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Built environment and children's travel to school

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ABSTRACT

The decline in children's active travel has significant implications for urban planning and sustainable mobility. This research explores the influence of built environment on children's travel to school across a range of typical urban environments in Australia. The analysis draws on a sample of children and their parents from nine primary schools across four urban regions: Brisbane, Melbourne, Perth and Rockhampton. The built environment features for each school neighbourhood are measured. An analysis of travel, socio-demographics and attitudes to travel is conducted. The findings indicate that children residing in built environments that are more dense and urban are significantly associated with more active travel to school and for other journey purposes. Distance to school is critical for active travel (AT) and many children lived beyond walking distance. While built environment is important, a decisive role for children's active travel to school and other places is seen in the combination of preferences and licences. Children who AT prefer to be more autonomous/independent travellers and have parents who foster their IM; conversely, children's preferences for being driven coincides with parents' fears for IM and lack of confidence in their children abilities to travel independently.

1. Introduction

Consistent with other countries in the developed world there has been a decline in the number of Australian children travelling by active modes (walking and cycling) to school and an increase in the numbers being driven to school (Van der Ploeg et al., 2008). This decline in active travel (AT) has been accompanied by a decline in the independent mobility (IM) of children. Along with a wide range of concerns, including health, social connectedness, and wellbeing, the reduction of AT has significant implications for sustainable mobility and urban planning policy.

There is now a wealth of empirical research emanating from North America associating the physical design and form of built environments with the travel behaviour outcomes of adults (see for example Rodriguez and Joo, 2004; Ewing and Cervero, 2002; Crane, 2000). The PLACE study (Cerin et al., 2007; University of Queensland Cancer Prevention Research Centre, 2005) and the RESIDE study (Giles-Corti et al., 2008) add Australian evidence to this research. Tempering the notion that built environment alone affects travel behaviour are a wealth of studies that demonstrate the contribution of socio-economic factors and attitudes to travel outcomes (Schwanen and Mokhtarian, 2005; Mokhtarian and Cao, 2008; De Vos et al., 2014).

The extent to which the design and form of built environments influences children's travel, as opposed to adult's travel, is under-researched (Van Goeverden and De Boer, 2013). That children's mobility is influenced by adults is not in question. Parental fears of 'stranger danger' and traffic safety are strong determinants of parent's restrictions of children's travel (Mackett, 2013). It is not enough, however, to simply assume children's attitudes and behaviours will mirror those for adults. Where children do get to travel independently their travel choices may not simply be determined by time or cost, the design of the built environment may have an influence. Of the limited evidence available, relationships have been observed between the absence of footpaths, presence of busy streets, long distances to schools and other destinations and children's travel (Sallis and Glanz, 2006, Panter et al., 2008).

Since the early 1990s there has been a key shift in town planning practise throughout the developed world. The rise of Smart Growth or New Urbanist policies (Congress for New Urbanism, 2001; Morris and Kaufman, 1998; Katz, 1994) together with sustainable mobility initiatives, across North America, the UK, Europe and Australasia, calls for a shift to higher densities, mixed land uses and replacing mobility with proximity to enhance accessibility by walking, cycling and public transport. Still, empirical evidence supporting ways in which this objective is achieved for

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various population groups is modest. In Australia, at least, there is a lack of evidence as to the role of varying physical built environments on children's travel. The purpose of this paper is to examine this question by looking at the range of factors that shape children's journey to school across four broad urban regions in Australia – inner urban, middle suburb, outer urban, and a regional country town.

2. Background: children's active travel, independent mobility and the built environment

For children, walking and cycling to and from school is important for a number of reasons. The routine nature of the journey to and from school provides potential benefits to children's health and wellbeing, contributing to the volume of children's everyday physical activity (Mackett and Paskins, 2008; Faulkner et al., 2009), affording them skills for independent travel (Tranter and Pawson, 2001), and providing opportunities for them to interact and engage with their natural and built local environments (Fusco et al., 2012). Despite the increasing recognition of benefits, however, studies are reporting a decline in the rates that children are participating in AT to school in many developed countries (see Fyhri et al., 2011 for Denmark, Finland, Great Britain and Norway; Buliung et al., 2009 for Canada; Peddie and Somerville, 2006 for Australia; Boarnet et al., 2005 for United States). Looking specifically at cycling, the reported decline in rates of travel to school is dramatic despite reported high bicycle ownership rates (Christie et al., 2011).

An important factor in determining children's AT is the *licence* to travel which parents provide children. Hillman et al. (1990) defined four licences children acquire in gaining their own independent mobility (IM): the licence to walk from school; cross roads; ride a bicycle; and catch public transport. The restrictions on children's licences are becoming stricter due to the increased concerns regarding the risk to children's safety in the public realm (Rudner, 2012). The licences to IM vary between children (O'Brien et al., 2000). The age of 10–11 years appears to delineate the transition between non-independent and independent mobility, although there are variations by gender, travel mode and journey purpose. Brown et al. (2008) reporting a UK study found a marked increase in IM when children reached 11 years of age, yet these licences were stricter for girls, particularly with regard to cycling. Zwerts et al. (2010) reporting a Belgian study of 10–13 year olds found that boys travelled more often than girls and a greater proportion of boys were independent travellers or IM. This transition point is not static, studies in the UK have shown a decline in the percentage of 10 and 11 year olds with IM from a reported 94% in 1970, 54% in 1990 and 47% in 1998 (Hillman, 1970; Hillman et al., 1990; O'Brien et al., 2000). Other studies (such as Fyhri and Hjorthol, 2009, in Norway) do not specify ages where major transitions occur; rather they note that age is an important influence on the level of independence.

The quality of the built environment around home and schools plays an important role in influencing children's rates of travel to school. Distance to school is one of the most consistently reported factors associated with children's active travel rates to school, with children more likely to walk or cycle to school the closer they live to the school (for example, Schlossberg et al., 2006 in Oregon, U.S.; Cole et al., 2007 in South East Queensland; McDonald, 2007 in a national U.S. study; and Ziviani et al., 2006 in Brisbane, Australia). Some researchers suggest that physical built environment elements influence children's IM, such as traffic calming on streets; safe paths and routes to school; secure end-of-trip facilities at schools; and monitored road crossings (Mackett, 2013; Johansson, 2006; Carver et al., 2005). Other scholars assert that perceptions of safety are more influential (Fyhri and Hjorthol, 2009).

For policy makers, an evidence base is emerging regarding the built environment factors that shape decision-making and behaviour related to active modes of travel within adults. The potential built environment factors at play include functional aspects such as: the distance between places; street design and geometry; the connectivity of streets; path infrastructure, aesthetic qualities; safety; the mix of land uses; and the proximity and quality of destinations (Olaru and Curtis, 2015; Saelens and Handy, 2008; Pikora et al., 2003; Bagley and Mokhtarian, 2002; Crane, 2000; Kitamura et al., 1997; Cervero and Radisch, 1996). The relationship is likely more nuanced – moderated by journey purpose-for example, in a study in Adelaide, Owen et al. (2007) found that street connectivity was associated with walking for transport, but not for recreation, indicating that built environment factors are associated with different types of walking activities in different ways. A children's perspective may add a further dimension given they may not see even a utilitarian journey as just that; they may add a creative dimension to their journey. The provision of good physical infrastructure has been posited as a means of addressing such factors as gender inequities in travel to school (McDonald, 2012).

In addition to built environment factors, other socio-economic and attitudinal factors play a role in determining whether children are permitted to AT. At the household scale, the scheduling of activities and parent's travel to work (McMillan, 2005; McDonald, 2008; Yarlagadda and Srinivasan, 2008; Copperman and Bhat, 2010; Lang et al., 2011) is influential in shaping children's likelihood of walking or cycling to school. McDonald (2008) found in the US that child's travel mode to school was significantly associated with their mother's commute to work. In New Zealand, Lang et al. (2011) asserted that parents may choose to drive their children to school, even when residing in close proximity to school, due to the perceived convenience of car travel. Attitudes and preferences of parents in Austin, Texas with regard to their children's travel activity were influential on whether their children walked to school (Lee et al., 2013). Furthermore, parents who walked their children to school had more positive perceptions of the walkability of the built environment than those who drove their children to school McMillan et al., 2007; Panter et al., 2010a, 2010b; Trapp et al., 2011). Research has found that there are important differences between the factors influencing adults' and children's travel (McMillan, 2007; Mitra, 2012). For example a study from Belgium reported that parents' perceptions of land use mix are more influential on active travel than children's perceptions (De Meester et al., 2014). Social norms, the cultural aspects of walking (Mitra et al., 2010; Panter et al., 2010a, 2010b), and economic contexts (Valentine, 2004; Mitchell et al., 2007; McMillan et al., 2006; Mitra et al., 2010), as well as the presence of social support for active travel (Sallis et al., 2008) also play a major role in shaping children's daily travel activity. However, as Kerr et al.'s (2007) research from Atlanta, US, has shown, despite ethnic and socio-economic differences between households and neighbourhoods, built environment factors remain significantly associated with children walking to school.

Policy responses to concerns about declining rates of children's AT to school have seen the emergence of a range of initiatives. Responses such as the introduction of walking school buses have been popular and can have an influence on rates of active travel to school, but they have been criticised due to their resource intensity and tendency to be present mainly in higher socio-economic areas (Collins and Kearns, 2005). Alternatively, policies targeted towards building social trust and community connectedness, as well as the safety of neighbourhoods, could increase children's AT to school (Carver et al., 2013). Behavioural and education programmes (community walking bus and road crossing agents, walking and cycling days, co-curricular physical