Do children like walking?

Children in the city of Dunedin, New Zealand

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There is rising interest in children's activity levels and the relationship between health, physical activity and their environments – in particular, their 'obesogenic' environments. This paper presents the results of a qualitative study of 71 school children in Dunedin, New Zealand, the purpose of which was to discover whether they liked walking. The study found that, whilst many children do like walking, they are not permitted to walk much, nor to many places. Some walk to school, but their overall levels of walking are low due to a combination of factors relating to concerns for their safety and to the need for children to fit in with increasingly complex, car-dependent family lives.

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The study of changing family mobility in the UK since the 1930s by Pooley, Turnbull and Adams (2006) confirmed what many intuitively know, namely that there has been a tremendous shift away from walking and reliance on public transport, to the current high dependence on private motorised transport in people's everyday lives. This change has been especially profound for children. In the 1930s, to phrase the question 'do children like walking?' would have been seen as somewhat odd given the centrality and imperative nature of walking in children's and most adults' lives. Today, by contrast, there is no such imperative for many children for whom walking is an optional rather than a required mode of transport. This paper explores walking and active transport mode (i.e. not car) use by children in their everyday lives. Whilst there has been substantive research on how much children walk, most notably on the journey to school, there has been little on children's interest in walking and how this relates to children's overall travel patterns. It is this interest that forms the basis of this paper. The first part of the paper explores the walking environment, why the apparent decline in walking, the growing concern around this decline, and the relationship between environment and physical activity for children. The second part presents the findings from a study of the mobility levels and travel behaviour of some 71 children aged from nine to eleven years attending schools in the city of Dunedin, New Zealand.

CHILDREN AND WALKING

Walking is a fundamental step in human behaviour. It is a major milestone in children's physical development; its achievement requires many 'little' steps to be attained (Cheatum & Hammond 2000; Chester, Tingley & Biden 2007). These little steps include developmental progression as a newborn learning to lift its head, through rolling over, crawling and pulling up to standing. Walking as a well-practised activity is expected to be ingrained by eight to ten years of age (Kubo & Ulrich 2006). However, despite its apparent prevalence, walking behaviour and character amongst children is not well understood.

The decline in children's independent mobility is well documented (Freeman 2006; Hillman 1993; Karsten & Van Vliet 2006; Kerr et al. 2006; Tranter & Whitelegg 1994; Valentine & McKendrik 1997). Central to this decline has been a reduction in numbers of children walking to school.

In studies on children and walking, the focus has most commonly been on walking to and from school, where the school journey is seen as providing an important indicator of physical activity in a child's day.

Walking to school has been found to provide significant amounts of a child's daily physical activity requirements. Studies in both the United Kingdom and Denmark found that children who walked to school were significantly more active overall than those who travelled to school by car (Cooper et al. 2005). These two studies were able to complement self or parental-report of walking to school with objectively measured physical activity with accelerometers. In New Zealand, the 2002 National Children's Nutrition Survey identified that only 37.2 per cent of NZ children aged between five and fourteen years self-reported that they actively travelled (walked, used the bus or rode a bike, scooter or skateboard) to school at least six times in the previous seven school days (Parnell et al. 2003). A Dunedin walking to school prevalence study had similar results, finding that 35 per cent of children walked to school on the study day. Children who lived less than one kilometre from school were most likely to walk to school (Yelavich et al. 2008).

Our research suggests that it is not the children who are choosing not to walk ...

The decline in children walking to school has been studied by researchers from a range of disciplines, notably planning (Freeman et al. 2007; McMillan et al. 2006), geography (Tranter & Pawson 2001), physical education (Schofield, Schofield & Mummery 2005), and health sciences (Kerr et al. 2006). There have been a number of studies pointing to the need to redress this decline and exploring initiatives being undertaken in this regard, especially the 'walking school bus' and 'safe routes to school' initiatives (Hubsmith 2006; Kearns & Neuwelt 2003; Kingham & Ussher 2005).

The journey to and from school provided a simple research focus that can be associated with physical activity and transport assumptions with associations found between children who walk to school and their overall physical activity levels (Timperio et al. 2004). The 'walkability' of a neighbourhood impacts on how active children are, with residential density being a key factor. In their study of urban sprawl and obesity, Platinga and Bernell (2007, p. 857) found that 'individuals who move to denser locations lose weight'. Whilst their study focused on adults, it may be that children in such neighbourhoods would also be more active. However, even in highly 'walkable' neighbourhoods, parental attitudes to walking are paramount in determining whether children actually walk (Kerr et al. 2006). In Holt et al.'s (2008) study, the walkability of a neighbourhood affected children's perceptions of places to be physically active and to play.

This relationship between children's active travel and the fact that they are more active overall than children who do not use active travel methods is not well understood. One explanation is that children who are more active perhaps choose to use active travel methods (Andersen 2007). Another is that activity levels are strongly influenced by parental attitudes. A study of Swedish parents found that parents whose children had older siblings and parents who had a high level of trust in the urban surroundings had more positive attitudes to independent travel (Johansson 2006). Different parents can have different attitudes to the same environment and how safe it is for active and independent travel.

The mobility of families and the relationship with privatised motor transport is a key aspect of any consideration of children's active travel (Handy, Weston & Mokhtarian 2005; Pooley, Turnbull & Adams 2006). Cars have, to use the words of Sheller and Urry (2006), 'reconfigured urban lives'. On the plus side, they have increased mobility for many families but, on the down side, they have also decreased environmental walkability, reduced overall levels of walking, limited children's independent mobility and diminished environmental access. Factors contributing to the decrease in walking include: urban sprawl and less dense neighbourhoods; dispersal of services, places of employment, leisure facilities, retail and schools across the city; reduction in public transport; more complex, travel-dependent lives; more geographically dispersed extended family; rising concerns about safety; and increasing wealth (Freeman 2006; Handy, Weston & Mokhtarian 2005; Platinga & Bernell 2007). The impacts of these changes have led to the coining of the term 'obesogenic' environments, i.e. environments associated with weight-inducing, unhealthy, sedentary lifestyles (Platinga & Bernell 2007). Dunedin, in common with many cities internationally, evidences several of these 'obesogenic' characteristics in its environmental makeup. Dunedin's roads are dominated by vehicular traffic, and although the public bus service is regular to some parts of the city, it is not well patronised overall.

Despite the rising interest in the health benefits of walking, there appears to be little research into the pleasurable aspects of walking; if there is any interest, the focus has been on enjoyment of physical activity. Lagerberg (2005), writing about children's mental health, proposed that increasing physical activity in children must be in the context of enjoyment, not of forced games, taking individual children's needs into account to ensure children's well-being. Bornholt and Piccolo (2005) also proposed that children's feelings, self-concepts and skills are related to participation in

physical activities. For adults, the theory of affective associations has been suggested by Kiviniemi, Voss-Humke and Seifert (2007) to influence their physical activity behaviours. Affection association proposes that people who have positive experiences are more likely to engage in that experience again.

Walking is not just about physical activity, but is critical to children's social development. It provides opportunities to meet friends, to have what Engwicht (1999) refers to as 'spontaneous encounters', that is, unplanned meetings with others in the community. It facilitates understanding of place and space, and places where people walk are more vibrant, interesting and welcoming – as any walk in some of the world's more walkable places, such as Amsterdam and Venice, plainly show. Although we cannot transform Dunedin into a Venice, we were interested in how children in Dunedin travelled to places that mattered to them, such as school, friends' homes and after-school activities. We were also interested in their walking and other active travel experiences, and how knowledge about these experiences could be interpreted in relation to other published findings about children's physical activity levels and independent mobility.

THE CHANGING GEOGRAPHIES OF DUNEDIN CHILDREN'S LIVES

A study to understand the geographies of children's lives was undertaken in Dunedin, New Zealand. Four researchers at the University of Otago were involved, representing the disciplines of geography, planning, education and public health. There were six objectives, but just two of these are the specific focus of this paper:

- to establish travel patterns and modes of travel;
- to explore reasons for these patterns as given by children and their parents.

SCHOOL SELECTION AND RESEARCH METHOD

Socio-economic and geographic criteria were used to select five schools from which to sample children and their parents. Schools in New Zealand are ascribed a decile rating which indicates the school's socio-economic status. The five schools represented a range of decile ratings. The community/neighbourhood setting of the schools also had different geographic characteristics: two schools were in distinct, geographically defined, coastal communities located around 10 kilometres outside the central city, one low and one high decile; two schools were in urban suburbs with little geographic differentiation from one suburb to the next, one in a flat area of mid-decile and one in a hill area of high decile; and finally, a low decile school in a hill suburb school at the edge of the city. The five schools were selected to try to represent a range of schools and settings in Dunedin city (see Table 1).

The chosen schools were asked if they would provide access to children and families at their school. Inclusion criteria were age and year classification related, with children who were either in year five or six and between nine and eleven-years-old being sought. (Children can start school in New Zealand on their fifth birthday. If they start between July and December, they are classified year zero. Most primary schools have children from years zero to six.) Recruitment of participating children was by class at school, with four of the schools allowing access to their only class of children around this age, and one school allowing access to two of their three classes of children of this age. Children around the age of ten were preferred because one of the primary objectives of the research was to understand children's independence in and exploration of their neighbourhoods. We expected that by the age of ten, children would have some independent mobility because at age eleven they usually transfer to intermediate or high school, which may be associated with longer independent travel.

Table 1. Socio-demographic characteristics of child participants

Socio-demographic characteristics	Overall % (n = 71)	HLD[1] (n = 11)	SHD (n = 13)	HHD (n = 13)	SLD (n = 14)	FMD (n = 20)
Mean age (±SD)	10.0 (±0.6)	10.4 (±0.5)	9.9 (±0.3)	10.4 (±0.5)	9.6 (±0.6)	9.8 (±0.6)
Sex – Boy	54.9%	82%	54%	38%	57%	50%
Sex – Girl	45.1%	18%	46%	62%	43%	50%
Number attending their closest school	77%	100%	91%	69%	78%	70%
Children using active travel methods to and from school	42%	82%	24%	15%	79%	25%
Children sometimes using a car to travel to school and sometimes using active travel methods	17%	0	38%	15%	0	25%
Children using a car to travel to and from school	41%	18%	38%	70%	21%	50%

[1] HLD= hill suburb low decile school; SHD = satellite suburb (i.e. separated from main city) high decile; HHD = hill suburb high decile; SLD = satellite suburb low decile; FMD= flat suburb middle decile.

Most senior classes in primary schools in this part of New Zealand have class sizes of 20 to 27 children. It was proposed that about 12 to 15 children from each class was a fair expectation for recruitment and would provide diverse experiences to share with the researchers. An information sheet about the research project and a consent form was sent home with all children in the selected classes at the participating schools. All children and their parents who consented to participate were included in the study (n=71, 45% girls, mean age=10.0±0.6 years). The participating group included one set of twins, and two children who had special education needs.

Qualitative methods were used to collect data. A mixed approach was used:

1. Children drew maps on A2 sized paper (420 x 594 mm) as a class activity. They were instructed to draw a map of their neighbourhood from a birds-eye view, with their house on it, and to draw the places that they go (whether faraway or nearby) on their map. The children had half an hour for this activity and were given the paper and four thick felt pens (black, blue, red and green colours) to use.
2. Individual, semi-structured, face-to-face interviews were conducted with the participating children, using their map drawings as a way of opening the interview and talking about their lives. They were asked open-ended questions about their home, how they got to school, their after-school and weekend activities, where they played and how they got there, about their walking and biking activities and experiences, and their opinion of their neighbourhood. They were able to finalise details of their map during this interview.
3. A semi-structured telephone interview with either a parent or guardian of the child was conducted – an open-ended questionnaire was used, exploring further the places children go, how they travel and general family travel information.

A Microsoft Access 2002 database was used to record and analyse the interview data. The map data was entered onto a geographic information database to show the range of activities and travel modes of the children. All identifying names and places in the responses from children and parents were removed from the database, and blanked out on the children's drawn maps after scanning into the computer. The same female member of the research team led all the class mapping exercises, conducted all the interviews with children and their parents/guardians, and completed all the data entry into the Access database.

For confidentiality purposes, the names of the children have been changed in this paper.

RESEARCH FINDINGS

School-related choices

Parents were asked about why their children travelled to school as they did, and about how they chose their child's school. Many parents chose the school because it was the local or closest school. Some of the parents' comments appeared to acknowledge the influence of the school travel journey in choosing a school such as:

> Dad was an ex-pupil and possibly the closest school (parent of Arama [2], age 11, boy who walks to HHD School).

> We live near and it's the closest (parent of Joe, age 11, boy, driven to FMD School).

Only one parent commented specifically that the school was within walking distance (parent of Rana, age 10, girl, SHD School).

Parents' comments indicate that the choice of travel mode for the school journey is influenced by a number of considerations:

> We have six children at three different schools (parent of Kauri, age 10, boy, driven to HHD School).

> Car because we are on our way to work anyway (parent of Gyan, age 11, boy, driven to FMD School).

The safety of the children is of concern to a number of parents:

> Safety, traffic, I worry about the way society is and my son is not road ready (parent of Hahona, age 10, boy, driven to FMD School).

> Car 90% of the time – concerned about safety, it's become a habit (parent of Kiri, age 11, girl, driven to FMD School).

> Bus goes on other side of the road and going anyway. Home on the bus – bus stops on other side of the road (parent of Li, age 10, girl, driven to and bus home from SHD School).

Table 2. Participating children's responses to the question 'Do you like walking?'

Do you like walking?	*Overall %* (n = 71)	*HLD* (n = 11)	*SHD* (n = 13)	*HHD* (n = 13)	*SLD* (n = 14)	*FMD* (n = 20)
Yes	84%	91%	77%	77%	93%	85%
Sometimes	3%	0	0	8%	0	5%
No	13%	9 %	23%	15%	7%	10%

Table 3. Children identifying 'active travel' in response to question 'How do you like to get to nearby places?'

Preference for getting to nearby places	Overall % (n = 71)	HLD (n = 11)	SHD (n = 13)	HHD (n = 13)	SLD (n = 14)	FMD (n = 20)
Active travel (includes walking, skating, scooting and biking)	91%	82%	85%	100%	100%	90%

Themes about walking

A number of themes emerged, the first being that, overall, children liked walking (Table 2), with 84% saying they liked walking, and a further 3% saying 'sometimes' they liked walking. Many children associated liking to walk with exercise. Koro, a 10-year-old boy at HHD School said that the best thing about walking was that it was 'good exercise'. Bill (10, boy, at HLD School) said that it 'keeps me fit and I like running'. Marika (10, girl, at FMD School) also said that you 'get fit'. Some of the children articulated their exercise concepts further. Tangaroa (10, boy, at FMD School) said, 'exercise, but I don't really need it because I'm skinny'. Lau (10, boy, at HLD School) said, 'it is good for you and good for the body'. Some children recognised that walking could be an opportunity for social interaction. When asked the best thing about walking, Chris (10, boy, at HLD School) said 'meeting with my friends'; Aroha (10, HHD School) said, 'talk to people'; and Elizabeth (9, girl, FMD School) said 'seeing people'. A few children communicated an appreciation of nature, the scenery around them, or an environmental awareness. Li (10, girl, SHD School) said about the best thing about walking, 'I like fresh air and the scenery'; Ari (9, girl, SLD School) said she liked to 'see new things like baby ducks', while Vicky (10, girl, FMD School) said, '[it] makes me feel better because I'm not wasting petrol'. A number of children said the best thing about walking was that it was enjoyable. Mere (9, girl, SLD School) said the best thing about walking was 'I get to have fun'. Some recognised that the enjoyment was associated with other people, such as Tane: 'it's funner [sic] walking with people because you can talk' (10, boy, HHD School). There were also children who recognised that walking could provide an opportunity to explore and give them some freedom. Joe (10, boy, FMD School) said the best thing about walking was 'you can stop at your friend's house, but if you're in the car, you can't stop'. Lily's comments were similar, identifying that 'when walking by yourself, you can stop every now and again and look at nature' (10, girl, SLD School).

Many children could express a reason why they liked walking. Some of them could also convey the influence of their parents. Ngaio (10, girl, HHD School) liked walking because 'you can get fit and healthy ... sometimes it is fun when walking with friends', but she also knew there were limitations on her walking: 'sometimes in Miller's Flat we walk for two to three kilometres. My mum doesn't like me walking around Dunedin'. Aroha (10, girl, HHD School) also commented on her boundaries: 'walk with Nana ... on own is okay but mum doesn't like me out on my own too far'. Vicky (10, girl, FMD School) had some experience of independence: 'you can go secret ways and hide behind bushes and play games on the way' but also that there were limits: 'it's fun – would like to walk everywhere on the map but only allowed to Aimee's house and to the shop'.

Bus use

The researchers asked children about their bus use, thinking that might help explore some of their walking relationships, as walking is central to bus use as well as independent mobility characteristics. Children who live in the satellite communities dominate the positive responses to bus use.

There are some central government funded school buses in New Zealand. Of the five schools in our study, only the SLD school had a government funded school bus service. All schools in the study and their surrounding communities were serviced by local authority supplied, commercial bus services, although there are differing levels of service. The community around the FMD school has regular bus services, running at short intervals of 10 to 15 minutes on weekdays. The intervals between regular services for the other communities are not so short, being between half an hour and two hours on weekdays.

Some children used buses regularly and buses formed a basic tool in their transportation choices. Cody (10, boy, SHD School) said:

> I like going on the bus. It is OK by self but better if [with] other people you know. Like the bus because in the car I have to answer Mum's phone.

Table 4. Participating children who use a school or public bus (with another child or adult or independently)

	Overall % (n = 71)	HLD (n = 11)	SHD (n = 13)	HHD (n = 13)	SLD (n = 14)	FMD (n = 20)
Percentage of participating children who use the bus services	24%	0	73%	0	36%	25%

Ruihi (10, boy, FMD School) uses:

> The bus to go shopping in town with mum, to the Meridian. Like to go by bus because we don't have to wear seatbelts.

Hone (9, boy, SLD School) uses:

> School bus – went with brother into town on bus from [suburb name deleted] and went to the movies.

Parents' comments about buses reflect this normalised bus use:

> He was eight when he started bussing on own; there were a few other boys on the bus; goes on bus to other places with family (parent of Paul, 9, boy, SHD School).

The parent of Dylan said:

> School bus at five with his big sister, on own and into town this year (10, boy, SLD School).

The parent of Kaia (10, boy, FMD School) said:

> We sometimes go into the city with family.

Children such as these have bus use integrated into their everyday transportation options. There is another group of children and their families who do not use bus services. When parents were asked if their child used buses and, if not, when that might happen, some of the responses were:

> Two car family, don't need to (parent of Chris, 10, boy, HLD School).

> Not yet. Don't know when. At the moment, happy to take her. Don't know anything about the buses (parent of Ngaio, 10, girl, HHD School).

> Never had to use bus, always had cars (parent of Marika, 10, girl, FMD School).

> Never has. Don't know. Usually drive (parent of Emma, 9, girl, FMD School).

Families that did not themselves use buses sometimes expressed puzzlement as to why their children would use buses when the family had a car.

DISCUSSION: CHILDREN LIKE WALKING

Children in our study showed differences in walking to school according to which school they attended. In New Zealand, most primary schools do not have zoning schemes, meaning parents are free to choose any school. Our study had similar proportions of children walking or using active travel methods to school to those reported in other published New Zealand prevalence studies (Parnell et al. 2003; Yelavich et al. in press) but our research showed that there were significant differences between schools. There are complex relationships at work in school and travel, and therefore complex transportation choices made around children's travel. Our study reflected the associations shown in Timperio et al.'s (2004) research, with the complexities associated with the age, sex, family and work situation. Parents in our study reported the need to drive around several different schools because of the different ages of their children and the different schools they attended, or driving because it was on the way to their work, or having a younger child who could not be trusted to walk with their older sibling, so all children would be driven to school. Children reported needing to access their or their siblings' various activities after school, such as sports practice, as affecting their ability to walk, as well as understanding their parental fears or concerns about road and general community safety.

The big challenge will be to break the cycle of car dependency, not just for children but for families, especially those with no or very limited experience of walking, using the bus or active travel generally.

The research also looked at children's wider attitude to walking. We were heartened by most children's positive outlook on walking, and that they preferred to use active methods such as walking, biking or scootering to get to nearby places. This positive attitude to walking was demonstrated regardless of the normal mode of travel to and from school for the children. The comments of the children in this Dunedin project indicate that they are cognizant of enjoyment, exploration and other values around walking, confirming the need to look at subjective experiences in evaluating walkability (B et al. 2007). The enjoyment of walking that children could articulate is an area that could be explored further, particularly in evaluating current interventions in New Zealand aimed at increasing walking to school, such as Walking School Buses and Walking Wednesdays. Our research suggests that it is not the children who are choosing not to walk, but that it is other aspects of family life that affect their choice.

The influence of health promotion activities and education was clearly evident. The number of children who said they liked walking but could only articulate that it was good exercise, may be a reflection of children hearing the health reasons for walking. It is encouraging that many responded that they like to walk, but perhaps if they continue to only view walking as good exercise, rather than appreciating other aspects of walking, they may be vulnerable in the future to simply choosing not to walk. It is important, as both Kiviniemi et al. (2007) and Lagerberg (2005) recognise, that positive experiences are important in supporting physical activity. This exercise approach may

already be reflected in our results of attitudes to bus use. In some areas, buses are clearly seen as a viable transportation option. Those parents and those children who do not see buses as a realistic transportation option may not enjoy the walk to the bus stop.

CONCLUSION AND SUGGESTED FOCUS AREAS

The most persistent factor in reducing walking rates is car dependency. Despite the fact that 75% of the children in our study attend the local school, only 42% report that they consistently use active travel methods to get to and from school. Car dependency was not seen as problematic by most parents. The big challenge will be to break the cycle of car dependency, not just for children but for families, especially those with no or very limited experience of walking, using the bus or active travel generally. This dependence is especially strong where children do not attend their local school and are dependent on car use for daily activities such as travel to school, travel to friends, family and activities. For these children, walking is not an option given that their lives and the places they access are based on decisions that assume car-based travel.

Whilst travel to school may be a useful indicator of levels of physical activity, there is an urgent need to look at broader aspects of children's lives in establishing existing and potential levels of active travel such as walking. Initiatives and interventions such as Walking School Buses, whilst useful, are irrelevant for many families where travel decisions are based not on factors around safety of the local neighbourhood for the school journey, but rather around family lifestyle factors such as the need to fit in with parental travel to work patterns, and the need to get different children in the family to a range of geographically dispersed schools. The issue in cases such as these is how walking can be integrated into the existing family lifestyle and how walking can emerge as a priority vis-à-vis other lifestyle factors. For example, in our study the key determinant of walking was proximity to school and friends. How can parents be encouraged to prioritise proximity, and implicitly walking, over the desire to live on a semi-rural lifestyle block, or to prioritise attending the local school rather than a school further away, but en route to the parents' work place?

There are, of course, limitations to this study which may affect generalisations being made from its findings. The schools were purposively chosen and there were small numbers of children participating in the study from each school, perhaps leading to selection and response bias. Additionally, the qualitative methods sought rich, meaningful data, rather than gathering data using quantitative methods that had been rigorously tested for reliability and validity. However, it is a strength of this study that it did cover a representative range of schools and used mixed methods designed to cover a range of issues, providing insight into children's complex lives. If as planners, health educators and physical activity specialists we do not understand the complex associations behind family travel practices, then the likelihood of any walking and active travel initiative succeeding is limited. Children clearly enjoy walking and want to walk – it is conducive to their mental and physical well-being, and they have a right to walk in safety and develop their independence. In New Zealand cities as elsewhere, these benefits are being denied to many of our children. ■

REFERENCES

Andersen, L. (2007) 'Physical activity and health: Even low intensity exercise such as walking is associated with better health', *British Medical Journal,* 334, 1173.

Bornholt, L.J. & Piccolo, A. (2005) 'Individuality, belonging, and children's self concepts: A motivational spiral model of self-evaluation, performance, and participation in physical activities', *Applied Psychology: An International Review,* 54, 515-536.

Brown, B., Werner, C., Amburgey, J. & Szalay, C. (2007) 'Walkable route perceptions and physical features', *Environment and Behavior,* 39, 34-61.

Cheatum, B.A. & Hammond, A.A. (2000) *Physical activities for improving children's learning and behaviour,* Champaign, Illinois, Human Kinetics.

Chester, V.L., Tingley, M. & Biden, E.N. (2007) 'An extended index to quantify normality of gait in children', *Gait & Posture,* 25, 549-554.

Cooper, A.R., Andersen, L.B., Wedderkopp, N., Page, A. & Froberg, K. (2005) 'Physical activity levels of children who walk, cycle, or are driven to school', *American Journal of Preventive Medicine,* 29, 179-184.

Engwicht, D. (1999) *Street reclaiming: Creating liveable streets and vibrant communities,* Australia, Pluto Press.

Freeman, C. (2006) 'Colliding worlds: Planning with children and young people for better cities', in B. Gleeson & N. Snipe (Eds.), *Creating child friendly cities: Reinstating kids in the city,* Oxon, Routledge.

Freeman, C., Quigg, R., Vass, E. & Broad, M. (2007) *The changing geographies of children's lives: A study of how children in Dunedin use their environment: Report on research findings,* Dunedin, Geography Department, University of Otago.

Handy, S., Weston, L. & Mokhtarian, P. (2005) Driving by choice or necessity, Transportation Research Part A: Policy & Practice, 39, 183-203.

Hillman, M. (Ed.) (1993) *Children, transport and the quality of life,* London, Policy Studies Institute.

Holt, N., Spence, J., Sehn, S. & Cutumisu, N. (2008) 'Neighborhood and developmental differences in children's perceptions of opportunities for play and physical activity', *Health & Place,* 14, 2-14.

Hubsmith, D. (2006) 'Safe routes to school in the United States', *Children Youth Environments,* 16, 168-190.

Johansson, M. (2006) 'Environmental and parental factors as determinants of mode for children's leisure travel', *Journal of Environmental Psychology,* 26, 156-169.

Karsten, L. & Van Vliet, W. (2006) 'Children in the city: Reclaiming the street', *Children Youth Environments,* 16, 151-167.

Kearns, R. & Neuwelt, P. (2003) 'The walking school bus: Extending children's geographies?', *Area,* 35, 285-292.

Kerr, J., Rosenberg, D., Sallis, J., Saelens, B., Frank, L. & Conway, T. (2006) 'Active commuting to school: Associations with environment and parental concerns', *Medicine and Science in Sports and Exercise,* 38, 787-794.

Kingham, S. & Ussher, S. (2005) 'Ticket to a sustainable future: An evaluation of the long-term durability of the Walking School Bus programme in Christchurch, New Zealand', *Transport Policy,* 12, 314-323.

Kiviniemi, M., Voss-Humke, A. & Seifert, A. (2007) 'How do I feel about the behavior? The interplay of affective associations with behaviors and cognitive beliefs as influences on physical activity behavior', *Health Psychology,* 26, 152-158.

Kubo, M. & Ulrich, B.D. (2006) 'Early stage of walking: Development of control in mediolateral and anteroposterior directions', *Journal of Motor Behavior,* 38, 229-237.

Lagerberg, D. (2005) 'Physical activity and mental health in schoolchildren: A complicated relationship', *Acta Paediatrica,* 94, 1699-1705.

McMillan, T., Day, K., Boarnet, M., Alfonzo, M. & Anderson, C. (2006) 'Johnny walks to school - Does Jane? Sex differences in children's active travel to school', *Children Youth Environments,* 16, 71-89.

Parnell, W., Scragg, R., Wilson, N., Schaaf, D. & Fitzgerald, E. (2003) NZ Food NZ Children: Key results of the 2002 National Children's Nutrition Survey, Wellington, Ministry of Health.

Platinga, A. & Bernell, S. (2007) 'The association between urban sprawl and obesity: Is it a two way street?', *Journal of Regional Science,* 47, 857-879.

Pooley, C., Turnbull, T. & Adams, M. (2006) 'The impact of new transport technologies on intraurban mobility: A view from the past', *Environment and Planning A,* 38, 253-267.

Schofield, G., Schofield, L. & Mummery, K. (2005) 'Active transportation: An important part of adolescent physical activity', *Youth Studies Australia,* 24, 43-49.

Sheller, M. & Urry, J. (2006) 'The new mobilities paradigm', *Environment and Planning A,* 38, 207-226.

Timperio, A., Crawford, D., Telford, A. & Salmond, J. (2004) 'Perceptions about the local neighbourhood and walking and cycling among children', *Preventive Medicine,* 38, 39-47.

Tranter, P. & Pawson, P. (2001) 'Children's access to local environments: A case study of Christchurch New Zealand', *Local Environment,* 6, 27-48.

Tranter, P. & Whitelegg, J. (1994) 'Children's travel behaviours in Canberra: Car dependent lifestyles in a low density city', *Journal of Transport Geography,* 2, 265-273.

Valentine, G. & McKendrik, J. (1997) 'Children's outdoor play: Exploring parental concerns about children's safety and the changing nature of childhood', *Geoforum,* 28, 219-235.

Yelavich, S., Town, C., Burt, R., Chow, K., Donohue, R., Sani, H., Taylor, K., Gray, A., Eberhart-Phillips, J. & Reeder, A. (2008) 'Walking to school: Frequency and predictors among primary school children', *New Zealand Medical Journal,* 121.