve traffic safety around schools, and to increase parents' *awareness* that action is being taken to improve the safety of children walking and cycling to school.

Understanding the differing factors that influence parents' decisions about independent or parent-escorted travel to school, and subsequent travel mode selection will assist with more targeted measures for increasing all forms of active school travel; that is, children walking or cycling to school alone, or with siblings, friends, other school parents, or with parents

themselves. Social safety and traffic safety are key factors for parents considering independent active school travel for their children, with many child characteristics, and environmental, social and policy factors impacting on parents' assessments of their children's readiness for independent active school travel.

Consistent support for active school travel from schools, parents and the wider community provides social approval for parents to allow their children to walk or cycle to school independently, and removes the fear of being blamed for being a neglectful parent. However, this consistent support is dependent on making independent active school travel both safe and perceived to be safe. School policies that promote active school travel and discourage driving to school, and include a safe system strategy for children walking and cycling to school[22] facilitate these interconnected processes by establishing an environment that is safe, perceived to be safe, and therefore socially safe for the school community to promote to the parent community.

In their study of parental fear as a barrier to children's independent mobility, Crawford et al. (2015) used a similar social-ecological framework to develop detailed recommendations for increasing children's independent mobility across the following four areas:

- family and individual factors,
- society and community,
- the built environment, and
- the policy and legislative context.

The study also developed guidelines for parents: "*How to help your kids get around safely on their own"* (https://www.vichealth.vic.gov.au/media-and-resources/publications/parental-fear) with summary information on:

- Why allowing children to get places on their own is so important
- What you can do to make it easier for your child (and you!)
- How will you know when the time's right?

The guide also lists stage-specific suggestions to assist parents to guide their children through a three-step process of increasing independence covering dependent, pre-independent and independent mobility.

There is also considerable potential to increase parent-accompanied walking and cycling to school. Broadly, this can be achieved by making active school travel more appealing, convenient and habitual than driving. 'Appealing' includes the health, social, cognitive, educational and environmental benefits of active school travel for children, parents and the wider community; some of which parents may not be aware of. Convenience is primarily about travel time; with measures including reducing travel distance, reducing vehicle speeds, and increasing flow and connectivity for pedestrians and cyclists. Establishing a habit of walking or cycling to school is assisted by initial planning and preparation to make the active choice an easier choice (eg ready access to bicycles, familiarity with safe,

[22] Encompassing safe children, safe drivers, safe speeds and safe routes/streets.

pleasant, direct routes to school, and secure and easily accessible bike storage). Flexible work arrangements also assist parents to accompany children to school actively.

Programs aimed at increasing primary school students' active school travel have been conducted in many countries, including Australia, though few have specifically addressed parental barriers to active school travel. Engaging with parents is crucial to the success of active school travel programs, and school active school travel policies and programs should include a parental engagement strategy. Engagement with the wider school community is also valuable, including police and local government participation in promoting road safety and social safety at the school. Once again, it is not just the actual safety improvements that are important for addressing parents' concerns; but also the fact that these respected authorities are publicly supporting active school travel.

Some active school travel programs in Australia have been formally evaluated, but many have not. Consequently, while there is considerable expertise in implementing active school travel programs, much of this expertise is not readily accessible in the public domain. Active school travel promotion efforts, expertise and effectiveness would benefit from the establishment of some form of 'clearing house' of schools' and other organisations' success stories in increasing active school travel, with a focus on addressing parental barriers to active school travel. This would complement the more formal research and evaluation literature on active school travel that has been the primary focus of this review.

APPENDIX A: CASE STUDIES OF THE IMPLEMENTATION OF 20MPH (32KMH) ZONES IN LOCAL GOVERNMENT AREAS IN THE UK

Many of the traffic calming and speed reduction interventions described in Section 4.5.2 investigated the impacts of reduced speed for short segments such as streets. This appendix describes 'case studies' of *area-level* speed reduction in the UK, where the results suggest that area-level speed reduction (eg in residential areas) can lead to increased walking and cycling.

The UK advocacy organisation "20's Plenty for Us[23]" promotes area-wide speed reduction (with a focus on residential areas) and provides a 'clearing house' of resources on the rationale, recommendations, strategies and evaluations of 20 mph (32 km/h) zones, primarily in the UK and Europe. These online resources include links to local council reports on their experiences of implementing 20 mph zones in their cities, towns and neighbourhoods. Some of these council reports include measures of walking and cycling before and after implementing 20 mph zones. While it is difficult to assess the rigour of these evaluations (as details are not provided) they nevertheless provide an indication of the behavioural impacts of the reduced speed areas in some locations. They should therefore be viewed as 'case studies' of 20 mph zones that may or may not be representative of all councils that have adopted 20 mph zones.

Nevertheless, the rapid growth in the last six years in the adoption of, and planning for 20 mph zones in the UK suggest that many councils' experiences with the reduced speed zones are positive and ongoing. In 2008, '20's Plenty for Us' reported that three-quarters of a million residents lived in local government areas with 20 mph zones, while in 2015 the number had risen to 11.8 million residents living in local government areas (n = 47) currently implementing 20 mph as the default speed limit for residential streets, and 1.7 million where local authorities (n = 11) are committed to implementing 20 mph zones (http://www.20splentyforus.org.uk/index.htm).

'Case studies' of 20 mph zones in Edinburgh and Bristol are described below, based on information provided online by '20s Plenty for Us' with links to council reports.

Edinburgh, 2014

Findings from the evaluation of South Central Edinburgh's 20mph limit trial included:

- support for 20 mph rose from 68% to 79% post-implementation,
- those considering cycling to be unsafe fell from 26% to 18%,
- children cycling to school rose from 4% to 12%. For older primary age children it rose from 3% to 22%,
- children allowed to play on the pavement or street rose from 31% to 66%,
- walking trips rose 7%, cycling trips rose 5% and car trips fell 3%, and
- speeds fell an average 1.9mph and by 3.3mph where pre-trial speeds were over 24mph.

Residents reported the main benefits as:

- safety for children walking about the area,
- safety for children to play in the street,

[23] Referring to 20 mph (32 km/h) speed limits.

- better conditions for walking,
- less traffic incidents,
- better cycling conditions.

The council report stated that Edinburgh's 20 mph extension policy across the remainder of the city was under consultation, and included:

- all residential streets,
- all main shopping streets,
- other streets with significant pedestrian and/or cyclist use.

(http://www.20splentyforus.org)

Bristol

"As part of the Cycling City project between 2008 and 2011 two areas in the South and East of the city were made 20mph. The combined areas cover approximately 500 roads and 30,000 households. The aim was to improve road safety and encourage more walking, more cycling and more independent mobility for children and elderly people in the City. The pilot areas saw an increase in walking ranging from between 10% and 36% and for cycling between 4% and 37%. Support for 20mph limits amongst residents in the pilot areas is 82%. Around 70% support a citywide expansion of 20mph limits in residential areas. Pedestrian casualties have remained constant in both areas and pedal cycle casualties in the Inner South area have fallen by 3 in the same period and remained constant in the Inner East area."

Additional brief case studies of locations where traffic is managed to encourage active transport modes can also be found in the following reports:

- World Health Organization (WHO) (2008). *Speed management: a road safety manual for decision-makers and practitioners.* Geneva, Global Road Safety Partnership.
- World Health Organisation (WHO), 2013. Pedestrian safety: a road safety manual for decision-makers and practitioners. WHO, Geneva.
- International Transport Forum, 2012. Cycling safety: key messages. OECD-ITF, Paris.
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