

**School of Built Environment
Department of Urban and Regional Planning**

Built environment auditing, active mobility and children's wellbeing

Courtney W Babb

**This thesis is presented for the Degree of
Doctor of Philosophy (PhD)
of
Curtin University**

March 2014

Declaration

To the best of my knowledge and belief this thesis contains no material previously published by any other person except where due acknowledgement has been made. This thesis contains no material that has been accepted for the award of any other degree or diploma in any university.

Courtney Babb.....

Abstract

Emerging evidence regarding the influence of the built environment on children's rates of active mobility has highlighted the importance of urban planning, transport planning and urban design. For children, active mobility – mainly walking and cycling – provides many opportunities to enhance their wellbeing through better health, access to activities, and developing independence. This thesis examines the relationship between children's wellbeing and the built environment, as mediated by walkability audits, built environment audit tools used by urban planners.

The objectives of the thesis were to explore the relationship between the built environment, children's everyday active mobility and children's wellbeing, and to understand how built environment audits address children's wellbeing through facilitating active mobility. The research objectives were considered via a number of different scales – individual, household, neighbourhood and policy. The research methods included surveys of children and parents, a photo-voice method, content and thematic analysis of the local newspaper, interviews with planners, and an evaluation of the built environment using a walkability audit. The research focused on a case study – a primary school in Western Australia.

The research findings revealed that, despite most children and parents valuing active mobility and the neighbourhood being perceived as good for walking and cycling, children's mobility was predominantly shaped by the car. Synergies between evaluations made by the walkability audit and those made by the children and their parents were identified, indicating that audits have the potential to offer meaningful evaluations of built environment supportiveness for children's active mobility. However, auditors need to pay careful attention to the design of audits so that they can capture meaningful information relating to the full range of barriers to children's active mobility and understand the potential of audits as a tool to challenge automobility. An ongoing critical reflection of the role of audits in practice is necessary in order for built environment audits to be valuable tools for planners to improve the capacity of cities to support children's wellbeing through active mobility.

Table of Contents

List of Figures.....	xi
List of Tables.....	xiv
Glossary and abbreviations.....	xvii
Acknowledgements	xix
Publications resulting from the work presented in this thesis	xxi
Chapter 1: Introduction.....	1
1.1 The research problem	1
1.2 Research approach.....	3
1.3 Research aims and objectives	4
1.4 Significance of the research.....	5
1.5 Research design and methodology.....	7
1.6 Key terminology	8
1.6.1 Children’s Mobility, Active Mobility and Sustainable Mobility.....	8
1.6.2 Urban environment, built environment and neighbourhood.....	9
1.6.3 Wellbeing	9
1.6.4 Urban planning and policy.....	9
1.7 Thesis structure.....	10
Chapter 2: The built environment and children’s mobility and wellbeing: a review of the literature	14
2.1 Introduction	14
2.2 Children’s mobility and wellbeing	14
2.2.1 The link between subjective wellbeing and mobility.....	15
2.2.2 The link between needs and mobility	16
2.2.3 The link between capabilities and mobility	19

2.3	Influences on children’s mobility.....	20
2.3.1	A conceptual model of children’s active and independent mobility	20
2.3.2	The individual	22
2.3.3	Household dynamics and the licence to travel.....	23
2.3.4	The urban environment.....	25
2.3.5	Automobility and the socio-political domain	27
2.3.6	The built environment and children’s active and independent mobility .	29
2.4	Conclusion	38
Chapter 3: Auditing the built environment for children’s mobility: a review of the literature		42
3.1	Introduction	42
3.2	The policy context of planning for children’s mobility	43
3.2.1	The policy domain	43
3.2.2.	Policy, wellbeing and children’s mobility.....	44
3.2.3	Examples of policy responses to children’s mobility.....	46
3.3	Walkability audits	49
3.3.1	An overview of walkability audits	49
3.3.2	Auditing the built environment: A brief history.....	50
3.3.3	Audit culture.....	54
3.3.4	Methodological issues of built environment audits.....	56
3.3.5	Built environment audits, ethics and wellbeing	57
3.4	Conclusion	61
Chapter 4: Research methodology and design		64
4.1	Introduction	64
4.2	Theoretical framework guiding the research design.....	65
4.2.1	Socio-ecological theory.....	65

4.2.2	Key socio-ecological concepts.....	66
4.3	Research objectives.....	71
4.4	Research methodology	72
4.4.1	Case study methodology	72
4.4.2	Research design framework.....	73
4.5	Case study description.....	76
4.6	Description of research methods.....	77
4.6.1	Children’s and parents’ survey	78
4.6.2	Photo-collage.....	80
4.6.3	Local newspaper analysis.....	84
4.6.4	Practitioner interviews.....	85
4.6.5	Audit and evaluations of the walkability of the neighbourhood.	87
4.6.6	Summary of methods	87
4.7	Analysis.....	88
4.7.1	Statistical analysis.....	88
4.7.2	Content and thematic analysis.....	91
4.8	Ethics	94
4.9	Limitations.....	96
4.10	Conclusion.....	97
5.	Individual, household and neighbourhood factors related to children’s active mobility and wellbeing: the case study findings.....	99
5.1	Introduction.....	99
5.2	Household context and parents’ and children’s individual travel behaviour....	99
5.2.1	Introduction	99
5.2.2	Household characteristics and parents’ travel to work.....	100
5.2.3	Children’s independent mobility	102

5.2.3.1	Parents' attitudes to independent mobility.....	103
5.2.3.2	Children's licences to travel independently	104
5.2.3.3	Children's attitudes towards their independent mobility.....	108
5.2.4	The school journey.....	110
5.2.4.1	Children's reported travel mode to school	110
5.2.4.2	Distance to school.....	113
5.2.4.3	Children's preferred mode of travel to school.....	114
5.2.5	Children's travel to places other than school	116
5.2.5.1	Local shops.....	117
5.2.5.2	Friends' homes in neighbourhood.....	118
5.2.5.3	Local parks.....	118
5.2.5.4	Organised activities.....	119
5.3	The neighbourhood, children's active mobility and wellbeing: area, places and routes	119
5.3.1	Introduction.....	119
5.3.2	The neighbourhood area and children's wellbeing.....	120
5.3.2.1	Children's and parents' perception of the quality of the neighbourhood area.....	120
5.3.2.2	Evaluating the neighbourhood for change.....	123
5.3.3	Places in the neighbourhood and children's wellbeing.....	127
5.3.3.1	Children's homes	127
5.3.3.2	Schools	129
5.3.3.3	Local parks.....	132
5.3.3.4	Local shops.....	138
5.3.3.5	Friends' houses.....	141
5.3.3.6	Sporting activities and places.....	143
5.3.4	Children's walking and cycling routes and wellbeing	145

5.3.4.1	Streets, pathways and children’s active mobility	145
5.3.4.2	Cars, roads and children’s active mobility	148
5.3.5	Individual, household and neighbourhood factors related to children’s active mobility and wellbeing: a summary.....	152
6.	Exploring the built environment audits and their policy context	159
6.1	Introduction	159
6.2	Interviews with practitioners	160
6.2.1	Organisational roles of the interviewees.....	160
6.2.2.	Problem framing in relation to active mobility	163
6.2.3.	Evaluation of audits by practitioners	165
6.3	Policy context of the case study: organisation, rules, and policy settings relevant to built environment auditing	174
6.3.1	Introduction.....	174
6.3.2	The policy context: thematic and content analysis of local newspaper articles.....	174
6.4	Evaluating the quality of the built environment for children’s active mobility: the audit findings.....	186
6.4.1	Introduction.....	186
6.4.2	Meta-analysis of audits in the Australian context	188
6.4.3	The walkability audit methodology in the case study.....	193
6.4.4	Findings of the walkability audit.....	196
6.5	Conclusion	209
7.	Discussion and conclusion	213
7.1	Introduction	213
7.2	Objective one: exploring the relationship between the built environment, children’s active mobility and children’s wellbeing	213
7.2.1	Research question one	213

7.2.2	Research question two.....	215
7.2.3	Research question three	216
7.2.4	Addressing the first research objective	219
7.3	Objective two: understanding how built environment audits address children’s wellbeing through facilitating active and independent mobility.....	221
7.3.1.	Research question four.....	221
7.3.2.	Research question five	223
7.3.3	Addressing the second research objective.....	226
	Conclusion.....	229
	References.....	231
	Appendix A-1: Details of the CATCH project.....	267
	Background	267
	Appendix A-2: Department of Education ethics approval	268
	Appendix A-3: Curtin University ethics approval – CATCH project	269
	Appendix A-4: Curtin University ethics approval – interviews.....	270
	Appendix A-5: Letter of introduction to participate in research – principal.....	271
	Appendix A-6: Letter of invitation to participate in research – student.....	274
	Appendix A-7: Letter of invitation to participate in research – parent	276
	Appendix A-8: Letter of invitation to participate in research – interviewees.....	279
	Appendix A-9: Consent form – principal	281
	Appendix A-10: Consent form - children	282
	Appendix A-11: Consent form - parents.....	283
	Appendix A-12: Consent form - interviewees.....	285
	Appendix B-1: Parent’s survey	286
	Appendix B-2: Children’s survey.....	299
	Appendix B-3: Interview protocol.....	313

Appendix B-4: Photo-collage instruction sheet	315
Appendix C-1: Interview transcripts	317
Appendix C-2: Audit Findings	351
Appendix C-3: Photo-collage content and thematic analysis	364
Appendix C-4: Newspaper content and thematic analysis.....	368
Appendix C-5: Categories for meta-analysis of audits.....	370

List of Figures

Figure 1-1: Research approach.....	4
Figure 1-2: Thesis chapter structure.....	10
Figure 2-1: Hierarchy of Walking Needs (Alfonzo 2005)	18
Figure 2-2: Mitra's (2012) Behavioural model of school transportation	21
Figure 2-3. Built environment factors associated with walkability	30
Figure 2-4: Area/ Place/ Route.....	32
Figure 3-1: Lewis' (2012a) general model of built environment audits.	60
Figure 4-1: Barton and Grant's (2006) 'Health Map'	65
Figure 4-2: Bronfenbrenner's (1979) Socio-Ecological Model.	67
Figure 4-3: Research design framework.	75
Figure 4-4: The case study location within the Perth metropolitan regional context.	76
Figure 4-5: Neighbourhood scale map of the case study area.....	77
Figure 4-6: Socio-ecological model and related research methods.....	78
Figure 4-7: Example of photo-collage with a sticky note attached.....	83
Figure 4-8: Example of the content and thematic analysis diagram.....	94
Figure 5-1: Average Length of Trip- Respondents and Partners.....	102
Figure 5-2: Children's Range of Independent Travel Reported by Parents	106
Figure 5-3: Independently mobile children by age group.....	106
Figure 5-4: Independently mobile children by gender.....	107
Figure 5-5: Children's licence to be independently mobile by bicycle.....	108
Figure 5-6: Children's self-reported usual travel mode to school.....	111
Figure 5-7: Children's preferred travel mode to school.....	114
Figure 5-8: Parents' and children's responses to the questions: "Which of the following would likely increase the freedom of your child/ yourself to walk or cycle in your local neighbourhood without an adult".....	124

Figure 5-9: Content and thematic analysis of "My Home" and "Backyard and frontyard".....	128
Figure 5-10: Content and thematic analysis of "parks, playgrounds and natural spaces".....	134
Figure 5-11: Play as a social activity - Karla's LOVE collage	135
Figure 5-12: Babyish Playground - Ursulla's HATE collage	136
Figure 5-13: "A love of nature" – Dorey's LOVE collage.....	138
Figure 5-14: Content and thematic analysis of "shops and shopping centres".....	140
Figure 5-15: Content and thematic analysis of "friends and other children"	142
Figure 5-16: Content and thematic analysis of "Playing and practicing sports" and "Sporting grounds, recreation centres, and public pools"	144
Figure 5-17: Content and thematic analysis of "the experience of active mobility" and "the neighbourhood street".....	146
Figure 5-18: "The creepy alleyway" – Molli's HATE collage	148
Figure 5-19: Roads as "fun" places to ride – Roley's PERFECT collage	149
Figure 5-20: Content and thematic analysis of "cars and traffic"	151
Figure 5-21: Content and thematic analysis of "crossing the road".....	152
Figure 6-1: Content and thematic analysis of "Road Crossing" in the local newspaper articles.....	180
Figure 6-2: Content and thematic analysis of "The School Zone" in the local newspaper articles	182
Figure 6-3: Content and thematic analysis of "Road Safety" in the local newspaper articles.....	184
Figure 6-4: Map of household cluster and walking routes.	194
Figure 6-5: Rubbish bins as barriers along the footpath.....	199
Figure 6-6: Parked cars as barriers along the footpath.	199
Figure 6-7: Location of crossings	201
Figure 6-8: Crossing A - Proportion of pedestrian according to type (A.M).	202

Figure 6-9: Crossing A - Proportion of pedestrians according to type (P.M).	202
Figure 6-10: Crossing B - Proportion of pedestrian according to type (A.M)	203
Figure 6-11: Crossing B - Proportion of pedestrian according to type (P.M)	203
Figure 6-12: Average number of vehicles over the three day survey period (A.M)	206
Figure 6-13: Average number of vehicles over the three day period (P.M)	207

List of Tables

Table 3-1: Example statements from current Australian metropolitan planning strategies.....	44
Table 3-2: Active Living Research Audit Tools.....	51
Table 4.1: Secondary research questions.....	72
Table 4.2: Children's questions addressed during the photo-collage exercise.....	82
Table 4.3: Limitations of the photo-collage exercise	84
Table 4.4: Methods and their relationship with the socio-ecological model.....	87
Table 4.5: Explanation of survey questions.....	89
Table 4.6: Coding framework for photo-collage, newspaper analysis, interviews	92
Table 4.7: Strategies to address ethical issues.....	94
Table 5-1: Car ownership rates in metropolitan area, local government area, and case study sample.....	101
Table 5-2: Travel to work data for metropolitan area, local government area, and case study sample.....	101
Table 5-3: Parents' attitude to their own children's independent mobility	103
Table 5-4: Parent's attitudes to their own and other children's independent mobility	104
Table 5-5: Children Licences to Travel- Parents' Responses.....	105
Table 5-6: Children's independent mobility and their freedom to go outside	109
Table 5-7: Children's reported usual travel mode to school	112
Table 5-8: Comparison of usually mode of travel to school with degree of independent mobility	112
Table 5-9: Distance of households from school/ comparison between active travel to school and non-active travel to school	113
Table 5-10: Reasons for children's preferred mode of travel.....	115
Table 5-11: Children's reported usual travel mode to activities.....	117

Table 5-12: Parents' perceptions of the neighbourhood.....	120
Table 5-13: Parent's perception of the neighbourhood as a place for walking	121
Table 5-14: Children's perceptions of the neighbourhood.....	122
Table 5-15: Other comments by parents "What would be likely to increase your child to be independently mobile	125
Table 5-16: Children's most frequent responses to the open question- "What are your suggestions about how to make the neighbourhood a better place for children or adults to walk or cycle, alone or with their friends?"	126
Table 5-17: Perceptions of the School Zone of Active/Non-Active Travellers to School	131
Table 5-18: Children's attitudes to parks in the neighbourhood.....	133
Table 5-19: Children's attitudes to local shops.....	139
Table 5-20: Travel to shop/ Independent Mobility Cross-tabulation	140
Table 5-21: Children's outdoor play with friends	142
Table 5-22: Children's perception of car traffic.....	150
Table 6-1: Description of interviewee's roles.....	161
Table 6-2: Content analysis of newspaper articles - policy actors associated with children's active mobility.....	175
Table 6-3: Content analysis of newspaper articles- policy initiatives associated with children's active mobility.....	178
Table 6-4: Content analysis of newspaper articles - places associated with children's active mobility.....	179
Table 6-5: Content analysis of newspaper articles - problem framing of issues associated with children's active mobility	183
Table 6-6: Search strategy for audits included in the meta-analysis	188
Table 6-7: Review of built environment audits from Australian and New Zealand websites	190
Table 6-8: Brief description of the routes.....	194

Table 6-9: General comments captured by the route-based audit 197

Table 6-10: Vehicle to pedestrian conflict ratios - Crossing A and B..... 204

Glossary and abbreviations

ACT	Australian Capital Territory
ARC	Australian Research Council
ARCMAP	Geographic Information System software
BCC	Brisbane City Council (QLD)
CABE	Commission for Architecture and Built Environment (UK)
CATCH	Children Active Travel, Connectedness and Health
DDA	Disability Discrimination Act
DEC	Department for Environment and Conservation (WA)
DOP	Department of Planning (WA)
EMRC	East Metropolitan Regional Council (WA)
GIS	Geographic Information Systems
GPS	Geographic Positioning System
IMI	Irvine Minnesota Inventory
MUTCD	Manual of Uniform Traffic Code Devices (QLD)
PERS	Pedestrian Environment Review System
PTA	Public Transport Authority (WA)
QLD	Queensland, Australia
RACQ	Royal Automobile Club Queensland
SRTS	Safe Routes To School
SPACES	Systematic Pedestrian and Cyclist Environmental Scan
SPSS	Statistical Product and Service Solutions

SWEAT	Senior Walking Environmental Audit Tool (Michael et al 2009)
TGSI	Tactile Ground Surface Indicators
TMR	Transport and Main Roads (QLD)
TRUM	Traffic and Road Use Management (QLD)
WAGS	Walking Action Groups
WALGA	Western Australian Local Government Association
WA	Western Australia
WAPC	Western Australian Planning Commission
WWCC	Working With Children Check

Acknowledgements

Firstly, thanks to each of my supervisors. Professor Carey Curtis' ongoing support, wealth of experience, critical feedback and guidance kept me on track and motivated throughout the entire research process. Dr Paul Cozens' guidance and support throughout the research process, and timely, intelligent and thorough feedback on my written material was much appreciated. Finally, Dr Paul Tranter's wealth of knowledge of children's urban geographies and practical feedback on presenting the written material was most valuable.

The research presented in this thesis was part of an Australian Research Council funded project, CATCH (Children's Active Travel, Social Connectedness and Health) involving five universities and a large team of investigators and support staff. Thank you to all the Chief Investigators: Dr Matthew Burke from Griffith University, Associate Professor Carolyn Whitzman from University of Melbourne, Dr Mitch Duncan from Central Queensland University, Dr Paul Tranter from University of New South Wales, and Dr Christine Armit, formerly from Merri Community Health Service. I'd especially like to thank my fellow CATCH/iMATCH PhD colleagues, Andrea Cook, Stephanie Schoeppe, Kala Wati and Farinaz Moghtaderiesfahani, whose support negotiating the particularities of a large, complex research project was much appreciated.

Thank you to those who participated in the research: the interviewees, school principal, teachers, and parents. In particular, thank you to the children, who made a complex data-collection process easy and enjoyable. Also, thanks to Kate Ringvall Oscar Thompson and Lee Claffey who assisted with some of the CATCH data collection.

I'd like to extend a thank you to the administrative, teaching and research staff and colleagues at the School of Built Environment, especially those in the Department of Urban and Regional Planning at Curtin. In particular, thanks to Diana McCallum, Garry Middle, Shahed Khan, Thor Kerr and Shaphan Cox, whose efforts to sustain a collegial research culture focussed on urban issues was a source of motivation and development. Also, thanks to Jake Schapper for, amongst many things, the last minute crash course in Adobe Illustrator. I'd especially like to thank my fellow PhD students at Curtin – Robyn Creagh, Roger Mellor, Rebecca Scherini, Isaac Middle,

James Bannerman, Mat Dalby, Shaoli Wang, Haider Alseidi, and many others – for countless conversations, meetings, presentations and collective head scratching.

Finally I'd like to extend a warm thank you to my family and friends who have supported me during my studies. Thanks to my fellow musicians and kendoka for providing welcome distractions. In particular, thank you to my wife, Lucy, whose support, feedback and company has been critical throughout the research process. I love you Lu – couldn't have done it without you.

Publications resulting from the work presented in this thesis

Babb, C. 2011. Measuring the Built Environment for Children: A theoretical perspective. State of Australian Cities Conference. Melbourne, Victoria: 29th November – 2 December.

Babb, C., Burke, M. And Tranter, P. 2011. Developing neighbourhood 'walkability' indices for children's active transport. World Planning Schools Congress. Perth, Western Australia. 4-8 July.

Babb, C. and Curtis, C. 2013. Evaluating the Built Environment for Active Travel to School. Australasian Transport Research Forum, Brisbane, Queensland. 2 - 4 October.

Babb, C. and Curtis, C. 2013. Access, Health and Independence: Children's quality of life and walkability. State of Australian Cities Conference. Sydney, New South Wales: 26th-29th November.

Cook, A., Babb, C., Whitzman, C. And Tranter, P. 2011. Developing Visual Research Tools to 'Do Planning' With Children: 10 Lessons from a Methodological Review. State of Australian Cities Conference. Melbourne, Victoria: 29th November – 2 December.

Chapter 1: Introduction

1.1 The research problem

The relationship between transport, mobility, and wellbeing has been the focus of growing academic attention (Nordbakke and Schwanen 2013; Reardon and Abdallah 2013). Although, there has been little work explicitly linking the concept of wellbeing and children's mobility, research into the relationship between children's mobility and different aspects of their wellbeing has proliferated in research years. Pioneering studies in the late twentieth century by Lynch and Banerjee (1977), Ward (1978), and Hillman et al (1990) have led to a focus on children's quality of life in urban environments. It is now recognized that active mobility provides children with a range of opportunities to increase their wellbeing. For children, active mobility includes walking, cycling and other modes of travel, such as by scooter, where physical activity is required (Pont et al 2009). Routine activities, such as the trip to and from school, provide children with the opportunity to be actively mobile and therefore can enable children to achieve the minimum amounts of physical activity recommended by health experts (Cooper et al 2005; McDonald 2007). Also, children who walk to school are more likely to engage in other types of moderate to vigorous physical activity in school environments and as extracurricular activities (Mackett et al 2005; Timperio et al 2006). Active mobility affords children access to places that are important for their quality of life, such as schools, parks, libraries, shops, and recreation centres. Importantly, walking and cycling are modes of travel that children can undertake without adult accompaniment, and therefore active mobility also affords children independence. Being independently mobile is linked with higher rates of physical activity in children (Mackett et al 2007; Wen et al 2009), the development of cognitive skills in wayfinding (Risotto and Tonucci 2002), and resilience and development of strategies to deal with risk (Malone 2007).

Despite the growing evidence that active mobility provides many opportunities for children's wellbeing, in Australia the rates of children's active mobility have been found to be decreasing over recent decades (Van der Ploeg 2008). Furthermore, there are indications that children's travel patterns in contemporary urban environments risk compromising their quality of life (Karsten 2005; Freeman and

Quigg 2009). A decline in children's active travel to school has been identified, with implications for children's health through a reduction in physical activity levels and the associated increase in the incidence of obesity (Mackett et al 2005). The potential reasons for the decline are numerous, with research identifying influential factors such as the increased distances between schools and households (Bringolf-Isler et al 2008; Merom et al 2006; Yarlagaadda and Srinivasan 2008); increased household incomes and greater car ownership rates (Pont et al 2009); more traffic on the roads leading to increased real and perceived risk of pedestrian injuries (Timperio et al 2004); and the perceived convenience of car travel (Lang, Collins and Kearns 2011; Pooley et al 2011). In several countries the rates of children's walking and cycling alone or in groups without adult accompaniment have been shown to be declining (Hillman et al 1990; O'Brien et al 2000; Fyri et al 2011). The modern lifestyle children lead is increasingly complex and is characterised by a range of extracurricular activities (Barker 2011), thus necessitating increased mobility in urban settings. Children are now more dependent on their parents than previous generations, and have acquired labels such as being "bubble wrapped", the "back seat generation", and "battery reared" rather than "free range" (Karsten 2005; Malone 2007). Restrictions on children's independent mobility may be derived from a number of sources including parents' anxieties, social norms and policy and regulatory responses in response to perceived risks (Rudner 2012).

An outcome of the increased attention on the role of the built environment in children's rates of active mobility is an increased awareness of the importance of urban planning, transport planning and urban design. At the neighbourhood level, the evaluation of the built environment through tools such as walkability audits enable urban planners and designers to develop knowledge of what problems are present in children's neighbourhood environments. Auditing, evaluating and systematically observing the built environment and human behaviour in the built environment has been a practical tool of urban planning and design extending back to Lynch (1971) and Whyte (1980). Only recently has the practice of auditing become the focus of wider academic attention as the relationship between health and the built environment has been highlighted (Hoehner et al 2006; Schaefer-McDaniel 2010). Audits have the potential to reflect issues of wellbeing in their evaluations (Lewis 2012a; 2012b). However, much of the research on the role of audits in addressing

active mobility and wellbeing has focused on the general population. As children's mobility is distinct in many ways from adult mobility, and children's mobility environments are potentially shaped by a number of unique range of factors, knowledge of the role of built environment audits in facilitating increased rates of children's active mobility is important.

1.2 Research approach

This thesis examines the relationship between children and the built environment, as mediated by the tools that urban planners use. By doing this it focuses on the translation of knowledge regarding children's wellbeing and mobility, through the instruments that planners use to shape built environments in positive ways. The role of tools and instruments has been the focus of recent attention in planning, urban policy and design research. Tiesdell and Adams (2011, 11) identify a tools-based approach to urban planning and policy that centres on "the range of instruments, mechanisms, tools and actions that policymakers can deploy in response to particular problems and challenges". Canter (1983, 665) noted that a critical role of researchers who are concerned with the human/ environment relationship:

...is no longer the understanding of the nature of the relationships between people and their physical surroundings, but an understanding of the ways that experiences of places maps onto accounts of places drawn from sources other than direct experience; sources such as architect's plans, cost estimates or decibel recorders.

The tools used by architects, urban planners, transport planners and urban designers – professionals who have a role in shaping the urban environment – are an important focus of research. Lewis (2012a; 2012b) provides an explanation of why this is so. According to Lewis (2012a), the tools used to evaluate and shape urban environments, are normative, value-laden, and contain ethical assumptions of ideal arrangements between humans and their environments. Tools such as audits, evaluate built environment 'goods' and 'resources'; for example their quality for walking and cycling. Lewis' draws on environmental psychology, the normative theories of the built environment, socio-ecological theory, and questions of moral philosophy, to ask the questions: how do we evaluate what is a good environment,

and how do we evaluate individuals' access to built environment resources in equitable ways?

This research thesis approaches the issue of the decline of children's active mobility and the implications this has for children's wellbeing, through the lens of a planning tool – a walkability audit. In doing so it draws on Lewis' (2008; 2012a; 2012b) notion of audits as an important means of shaping values and norms regarding ethics and wellbeing. **Figure 1-1** illustrates the research approach of the thesis.

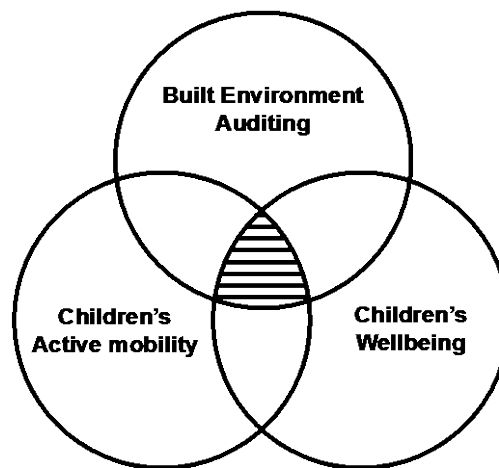


Figure 1-1: Research approach

1.3 Research aims and objectives

The overarching purpose of this research thesis is to provide knowledge that contributes to urban planners' capacity to develop practices and shape urban environments that are beneficial to children's wellbeing. This thesis approaches the research problem in two stages. The first stage of the research inquiry focuses on children's wellbeing and mobility. It approaches the topic using a socio-ecological framework that investigates a range of influences on children's mobility including individual, household, and neighbourhood scale factors. The research objective of the first stage of the thesis is to:

Explore the relationship between the built environment, children's active mobility and children's wellbeing.

Following a literature review, three questions emerge that contribute to achieving the first objective. These questions are:

Question One: What factors are important in the relationship between active mobility and children's subjective wellbeing?

Question Two: What factors are important in the relationship between active mobility and children's needs?

Question Three: What factors are important in the relationship between active mobility and children's capabilities?

The second stage of the thesis relates to the activity of planners. It relates to a specific practice planners use to evaluate the quality of the built environment for walking and cycling; that of built environment auditing. The research objective of the second stage is to:

Understand how built environment audits can better address children's wellbeing through facilitating active and independent mobility.

Following a review of theoretical and empirical literature relating to built environment audits and the practical contexts in which they are used, two further questions were developed that contribute to addressing the second objective. These questions are:

Question Four: How do built environment audits evaluate built environments in relation to children's active mobility and wellbeing?

Question Five: How can a socio-ecological approach advance built environment auditing for children's active mobility?

1.4 Significance of the research

The knowledge derived from this research thesis contributes to three broad areas relevant to children's wellbeing in contemporary urban environments. Firstly, the thesis integrates children's active mobility into a general framework of wellbeing. Whereas there has been a great deal of research on children's mobility, there has been little that explicitly locates children's mobility within a conceptual framework of wellbeing. The analysis of empirical data contributes to understanding the relationship between children's active mobility and their wellbeing through an

exploratory and rich descriptive inquiry into children's and their parents' travel behaviour, perceptions of the neighbourhood environment, attitudes to active mobility, and evaluation of the built environment's quality as a place to walk and cycle. Rather than approaching the research objectives from one theoretical perspective of wellbeing, the research questions are interrogated from a number of perspectives. The insight into the multiple links between children's mobility and their wellbeing that this thesis elicits, contributes to:

- Knowledge of the aspects of children's mobility important to children's wellbeing;
- Knowledge of the links between children's active mobility and their wellbeing;
- Knowledge of the relationships between differing theories of wellbeing and children's wellbeing.

Secondly, the thesis reports on the translation of knowledge of children's wellbeing and active mobility through the process and output of a planning tool - a walkability audit. Through a comparative analysis of the children's experience of their local neighbourhood, and the normative neighbourhood forms and social arrangements as represented by the walkability audit, a number of significant insights are gained regarding children's wellbeing and mobility. These insights can contribute to a public understanding of the links between children's wellbeing and active travel. As Myers (1988) noted, the concept of quality of life can be a "potent" metaphor for planning. The ability of audits to contribute to the social discourse of 'wellbeing' may legitimise and influence the governance of places and communities for children's active mobility and wellbeing. Therefore, a better understanding of how planners operationalize the links between active mobility and wellbeing for children, offers the potential for enhancing the practical efforts of spatial planners in shaping the quality of urban environments for children.

Thirdly, the thesis provides insight into the practice of auditing children's mobility environments. It does this by focusing on the aspects of the built, social and policy environments that are particularly relevant to children's mobility environments. An understanding of the role of audits and of the practice of auditing, related specifically to children's mobility environments, allows planners to adapt their audit instruments and processes to reflect the range of factors most relevant to children's wellbeing.

1.5 Research design and methodology

This thesis employs a single case study methodology, using a mixed-methods approach to address the research objectives. A primary school in Western Australia was chosen as the case study. A socio-ecological theory informed the research design. A mixed qualitative and quantitative approach was used to investigate the characteristics of a number of different scales – individual, household, neighbourhood, policy and socio-political – that are influential in shaping children’s active mobility and wellbeing. Surveys and a photo-collage exercise were conducted with fifty-one children from the primary school aged between nine and twelve years, in order to understand their travel behaviour, preferences and attitudes towards active mobility. Forty-nine parents of the children completed a survey capturing the perceptions of their own children’s mobility and the quality of the local neighbourhood environment for children’s active mobility. The surveys also contained questions that determined the licences children had to travel independently. These licences included the licence to travel to and from school, to cross roads and to catch public transport unaccompanied by adults. A built environment audit and a thematic analysis of issues relevant to children’s active mobility in the local newspaper indicated the relevant neighbourhood scale factors. Interviewees with eight professionals with knowledge of the practice of built environment auditing indicated the policy scale factors at play in the case study.

This PhD research was part of a larger national study funded by an Australian Research Council Discovery Grant (CATCH: Children’s Active Travel, Connectedness and Health DP1094495). The objective of the CATCH project was to examine how factors of the social and built environment influence the independent mobility, active travel and health of Australian children across a range of environments that broadly represent where the majority of children reside in contemporary Australian society. The project was unique in that it was a collaboration of a research team from five Australian universities, drawing together a range of disciplines including urban and regional planning, transport planning, social planning, human geography and public health. The Perth case study used in this thesis was one of the CATCH project case studies.

1.6 Key terminology

There are several key terms that are important to clarify at the outset of this thesis:

1.6.1 Children's Mobility, Active Mobility and Sustainable Mobility

The term *mobility* is used in this thesis in preference to the term *travel*. *Mobility* has been defined as “the social dimensions of being ‘mobile’, including its driving forces and influences on the personal level” (Schiefelbusch 2010, 201). *Mobility* therefore encompasses a broader range of social concepts and questions than the notion of *travel*, which implies the function of moving from point of origin to a destination. Although in the literature relevant to the research topic, the term *mobility* is used in regard to children's independent mobility (O'Brien et al 2000; Kytta 2004; Fyhri and Hjorthol 2009) much of the literature uses terminology such as active travel. The thesis utilises the term *mobility* even when drawing upon the literature referring to active travel. In doing so it reconceptualises utilitarian travel within the broader social processes that constitutes children's everyday mobility. That being said, the term *travel* or *trip* is used sparingly throughout the thesis when referring to specific phenomena such as ‘travel to local shops’ or ‘school trips’.

A number of terms drawing upon the notion of *mobility* are used in this thesis.

- **Active mobility** refers to walking or cycling, and other modes of travel that do not rely on motorised vehicles. As children rely on **active mobility** in order to be independently mobile, and independence is linked to children's wellbeing, the thesis uses this term extensively.
- **Sustainable mobility** refers to the normative objective of policy and planning to reduce private motorised trips and increase trips by walking, cycling and public transport. The term refers to the recognised need to mitigate the social, economic and environmental effects of private motorised mass-mobility (Banister 2008).
- **Mobility environment** refers to the combined urban spaces that are associated with an individual's or group's mobility patterns. The term was drawn from Bertolini (2006, 320) who considered that cities must be understood as “a diversity of mobility environments” that exist at a number of different spatial scales.

- **Automobility** refers to the current regime of mobility of modern urban environments, characterised by institutional practices and social norms based on the ideal of the unfettered mobility of motorised vehicles (Urry 2004).

1.6.2 Urban environment, built environment and neighbourhood

In addition to the term **mobility environment**, three other terms are used to reflect environmental aspects of the research thesis.

- **Urban environment** refers to the broader, environmental features associated with urbanisation.
- **Built environment** refers to the physical elements of the urban environment, and their arrangement in urban space.
- **Neighbourhood environment** refers specifically to the built and social environments in proximity to places of residence. An underlying assumption of this thesis is that neighbourhood environments are central to children's active mobility.

1.6.3 Wellbeing

The concept of **wellbeing** is central to this thesis and therefore the term is used extensively. One objective of the thesis is to explore the concept and provide an interpretation of wellbeing in the context of children's active mobility, so it is therefore not necessary to provide a definitive explanation of the term here. However, it is worth noting that the concept of **wellbeing**, although represented by its own body of theoretical and empirical literature (Qizilbash 1998), shares similarities with the related concept of 'quality of life' (Phillips 2006), and happiness (Franklin 2010). The concept of **wellbeing** is explained in more depth in Chapter 2.

1.6.4 Urban planning and policy

An objective of this thesis is to understand the relationship between children's active mobility and wellbeing within a policy context. Throughout the thesis a number of terms are used to refer to aspects of the policy context.

- **Policy and policy environment:** These terms refer to more than just formal, written policies. Policy and the policy environment instead reflect the range of formal statements, rules and regulations, policy actors, and resources that are

assembled to address policy issues. For a more detailed explanation of policy, see Section 3.2.1.

- **Planning:** This term refers to the range of professions that are involved in the planning, management, and collective governance of the urban environment, including the built form, land use, transport systems, and travel behaviour of individuals. The professions may encompass transport planning, urban planning and urban design.

1.7 Thesis structure

The structure of the thesis is illustrated in **Figure 1-2**.

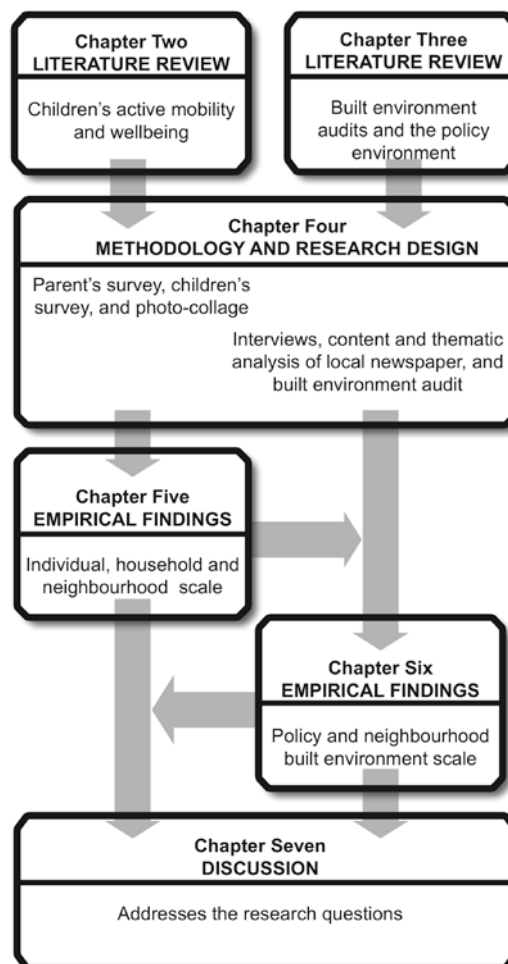


Figure 1-2: Thesis chapter structure

Chapter 2 reviews the literature relevant to the research objectives. The chapter begins with an overview of the relationship between mobility and wellbeing, before grounding the overview within the literature relevant to children's active mobility. A

framework developed by Raktim Mitra (2012) provides a means of organising the review of literature according to the influences at different scales. The review begins by focusing on the individual scale factors that shape children's active mobility, including the children's attitudes and perceptions. It then discusses the importance of household scale factors including the scheduling of activities, parents' travel patterns, and children's licences to travel. The chapter concludes with a comprehensive review of literature concerning the neighbourhood and built environment factors which influence children's active mobility. Moudon and Lee's (2003) theoretical framework of area, place and route characteristics is used to structure the literature relevant to the neighbourhood and built environment.

Chapter 3 continues the review of the literature, turning attention to built environment audits and the policy environment relevant to children's active mobility. It commences by charting the policy environment relevant to furthering children's active mobility, explaining that the policy commitment to children's active mobility is constrained and enabled by the framing of policy problems, the relationships between policy organisations, rules and regulations, and resources. These factors are briefly explored in relation to three policy approaches that address children's active mobility. The chapter concludes with a detailed exploration of built environment audits. Built environment audits are policy tools that are being increasingly used to evaluate the quality of neighbourhood environments, and can be potentially used to improve children's active mobility and wellbeing. The work of Ferdinand Lewis (2012a; 2012b) is identified and outlined as an important means to integrate the concerns of built environment auditing, active mobility, and wellbeing.

The first part of Chapter 4 outlines the theoretical approach that underpins the research design, analysis and discussion of findings. A socio-ecological approach is proposed. The approach conceptualises individuals as nested within a number of ecological scales (the household environment, the neighbourhood environment, and the policy environment). The approach is an appropriate means to understanding both children's wellbeing as it relates to active mobility and their mobility environments, and also the tools operating within the policy domain as they shape children's active mobility. The second part of Chapter 4 describes the methodological details of the research thesis. The research approach and design are outlined. The case study context is provided, and a multi-stage mixed methods approach is

defined. The methods used to collect data are then described, and the associated analytic techniques are then explained.

Chapter 5 reports the findings from the surveys of children, their parents, and the children's photo-collages. Using the socio-ecological approach, the chapter begins by exploring the household characteristics, children's travel to places in the neighbourhood, and their independent mobility. The second part of the chapter explores children's and parents' perceptions and attitudes towards the neighbourhood environment. The findings are presented according to Moudon and Lee's (2003) model of the built environment: area, place, and route. The findings reveal that although most children preferred active mobility and many children had the licence to travel independently, in fact most neighbourhood travel for the children was conducted as a passenger in a car. The children's evaluation of their local neighbourhood identified a number of significant issues, including the lack of pedestrian paths in streets, and the importance of activities being accessible by active modes of transport. Overall, the findings suggest that there are multiple links between wellbeing and children's mobility, and in some cases there are contradictions evident between different interpretations of wellbeing.

Chapter 6 presents the findings relevant to the policy context of the case study. The chapter begins by presenting findings from interviewees who have knowledge of the development or use of built environment audits. Secondly, the content and thematic analysis of local newspaper's representations of policy issues relevant to children's active mobility in the case study is presented. Thirdly the presentation of audit evaluations of the case study locality concludes the chapter. The findings suggest that there are several different ways that planning practitioners use audits. The use of audits is shaped by policy contexts, which include the resources available, policy actors, and the overall strategic objectives and framing of policy problems. The newspaper analysis reveals that the case study neighbourhood policy context has a number of key policy actors. The analysis also provides evidence that policy actors have differing expectations regarding the quality of children's mobility environments. The audit of the case study context reveals that, despite some problems, including the absence of paths along some streets, the presence of temporary, physical barriers along paths, and congestion around the school at the beginning and end of the school day, overall the neighbourhood rates highly as a walkable environment.

Chapter 7 draws together the research strands, addressing the research objectives and questions, before concluding the thesis. The significant contributions of the research thesis are presented, particularly relating to the development of a more thorough understanding of the relationship between children's active mobility and their wellbeing. The concluding chapter also identifies new directions for research into built environment auditing.

Chapter 2: The built environment and children's mobility and wellbeing: a review of the literature

2.1 Introduction

The purpose of this thesis is to explore how planners can facilitate children's wellbeing through auditing and evaluating the quality of the urban environment for walking and cycling. This chapter reviews relevant theoretical and empirical literature to examine the links between wellbeing, children's mobility, and the urban environment. It begins with an overview of three approaches to wellbeing – subjective wellbeing, needs, and capabilities - before progressing to a review of the links between children's mobility and wellbeing. A framework is then outlined that positions children's mobility within the range of domains that constitute everyday life in urban environments for many children. Finally, literature is reviewed concerning the built environment factors influential on the behavioural and experiential aspects of children's walking and cycling trips within their local environments.

2.2 Children's mobility and wellbeing

The important factors that influence the wellbeing of individuals are not difficult to articulate. Individuals require food, water, shelter, connection with others, and access to resources that provide them agency to develop and self-actualise. It is more problematic, however, to define how wellbeing should be conceptualised collectively. An understanding of the collective wellbeing of individuals raises questions of moral philosophy, psychology, ethics and justice. For example, should the 'wellbeing' of individuals be averaged across a population, reflecting the utilitarian philosophy of 'the greatest good for the greatest number'? Or should 'wellbeing' of a population reflect the capacity of the least well off to advance their own quality of life.

Advancing the wellbeing of populations is particularly pertinent for urban planning. Urban planning is concerned with normative questions such as: what are good quality settlements? How do we plan cities that are liveable and sustainable? What is the public good or public interest? As mobility and travel are an essential part of life, an understanding of the links between wellbeing and mobility is critical. However, the relationship between mobility and wellbeing is complex partly because the question

of 'what constitutes wellbeing?' can be answered in different ways (Phillips, 2006; Nordbakke and Schwanen 2013; Reardon and Abdallah 2013). The following sections introduce three ways that wellbeing can be conceptualised, and provide an overview of their implications for understanding the relationship between wellbeing and mobility.

2.2.1 The link between subjective wellbeing and mobility

Subjective notions of wellbeing are based on the physical experience of pleasure or happiness, the absence of pain, and also the satisfaction of individuals' preferences. The subjective approach to wellbeing has its origins in utilitarian philosophies and is referred to as a hedonic concept of wellbeing (Phillips 2006). The relationship between mobility and hedonic wellbeing has been the focus of recent attention (Nordbakke and Schwanen 2013; Reardon and Abdallah 2013). In an overview of empirical research on travel and subjective wellbeing, de Vos et al (2013) highlight five ways in which subjective wellbeing may be influenced by travel or mobility. Firstly, they consider that wellbeing may be affected whilst travelling to and from destinations. For example, commuters can be delayed, either on congested roads or delays in public transport, and may experience negative emotional responses to everyday mobility practices. The second association is that mobility enables people to participate in activities. Having access to activities can improve people's wellbeing by providing opportunities for social interaction or recreation. Thirdly, different types of mobility enable people to participate in activities whilst travelling, such as chatting to people or reading a book on the train. Mobility can also engender wellbeing when the journey itself is the activity. People sometimes travel for the sake of travelling (Mokhtarian and Salomon 2001). In other words, being mobile, or the experience of travel is linked to feelings of wellbeing and satisfaction. Finally, wellbeing can be associated with the potential for travel, even if it is not realized (Sager 2006). People may experience feelings of satisfaction or pleasure from having the freedom to travel without actually travelling.

Subjective notions of wellbeing, however, have been criticised for a number of reasons. One of these is that subjective wellbeing is based on the assumption that individuals know best about their own wellbeing (Andresen et al 2010). An individual may experience physical pleasure or have their preferences met, yet they also may

be subject to factors that they are unaware of, that restrict their potential to experience different kinds of wellbeing. This criticism has been referred to as the notion of adapted preferences (Qizilbash 2006). Individual's preferences to certain states of being may adapt to particular circumstances and therefore not adequately encompass the full range of factors that may be possible for individuals to access in order to enable a good quality of life or wellbeing. A second criticism is that an individual's subjective wellbeing may be valued in the short term at the expense of their long-term wellbeing (de Vos et al 2013). For example, a person may choose to drive to local shops, rather than walking, because it is faster and they perceive it to be convenient. However, what may be neglected are longer-term benefits from the physical activity of walking or the social connection that may be made within the neighbourhood along the way. Evaluations of wellbeing derived solely from a subjective basis, or from the satisfaction of preferences, are often based on the assumption that individuals have comprehensive knowledge of their social and economic position and that they have knowledge of the consequences of their decisions and behaviour (Phillips 2006).

2.2.2 The link between needs and mobility

An alternative approach to understanding wellbeing is the notion of whether or not fundamental human needs are being met. A concept of wellbeing based on a concept of need differs from the utilitarian perspective, in that it does not rely on subjective notions of 'happiness', satisfaction or pleasure. Needs are essentially normative criteria for what constitutes a good quality of life (Phillips 2006) and can be understood outside individual experience (Andresen et al 2010). The concept of needs shifts the focus of wellbeing away from the goal of maximizing pleasure, happiness, and utility, towards a goal of meeting normative standards of quality of life. Needs are commonly represented in minimum standards for such things as nutritional intake, literacy, and recommended minimum amounts of physical activity. Thus, when an individual's needs are met, they have adequate means to pursue quality of life (Qizilbash 1997). However, difficulties arise when it comes to identifying issues such as: what constitutes a need; how should acceptable levels of need be established; and do certain needs take priority over others? Needs based approaches to wellbeing have been criticised for placing too much emphasis on fundamental needs, such as the access to food and water over, what are constituted

secondary needs, such as social connectedness and self-actualisation (Phillips 2006).

One of the few examples of the link between 'needs' and mobility is illustrated in Alfonzo's (2005) 'hierarchy of walking needs'. Alfonzo employed Maslow's (1999) hierarchy of needs to better understand the walkability of neighbourhoods. Maslow's theory of needs posits that human needs can be organised according a hierarchy based on how important they are to sustain human life. According to Maslow, only when more fundamental needs, such as food and shelter, are met higher order needs, such as the need for self-actualisation or personal development, become important. Alfonzo's theory organises the elements of the built environment related to walking according to a similar hierarchy. The hierarchy is organised, from fundamental to higher order needs: feasibility; accessibility; safety; comfort; and pleasurability. The hierarchy is illustrated in **Figure 2-1**.

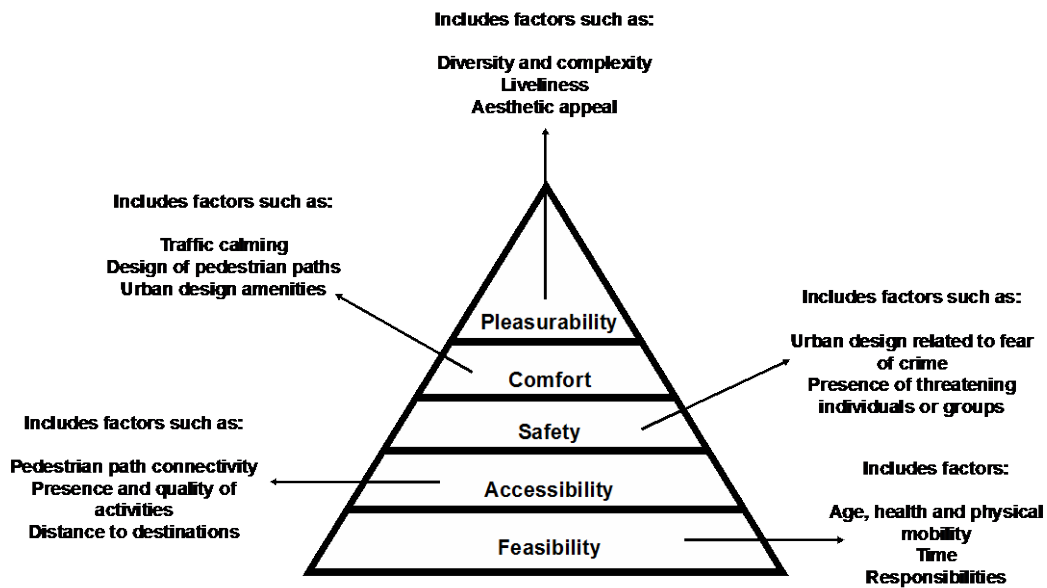


Figure 2-1: Hierarchy of Walking Needs (Alfonzo 2005)

Alfonzo (2005) explains that feasibility refers to whether the walking trip is viable. It encompasses both built environment factors, such as the proximity of particular places to walk to, and other factors such as time restraints and commitments. This is a fundamental walking need because most walking trips need to be feasible in order to take place. Accessibility refers to the types of destinations available; their proximity in relation to one another; and the quality and connectivity of the paths that link them. The perception of and quality of the built environment in regard to safety is the next level of hierarchy identified by Alfonzo. Following safety, the comfort and pleasurability of the built environment are identified. These factors relate to physical feelings of comfort and the aesthetic elements of the walking environment. Alfonzo explains that the hierarchy of walking needs is not a descriptive theory of walking, but rather a framework that needs to be interpreted within the contexts where walking takes place. The theory offers the potential to advance the understanding of children's active mobility and wellbeing; however, no empirical research has been conducted in this area as of yet.

A further parallel between a wellbeing and mobility can also be drawn in relation to health. In 1948 the World Health Organisation defined health holistically, encompassing physical, psychological and social wellbeing rather than the absence

of disease (WHO 1948). Active modes of travel are associated with a range of positive health outcomes. For example, there has been a great deal of interest in walking as a form of active travel emerging from concerns over the rising obesity rates (Moudon and Lee 2008; Saelens et al 2003) as higher rates of walking have been found to decrease the risk of obesity (Frank et al 2007). Furthermore, walking has also been found to be beneficial to mental health and wellbeing (Roe and Aspinall 2011). Regular walking may have greater benefits than more structured yet infrequent forms of exercise, such as jogging (Frank and Engelke 2001) and has therefore been found to be an excellent means to achieve the minimum rates of physical activity recommended by health experts (Australia Department of Health 2013). A needs-based approach values the amount of physically active mobility undertaken, as a way of achieving these minimum rates of physical activity and therefore, achieving wellbeing through better health.

2.2.3 The link between capabilities and mobility

A final concept of wellbeing is represented in the capabilities approach based on the work of Amartya Sen and Martha Nussbaum (Nussbaum and Sen 1993). This approach provides a more holistic notion of wellbeing compared to an approach based on subjective feelings of pleasure or the satisfaction of basic needs. It evaluates wellbeing or quality of life based on the satisfaction and happiness of individuals in relation to what they aspire to do and their freedom to achieve their aspirations. The capability approach reflects a more varied range of end-states associated with wellbeing; “happiness” or “pleasure” being two of a number of potential ends. Unlike a utilitarian notion of quality of life that focuses purely on the end-state of wellbeing (the feeling of happiness or pleasure), and the needs based or resources based approach that addresses the means to achieve wellbeing (having needs met so that the individual is in a position to achieve wellbeing), the capability approach includes both the ends and the means of attaining end-states. The capability approach necessitates a consideration of different individuals or groups of individuals’ capacity to actualise the benefits and goods that are made available. The capability approach is more concerned with the conditions individuals are faced with to achieve their own wellbeing, rather than the experience of pleasure, or whether needs are met.

There have been few attempts to link the capabilities approach to mobility. Capability approaches focus on ethical implications of outcomes, processes and practices of planning practices (Beyazit 2011). The next chapter explores Lewis' (2012a; 2012b) use of the capability approach to understand the role of built environment audits in shaping wellbeing. For Lewis, capability encompasses both the opportunity and the agency of individuals to access resources. An example in relation to active mobility is whether good quality paths are made available (opportunity) and whether people actually use those paths to get around (agency). Understanding the role of mobility in shaping wellbeing from a capability perspective therefore encompasses the physical infrastructure or quality of the built environment, and the range of factors that shape an individual's agency to act and make use of the available infrastructure.

2.3 Influences on children's mobility

2.3.1 A conceptual model of children's active and independent mobility

Children's ability to walk, cycle, and get around by themselves is linked to potential benefits to their overall wellbeing through better health, increased physical activity, more social connections, better access to places that can support their emotional and social development, and greater independence and freedom (Tranter and Pawson 2001; Cooper et al 2005; Timperio et al 2006; Mackett et al 2007; Malone 2007; McDonald 2007). For spatial planners concerned with shaping environments that encourage children to walk and cycle, it is important to develop an understanding of the relationship between urban environments and children's mobility. Focusing on the relationship between urban environments and children's mobility specifically is important because children's mobility patterns are different to those of adults (Mitra 2012). In order to further knowledge of this relationship, a number of conceptual models have been developed to better understand the environmental influences on children's mobility (McMillan 2007; Mitra et al 2010; Panter, Jones and Van Sluijs 2009). Mitra (2012) draws on several of these models to establish a conceptual framework for understanding independent and active travel to school that includes a range of environmental, household activity and behavioural factors. Mitra's model (**Figure 2-2**) highlights a number of domains that are influential on children's active and independent travel to school: the macro-level urban environment, including the regional context, urban density, and land-use mix; the

neighbourhood level environment; household factors; individual attributes and attitudes of the child; and external factors, such as policy and socio-cultural environment.

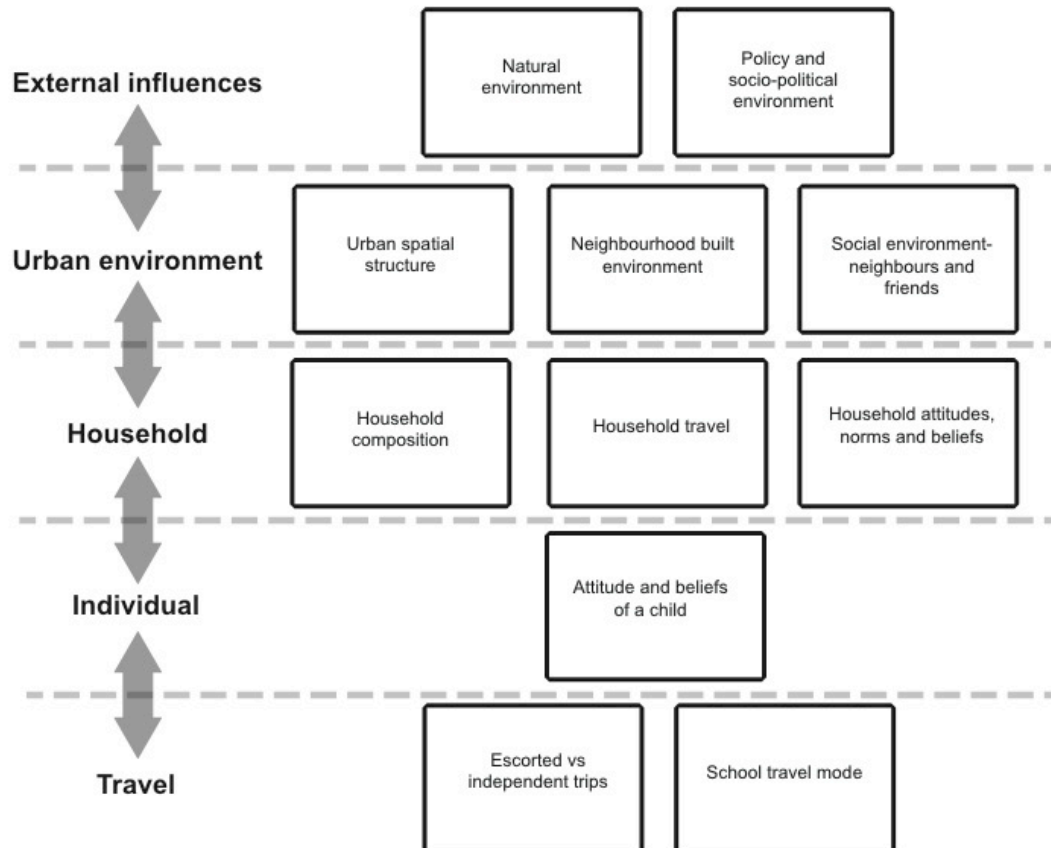


Figure 2-2: Mitra's (2012) Behavioural model of school transportation (Source: Author, adapted from Mitra (2012))

Mitra's (2012) model offers a useful framework for the purpose of exploring the literature relating to children's mobility in their everyday, urban life. The model also provides a means of linking the work of planners and policy makers within the range of domains directly influential on children's mobility – the individual, household, and neighbourhood. Walkability audits originate from the policy domain; an external influence according to Mitra's model. Mitra's model shows that each domain is interrelated with each other domain and that in order to better understand the role of audits in evaluating the built environment for children's mobility, knowledge of the other domains is important. The following section focuses on literature related to a

number of domains identified in Mitra's model: the individual child, the household characteristics, the urban environment and the socio-political environment.

2.3.2 The individual

Mitra (2012) identifies several aspects relevant to the individual scale including attitudes, beliefs, physical and cognitive capability, and the development of the child. Children's attitudes towards different types of mobility are important because these can be an important driver for the mode of travel that children use. Several qualitative studies highlight that children can have substantial agency when it comes to their own mobility. Kullman and Palludan (2011) conducted ethnographic research with children aged seven to twelve years old walking to and from school in Helsinki. They found that children were continually shaping their own mobility patterns, routes and activities to adapt to a wide range of temporal, spatial and technological factors; such as everyday schedules, timetables and in response to mobile phone communication (with parents and friends for example). Barker (2010) demonstrated that car travel serves more than a functional purpose for children, and that children tend to shape 'mobility environments', conducting a wide range of activities, such as home-work and socialising, within the confined space of a car. Furthermore, Bell (2011) argued that children may embrace a sedentary lifestyle as a way of empowering themselves, reacting against the pace and 'busyness' of contemporary life.

Individual children's attitudes are important factors in shaping their mobility environments. However, individual scale factors are problematic when evaluating a collective group of individual children. Often, the consideration that children are one homogenous, aggregated group, simplifies issues of mobility and may dislocate children from the deeper structural forms of inequity based on gender, ethnicity, socio-economic status and disability (James and Prout 1990). Focusing on individual children's experience of mobility has the potential to explore this broader range of issues. It is therefore beneficial to consider how the shared experiences of children, such as getting to school and learning to be independently mobile, differ amongst children, as much as it is to understand the commonalities. For this reason it is important not to reduce children's travel behaviour to simple labels such as 'pedestrian', 'cyclist' and 'car passenger' but, rather, it is crucial to understand that

travel behaviours are associated with a diverse “bundle of beliefs, values and activities” (Guell et al 2012, 238).

2.3.3 Household dynamics and the licence to travel

The capacity for household level relationships, particularly the relationship between children, their siblings, and their parents, must be appreciated if knowledge is to be developed about the link between children’s mobility and their wellbeing. Households provide children with shelter, food, comfort, and social connections for children as they grow, learn and play. In doing so, households create a ‘protective space’ (Hartas 2008), enabling children to develop their capacity to be in the world. Childhood is characterised by a transition from this nurturing and protective household environment to one where the child, in regard to their mobility, eventually becomes more independent and is able to “get around on their own” (Hillman et al 1990). However, Hartas (2008) adds that the ‘protected space’ that children inhabit also functions as a controlling mechanism, limiting children’s freedoms, their development and, potentially, their wellbeing.

The ability for household relationships to enable and restrict children’s mobility is evident in the notion of children’s licence to travel (Hillman et al 1990). Parents impose a number of different licences to travel independent of adult supervision. These licences define what mode of travel children can and cannot take and where children may travel, with or without adult accompaniment. Hillman et al (1990) identified six different licences parents imposed on their children’s mobility. Four relate to travel on foot: the freedom to cross roads; to go to places other than school; to come home from school alone; and to be able to go out after dark. Two relate to cycling and public transport: the freedom to cycle on roads; and the freedom to catch buses or trains. Usually between the age of 7 and 13 children and parents negotiate the various ‘licences’ that constrain their mobility and their potential and actual mobility is increased (Tranter and Pawson 2001; Kytta 2004; Kullman 2010)¹.

Children’s independent mobility has the potential to increase wellbeing. Walking and cycling independently is empowering and even routine activities, such as the walk to school, can provide children with a sense of being independent and in control

¹ The geographic contexts for these references are New Zealand (Tranter and Pawson 2001); Finland and Belarus (Kytta 2004); and Finland (Kullman 2010)

(Pooley et al 2010). Independent mobility can also afford other important aspects related to their wellbeing. Children who walk or cycle without adult accompaniment may be likely to spend a longer time being physically active and playing than those whose licences to travel independently have been restricted (Mackett et al 2005). Malone (2007, 524) argues that independent mobility allows children to be competent in a range of environmental skills, such as reading environments in regard to the spatial, social, and cultural elements; sense of purpose; self-worth and efficacy; social competence; and resilience.

In addition to defining licences to travel, there are other ways that household relationships can shape children's mobility. Mitra's (2012) model identifies three aspects of households that influence children's mobility. The first is household composition, which includes socio-economic status, household size and vehicle ownership rates. The second influence is general household travel activity. Parents and carers influence children's mobility patterns through the scheduling of household activities and travel patterns (Schwanen 2007). Research in the U.S has shown that aspects of parents' travel to work have an influence on the likelihood that children will walk to school, with children less likely to walk when their mothers drove to work (McDonald 2008). Consequentially many children have little control on the routes chosen to travel, the timing, and speed of travel (Freeman and Quigg 2009). Finally, Mitra (2012) identifies attitudes, beliefs, and social norms at the household level as an important factor in shaping children's independent and active mobility. An example that illustrates this is the issue of the actual and perceived safety of a local environment. Safety issues for children in the neighbourhood are usually associated with either road safety or personal safety (Carver et al (2008, 219) refer to 'stranger danger'), although personal safety concerns have also been linked to the presence of other children and the perceived risk of bullying (Veitch et al 2007). Urban environments harbour real risks for children. However, it is important to distinguish between perceptions of safety and real risks to children's safety. How parents perceive issues of safety can influence the licences for children to be mobile. For example, in the U.S., Handy et al (2008) found that the likelihood children played outside increased when parents perceived that the neighbourhood had lower rates of criminal activity.

Although concerns regarding road safety and personal safety have been found to be influential on children's active travel and physical activity, the relationship between perceived and actual safety conditions, is unclear (Carver et al 2008). Travel behaviour decisions based on perceived risks can have perverse outcomes. Collins and Kearns (2005) note the irony of using car-based transport to school as a reaction against unsafe streets and in doing so further contributing to an unsafe pedestrian environment. This is illustrated in research by Kingham et al (2011), who identified in Christchurch, New Zealand, a shift in the time pedestrian accidents have been predominantly occurring over the last 30 years towards the time of the 'school run' between 8am and 9am and 3pm and 4pm. As a result, children bear the burden of a higher proportion of risks due to unsafe pedestrian environments and increased health risks associated with sedentary behaviour, due to increased car travel to and from school.

2.3.4 The urban environment

The next influential domain identified in Mitra's (2012) model, is the urban environment. The concept of the neighbourhood is important to understanding the factors related to the children's mobility environments as it integrates the spatial structure, the built environment, and the social environment as identified by Mitra (2012). The neighbourhood unit, popularised by Clarence Perry in the U.S. in the 1920s used the school as the focus of the unit (Brody 2013). As Hall (2002, 130) explains, children's mobility is central to the concept of the neighbourhood:

(The neighbourhood's) size would be set by the catchment area of the local elementary school, and so would depend on population density; its central features would be this local school and associated playground, reachable on foot within half a mile; local shops, which, by being placed at the corners of several neighbourhoods, could be within a quarter mile; and a central point or common place for the encouragement of community institutions.

The design of neighbourhood areas has important implications for the quality of everyday urban life for children because, in theory, they are spatially arranged to provide places and resources within close proximity to households. Key activities such as buying goods and services, accessing open space for sport and recreation,

and attending education institutions can be supported within the immediate urban environment. Furthermore, the philosophy underpinning the design of neighbourhoods also has important social implications. The neighbourhood scale is important as it potentially supports social cohesion, belonging, and wellbeing through residentially based social networks (Forrest and Kearns 2001, 2130). The ability to build and maintain social capital is provided by the neighbourhood; although the actual extent the neighbourhood contributes to social connectivity is arguable in an age of increasingly dispersed social networks (Kearns and Parkinson 2001). Nonetheless, the social environment of neighbourhoods can influence the degrees of risk parents are willing to accept when providing children with licences to travel (Hart 2002; Valentine 2004; Wridt 2004). Higher rates of active travel have been reported when parents consider that their neighbours are monitoring and looking out for the interest of their children when out in the neighbourhood (McDonald et al 2010). Social discourse can also construct norms and socially accepted standards of behaviour that negatively influence the extent of children's freedom to be independently mobile (Harden 2000). Media and educational campaigns can reinforce the notion that the public space is a riskier space for children than the home environment (Valentine 2004). It has often been shown that parents over-estimate the risks associated with the public realm and under-estimate the risks associated with the home environment (Carver et al 2008). It has been noted that children's potential to access places to play and be active in the neighbourhood is often compromised due to stigmatization by community perceptions of children's anti-social and deviant behaviour (McMeeking and Purkayastha 1995).

In addition to the social aspects of the neighbourhood relating to behavioural norms and conceptions of risk, the economic context of the neighbourhood can contribute to the quality of children's mobility. For children from lower socio-economic areas can be manifest in the absence of good quality spaces for play and physical activity within safe walking distances (Hart 2002; Veitch et al 2007). The risks associated with active travel also vary according to the uneven distribution of economic wealth. Collins and Kearns (2005) found that in Auckland, schools in lower socio-economic areas were both less well served by Walk Safely to School programs and more likely to have a higher risk of pedestrian injuries in the built environment surrounding the school. Children from lower socio-economic areas have been reported as feeling at

risk from other children in public parks (Veitch et al 2007). Studies have shown that even when children from lower socio-economic areas readily utilise public spaces such as parks, they can also suffer stigmatization from broader public perceptions that they may be involved in anti-social behaviour (Sutton 2008). On the other hand, opportunities to access places to play may not be available to children from middle and high income backgrounds (Hart 2002). Sutton (2008) noted that children from an upper socio-economic area in England were engaged in highly organised and spatially dispersed extra-curricular activities and relied on parents to drive them to and from activities. Furthermore, she found that children from lower socio-economic groups were more likely to associate risks in outdoor play to their own safety, whilst children from upper socio-economic groups tended to relate risks to their parent's concerns for their children's safety.

2.3.5 Automobility and the socio-political domain

The final domain in Mitra's (2012) model identifies policy and socio-political factors, as well as the natural environment, as important external influences shaping children's independent and active mobility. Recent attention to the sociological aspects of mobility has highlighted the socio-political nature of urban transport systems and mobility environments (Urry 2000). The notion of automobility has emerged to define the dominant system (Urry 2004) or regime (Bohm et al 2006) of mobility in contemporary urban society. Automobility has not only transformed the physical scale and form of urban development, but it has also shaped the social ecology of cities (Martin 2002). Automobility encapsulates both the association of mobility and freedom reflected in human individual desire for unfettered mobility, and the social, technical and spatial systems that have emerged to support this desire (Beckmann 2001). The perceived speed, flexibility and quasi-private space provided by the car has led to it becoming the manifestation of a regime of automobility and the dominant mode of mobility in urban environments. Rather than a uniform, singular concept, automobility is represented in a variety of social, cultural and political institutions and domains including the planning, provision and regulation of roads (Merriman 2006), the path dependence of transport institutions (Curtis and Low 2013), the centrality of the car and road building industries to global, national and local economies (Urry 2004), urban form and facilities such as parking spaces (Shoup 2006), and the culture of convenience associated with car uses (Steg 2005).

Automobility is fundamental to understanding how human wellbeing is reflected within urban systems and environments. Urry (2004) highlights one of six key components of automobility as “the dominant culture that sustains major discourses of what constitutes the good life”. One way automobility is sustained is through operationalising rights to mobility. The promise of automobility is based on the freedom to be mobile and requires speed and flexibility in order to achieve this. For the promise of automobility to be achieved, motorised vehicles require road space for movement at particular speeds. The requirement for space to accommodate more and more individual car users exercising their rights to mobility is reflected in conventional road planning practice that is often based on increasing the capacity or managing travel demand for more efficient use of road space. In addition to the right to automobility exercised by car-users, the right to walk, run, cycle or play in street free of intimidation or physical harm are fundamental to the quality of life of urban citizens, particularly children. Yet Patton (2007) suggests that the rights to mobility asserted by pedestrians and automobiles are incommensurable in urban streets and trade-offs are necessary. Historically, these trade-offs have been in favour of automobility rather than the mobility of alternative modes, such as walking and cycling (Whitelegg 1997). Trade-offs are made in the name of maintaining prescribed speeds and volumes of vehicles on roads. Although the safety of pedestrians and cyclists are addressed by road planners and engineers, conventional practices provide only an “illusion of safety” (Parusel and McLaren 2010) that conceals risks and rarely challenges the hegemony of automobility.

Children’s wellbeing and safety in the streets has played an important part in challenging the dominance and growth of automobility within particular urban spaces. In the densely developed urban centres of the Netherlands, the “Stop de Kindermoord” (Stop Child Murder) protests in the 1970’s were instrumental in limiting the growth in automobile use and halting the removal of cycle lanes (Stoffers 2012). Today the Netherlands has one of the highest rates of children active travel to school in the developed world (Garrard 2009). However, children’s mobility remains largely shaped by the socio-spatial consequences of a regime of automobility. This is evident in the greater emphasis on the responsibility of parents and children to conduct safe behaviour in streets (Parusel and McLaren 2010); the increasing restriction on children’s travel in reaction to increasing traffic in cities (Hillman et al

1990); the increasing burden of risk placed on children in places such as the school zone (Parusel and McLaren 2010); and the appeal of the quasi-private space within cars to children (Barker et al 2009). Patton (2007) recommends that trade-offs between the needs of different modes are established in comparable terms in order to support political decision-making over changes to the street. However, he goes on to outline that the major barrier to achieving a comparison in trade-offs is that modes of transport are based on competing rationalities. For example, the dominant rationality of the automobile is “unfettered mobility”, with greater speeds the long held objective of transport planning for the car. On the other hand, the value of children’s mobility may rely less on speed and more on the quality of the experience such as the social opportunities provided by walking.

2.3.6 The built environment and children’s active and independent mobility

As the focus of this thesis is to establish the potential for built environment audits to facilitate children’s active and independent travel to school, this section explores in detail the role of the built environment in shaping children’s mobility. Two conceptual frameworks illustrate a range of important factors in the relationship between children’s active mobility and the built environment. The first is provided by Pikora et al (2003) who used a conceptual framework to understand the influences of the built environment on walking based on four features: the functional aspects of the built environment; safety; the aesthetic qualities; and the destinations available. These features are organised into further built environment elements. Their model is illustrated in **Figure 2-3**.

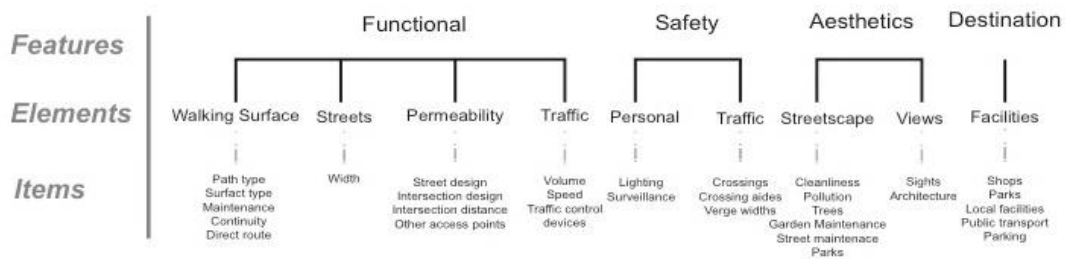


Figure 2-3. Built environment factors associated with walkability (Source: Pikora et al 2003)

The model suggests that walking is influenced by several features, each consisting of a number of elements and items, and that an understanding of the built environment’s relationship with walking must consider the full range of possible influences. However, the features and built environment elements that are influential on whether active travel occurs may not have an equal weight in the decision to walk, or the quality of the walking experience. In various contexts some features could be more important to whether walking occurs than others.

A second example is the concept of walkability. Southworth (2005, 248) provides a definition of walkability as:

...the extent to which the built environment supports and encourages walking by providing for pedestrian comfort and safety, connecting people with varied destinations within a reasonable amount of time and effort, and offering visual interest in journeys throughout the network.

Implicit in Southworth’s definition is a relationship between a number of different elements: the act of walking (function); the spatial arrangements of activities (destinations within reasonable time and effort); different aspects of quality of human life (comfort and visual interest); and the material characteristics of the built environment. Southworth goes on to outline a series of performance criteria that refine his definition of a walkable urban environment. These include the connectivity of the path network; links to other transport modes; mixed and varied land uses; safety from both physical and mental harm arising from traffic, criminal activity or violence; a high quality and legible walking environment; and an environment that is aesthetically pleasing and interesting (Southworth 2005, 249). What is important to

recognize with regard to Southworth's definition and criteria is that an understanding of the role of the built environment in shaping children's mobility needs to go beyond the purely physical dimension of the urban environment and also address what the built environment affords children; whether it be access to activities or the experience of mobility associated with comfort or 'visual interest'.

A limitation of Pikora et al's and Southworth's approaches to active mobility is that they are concerned with walkability in relation to an aggregate population, and not to groups with specific needs in regard to mobility. What constitutes a good walkable environment may be very different according to the perceptions, needs and capabilities of different groups, such as children. As the literature review has outlined above, the range of factors shaping children's mobility is distinct from the factors that shape adults' mobility. This is a significant point for planners aiming to address the built environment to enhance the quality of children's mobility. Mitra's (2012) model described above is an important contribution to understanding the factors that specifically shape children's mobility. However, while Mitra's (2012) model aims to comprehend the range of domains that influence children's active and independent mobility, a detailed framework structuring the built environment elements that planners can shape and design is absent.

In order to highlight the factors that are most important to understanding children's relationship with the built environment in regard to active mobility, a more refined conceptual understanding of the built environment is important. For this purpose a framework developed by Moudon and Lee (2003) is utilised to further organise aspects of the built environment that may be influential on children's active mobility. The framework is based on three aspects of built environment specifically relating to walking and cycling: the wider area or neighbourhood context in which active mobility takes place; the places children travel to and from (origin and destinations); and the routes that children take to access these places. The influence of each of the aspects is inter-dependent; for example, path quality is important in so far as the origin and destination are in close enough proximity in order for active travel to be attractive. Importantly, each of the aspects – area, origin and destination, and routes – is drawn from the types of audits currently used by planners to evaluate the built environment for walking and cycling. The model provides an additional level of detail to Mitra's (2012) framework, allowing a discussion of the neighbourhood built

environment factors relevant to children’s mobility. **Figure 2-4** illustrates the three aspects of Moudon and Lee’s model.

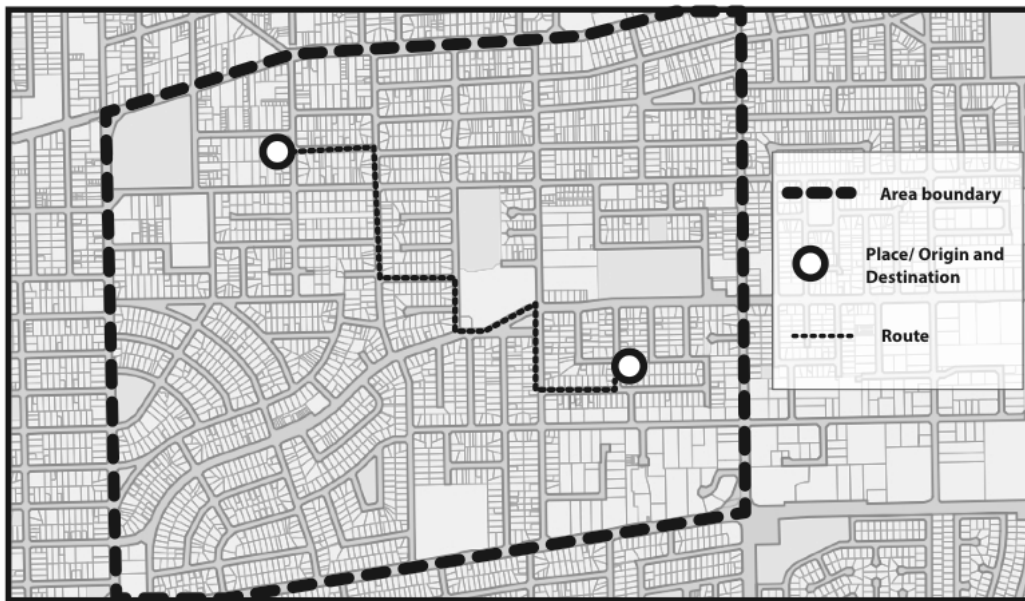


Figure 2-4: Area/ Place/ Route (Source: Author, adapted from Moudon and Lee (2003))

2.3.6.1 Area

Moudon and Lee (2003, 23) consider that the built environment characteristics of the area where walking or cycling trips takes place address the fundamental reason ‘why’ people choose to walk or cycle. Area characteristics include the density of the urban environment, the land uses or potential activities made available in places, and the street network layout. Compact urban areas have been found to influence shorter and non-motorised journeys because the range of services and social functions that create a need for travel are located in close proximity (Boarnet and Crane 2001; Frank and Pivo 1994; Forsyth et al 2007). Much of the research on density’s relationship with urban quality has centred on aggregate populations and for children the relationship between density and walking remains unclear. There are a small number of studies that have found that density is positively related to higher rates of walking to and from school in children in the U.S. (Kerr et al 2006; McDonald 2008). For children’s active and independent mobility, the urban area within feasible walking and cycling distance from the household is of key importance. Researchers have used different measures of what constitutes a feasible walkable distance to school, for example, ranging from, in the U.S., 200 metres (Schlossberg et al 2006);

800 metres (Panter et al 2010; Zhu and Lee 2008); and one kilometre (Kerr et al 2006). There has been little research exploring feasible cycle distances for children.

Similarly, urban areas that have a greater mix of land use are assumed to be related to mobility patterns characterised by a greater share of active modes of travel such as walking and cycling (Hoehner et al 2005). If activities are located nearby, trips on foot or by bike are feasible. Indeed, proximity to destinations has been found to be an influence on children's rates of walking (Giles Corti et al 2009). Yet it is important to note how land use is measured and what this indicates about the area characteristics, in regard to active mobility for children. For instance, Boarnet and Crane (2001) use employment density (indicated by the number of employed people divided by land area) as a proxy for land use mix. The employment is separated into retail and service employment. Although these factors may relate to children in relation to the scheduling of travel shared with their parents, these factors may not be relevant to children's independent travel, which may be linked to different types of land uses. It is important to interpret land use measures with this in mind.

The street design of neighbourhoods and their level of connectivity with other streets have also been linked to higher rates of active travel (Owen et al 2004; Oakes et al 2007). Higher street connectivity has been used to indicate a 'traditional neighbourhood' representing environments that are more conducive to walking (Krizek 2003). Patterns of high street connectivity, such as grid-like street networks, are used as measures of accessibility as they provide shorter, more efficient destinations to locations. On the other hand, curvilinear street patterns containing many culs-de-sac are not considered connective, often prolonging walking journeys. However, the claims made by proponents of connected street designs have been shown to be inconclusive, and there are indications that permeable, grid-pattern streets are more vulnerable to crime (Cozens and Hillier 2008). Of relevance to this thesis is that street patterns exhibiting lower degrees of connectivity have been found to be important for children as they provide safe places to play in the U.S (Handy et al 2008) and in Australia (Veitch et al 2006; Veitch et al 2007).

2.3.6.2 Places

Knowledge of a range of potential destinations and origins of children's trips is important. Moudon and Lee (2003) consider that the origins and destinations of

travel provide insight, not only into where people travel to and from, but also into the reasons why people choose to travel. The activities associated with particular places influence children's travel behaviour. For example, the household is an important place, or origin and destination of children's travel. The capacity of households to afford children activities can shape their need or desire to travel outside the home. In the household environment, frontyards and backyards are important play spaces for children (Veitch et al 2007; Freeman and Tranter 2011). In Australia, the rapid consolidation of urban areas through subdivision of residential lots, and trends towards larger houses, has seen outdoor play space in the home shrink and disappear (Hall 2010), placing increased importance on the quality of play spaces available in the local neighbourhood environment. It is these qualities of household environment that influence the needs and decisions about travel.

Another place that plays a central role in the everyday travel routine of children is school. As well as education, schools provide children opportunities to engage in regular physical activity, the development of social networks, participation in community programs, and extra-curricular activities. The school journey is an important travel routine that not only affords children access to the benefits and resources associated with the school but also provides opportunities for children to learn skills and become mobile, independent of adult supervision. Mitchell et al (2007, 625) describe the trip to school as part of a "pervasive and mundane example of the structure/agency dynamic..." This means that the structured routine of the school journey both shapes children's travel activity, and may also be shaped by children as it provides children with regular opportunities to exercise their agency and negotiate the licences that adults impose on them (Romero 2010).

Urban parks, playgrounds and natural spaces, such as bush reserves, are also important places for children as they provide a range of possible physical and mental health benefits (Kaplan 1995; Korpela et al 2002; Strife and Downey 2009). These places enable children to play, be physically active, interact with the natural environment, learn and socialise (Veitch et al 2007). Hart (2002) considers that the provision of urban, public space for play is important both for the development of children's physical, intellectual, social, and emotional capabilities. Although the accessibility of good quality public open space has been found to be only weakly associated with higher rates of walking and physical activity in general for adults

(Giles-Corti 2005; Witten et al 2008), this may not be the same for children. As children rely primarily on walking as a mode of transport, the accessibility of good quality open spaces becomes integral to independent travel and access to activities such as exercise and play.

The places where children play in the neighbourhood may not, however, be confined to designated play areas or open spaces. As previously mentioned, cul-de-sac street designs are examples of such places that provide opportunities for children to play. Handy et al (2008) looked at children's outdoor play and the built environment elements of neighbourhoods in Northern California. Their study found that cul-de-sac street design was an important predictor of outdoor play among children aged between 6 and 12. Similarly in Australia Veitch et al (2006) found that parents considered culs-de-sac as providing safe spaces for children to play and develop social ties. Having such spaces within close proximity of the home environment may encourage parents to lessen restrictions on children's independent travel.

There is a range of other places that can be important to children's quality of life, and accessed through children's walking. Freeman and Tranter (2011) use the term 'service spaces' to reflect the range of places that accommodate a diversity of experiences and opportunities to explore possible lives available to children in the modern urban environment. Service spaces:

...provide specific services for children either for play, health, entertainment or education (other than through schools). These spaces include playgrounds, health centres, shopping centres, libraries, galleries and museums, swimming pools and community gardens (Freeman and Tranter 2011, 115).

The services these places provide are diverse and linked to various aspects of children's quality of life. Shopping malls, for example, provide a possible space for simply 'hanging out' or even more actively pushing boundaries related to identity and self-image (Matthews et al 2000). The increase in children's participation in organised leisure activities outside of school hours highlights a range of other places that may be accessed, including sporting fields, recreational facilities and civic centres. Leisure activities are increasingly becoming formalised and chauffeured car travel has increased in order to enable access to clubs, recreation centres and other

places where these activities are conducted (Hjorthol and Fyhri 2009). However, there is little research on children's travel to these places and therefore it is difficult to draw the link between increased involvement in these activities with less walking and active travel by children.

2.3.6.3 Routes

The final aspect of Moudon and Lee's (2003) model is the characteristics of the routes taken for walking and cycling. Moudon and Lee highlight two important aspects related to route characteristics. The first is the length of the route; that is because the distance between places influences the ability and willingness for people to choose to walk (Saelens and Handy 2008). For children, the proximity to destinations influences their licences to travel independently and their access to activities (Timperio et al 2006; McMillan 2007). Greater distances to school are correlated with higher rates of non-active travel to school (Merom et al 2006; Bringolf-Isler et al 2008; Yarlagadda and Srinivasan 2008). For longer walking trips, the distance between origins and destinations is particularly important for walking as there must be a feasible distance between origins and destinations in order to facilitate walking as a travel mode.

However, routes are not only a functional means of children walking from *a* to *b*. When distances to travel are feasible, the quality of the route may be a more important influence on the decision to walk or cycle. Walking routes provide potential places for children to play, socialise and acquire important skills (Romero 2010). Children actively engage with their environments whilst walking, using street signage for wayfinding, and assessing risks (Fusco et al 2012). Although some research has found that aesthetic qualities have little relationship with walking (Pikora et al 2003; 2006) this was found for walking for transport, not recreation, and for adults, not children. Routes may have interesting or aesthetic characteristics that enhance the walking experience of children.

As walking and cycling occur at a slower pace than being driven in a car, they afford children the opportunity to engage with the natural features of the everyday world in much greater detail (Rapoport 1982). This is supported by research in Toronto, Canada, that found children develop spatial skills and a detailed awareness of the surrounding environment through the routine experience of walking to school (Fusco

et al 2012). Through photographic methods, Fusco et al. (2012) found that, although all children expressed some form of affinity with the natural world, the level of detail of environmental knowledge reflected in the photographs and narratives of children who walked to school was much more refined, as opposed to that of children who were driven. Studies have also found that children who walked independently developed more detailed knowledge and images of landmarks and places along routes than children who were driven (Rissotto and Tonucci 2002). These benefits afforded by slower and active modes of travel have not been reflected in traditional transport planning conventions that have valued minimal travel times and maximum speed (Evans 2009).

The presence of good quality pedestrian infrastructure and a continuous network of pathways have been found to be associated with higher rates of walking (Pikora et al 2003). Barriers to walking or cycling emerge when the continuity of the route is compromised. Coleman (2003, 132) notes “a journey can be seen as a chain of individual products and services whose accessibility is only as strong as its weakest link”. Barriers to walking are the weakest links in the walking journey. Although barriers to walking have been conceptualised at a macro level, represented by issues such as the distance to travel (Gallimore et al 2011; Lee and Moudon 2004), micro-level barriers, such as those that exist at certain points along a route, have a significant influence on children’s active and independent mobility. A significant barrier may exist anywhere along the route that cancels the positive qualities of the route. For example, barriers may take the form of permanent features such as unsafe or large road crossings (Miller, Austin and Rohn 2004). Barriers can also be less permanent. A significant barrier to the continuity of pedestrian pathways is that of motorised vehicles. Parked vehicles may block pedestrian pathways forcing pedestrians onto unsafe roads (Shoup 2010), supporting Lo’s (2009) suggestion that the prioritisation of the function and movement of motorised vehicles continually compromises the continuity pedestrian routes. Gallimore et al (2011) suggest that the location of higher and lower quality walkable routes is more important to consider than the number or proportion of high or low quality routes. For example, if the lowest quality walkable link in a likely walking route is located adjacent to schools, a significant barrier is formed and cancels out the overall benefits of other high quality aspects of the route to the school.

2.4 Conclusion

It has been established that there are links between children's mobility and wellbeing. Given that wellbeing and mobility can be conceptualised in different ways and because children's mobility is distinct from adult mobility, it is important to examine how different concepts of wellbeing contribute to our understanding of the factors influencing children's patterns of mobility. **Wellbeing** can be understood **subjectively**, in regard to an individual's experience of pleasure, or the satisfaction of preferences; through meeting certain **needs**, such as those reflected in Alfonzo's (2005) 'hierarchy of walking needs'; or through the **capabilities approach**, which conceptualises wellbeing as based on whether an individual has the capacity to achieve wellbeing and how individuals act on their capacity to achieve a range of possible states of wellbeing. The theoretical frameworks provided by de Vos et al. (2013), Nordbakke and Schwanen (2013), and Reardon and Abdallah (2013), provide a useful introduction into the potential links between children's active mobility and wellbeing. However, there is little literature regarding the explicit links between concepts of wellbeing and children's mobility, and more empirical insight is required.

The three approaches to wellbeing suggest a diverse range of possibilities for investigating children's mobility. Firstly, the relationship between children's subjective experience and active mobility highlights the importance on children's experience of active mobility. As identified in the literature review, the quality of walking and cycling routes are important to the direct experience of mobility. Evaluating the quality of walking or cycling routes is therefore integral to understanding how children's subjective wellbeing is related to active mobility. Questions emerge as to what aspects of children's active mobility and what features of walking or cycling routes are important to subjective wellbeing. Furthermore, a question relevant to policy-making and planning is how individual children's subjective experience of active mobility relates to the collective subjective experience of children. In other words, how do policy makers and planners accommodate a plurality of potentially diverse links between subjective wellbeing and mobility?

The second approach relates to children's needs relevant to their active mobility. Alfonzo's (2005) 'hierarchy of walking needs' demonstrates a number of important 'needs' relevant to active mobility. Although not specifically related to children, the hierarchy provides an opportunity to explore the role of 'needs' in enhancing

children's wellbeing through facilitating active mobility. For example, access is identified in Alfonzo's hierarchy, as a fundamental 'need' for walking to take place. There needs to be good quality places to walk to, and routes of a minimum standard of quality in order for places to be accessible. As the literature review has outlined, local environments provide children with places, resources and opportunities that are important to their development, health, and quality of life. Places, such as playgrounds, health centres, shopping centres, libraries, galleries and museums, swimming pools, and community gardens (Freeman and Tranter 2011, 115) afford opportunities for learning, physical activity, and social engagement through various activities (Hart 1979; Barratt Hacking, Barratt and Scott 2007). There is a gap in the understanding of how needs, such as access, relate to children's active mobility at the neighbourhood scale. Furthermore, insight is required as to the applicability of Alfonzo's hierarchy to children's active mobility.

The third approach to investigating children's active mobility and wellbeing is the capability approach. The capability approach incorporates both the end states (subjective wellbeing) and means (needs) related to children's active mobility. The capability approach necessitates consideration of a range of factors, including the perceptions and attitudes of children, the quality of the built environment, and other factors that may enable or restrict children's active mobility. The issue of children's independent mobility is important to the capabilities approach. Children's potential mobility, and therefore their potential wellbeing, increases as they become more and more independent. However, there has been little research linking the capability approach, potential mobility and children's independent and active mobility.

Mitra's (2012) conceptual model illustrating the factors potentially influencing children's independent, active travel to school was introduced as a framework for reviewing the literature on children's mobility. The model uses a socio-ecological approach, organising the influential factors according to multiple, yet inter-related domains: the individual, the household, the neighbourhood, policy and socio-political factors. Children's mobility may be shaped by their own individual attitudes, or by exercising agency in negotiating the sets of rules set by parents regarding their children's travel. Decisions made within the household, including travel schedules and children licences to travel independently play an important role in determining children's travel activity. Neighbourhood factors such as the quality and availability of

places to travel to, the safety of the streets, the level of social cohesion, and the actions of important local institutions including schools, religious and community bodies are other important factors. Finally, dominant policy and socio-political factors play an important role in defining the broader social norms and the field of potential action planning agents face when endeavoring to make change towards more sustainable regimes of mobility. The notion of automobility was introduced as the dominant regime of mobility operating within contemporary policy and socio-political domains relevant to children's everyday mobility.

The overarching objective of this thesis is to approach the relationship between wellbeing and children's active mobility from the perspective of urban planning and design practice. Much of the understanding of the relationship between the built environment and children's active mobility is informed by concepts informed by adult mobility. In order to further explore the relationship between children's wellbeing and active mobility, a conceptual understanding of the built environment is needed that is informed by the characteristics specific to children's mobility. Using Mitra's (2012) model and Moudon and Lee's (2003) model of the built environment as a guide – area, place and route – the review of literature identified several important built environment factors that are relevant to children's active mobility. In order to understand the role of these built environment in shaping children's wellbeing, three questions, drawing on the three different approaches to wellbeing, are needed to address the first research objective of this thesis: *to explore the relationship between the built environment, children's active mobility and children's wellbeing*. These questions are:

Question One: What factors are important in the relationship between active mobility and children's subjective wellbeing?

Question Two: What factors are important in the relationship between active mobility and children's needs?

Question Three: What factors are important in the relationship between active mobility and children's capabilities?

This chapter has provided a review of the theoretical and empirical literature related to children's wellbeing, active mobility (walking and cycling), and the built environment. The next chapter will explore the literature regarding how planners

address children's active mobility, and explore ways in which wellbeing can be conceptualised in the tools that planners use to evaluate urban environments.

Chapter 3: Auditing the built environment for children's mobility: a review of the literature

3.1 Introduction

The previous chapter outlined how the relationship between the children's wellbeing, mobility and the built environment has been represented in the literature. A review of the literature concerning the policy domain relevant to children's active mobility and wellbeing is the focus of this chapter. The influence of the policy domain on facilitating active mobility has been highlighted as an important, albeit unexplored, area of research (Cole et al 2010; Pooley et al 2013). In order to develop knowledge of how the policy domain influences children's mobility, a review of the literature regarding the activity of auditing the built environment for walkability is the focus of this chapter. Built environment audits evaluate the urban environment's actual and potential quality for walking and cycling. The increased interest in and use of built environment audits by planning and community organisations, has the potential to positively address the issue of children's active and independent mobility.

This chapter begins with a brief overview of the policy domain. It explains that a number of key aspects are important when considering the policy domain including the policy stakeholders and actors; statements of policy, regulatory frameworks and a range of rules; and the ways that problems and solutions are defined and knowledge is generated to address these problems. These are the background issues that underpin planning for increases in children's active mobility. The chapter then briefly explores these aspects in relation to a number of policy approaches to children's mobility, providing more specific insight into planning for children's mobility. Finally, the role of audits in evaluating the quality of built environments for active modes of travel is explored in detail. This includes the historical development of audits, some key methodological issues, and finally, the relevance of audits to issues of wellbeing.

3.2 The policy context of planning for children's mobility

3.2.1 The policy domain

In Mitra's model (2012) outlined in the previous chapter, the policy context is identified as an influential domain on children's active and independent mobility. The model locates the policy context as an external influence on the individual, household, and neighbourhood contexts. However, the influence of the policy domain is not explored in detail in Mitra's (2012) paper. The integration of policy and policy related issues within socio-ecological approaches to active travel, of which Mitra's is one, is a relatively recent development (Sallis et al 2006). In order to develop knowledge of how policy issues and instruments can better serve the wellbeing of children through better planning of their mobility environments, an understanding of what policy is, is important.

Considine (1994, 3) describes two different ways in which policy can be viewed. The first is the traditional definition of policy, which is that policy is "an action, which employs governmental authority to commit resources in support of a preferred value". Sallis et al (1998, 380) provide a similar definition, stating that:

'Policy' refers to legislative, regulatory, or policy-making actions that have the potential to affect physical activity...Policies are organisational statements that are meant to influence behaviour.

Policy, from this perspective, is a formal, top-down initiated action that originates in government organisations. Considine (1994, 4) then goes on to define an alternative view, which is that "policy is the continuing work done by groups of policy actors who use available public institutions to articulate and express the things they value". In this sense, policy is open to a range of 'actors' who assemble to 'articulate' policy issues. Policy can be understood to be part of a wider institutional context. Institutions are the series of structures and rules that shape behaviour and decision-making related to particular domains (Rietveld and Stough 2005), such as the built environment, transport networks, and social organisation of local environment relevant to children's mobility. The understanding of this institutional dimension relevant to children's mobility is important if the quality of their mobility is to be enriched. As Curtis and Low (2012, 20) note:

Institutions both limit intentional action, and make action possible by providing definitions of problems, solutions to those problems, the knowledge to implement those solutions and a corps of personnel bearing that knowledge.

This statement and the discussion of issues relevant to the policy domain, highlight some important areas to advancing children’s wellbeing through sustainable mobility. These include the way problems associated with children’s mobility are framed and defined, the types of knowledge that are valued and utilised in planning and designing solutions to enable children’s active mobility, the capacity of resources available to commit to policy issues, and the actors that are involved in the planning and governance of children’s mobility environments. Some of these aspects are explored in relation to children’s mobility in the following section.

3.2.2. Policy, wellbeing and children’s mobility

In terms of formal policy statements or commitments, active modes of transport, and mobility, such as walking and cycling receive wide support. Internationally, policies for creating walkable cities include policy developed by the World Health Organisation, the OECD report on walking, and the International Charter for Walking. Policy specifically related to children’s mobility is exemplified in the *UN Convention on the Rights of Children*, which has influenced the development of the concept of the child-friendly city (Nordstrom 2010). Living in ‘walkable’ urban environments has become an entrenched goal of contemporary planning policy in developed countries (Southworth 2005; Tolley, Lumsdem and Bickerstaff 2001). Increasingly, the benefits to wellbeing associated with active travel have become an important policy direction for transport and public health policy. In Australia, each major state metropolitan planning strategy, or guiding policy, includes an objective to create walkable urban environments (See **Table 3-1**).

Table 3-1: Example statements from current Australian metropolitan planning strategies

Metropolitan Area	Document (Year)	Policy Statement
Perth, Western Australia	Directions 2031 and Beyond (2009)	“Recognise and build on the growing preference for non-motorised forms of transport - walking and cycling” (2009, 10).

Melbourne, Victoria	Melbourne 2030 (2002)	<p>“Promote excellent neighbourhood design to create attractive, walkable and diverse communities (Policy 5.5)” (2002, 3).</p> <p>“Give more priority to cycling and walking in planning urban development and in managing our road system and neighbourhoods (Policy 8.7)” (2002, 5).</p>
Sydney, New South Wales	Draft Metropolitan Strategy for Sydney (2013)	“Connectivity will be encouraged between open spaces, walking trails, cycle paths and streets” (2013, 36).
Brisbane, Queensland	South-East Queensland (SEQ) Regional Plan (2009)	“Implement best practice urban design to create built environments that enable walking and cycling, support community safety and provide adequate shade” (2009, 80).
Adelaide, South Australia	30-Year Plan for Greater Adelaide (2010)	“There will be a new generation of greenways and open- space precincts. The result will be a more liveable city, with more green space for walking and cycling” (2010, 80).

Although the objectives of broad strategic planning reflects wellbeing through greater active travel, the urban environments associated with everyday travel are largely shaped and managed by a range of technical instruments such as design guidelines, by-laws, zoning requirements, and regulation (Lo 2009). These technical policy instruments maintain the functionality of streets, rather than addressing the qualities of streets associated with children’s wellbeing. Blomley (2010) employs the term ‘pedestrianism’, indicating the prioritization of the functional elements of the street over elements that represent the street’s capacity as a ‘public realm’. The public good according to the governing agents associated with pedestrianism– the local municipality or state departments – is predominantly unimpeded circulation of bodies and objects within the street. This circulation is enforced through a specific set of ‘policing powers’ that ensure functioning occurs within accepted standards of risk and safety. However, pedestrianism according to Blomley, is apolitical, technical and practical and not concerned with the ethics or consideration of aspects of wellbeing. Blomley goes on to distinguish the functionality of ‘pedestriansim’ with an approach based on ‘civic humanism’, an “ontology centred on human capabilities and inter-relationships, with a broad ethical commitment to human flourishing in the here and now” (Blomley 2010, 17). The prioritisation of function and circulation over qualities

of the street associated with civic humanism neglects many of the aspects identified in the previous chapter associated with children's wellbeing within their everyday mobility environments.

A further example of the influence policy instruments have on children's mobility is education policy. These policies, such as those dictating rules and regulation regarding children's education and enrolment to schools, have geographic implications (Doherty et al 2012). Of primary importance for children's mobility and travel are school enrolment policies. In order for the journey to and from school to be walkable one important factor is that the journey must be feasible. Education policies that have the objective of amalgamating smaller schools into larger schools with wider enrolment catchment areas can have a significant influence on the distances children are required to travel to school. In the U.S., McDonald et al (2011) found walking and cycling to school decreased from 48% in 1969 to 13% in 2009, with the decline explained as partly due to policy directions that saw larger and fewer schools, increasing the distance from school. Furthermore, education policies that enable parents to enroll their children in schools outside of their own local area can also influence children's mobility patterns. Yang et al (2012) found that in the U.S. a policy allowing greater choice in the range of schools children are able to be enrolled in was associated with an increase in distances from the home to school. The effect of policies on the distance between where children live and school is an important consideration for planners (Zwertz et al 2010).

3.2.3 Examples of policy responses to children's mobility

In order to ground an explanation of the policy environment within the issue of children's active mobility, three policy initiatives directly related to addressing the quality of children's mobility are discussed. These are Safe Routes to School policies; walking school buses; and travel behaviour change plans. A brief description of three examples is useful in illustrating the types of policy approaches that have been developed to improve the quality of children's mobility environments.

3.2.3.1 Safe Routes to Schools and other school travel policies

An example of a policy approach to children's active mobility is Safe Routes to School (SRTS). SRTS originated in Denmark in the 1970s and has been

implemented worldwide, particularly in the U.S (Stewart 2011). SRTS is a program targeting areas surrounding schools in an effort to address unsafe walking and cycling environments and declining rates of children's active travel to school. The initiatives draw together a range of policy actors such as schools, planners, households, and children. A number of strategies to improve the safety of school environments for walking are usually employed such as the provision of physical infrastructure; educational programs; enforcing laws (for example speed limits around schools); media campaigns; and data collection, analysis and evaluation. Yet often these approaches are also based on facilitating and maintaining the unimpeded flow of vehicle traffic and do not adequately challenge the notion of automobility and the dominant role it plays in shaping children's mobility within neighbourhoods and around schools (Parusel and McLaren 2010).

Similar school based initiatives are evident in the literature. In New Zealand, the School Travel Plan program is an example (Hinckson et al 2011), where a travel planner works in collaboration with the school community and other stakeholders to improve active travel rates to individual schools. Interventions often involve a mix of educational strategies, behavioural programs, incentives, physical design responses and enforcement. Another example from New Zealand is described by Collins and Kearns (2001) who participated in a school led initiative 'Safe Journeys Coalition', which was established to better understand and address issues of children's pedestrian safety around a school. The authors note the initiative was shaped by an ideology of neo-liberal governance; on the one hand creating the conditions for growing concerns over traffic safety adjacent to the school caused in part by deregulated school enrolments and large intake catchments, and on the other hand encouraging action and collaboration between groups burdened by the pressures of individualisation of risk. In Australia, the Pedestrian Council of Australia coordinates an annual Walk Safely to School Day. The intent of the initiative is to raise public awareness to the benefits of regular walking, yet it focuses on children's walking with adult supervision and therefore neglects the benefits of children's independent travel that may develop children's skills in negotiating the built environment in the long run (Romero 2010).

These programs provide examples of some of the institutional factors relevant to policy approaches to improving the quality of the built environment for children's

mobility, and facilitating more active travel and independent travel. Policies may have a number of objectives and strategies to achieve those objectives (as exemplified in SRTS approaches); they may have a coalition of policy actors; they may emerge from within government or within the community; and they may frame issues of children's mobility in ways that focus attention on certain aspects (active travel) whilst ignoring other (unaccompanied travel).

3.2.3.2 Walking School Buses

Walking school buses are a similar grass-roots policy approach to increase rates of active travel to schools used in countries such as New Zealand, Australia, Great Britain and Norway (Collins and Kearns 2010; Mackett et al 2005; Kingham and Usher 2007). The walking school bus is a program that addresses the declining rates of active travel to and from school by using a 'safety in numbers' approach and has been found to have a number of social and health benefits (Kingham and Ussher 2007). However, reinforcing the importance of understanding how policy approaches frame issues of children's mobility, Kearns et al (2003) highlight the contradictory aspects of walking school buses, noting that the health, social and traffic educational benefits are offset by a reinforcement of dependence on adults. They comment that:

...(walking school buses) are highly structured initiatives that ultimately seek to control children as opposed to traffic, and have only a limited ability to address congestion and automobile dependence (restricted as they are to primary schools) (2003, 290).

Walking school buses demonstrate that whereas policies may result in improved wellbeing from health perspectives, these gains need to be evaluated in regard to the extension of adult control into a routine that can afford children greater freedoms (Collins and Kearns 2010). Furthermore, the contexts that policies operate within are important to consider. Collins and Kearns (2005) note that walking school buses were more likely to be in operation in higher socio-economic areas than in areas that children face a higher risk of pedestrian related injuries. The low rates of walking school buses in lower socio-economic areas were said to be due to various barriers to attracting volunteers, including lack of time, resources and skills. This argument emphasises a point that Sallis et al (2006) raise, that research into the active travel

policy domain should focus on single or comparative cases as the complex relationships that are characteristics of policy contexts are not adequately addressed in broad, aggregate studies.

3.2.3.3 *Travel behaviour change*

A significant policy approach to increasing rates of walking and cycling and one worth exploring in detail is related to programs targeting travel behaviour change. This approach has been adopted several nations, including Denmark, Finland, Great Britain, Norway, and in Australia (Fyhri et al 2011; Taylor and Ampt 2003). Travel behaviour change programs (such as TravelSmart in Australia) are operational in most Australian states (Di Pierto and Hughes 2003; Zhang et al 2009). These programs seek to facilitate a shift in individual behaviour from motorised to active modes of transport by enabling the individual to choose to change behaviour, rather than by enforcing a change in behaviour. In Western Australia, TravelSmart programs have been jointly funded by state and local governments and TravelSmart officers embedded within various local governments (Murphy 2012). These officers used a range of tools and strategies, such as raising community awareness, developing local transport plans, facilitating the provision of infrastructure, and intensive mentoring of small groups. Although there has been widespread support for travel behaviour change programs, a more general critique is aimed at these programs limited focus on individual behaviour in order to transition to more sustainable urban systems. Shove (2010) articulates this critique, arguing that behaviour change programs avoid the more significant social and economic structures individual behaviour is linked to and ultimately obscures the reproduction of unsustainable practices. For children's mobility, the impact of the regimes of automobility may be of a magnitude that renders individual behaviour change inadequate in bring about new practices of sustainable mobility for children.

3.3 Walkability audits

3.3.1 An overview of walkability audits

Safe Routes to Schools, walking school buses, and travel behaviour change programs are three examples of policy approaches that have been developed to address the quality of children's mobility and mobility environments. Another

emerging policy trend within public planning departments, particularly in Australia, is the development and promotion of walking audits². The purpose of the walking audit is to provide a structured means of evaluating aspects of the built environment relevant to pedestrian mobility. Audit tools are used to gather knowledge and evaluate the built environment ideally in order to guide strategic planning and policy responses to issues of walkability. Audits are defined in the literature as a process that records the presence and quality of various built environment elements associated with walking (Hoehner et al 2006; Pelletier et al 2007). Moudon and Lee (2003) define an audit as “a tool used to inventory and assess physical environment conditions” (2003, 21). Moudon and Lee (2003) organise audit instruments into four categories. These are inventories that collect data about street segments; route quality assessment tools measuring users’ perception of comfort and safety; area based assessment tools using surveys, GIS data-bases or field audit tools; and instruments that estimate latent travel through travel data such as vehicle count. Moudon and Lee (2003) explain that audits may draw on both subjective data, such as perceptions of the built environment, and objective data, such as inventories or quantification of built environment features. The use of different sources of data and the organisation of audit data into a conceptual framework have important implications for the evaluation of the built environment for children’s active mobility. Different types of audits necessarily organise their built environment conceptual schema in distinct ways. In doing so they prioritise certain elements over others, focusing attention on selected aspects of the built environment associated with walking. This aspect of audits has certain implications for discussing children’s wellbeing and the evaluation of the built environment for children’s mobility. However, before discussing these ethical aspects, a discussion of the historical context, the policy context and audit culture, and methodological aspects of auditing the built environment will help ground the theoretical discussion.

3.3.2 Auditing the built environment: A brief history

Although it was not until the late 1990’s that there was the widespread development of systematic auditing techniques to encompass the qualities of the built environment, the use of auditing techniques in built environments has a long history

² See Section 6.4.2 for a review of current walking audits available in Australia and New Zealand.

in the social sciences. The process of auditing the built environment can be linked to the systematic observation in research such as Whyte's (1980) study of urban places. His use of systematic and detailed observations of social behaviour and patterns in urban contexts informed urban design theory and practice by providing insight into how people use urban spaces. Much of the recent use of audits to evaluate the walkability of urban environments has its origins in systematic social observations, exemplified in Raudenbusch and Sampson's (1999) study of Chicago neighbourhoods.

The use of field audits increased dramatically in the 2000's, primarily due to the interest in the built environment's relationship with a range of health-related behaviour, such as physical activity, cycling, and walking (Lewis 2012a). In the context of the increasing acceptance of cross-disciplinary research agendas and the identification of mutual benefits associated with closer collaboration, a range of disciplines including urban design, urban planning, transport planning and public health converged around the idea that the built environment can influence the health of increasingly urbanising populations (Sallis et al 1998).

An important contributor to the development of a formal and systematic approach to developing audits has been the Active Living Research program. The program, established in 2001 and funded by the Robert Wood Johnson Foundation, conducts and disseminates research on the physical activity of children and families in the U.S. (<http://www.activelivingresearch.org/about>) and has funded and published research on many audit instruments. At the beginning of 2013, there were 34 audit tools listed on the website. 28 tools were identified that used objective or subjective measures of the built environment. The remaining tools related to methods of data management and reviews of policy environments. The audit tools, organised according to their area of interest, are listed in **Table 3-2**.

Table 3-2: Active Living Research Audit Tools (Source: <http://activelivingresearch.org/toolsandresources/toolsandmeasures>)

Urban Design	<ul style="list-style-type: none"> • Measuring Urban Design Qualities—An Illustrated Field Manual (Ewing et al 2005) • The Measurement Instrument for Urban Design Quantities (Ewing et al 2006)
Food, Nutrition and the Built Environment	<ul style="list-style-type: none"> • BEACHES: Behaviours of Eating and Activity for Children's Health- Evaluation System (MacKenzie 2009) • The Nutrition Environment Measures Survey (NEMS) tool (Glanz et al 2012)

Physical Activity	<ul style="list-style-type: none"> • The Analytic and Checklist Audit Tools (Brownson et al 2004) • Environmental Supports for Physical Activity Questionnaire (Ainsworth et al 2006) • The Irvine Minnesota Inventory (Day et al 2006) • Physical Activity Resource Assessment (PARA) Instrument (Lee et al 2005) • Saint Louis Environment and Physical Activity Instrument (Brownson et al 2004) • Active Where? Surveys (Kerr et al 2006) • The Rural Active Living Assessment (RALA) Tools (Yousefian et al. 2010) • Active Neighbourhood Checklist (Hoehner et al 2007) • Rural Active Living Perceived Environment Support Scale (RALPESS) (Umstattd et al 2011)
Walking and Cycling	<ul style="list-style-type: none"> • Walking and Bicycling Suitability Assessment (WABSA) (Emery, Crump and Bors 2003) • Systematic Pedestrian and Cycling Environmental Scan (SPACES) Instrument (Pikora et al 2000) • Twin Cities Walking Survey (Oakes, Forsyth, and Schmitz 2007) • Neighbourhood Environment Walkability Scale – Youth (NEWS-Y) (Rosenberg et al 2009) • Neighbourhood Environment Walkability Survey (NEWS) and Neighbourhood Environment Walkability Survey – Abbreviated (NEWS-A) (Cerin et al 2006) • PIN3 Neighbourhood Audit Instrument (Evenson 2009) • Pedestrian Environment Data Scan (PEDS) Tool (Clifton et al 2007) • Walking Route Audit Tool for Seniors (WRATS) (Kerr et al 2012)
Parks, Open Space and Walking Trails	<ul style="list-style-type: none"> • BRAT-Direct Observation (BRAT-DO) (Bedimo-Rung et al 2006) • Path Environment Audit Tool (PEAT) (Troped et al 2006) • Core Measures of Trail Use (Wolch et al 2010) • Environmental Assessment of Public Recreation Spaces (EAPRS) Tool (Saelens et al 2006) • SOPARC: System for Observing Play and Recreation in Communities (MacKenzie et al 2006) • Community Park Audit Tool (CPAT) (Kaczynski et al 2012)
Play	<ul style="list-style-type: none"> • SOPLAY: System for Observing Play and Leisure Activity in Youth (MacKenzie et al 2000)
Non-Built Environment Measures included	<ul style="list-style-type: none"> • Preschool Outdoor Environment Measurement Scale (POEMS) (De Bord et al 2005) • School Physical Activity Policy Assessment (S-PAPA) (Lounsbery et al 2013) • Healthy Afterschool Activity and Nutrition Documentation (HAAND) (Dolmans et al. 2003) • SOFIT: System for Observing Fitness Instruction Time (MacKenzie 2002)

Early research into the influence of the built environment on health and active travel used audits to isolate built environment variables and domains that were influential on physical activity rates and travel behaviour. For example, Pikora et al (2003) developed an audit to measure the built environment features associated with walking and cycling (Systematic Pedestrian and Cycling Environmental Scan or SPACES). The audit based on Pikora et al's (2002) model explained in the previous chapter, was designed to collect built environment data related to factors such as the characteristics of urban form, land use, transport infrastructure, and the safety and aesthetics of street segments. The SPACES audit has gone on to be used in the United States and Australia, and has informed a considerable body of research on the empirical and methodological aspects of the relationship between the built environment and active travel (Pikora et al 2003; McCormack et al 2006; Pikora et al 2006). SPACES exemplified an audit designed to capture a comprehensive measure of the built environment in order to develop evidence on built environment factors that influenced active mobility.

One of the main objectives of the multidisciplinary research that converged around the relationship between the built environment and physical activity and active travel was to contribute to an evidence base in order to inform policy and urban design practice in order to shape 'healthy' built environments (Sallis et al 2006). This led to the development of audits that focused on aspects of the built environment most relevant to urban design and policy. An example of such an audit is the Irving Minnesota Inventory (IMI) (Day et al 2006). The IMI is a checklist intended to record the presence of built environment attributes associated with walking. It was developed in order to provide a more comprehensive audit than SPACES, incorporating micro-scale design features of the built environment so that urban design and planning interventions may be designed in response to the audit findings. Other similar audits were developed to gather built environment data on more abstract urban design concepts related to walking, such as 'imageability', 'enclosure', and 'transparency' (Ewing et al 2006; Ewing and Handy 2009). This was a step towards auditing of the built environment for practical means and whilst it provided comprehensive and flexible data (as individual issues could be separated for analysis), it was also found to be extremely time consuming and resource intensive (Forsyth et al 2010).

The development of the IMI represented a shift in using built environment audits towards their increased use outside of academic research contexts. An example from the Active Living Research is provided by Brownson et al (2004) who developed, in conjunction with an extensive analytic audit tool, a simplified version of the same tool. The analytic tool captured detailed measures of the built environment, while the second audit, intended for use by community members, was a simple checklist. The increasing development of audits designed for community and practitioner use, necessitated a different approach to the design and use of audits in an academic context. Audits designed for academic contexts were too resource intensive leading Hoehner et al (2006) to recommend a number of strategies to tailor audit for community or non-professional use. These included the need for shorter, more user-friendly audits than those employed by researchers; the need to test the reliability of new tools being developed; and the necessity of using a range of data types, not just from audit checklists or built environment inventories, when evaluating spatial qualities in social contexts.

An area of auditing that is increasingly evolving is that concerned with the built environment factors relevant to the mobility needs of particular groups or users. Audits developed to comprehensively capture built environments were unable to adequately capture complex and plural socio-spatial contexts and as a result some audits were tailor made targeting specific groups like the seniors (The Senior Walking Environmental Audit Tool, SWEAT (Michael et al 2009)), and the disabled (Church and Marston 2003). Friedner and Osbourne (2013) described the use of accessibility audits in Indian cities as a tactic used to draw attention to issues that excluded disabled people from public places. Despite some research projects on auditing for children's physical activity (Jones et al 2010), there is little evidence of audit tools being developed for children's active and independent mobility.

3.3.3 Audit culture

Audit culture has emerged from the application of financial auditing techniques outside the traditional accounting profession where they were developed. Accounting techniques have been integrated within a broad range of institutional practices such as corporate social accounting (Gray 2002; Spence 2009), education (Shore and Wright 2004), environmental regulation (Power 1997; Darnall et al 2009) and

organisational management (Power 2004). Audits refer to methods of evaluating or verifying the status of individuals, organisations or systems, usually against defined standards and norms. There are obvious parallels between audit culture and walkability and other built environment audits, evident in their use as indicators to measure and monitor the function and health of spatial systems. These “routine systems of accounting” have led to profound changes in organisational culture and social practice, to the point that they are a “new form of hegemonic governance” (Shore 2008). Audits serve as effective tools for self-monitoring and self-evaluation within organisations and therefore are compatible with the central tenets of neo-liberal governance. Public, private and civic organisations have increasingly made use of audits to internalize the management of ‘standards’ ‘efficiency’, ‘quality control’ and ‘risk analysis’.

Audits have achieved a status that has seen them become naturalised within an increasingly diverse range of institutional contexts. The appeal of audits has much to do with their ability to draw on technical rationality to support their claims as tools for legitimacy and accountability. Power (1995) suggests, “the ‘technicality’ of audits is a product of a multiplicity of ‘symbolic’ resources invoked to give order and rationality to practice”. One of the primary symbolic resources invoked by auditing practice is their appeal as instruments of science based on claims to higher order, abstracted knowledge (Power 1995). This is evident in the literature on built environment audits. All built environment audits contain claims to represent the range of built environment factors associated with a public good or resource, such as healthy environment or a walkable environment. The notion of ‘walkability’ is an abstracted concept referring to the ideal built environment for walking. Through the process of measurement, audits transform an abstracted ideal of walkability into a concrete and practical concept.

The appeal of audits as practical tools to capture abstracted knowledge based on notions of ‘best practice’, ‘quality’ and ‘performance’ has led to the spread of audit culture. The consequence of this has been the dissemination of neoliberal values, such as economic efficiency, productivity and accountability within a range of democratic and social institutions (Shore 2008). However, although audits have been identified as the quintessential tools of neoliberal governance serving an underlying economic rationality, audits do have the potential to be counter-hegemonic. The

proliferation of techniques of quantification through social institutions has led to the recognition that measurement practices are also moral practices (Porter 1995; Lewis 2012). Spence (2009) draws attention to the emancipatory potential of traditional accounting techniques when used by civil society organisations to make accountable the social and ethical consequences of hegemonic power. In this sense, the 'tools of the trade' of governing institutions can be used to legitimize the claims of those outside the limits of the dominant regimes of thought and practice.

3.3.4 Methodological issues of built environment audits

The discussion of the historical context of built environment audits and audit culture in general suggests that there are several important issues pertaining to their methodological nature. Firstly, as suggested in the review of audit culture above, the appeal of auditing is based on their status as scientific tools, necessitating claims to robust scientific criteria including validity and reliability. However, audits are strong on process and rational procedures, however weak on other aspects such as statistical sampling and reliability (Power 1995). Built environment audits have been found to be not reliable across a range of urban contexts (Evenson 2009). This, as Power (1995) argues, creates problems for generalising audit knowledge and ultimately weakens their status as instruments of science. In order to address this weakness in built environment audits' scientific rationality, inter-rater reliability tests have been used to improve the reliability of audit tools through highlighting areas of consensus and dissent amongst auditors. These tests involve two or more auditors conducting an audit of the same sample of streets or places, and conducting a statistically comparison of the results. The use of inter-rater reliability tests to improve the objectivity of audits have been justified as improving their utility as tools of science and therefore enable the generalisation of audit knowledge outside particular audit contexts (Brownson et al 2004). Domains or measures with audit tools that are highly variable between auditors, and therefore highly subjective, can be omitted or addressed through better training procedures (Pikora et al 2002) in order to improve the 'objectivity' of audits. Domains that have demonstrated low reliability in audits have been aesthetics and social environments (Brownson et al 2004). In the search for more reliable auditing tools, 'objective' types of knowledge are therefore privileged over subjective or social knowledge.

Despite the improvement in the reliability of audits through inter-rater reliability tests, the issue of variation between different built environment contexts remains. For this reason some researchers have suggested that audits be tailor-made to the specific purposes and contexts in which they are needed (Moudon and Lee 2003; Clifton et al 2007; Schaefer-McDaniel et al 2010). In light of this, processes and protocols have been developed to add consistency to the collection of measurement data and to contribute to a robust evidence base by reducing the variability of audit findings (Forsyth et al 2006). The difference across the variety of urban, social and policy environments has been identified as a confounding issue for choosing appropriate methods, the analysis of data and translating analysis into policy recommendations (Caughy et al 2001). However, there is little guidance in the literature as to how to develop built environment audits to respond to particular contexts.

Finally, the process and administration of auditing the built environment has been identified as a significant burden on organisational resources, with audits found to be time consuming, and the quality of audit evaluations limited by available financial, technical and human resources available to organisations (Brownson et al 2004; Schaefer-McDaniel et al 2010). On the other hand, the capacity of audits to capture spatial data is increasingly being expanded with developments in the technology of data collection tools. These include hand held data input devices that enable GIS compatible data (Schlossberg et al 2007); use of smart phones (Mikkelsen and Christensen 2009); GPS devices (Duncan, Badland and Mummery 2009); and accelerometers (Quigg et al 2010). Technological developments can create new opportunities for different types of knowledge about children and their travel activity. This methodological issue, and the others discussed here, are important to consider when investigating the potential for audits to evaluate urban environments for children's mobility.

3.3.5 Built environment audits, ethics and wellbeing

Auditing the built environment has implications for addressing issues of wellbeing for children. The work of Ferdinand Lewis (2008; 2012a; 2012b) offers a significant contribution to this aspect of audits. Drawing on the work of moral philosophers such as Mills, Rawls and Sen, Lewis developed a theoretical model of built environment audits based on how they value 'goods' and 'resources' in the built environment, and

how they position individuals' capacity to access these goods and improve their wellbeing. Referring to the range of built environment audits developed by the Robert Wood Johnston's Active Living Research Foundation, Lewis (2012a) explains that the use of audits has proliferated in recent years due to the acceptance that the built environment has an influence on the wellbeing and health of humans. However, most audits, according to Lewis, lack an adequate ethical basis that accommodates different groups' capacity to access the goods provided by built environments. Many audits gather data about the presence or absence of particular built environment infrastructure or qualities, but few collect information on the factors that limit the ability of individuals to convert the built environment resources into goods.

Lewis (2012a) explains that within the structure and contents of audits there are assumptions of the relationship between individuals and collective goods. One such 'collective good', for example, is walkability; the 'good' being the benefits and improvements to wellbeing afforded by walking. The underlying assumption of the relationship between individuals and goods is based on differing arrangements in the ways that individuals hold portions of a particular good. According to Lewis, this relationship can be either absolute or relative. Holding an absolute portion means that there is an assumption that the 'good' is held in equal measure amongst all individuals. Therefore a good walkable environment is the same for all individuals in the same way. An audit based on an absolute evaluation of the quality of the built environment assumes that the ideal environment is one where each individual has equal access to the goods that environment provides. An example of a built environment audit based on an absolute evaluation is one that records and values the presence of a continuous, paved path in a neighbourhood area. The presence of the path is valued in the audit as it represents a good quality walkable environment. Each individual is assumed to have equal opportunity to access the goods that the path provides.

Conversely, a relative evaluation considers that individuals hold differing proportions, or unequal amounts, of collective goods. Despite this, the proportion held can be considered equitable, or ethical, because the amount held may be relative to the characteristics of the individual. Individuals have differing capacities to access collective goods so an equitable audit, according to a relative view, evaluates the built environment taking into account differing individual's capacity to access

collective goods within the audited environment. Drawing on the example of a path, a relative evaluation may, in addition to recording the presence of a continuous path, also evaluate the surface of the path and its suitability for wheel-chair access. An evaluation of the factors that may be barriers for a particular group of people, involves an evaluation relative to the characteristics of the group. In this sense audits are normative, value laden and, in order to address issues of wellbeing, there requires an ethical examination of the assumptions underpinning audits. Lewis is also concerned with the way audits represent how goods serve individuals in functional terms. Goods can be conceived of as ends or means. Looking at goods as ends implies that goods serve the function of preference fulfillment or satisfaction. This means that the good is considered an end-state and serves no purpose outside of itself. Goods can also be considered as 'means', or an equality of a general resource or access to resource. The good is valued according to the 'opportunity' it affords individuals.

Three audits are identified by Lewis based on differing lines of valuation that represent three relationship between individuals and built environment good.

1. The first is the utilitarian audit. This audit assigns an absolute proportion of the good to individuals, assuming that all individuals hold an equal proportion of the good being audited. The value of the proportion of the good is determined by how the audit evaluates individual preferences. Equality is measured by the averaging of 'satisfaction' in the built environment. When audits evaluate equality based on an aggregate level of satisfactions, Lewis refers to this type of audit as an "audit of satisfactions". These audits are hedonistic and prioritise psychological end-states, such as 'pleasurability' or 'comfort'. A parallel can be drawn between the "audit of satisfactions" and the notion of preference satisfactions and subjective wellbeing described in Chapter 2.
2. The second is the general resources audit. These audits value the relative proportions of goods held by individuals. An example is an audit that measures the level of access of a neighbourhood to opportunities to engage in physical activity within parks. When the distance of different households to parks is considered, an evaluation of the relative proportions of access has been undertaken. Equality is based on the opportunities individuals have to

access good and resources. Lewis refers to this type of audit as an “audit of opportunities”.

3. The final audit Lewis refers to is the capabilities audit. This audit not only evaluates the presence of goods, but also the ability of individuals to access goods. It takes into account the capacity of individuals to convert resources into goods. Using a playground as an example, as well as the quality of play equipment evaluated by the other audits, the capabilities audit would take into account a range of other considerations including whether the distance children have to travel to access the playground is feasible; whether particular play activities are regulated against; or alternatively if other groups of children have a territorial claim to the playground. Equality is based on evaluating the capabilities of individuals to access and concert built environment resources into goods, or wellbeing. According to Lewis this is an “audit of freedoms” (Lewis 2012b, 296).

Figure 3-1 illustrates Lewis’ model of built environment audits, depicting the three types of audits described above as a series of differing lines of evaluation.

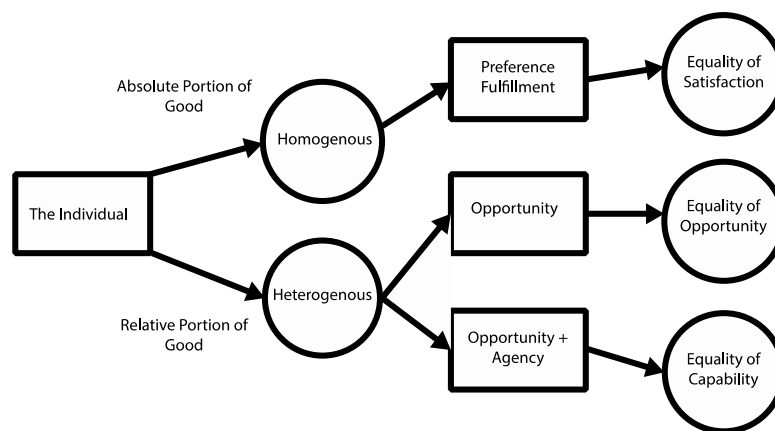


Figure 3-1: A general model of built environment audits. Source: Lewis (2012a)

Ultimately, Lewis is concerned with how to “reconsider how our instruments assign value to the individuals and to built environment good (2012a, 45).” The focus of his theoretical work is on guiding the development of ethically sound built environment audits through understanding the form and content of audits. Knowledge of the assumptions that underpin particular audit designs assist audit developers in making choices that are informed by ethical responses to the practical contexts in which audits may be employed.

Whilst Lewis' contribution is significant in enabling urban planners and designers to design ethically sound tools and instruments to facilitate children's wellbeing, the broader policy context outlined above is largely absent from his exploration of the theory of built environment audits. As previously discussed, the literature on audit culture shows us that the design, administration and the outcomes of audits are contingent on the institutional contexts that audit practices emerge from. For example the resources committed for data collection will influence decisions regarding the design of audits. This has consequences for audits' capacity to be arranged to reflect particular moral positions. The level of complexity reflected in a capability approaches to planning issues may require significantly more financial resources, technical proficiency and labour to capture the necessary multiple data sets (Beyazit 2011). Audit developers may need to make trade-offs in the design of audits restricting their choices in achieving evaluations based on capabilities. Knowing more about the decisions made in designing and conducting audits therefore will contribute to an understanding of the capacity for audits to address issues of children's active mobility and wellbeing.

3.4 Conclusion

This chapter has focused on the policy environment related to shaping the built environments factors relevant to children's active mobility. The review of literature regarding policy environment and built environment audits contributed to forming the background for an exploration of the second research objective of this thesis: *to understand how built environment audits can address children's wellbeing through facilitating active mobility.*

The chapter began with an overview of the policy environment relevant to active mobility. The policy environment was described as encapsulating the range of laws and regulations, organisations and agents, and capacity of resources that are assembled to address policy issues. Built environment policy environments, as outlined in Mitra (2012) model, are nested within a broader socio-political domain, therefore necessitating an inquiry into the hidden structural or cultural factors within policy environments. The notion of 'pedestrianisation', the prioritisation of functional over the civic qualities of streets, was put forward as a dominant policy culture relevant to children's mobility. Three specific policy initiatives aimed at improving

rates of and environment for children's active mobility were briefly outlined. These were Safe Routes to Schools, walking school buses, and travel behaviour change. The capacity of each policy initiative to address issues related to children's mobility was tempered by a tendency to support the underlying function of automobile culture.

Built environment audits were then examined. The recent historical development and proliferation of built environment audits was outlined, highlighting their use in academic contexts to develop knowledge of the influence of the built environment on health, physical activity and active travel. An audit culture was identified, where the use of audits has proliferated within multiple institutional contexts, driven by objectives aligned with the neoliberal agenda – efficiency, quality and accountability. Part of the appeal of audits is due to their status as instruments of science, provided valid, objective measures of performance against standards and the health and quality of systems. Audits claims of scientific rationality have necessitated methodological robustness and highlighted their reliability, adaptation for different built environment contexts and for different users, and their resource intensive nature. Audits, however, have the potential to address children's wellbeing. Lewis' (2012a; 2012b) contribution to the theoretical aspects of auditing the built environment is significant for this research thesis' objective, as it highlights that audits are based on assumptions about individuals and collective wellbeing. Lewis (2012a) introduced a theory of built environment auditing based on three types of audits: audits of satisfactions; audits of opportunities; and audits of freedoms. Each type of audit constructs a different moral relationship between individuals and the built environment resources, or 'goods' that are evaluated. Lewis suggests the capabilities audit, or 'audit of freedoms' provides a robust moral arrangement between individuals and resources. The 'audit of freedoms' evaluates both the opportunities available, and the individual's agency to make use of the opportunities. Yet Lewis' work does not explicitly refer to the institutional characteristics of auditing practice that reflect a broader 'audit culture'. In order to adequately evaluate the capacity of built environment audits to address children's wellbeing, both the institutional and the form and content of audits need to be addressed.

In order to address the issues above, a question posed by this research thesis is: *how do built environment audits evaluate built environments in relation to children's*

active mobility and wellbeing? Understanding how audits operate in policy environments, and how audits represent and reflect issues of children's wellbeing, is important in order to understand how planners can adapt their tools and practices to produce relevant and ethically sound evaluations of children's mobility environments. The next section outlines the methodological basis for the design of the research thesis.

Chapter 4: Research methodology and design

4.1 Introduction

This chapter outlines the methodology and design of the empirical research used to address this thesis' overarching objectives:

- *To explore the relationship between the built environment, children's active mobility and children's wellbeing.*
- *To understand how built environment audits can better address children's wellbeing through facilitating active and independent mobility.*

The chapter begins by examining socio-ecological theory and establishing a framework for the research design. Three socio-ecological concepts are introduced: Bronfenbrenner's socio-ecological model; activity settings; and affordances. Following an explanation of the research questions that have emerged from the literature review, the single case study methodology used to address the research objectives is explained. Five research methods and the techniques used to analyse the data are described: a survey of children and their parents; a photo-collage method; a content and thematic analysis the local newspaper; interviews with planning practitioners; and an audit of the built environment. The chapter concludes with an overview of the ethical issues associated with the research thesis.

This PhD research sits within a larger national study funded by an Australian Research Council Discovery Grant (CATCH: Children's Active Travel, Connectedness and Health - DP1094495). The objective of the CATCH project was to examine the factors of the social and built environment that influence the independent mobility, active travel, and health of Australian children. The project is national in scale, and a number of primary schools in four urban centres participated in the research. This thesis uses the Western Australian primary school as a case study. Some of the methodological choices made were determined by the CATCH project and some data from that project was used in this PhD research. Several additional methods were used in order to address the objectives of this research project. Analysis of all data arising from the main study and my own was conducted independent of the CATCH project and is unique to this thesis. For more details on the CATCH project and its relationship with this thesis, see Appendix A-1.

4.2 Theoretical framework guiding the research design

4.2.1 Socio-ecological theory

Socio-ecological theories have been posited as appropriate theoretical frameworks to investigate the relationship between children, wellbeing and their environments (Earls and Carlson 2001). Socio-ecological theories propose that individuals are nested within a series of inter-personal, material and social scales; that is, the individual is part of an ecological system (McLaren and Hawe 2004). Socio-ecological theory integrates the built environment, socio-cultural and institutional relationships that shape individuals' behaviour (Sallis et al 2006). The visual representation of Barton and Grant's (2006) 'Health Map' illustrates a socio-ecological model (**Figure 4-1**). In this example people are conceptualised as nested with their community scale, which is nested within a local economy, built environment, natural environment and global ecosystem.

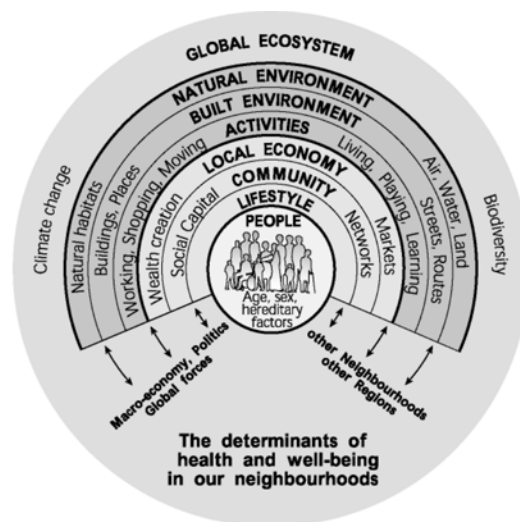


Figure 4-1: Barton and Grant's (2006) 'Health Map'

The socio-ecological approach is useful for investigating the built and social scale factors relevant to children's mobility. Mitra's (2012) model, illustrated in Chapter 2, is an example of a socio-ecological approach to conceptualising children's active and independent mobility. The model conceives of children's activity nested within the household, urban environment and socio-political scales. The relevance of a socio-ecological approach in understanding the range of social and spatial issues associated with children's mobility outlined above is further demonstrated in the use

of these models in a number of studies focused on travel behaviour (Moudon and Lee 2004); physical activity (Holt et al 2009; Forsyth et al 2006); children's active free play (Veitch, Salmon and Ball 2007); and the influence of social environments on children's school travel (McDonald et al 2010). Socio-ecological theories are increasingly being used as a means to understand the complex relationships between people and their environments in order to plan and develop policy and strategies to improve people's wellbeing (Sallis et al 1998; Giles-Corti et al 2005).

4.2.2 Key socio-ecological concepts

In order to facilitate the discussion of the research findings in this thesis, three key socio-ecological concepts are important. These are:

- Urie Bronfenbrenner's socio-ecological model and its concept of systems.
- The concept of the activity setting.
- The concept of affordances.

4.2.2.1 Bronfenbrenner's socio-ecological Model

One of the more detailed theories of a socio-ecological approach is that developed by Urie Bronfenbrenner presented in *The Ecology of Human Development* (1979). Bronfenbrenner, an American psychologist concerned with the subject of children's development, was deeply interested in the interaction between humans and their environments and considered that any meaningful explanation of human psychology needed to look at the individual in relation to the past and present environmental conditions (1979, x). In order to develop this understanding of the human-environment relationship he developed a socio-ecological theoretical model. As Bronfenbrenner (1979, 11) explains, the model:

...seeks to provide a unified but highly differentiated conceptual schema for describing and interrelating structures and processes in both the immediate and more remote environment as it shapes the course of human development through its lifespan.

Figure 4-2 illustrates Bronfenbrenner's model. Looking at the model as a whole, the individual can be seen as nested within and influenced by the system of relationships operating at a number of these different scales.

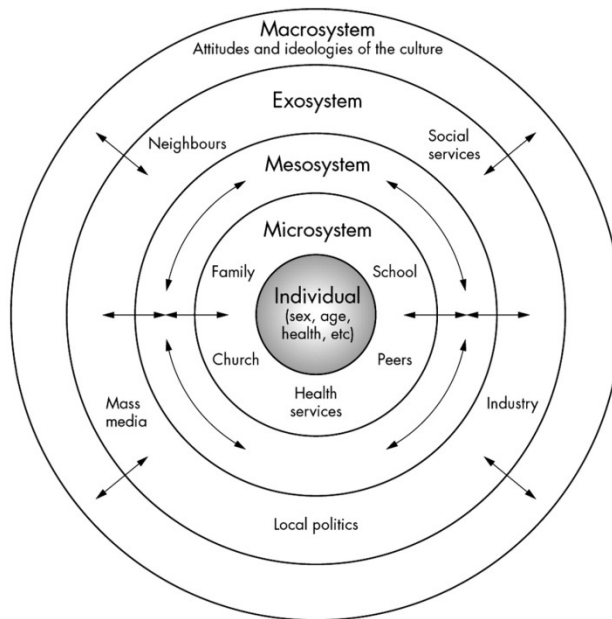


Figure 4-2: Bronfenbrenner's Socio-Ecological Model. Source: McLaren and Hawe (2004)

At the centre of the model is the individual. An individual is characterised by a range of factors including gender, age and differing capacities of the body to interact with the immediate environment. The model places the individual within a series of four nested scales that are the site of various systems of relationships.

- The individual is part of what Bronfenbrenner calls the **micro-system**. The microsystem encompasses relationships that operate within defined settings. Relationships form in settings where behaviour follows a regular and routine pattern. These relationships can be indirect and observational, or direct and collaborative (Bronfenbrenner 1979, 56-58). The important aspect of microsystem relationships is that they are based in settings or places and therefore are bound together with the physical environment. For example, common microsystems relevant to children form within a household space, such as the backyard, or in a school environment, such as the school playground. In each of these, regular patterns of behaviour between children and the objects within the setting form distinct microsystems of relationships.
- Children's everyday lives consist of a number of micro-systems, each related to one another in different ways. Bronfenbrenner refers to the relationship between multiple micro-systems as the **meso-system**. For children's active mobility the relationship between homes, schools, after-school sports, and friends' houses reflect a more complete set of routines and activities that

make up everyday life. The meso-system scale is important to children's active mobility because it encompasses the connections between spatially differentiated micro-systems and therefore reflects the transport systems individuals are embedded within. The meso-systems weave together microsystems and enable a coherent understanding of the travel activity of children's everyday life.

- **Exo-systems**, according to Bronfenbrenner (1979, 25), are other micro-systems that the individual is not directly a part of, yet are still influential. Examples of exo-systems relevant to children's mobility may include parents' associations, parents' social networks, neighbours and local community groups who are involved in advocating for the quality of neighbourhood environment. Each of these systems may shape children's mobility patterns in different ways; however the child is not directly a part of the series of relationships that make up the system.
- **Macro-systems** are higher-level systems such as economic structures, cultural and social norms that influence the rhythms of daily life. Bronfenbrenner (1979) placed the influence of policy and planning at the scale of the macro-system. Furthermore, he noted the importance of socio-ecological models to "functionally integrate" social science and policy in order to positively shape the development of people living in communities. Bronfenbrenner consider policy scale systems as influential on the cognitive and social development of children, and developed his socio-ecological theory in part to understand the relationship between individual, household, neighbourhood and policy scale relationships.

4.2.2.2 Activity settings

Bronfenbrenner's (1979) micro-system is series of relationships that develops between people within particular settings. These settings are known as activity settings (O'Donnell, Tharp and Wilson 1993; McLaren and Hawe 2004). Activity settings are "on-going patterns of activity and the environmental features that support as well as constrain this activity" (Heft 1988, 31). Integrated within the activity setting is a relationship between individuals, with other individuals, and with the environmental features of the setting. However, activity settings encompass more than just the relationship between the physical environmental settings and

individuals though. According to a socio-ecological perspective, what is evident within the activity setting are the series of relationships with other socio-ecological scales. Within an activity setting are, what Earls and Carlson (2001) referred to as, the distal and proximal effects upon behaviour. This means that the influence of different domains and scales are manifest within each activity setting, not only the proximal influence of direct, micro-system relationships between children and their environment, but also the distal effects of mesosystem and exosystem domains, such as household characteristics and broader social norms. The intent of highlighting the activity setting here is that it provides an empirical unit of analysis in which the broader socio-ecological relationships can be explored. O'Donnell, Tharp and Wilson (1993, 504) outline that the activity setting is a pragmatic concept that integrates "subjective experience, behaviour and external features into a common phenomenon". For this reason the activity setting is a useful unit of analysis for complex, multi-scalar relationships reflected in urban social and built environments.

In the context of this thesis, a relevant example of an activity setting relevant to children's everyday lives in urban environment is a playground. A playground is an activity setting that serves to provide children with the opportunity to play. Play is an activity that involves the interaction between a child and the environment features present within the setting, whether these are purpose built play equipment, incidental objects (such as trees and rocks), or simply an expanse of ground on which certain activities can take place (riding a bike or playing basketball). The activity setting may also consist of a number of relationships between different children; between parents and children; or other adults and children in the playground. These relationships make up the microsystem as described by Bronfenbrenner (1979). The activity of play occurs also in relationship with all other microsystems that make up children's everyday activities; the mesosystem scale. Furthermore, the quality of playgrounds, and therefore the behaviours acted out in these settings, can also be influenced by relationships at other scales, such as the exosystem. One example of such an exosystem scale is playground regulations that influence the size, location and quality of play areas (Jansson and Persson 2010). Within this one setting, a range of relationships may be identified. In order to understand better understand children's active and independent mobility, the activity setting provides a useful means of

analysing the settings associated with children's mobility, and the series of socio-spatial relationships that constitute them.

4.2.2.3 Affordances

The third concept relevant to this research thesis is that of affordances, and this concept provides a means of linking the relationships within children's mobility environments with children's wellbeing. Affordances are a socio-ecological understanding of the direct relationship between humans and the environment. The concept of affordances is drawn from Gibson's (1979) theory that we perceive the environment, not in terms of its appearance of form, but through the various functions that its form and materiality affords us. The affordance refers to the function or action an environment allows an individual to carry out. For example, a set of stairs might simply afford access from one level to another; alternatively, for children just 'hanging around', the set of stairs may afford sitting and socialising with friends. For a child who likes to skateboard, the same stairs could provide a challenging surface on which to skate. Objects and environments, rather than being restricted to having a distinct purpose or function, could have multiple affordances (Heft 1988). Thus, the stairs in this example have multiple affordances – they are walk-able, sit-able and skate-able. What is important is that the environment or objects within the environment are understood in relation to perceiver and the perceiver's capability to access or use the environment in different ways. In this way, the affordance conceives the human and environment relationship as a pragmatic one, in which perception, behaviour and the built environment context are integrated.

The notion of affordance has been used widely in relation to children's relationship with their local environment (Chawla and Heft 2002; Kytta 2002; Rudner 2012). Affordances are the 'real' characteristics of the environment that provide actual activities and behaviours for children; rather than the prescribed functions intended by planners and designers. Furthermore, they enable a discussion of children's freedom to engage in behaviours in their local environment. For example, Kytta (2002) notes that affordances can be understood as 'actualised', either perceived or utilised. Alternatively, affordances may be potential; that is they are available to be acted on but chosen not to be. Affordances can also provide insight into the factors that constrain particular behaviour. This type of affordance is represented in, what

Kytta (2002) refers to as the field of constrained action. These are potential affordances for children that are not available for a variety of reasons, such as parental licences or regulatory practices (Rudner 2012). In this thesis, the concept of affordances is used to facilitate a discussion of how the activities of children relate to issues of wellbeing, such as subjective wellbeing, needs and freedoms. The remaining sections in this chapter outline the methodological approach, research design, and the methods and analytic techniques employed to address the thesis objectives. The three socio-ecological concepts discussed here – Bronfenbrenner’s socio-ecological scales, activity settings, and affordances – were used to provide a framework for the design of the research approach, guide the selection of methods, and guide the selection of analytic techniques.

4.3 Research objectives

The overarching purpose of this thesis is to explore how planners can better shape built environments to enhance children’s wellbeing through facilitating active and independent mobility. Two overarching objectives guide the research design:

Objective One Explore the relationship between the built environment, children’s active mobility and children’s wellbeing.

Objective Two Understand how built environment audits can better address children’s wellbeing through facilitating active and independent mobility.

A number of secondary questions were derived from the review of empirical and theoretical literature in Chapter 2 and 3, and from the overview of the socio-ecological approach in this chapter. Responding to these research questions contributes to addressing the primary research objectives of the thesis. **Table 4-1** reiterates these questions:

Table 4-1: Secondary research questions

Relevant Chapter	Research Question	Primary objective addressed
Chapter 2	<i>What factors are important in the relationship between active mobility and children’s subjective wellbeing?</i>	Objective One
	<i>What factors are important in the relationship between active mobility and children’s needs?</i>	Objective One
	<i>What factors are important in the relationship between active mobility and children’s capabilities?</i>	Objective One
Chapter 3 and 4	<i>How do built environment audits evaluate built environments in relation to children’s active mobility and wellbeing?</i>	Objective Two
	<i>How can a socio-ecological approach advance built environment auditing for children’s active mobility and wellbeing?</i>	Objective Two

4.4 Research methodology

4.4.1 Case study methodology

This research employs a single case study methodology to address the research objectives. A case is “a bounded system or object of study” (Creswell 2007, 244). In this thesis the case is a primary school in the Perth metropolitan area, Western Australia. The single case study approach focuses on developing in-depth knowledge of the children’s attitudes, mobility patterns, built and social context of the primary school. Sallis et al’s (2006, 312) comment on the need to developing a rich understanding focus on specific contexts highlights the importance of single case studies to further develop the relevance of socio-ecological approaches to issues of active mobility. Other studies have employed single case study methodologies to address the issue of children’s mobility in contemporary urban environments (for example Collins and Kearns (2001); Lang, Collins and Kearns (2011); and Pooley et al (2010)). The single case study approach contributes to knowledge of the interaction between the range of individual, household, neighbourhood and policy

factors related to auditing the built environment for children's active mobility. The single case study approach allows an investigation into the inter and intra-scale relationships within a specific context. This knowledge is important for understanding social problems such as those associated with the reduction in children's active mobility. Krohn (2008) suggests that issues and characteristics associated with social problems need to be "interpreted and ordered" in the situations in which they occur. As Krohn (2008, 372) states:

...local actors care for their case, and not for any general knowledge. They force researchers to be as specific as possible and develop their models and scenarios close to circumstantial conditions.

A common argument that is directed towards case study methodologies is that their findings cannot be validly generalised to the wider population (Flyvbjerg 2006). However, as Yin (2009) notes, case study research does not intend to generalise from a sample to a general population. Instead, case studies generalise analytically, using results to compare to a broader theory. In the case of this research thesis this theory relates to the relationships between children's active mobility, their wellbeing, and auditing tools. Thus the intent of this thesis is not to use a case study approach to infer statistically generalisable social and behavioural findings about children and active mobility. Rather, the intent is to use the socio-ecological model to explore in detail, the theoretical, empirical and practical relationships between the built environment, children's walking, and planners' practical means to address problems associated with children's walkability.

4.4.2 Research design framework

To address the research objectives a mixed-methods approach, organised as a multi-strand research design framework, was used in the case study. A mixed methods approach has been recommended by researchers focusing on links between children's health and social capital (Baum et al 2009); children's independent mobility (O'Brien et al 2000) and everyday mobility (Christensen et al 2011); children's development of a sense of place (Lim and Barton 2010; Trell and Van Hoven 2010); and children's experience of their local geography (Mitchell et al 2007). In this research thesis quantitative approaches were used to gather statistical data relating to both the attitudes and travel behaviour of children and parents, and

objective aspects of the neighbourhood built environment. A qualitative methodological approach, on the other hand, was used to capture children's and parents' perceptions of the local neighbourhood environment, the framing of issues in local newspapers regarding children's active mobility, and reflections of practitioners who use audits to evaluate the built environment.

A two strand research design focusing on two distinct strands was used to organise the quantitative and qualitative methods. Teddlie and Tashakkori (2009, 144) describe a strand as the phase of the study that includes three stages - the conceptualisation stage, the experiential stage (methodological/analytical), and the inferential stage - often in an iterative or interactive manner. The two strands of the research design relate firstly to children's active mobility and their wellbeing, and secondly to policy environments and built environment audits. **Figure 4-3** adapts **Figure 1-1**, illustrating the research design framework and identifying the stages and strands of the research design.

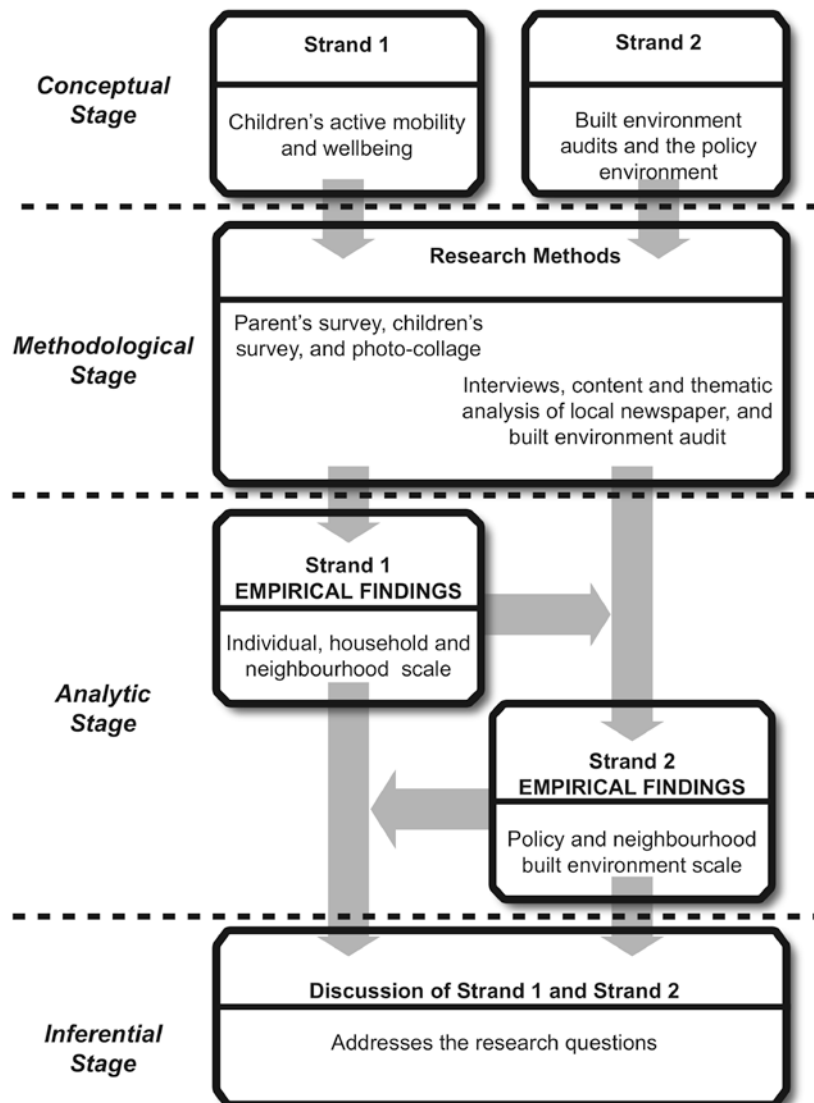


Figure 4-3: Research design framework. Source: adapted from Teddlie and Tashakkori (2009)

The two strands that bind the research design framework are children's wellbeing, active mobility and the built environment, and the policy environment and practice of auditing the built environment for active travel. The conceptualisation stage was comprised of the literature reviews in Chapter 2 and 3. The experiential (methodological and analytic) stage of the research occurred in two phases. The first focused on the collection and analysis of data relevant to children's active mobility within the case study area. This captured the individual, household and neighbourhood built and social environment factors relevant to children's mobility.

The next stage involved the collection and analysis of data relating to the practical role of planners in evaluating built environments for children’s mobility. This stage focused on the institutional and policy aspects of the case study; the output of a built environment audit; and knowledge from planners regarding the role of audits in planning practice. Finally, both strands were merged for the final inferential stage where a meta-analysis was conducted of the conceptual and empirical findings.

4.5 Case study description

The case study selected for this thesis was a primary school in an inner urban suburb of Perth, Western Australia³. The primary school was approximately twelve kilometres from the Perth CBD, and five kilometres from the coastal city of Fremantle. **Figure 4-4** illustrates the regional context of the case study.



Figure 4-4: The case study location within the Perth metropolitan regional context. Source: adapted from WAPC (2013)

The case study primary school was located in one of the eighteen suburbs that made up the City of Melville. The city was established at the beginning of the twentieth

³ The case study school was selected according to the criteria defined by the ARC CATCH project. In the project, research findings were compared between two schools from inner urban areas, two schools from middle urban areas, a master-planned community and a regional centre. This research thesis draws upon the data from the Western Australian case study. Due to the ethics agreement the school cannot be named. For more details on the project see Appendix A-1.

century and early land development occurred adjacent to a main highway that linked Perth to Fremantle. It was not until the 1950's that suburban expansion extended beyond the immediate area of the highway (City of Melville 1998). The gradual subdivisions of lots since the 1950s resulted in the land use being predominantly a patchwork of primarily residential cells with varied road network design (mixed grid pattern, curvilinear, and cul-de-sac street designs). Some light industrial land uses were scattered amongst the residential area, with the concentration of industry increasing in close proximity to a second major highway that dissected the area to the south of the school. The city had over six hundred hectares of open space, distributed across over two hundred parks (City of Melville 2013). The case study school catered for children between the ages of 6 and 12. The Western Australian State Government had designated the school as a local intake area school (WA Department of Education 2013), meaning that priority is given to students residing within a specified boundary of at most 1.25 kilometres from the school. **Figure 4-5** illustrates the district scale of the case study primary school.

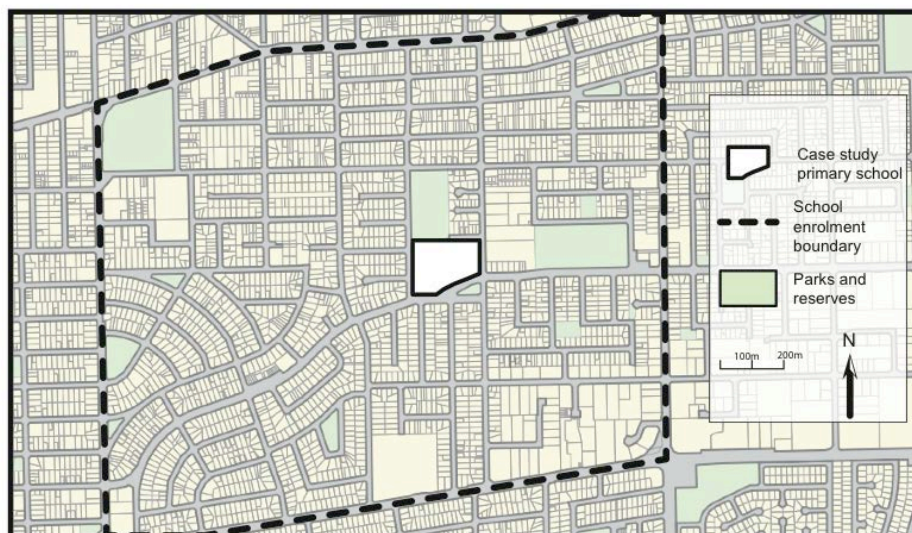


Figure 4-5: Neighbourhood scale map of the case study area. Source: author (Basemap: City of Melville 2013)

4.6 Description of research methods

The following section outlines the specific methods used to address the research questions and objectives of this thesis. Five research methods were used, conforming to the mixed methods approach described above:

1. A survey of children and their parents;
2. A photo-collage method;
3. A content and thematic analysis of the local newspaper;
4. Interviews with planning practitioners;
5. A walkability audit of the case study neighbourhood.

The methods each relate to a number of different sub-units of analysis, as described by Yin (2009). These are children from the school; their parents; the neighbourhood built environment; local newspaper coverage; and planners who have knowledge of built environment auditing. Each unit of analysis provided insight into an aspect of a socio-ecological scale. **Figure 4-6** illustrates the socio-ecological model used to guide the research design and identifies the methods linked to each socio-ecological scale.

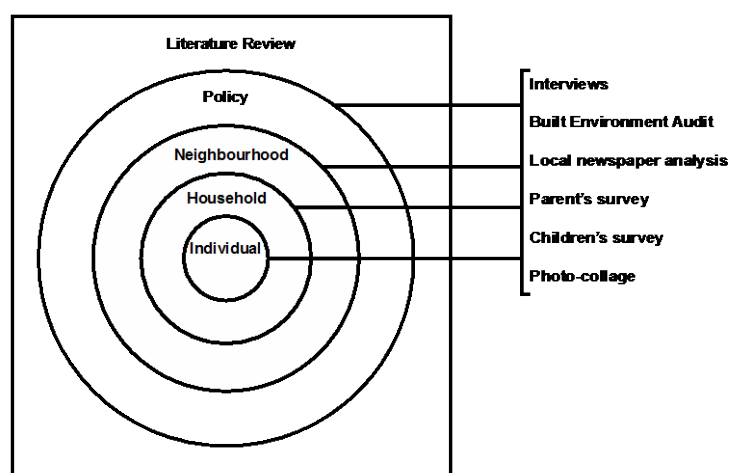


Figure 4-6: Socio-ecological model and related research methods. Source: author.

Some of the methods used in this research were a part of the CATCH project and some were unique to this research⁴. The following sections outline each individual method in detail.

4.6.1 Children's and parents' survey

A survey of children (n=51) from the case study school, and a separate survey of their parents (n=49⁵) were conducted. The purpose of the surveys was to gain

⁴ For more details on the relationship between methods and the CATCH project, see Appendix A-1.

insight into individual and household scale factors related to children's mobility, and also children's and parents' perceptions of their neighbourhood. The children's survey included items related to children's usual travel to places in their local neighbourhood; their preferred mode of travel; and their attitudes towards and perceptions of their local neighbourhoods. The parents' survey gathered data on household characteristics such as size, location, and composition; their own travel activity; attitudes and perceptions towards their children's travel behaviour and their local neighbourhood; and the licences they granted to their children to be independently mobile⁶.

A purposive sampling technique was used in order to select the most appropriate sample of children and their parents relevant to the research questions. The recruitment of participants was conducted with consultation and assistance from the principal and teachers in the case study school⁷. Children within three school year groups (141 in total) were gathered together, verbally briefed and provided with written information regarding the research project. The participant year groups consisted of children aged between nine and twelve years old and this cohort was selected as it represented the ages that children begin to become independently mobile (Hillman et al 1990; O'Brien et al 2000). The children were asked to give the information and consent forms regarding the research project to their parents. Of the potential 141 children from the three school year groups, 51 children and 49 of their parents completed the surveys. The sample size, whilst smaller than desired, is similar to other studies that use a range of complex methods in order to develop a more detailed explanation of children's mobility (for example, see Pooley et al (2010) who focused on sample of fourth grade children (aged twelve to fourteen years) from a single school in Northern England and used a range of methods).

In order to assess the representativeness of the sample in regard to the mobility profile of total group, a "hands-up" survey was conducted with the total group during the school visit. The children were asked to indicate by show of hands how they travelled to school that day. The day was sunny and a mild temperature; therefore it was assumed the children travelled to school by their normal mode of transport. Of

⁵ Two of the children's parents did not want to participate in the research.

⁶ For a more detailed description of the survey questions see 4.7.1 below. The full surveys are also provided in Appendix B-1 and B-2.

⁷ For more information regarding how the school and the children were contacted, see Section 4.8: Ethics.

the 141 children in the group, 60% responded that they were driven; 31% responded that they walked; and 8% either rode their bike or scooter. These results correspond with the sample of children and their reported usual travel to school (see Section 5.2.4.1 in Chapter 5). The sample was therefore considered to be representative of the total group of 141 children across three year groups, in relation to their travel mode.

The children's survey was administered during one of the school visits. A team of five researchers, including the author of this thesis, conducted the surveys. Two groups of children were organised according to the scheduling of classes and the space available to conduct the survey. The survey administration for each group took approximately 45 minutes. One researcher facilitated the survey process by addressing the class and by going through the questions one by one. Two research assistants and the author circulated among the children, addressing any individual concerns and making sure each question was completed correctly. The parents' survey was distributed to children at the initial school visit. Children were asked to take the survey home to their parents and, once it was completed, they were asked to return the survey to the school and place it in a returns box. The parents' survey required only one parent to complete and the overwhelming majority of respondents were female (89.8%, n=44). 8.2% (n=4) were completed by males, whilst one did not disclose their gender.

4.6.2 Photo-collage

A photo-collage method was conducted with the same group of children who completed the survey (n=48). The intent of the photo-collage method was to capture children's perceptions and evaluation of their local neighbourhood. The use of visual methods and photography has been identified as a way of better enabling children to become part of the research process (Mitchell et al 2007). Whereas children have been found to have differing capacities to use certain types of technology to express themselves in research contexts, photography is appealing, as children easily understand it (Santo et al 2010). The use of photographic methods in research with children has, for this reason, proliferated (Basilington 2000; Morrow 2001; Dennis Jr 2006; Witten et al 2011).

Forty eight of the fifty one children who completed the survey participated in a photo-collage exercise. In the exercise the children were given disposable cameras and asked to take photographs of what they liked and hated about their neighbourhood. After the photographs were developed the children were asked to construct three thematic collages using their photographs, annotations and drawings. The three themes were: “What I love about my neighbourhood” (LOVE); “What I hate about my neighbourhood” (HATE); and “What I think my perfect neighbourhood is especially if I was exploring it without any adults” (PERFECT). The photo-collage approach was developed from the work of Ross (2007) and Castonguay and Jutras (2009). 144 photo-collages were collected at the end of the collage exercise; 48 each of the ‘HATE’, ‘LOVE’, and ‘PERFECT’ collages. The purpose of the photo-collage method was to understand children’s experience of mobility and to gather knowledge of how children perceived their mobility environments; what aspects and places within their local neighbourhoods were important; and what these places afforded children in regard to their wellbeing. With reference to the socio-ecological model discussed earlier, the photo-collage provides insight into individual and neighbourhood domains relevant to mobility.

At the initial school visit, each of the children participating in the CATCH project was given a package containing a disposable camera and information sheet (see Appendix B-4). A training session was conducted with the children, instructing them on the use of the cameras. During the training session the children were asked to use the cameras to photograph things they liked and disliked about their neighbourhood. We explained that the photographs could be taken during the trip to school; when they were playing in the neighbourhood; or when travelling to and from different activities. They were asked to get permission to take photographs of other people. They were told that they could take photos of their friends. The children were also offered the opportunity to ask questions. The questions raised in the training session are outlined in **Table 4-2**.

Table 4-2: Children's questions addressed during the photo-collage exercise

Question	Response
One child asked what to take a photograph of if they went everywhere by car.	We said it was acceptable to take photographs from the car.
One child asked what he should photograph on the walk to school.	We suggested he take a photo of whatever interested him. It could be the view of the street from the footpath or it could be something that catches his eye on the way to school.
One child was confused about what we meant by "The Neighbourhood".	We clarified the term by suggesting that they think of it as the suburb they lived in. We added it could include the places that children go to on normal days, like school, the shops, sporting activities and friends' places.

The cameras were distributed on a Wednesday and most were collected during the following week. This gave the children the chance to photograph their environments over school days and the weekend. After the cameras were collected, the photographs were developed and we returned to the school with the photographs to conduct the collage exercise. 48 children completed the collage activity. The participants were placed in two separate groups by the school on the day of the data collection for the activity. The first group consisted of 16 children and the second group contained 32 children. The first group exercise took place in a classroom and the second in the school library. The children were seated at desks in groups of 4. They were provided three A3 collage sheets, scissors, pens, glue, and their photographs. The three A3 sheets were labeled:

1. "What I love about my neighbourhood";
2. "What I hate about my neighbourhood"; and
3. "What I think my perfect neighbourhood is especially if I was exploring it without any adults".

Before beginning to put together their collages the children were asked to look quickly through their photographs and to enjoy them. This resulted in lots of talking and comparing of photographs. They were then told they could begin arranging their

photo-collages. They were told that a good way to begin was to choose the photographs by spreading them out and arranging them on their collage sheets before beginning to glue them to the sheets. Once they were happy with the collage they were told they could start gluing the photographs to the sheet. At this stage the research team circulated around the class and looked at the collages. In order to gain extra explanations of the photographs and the reasons they were included in the three sheets, the instructors invited the children to talk about the photographs they had chosen. Open questions such as “What is this photograph of?” and “Why did you put this photograph here?” were asked. The children then spoke freely about the photos and the choices they made about placement of photographs. Comments were noted in notebooks by the researchers following the explanations. The research team later transcribed these comments onto sticky notes, adding these to the collages for which the explanations were provided. See **Figure 4-7** for an example.



Figure 4-7: Example of photo-collage with a sticky note attached

Children were also encouraged to write about the photos or to draw pictures or maps on the collage sheet. Some children had taken photographs of what they loved about the neighbourhood and did not have any photos of things for the “Hate” collage. They were told that they could just draw images instead. Three children did not have any photographs to work with as they had not returned the camera or had decided

not to participate in the study. They were asked to draw images for each of the collage sheets.

Several limitations arose during the design and the administration of the photo-collage exercise. These limitations and the measures taken to address them are described in Table 4-3.

Table 4-3: Limitations of the photo-collage exercise

Limitation	Measures taken to address
There was no supervision by researchers of children when they were taking the photographs.	Children were given detailed verbal instruction in a class setting and provided with an instruction sheet. I informed the children that I was available during the exercise, provide my telephone number and reassured them that I was happy to receive telephone calls. None of the children chose to contact me.
Children were unable to obtain photographs that accurately reflect what they liked and disliked about their neighbourhoods.	We provided coloured pencils during the collage exercise and encouraged children to draw and write about what they liked and disliked about their neighbourhood.
‘Neighbourhood’ is a vague concept	We provided an explanation of ‘neighbourhood’ in the instructions. We also gave specific instructions regarding the types of things we would like them to photograph, for example the school journey or what children do after school. These activities take place in the neighbourhood context.
Inferring meaning from visual sources is difficult.	The week-with-a-camera methodology attempted to address this through asking the children to annotate their collages. In addition, the facilitators were asked to circulate the room and ask the children to explain their specific choices made during the collage exercise.

4.6.3 Local newspaper analysis

A content and thematic analysis was conducted of articles relating to children’s mobility environments contained in a local newspaper. Local newspapers regularly focus on issues of urbanism close to the everyday lives and experiences of communities. They are also read by people in the context of their everyday life and

therefore can reflect, reinforce, and shape social messages about behaviours and everyday issues, such as their choices relating to travel. In doing so, they contribute to the shaping of urban space (Valentine 2004). The purpose of the analysis was to capture a different perspective of issues relevant to children's mobility to those provided by the parents and children in the surveys and photo-collages. It was anticipated that the local newspapers would give insight into the neighbourhood environment, both on specific issues, and the general social discourse relevant to children's mobility. Local media sources, such as the community newspaper, provide a number of insights into local urban issues.

The articles were selected from the local newspaper distributed in the suburb of the case study school. The weekly newspaper was freely distributed amongst the eighteen suburbs within the local government area. The content of the newspaper was assumed to reflect the issues of the case study school. The local community area newspaper was accessed via an online archive that held editions back to 2006. The newspaper is released weekly and 372 editions were included in the sampling frame. The full archive was used as the sampling frame in order to maximize the sample. The sample of articles was derived from a list of ten keywords entered into the search engine. These key words, derived from the literature review relevant to children's mobility, were: children; walking; cycling; school; pedestrian; streets; health; independence; traffic; road crossing. These terms were used in the community newspaper search engine and each article that was displayed containing these keywords was checked for relevance to the research topic. Articles relating to adult active modes of travel were also included as these articles were assumed to be relevant to the same pedestrian environments that children use. A total number of 67 articles were sourced from the search. The articles were then scanned and inputted into *Hyper-research Version 3.5.2*, a program that allows various textual analysis techniques. The articles were then analysed using a content and thematic analysis. The analysis of articles is discussed in Section 4.7.2 below.

4.6.4 Practitioner interviews

Interviews were conducted with eight professionals with some knowledge of walkability audits. Professionals with some experience of transport issues other than auditing the built environment, although potentially providing some insights into

planning for children's active mobility, were not included in the sample selection. The intent of the interviews was to gather specific knowledge of the practical contexts of walkability audits and therefore focused on planners, policy-makers and engineers who had used or developed built environment audits for walking or cycling. An opportunistic and snowball sampling technique (Teddlie and Tashakori 2009) was used to identify interviewees. Walkability audits are an emerging planning technique in Australia and therefore potential interviewees with a suitable level of experience in developing or using audits were scarce. Initial interviewees were identified through a search of Australian planning departments and community advocacy websites. During these interviews I sought recommendations from the interviewees of further interviewees (snowball sampling). Furthermore, new opportunities arose during the research process that enabled me to contact new interviewees (opportunistic sampling). It was hoped that a number of interviewees would have conducted evaluation specifically for children. However, evaluations solely relevant to children were uncommon, and therefore, planning practitioners who have conducted measures for the general population were included in the sample.

The interviewees were transport planners (3), travel behaviour change officers (2), a traffic engineer (1), and advocates for walking (2). Each of the interviewees had developed, used, or were considering developing audits that evaluated the quality of the built environment for walking. All interviewees were concerned with issues of walkability at the metropolitan scale, as opposed to a small local government authority. Interviewees were based in three Australian cities – Perth, Melbourne and Brisbane. The rationale for including interviewees from outside the case study area was that a general understanding of the use of built environments audits was sought, rather than one specifically related to the case study area.

The interviews were designed as in-depth, semi-structured interviews. Semi-structured interviews were necessary as the interviewees were from a range of professional backgrounds and the interviews were exploratory in nature. A number of initial framing questions were developed from the literature review and the complete interview schedule is included in Appendix B-3. The questions asked concerned the reasoning behind the selection of different types of audits; the identification of the range of stakeholders involved in auditing; evaluation of the outcomes of audits; and the application of audit findings in practice. All interviews lasted between 45 minutes

and an hour each. The interviews were recorded using a portable recorder and then transcribed. One interviewee did not want the interview to be recorded and therefore detailed notes were taken during the interview. Following the interview the transcribed data was entered into *Hyper-research Version 3.5.2*. For the full interview transcripts see Appendix C-1.

4.6.5 Audit and evaluations of the walkability of the neighbourhood.

An audit was used to evaluate the built environment of the case study neighbourhood. The intent of conducting the audit evaluation was to compare the representation of built environment quality of the audits, with those of the findings of other empirical data, such as the surveys and photo-collages. The audit tool used was one that is available on the Western Australian Department of Transport website⁸. The audit sampling technique, administrative process, and analytic technique are discussed in more detail in Chapter 6.

4.6.6 Summary of methods

A brief summary of the methods used to address the research objective, and their relationship with the socio-ecological theoretical framework are illustrated in **Table 4-4**.

Table 4-4: Methods and their relationship with the socio-ecological model

Method	Relationship with Socio-ecological theory
Children’s and parents’ survey	Provides insight into individual attitudes and travel behaviour; household travel patterns; and perceptions of the neighbourhood area (individual, household and neighbourhood domains)
‘Week-with-a-camera’ and photo-collage	Provides insight into the individual experience of travel and perceptions of the neighbourhood (individual, household and neighbourhood domains)
Local newspaper content and thematic analysis	Provides insight into broader social norms and problem-framing relating to children’s mobility. It also allows insight into the policy actors, rules and regulations relating to children’s mobility environments in the neighbourhood (neighbourhood and policy domains)
Interviews with planners	Provides insight into the institutional context that built environment audits operate within (policy domain)

⁸http://www.transport.wa.gov.au/mediaFiles/active-transport/AT_WALK_P_Walkability_Audit_Tool.pdf

Built environment audit and evaluations	Provides insight into the quality of children’s mobility environments in the neighbourhood, from the perspective of planners (neighbourhood and policy domains)
--	---

4.7 Analysis

4.7.1 Statistical analysis

The children’s and parents’ surveys contained both quantitative and open-ended, qualitative responses. The survey data was entered into SPSS, a statistical software program. Each question represented a distinct variable. Quantitative questions were in the form of bi-nominal and likert scale responses. A mix of descriptive analysis, frequency counts and cross-tabulations were used to analyse the quantitative survey questions. The intention of the descriptive analysis was to provide an aggregation of responses from the group of children and parents. The aggregation of responses across a collective is important to utilitarian concepts of wellbeing that are based on the averaging of satisfactions or preferences (Phillips 2006; Lewis 2012a). The open-ended questions were transcribed into a Word document and their content was analysed using *Hyperresearch Version 3.5.2*, which allowed the categorization of responses to open-ended question according to themes. A summary of key survey questions themes, the type of responses, and the conceptual and theoretical themes associated with each question are outlined in **Table 4-5**.

Survey Instrument	Question themes	Response	Relationship with the research and theoretical literature	Sources of literature
Children's Survey	How do you usually travel to school and other places and how long does it take you to travel there?	Multi-nominal	Modes of travel; distance; length of journey; and active and independent mobility.	Fyhri and Hjorthol (2009); Tilt (2010)
	How do you want to travel to school and other places?	Multi-nominal	Modes of travel; affordances; and preference satisfaction.	Collins and Kearns (2001)
	How often do you play outside and do you wish you had more freedom to go outside?	Multi-nominal	Household, neighbourhood; affordances; and independent mobility.	Veitch, Salmon and Ball (2007)
	Do you agree with the following statement about the neighbourhood?	Likert Scale	Neighbourhood environment (built and social); mobility; routes; places; and children's wellbeing.	Hume, Salmon and Ball (2005)
	Do you agree with the following statement about your school?	Likert Scale	The role of school in active travel; the school journey; and neighbourhood environment surrounding the school.	Baslington (2009)
	What suggestions do you have about how to make your neighbourhood a better place for children and adults to walk and cycle by themselves, or with friends?	Open-ended	Neighbourhood environment (built and social); mobility; and children's well-being.	Nordstrom (2009)

Table 4-5: Explanation of survey questions

Survey Instrument	Question themes	Response	Relationship with the research and theoretical literature	Sources of literature
Parents' Survey	Is your child allowed to (travel to and from school; cross roads; ride a bicycle; catch a bus) without an adult present? How far?	Bi-nominal	Independent mobility; licence to travel; and range of active and independent mobility.	O'Brien et al (2000)
	Attitudes to children's travel to school and in the neighbourhood.	Multi-nominal/ Likert scale	Norms relating to children's active and independent mobility; neighbourhood; and school journey.	Barker (2011); Lang, Collins and Kearns (2011)
	People and places in the neighbourhood.	Likert scale	Neighbourhood environment (built and social); routes; and places (school, parks and local shops).	Tranter and Pawson (2001)
	Do you have any other comments about increasing children's active and independent travel in your neighbourhood?	Open-ended	Neighbourhood environment (built and social); mobility; and children's wellbeing.	Witten et al (2012)

4.7.2 Content and thematic analysis

The photo-collage, newspaper articles, and interviews were analysed using a technique derived from both content analysis (Krippendorff 2004) and thematic analysis (Boyatzis 1998). This approach is based on a process used by Ross (2007), Castonguay and Jutras (2009) and Fusco et al (2012) each of whom established an initial framework to guide the thematic and content analyses of images children had taken of significant places and aspects of their neighbourhood. A content analysis (Granner et al 2010) of local newspapers to evaluate community participation programs was also drawn on to develop the technique used in this research thesis. Following a brief overview of content and thematic analysis, I will describe the technique used to analyse the images, articles and interviewee statements.

The content and thematic analysis were based on codes; units of data that enable the classification or categorization of groups of codes into themes (Saldana 2013). Content analysis is defined by Krippendorff (2004, 18) as “a research technique for making replicable and valid inferences from texts (or other meaningful matter) to the contexts of their use”. The link, in this definition, between content from texts, and the context of their use, is important to highlight in relation to each of the sources of data. For example, the content of the images from children’s photo-collages is derived from the everyday experience of children’s mobility environments; the content of the local newspaper relates to issues, associated with children’s mobility, that are deemed relevant to the public domain; and statements from the interviewees relate to the institutional contexts that planning professionals are situated within. The technique for analysis was also based on thematic analysis. Thematic analysis allows inferences to be made from codes, and provides a way linking the data and the theoretical framework in which the data is interpreted (Boyatzis 1998). Themes are the outcomes of the categorization and analysis of codes (Saldana 2013). Themes bring meaning to commonly occurring or associated codes. Through using a combination of the content and thematic analytic techniques each of the texts (images; articles; and statements) provided insights into different socio-ecological scales relevant to this thesis (individual/ household/ neighbourhood/ policy).

The analytic procedure for each of the three sources of data was the identical. Each data set was entered into *Hyperresearch Version 3.5.2.*, allowing each image within

the collages, and the text from the interviews and newspaper articles, to be assigned codes or multiple codes, and for the codes and coded data to be extracted and analysed. Each of the methods were analysed using a similar procedure. A coding framework was developed from the literature and theoretical review in Chapters 2 and 3. The framework was based on a series of four questions that were asked of each unit of data. The questions allowed codes to emerge from the data and then related back to the research and theoretical literature. The coding framework, including guiding questions and their relationship to the literature, is outlined in **Table 4-6**.

Table 4-6: Coding framework for photo-collage, newspaper analysis, interviews

Method	Code	Guiding question	Relationship with research and theoretical literature
Photo-collage	Place/ Setting	What is the setting?	Activity Setting (household and neighbourhood domain).
	Object/ Agent	What objects or agents are framed within the photograph?	Relationship between agents/objects within the activity setting (household and neighbourhood domain).
	Activity	What activities are being conducted or referred to by the image or text?	Affordances (household and neighbourhood domain).
	Thought/ Feeling	What thoughts or feelings are being expressed in the text?	Affordances (household and neighbourhood domain).
Newspaper Analysis	Place/ setting	What setting is being referred to?	Activity setting (neighbourhood domain)
	Actors/ agents	What actors or agents are identified in the article?	Relationship between agents/actors within the activity setting (neighbourhood)
	Problem Framing	How is the problem being framed?	Problem framing; institutional design; and children's wellbeing (policy domain)
	Intervention	What intervention is being suggested?	Institutional design (Policy domain)

Interviews	Place/ setting	What setting is being referred to?	Activity setting (a perspective from the policy domain).
	Actors/ Agents	What actors/ agents are being referred to?	Relationship between actors/ agents in relation to the activity setting (policy domain).
	Problem Framing	How is the problem being framed?	Problem framing; institutional design; and wellbeing (policy domain)
	Audit tools/ Intervention	What audit tools or interventions are being proposed?	Audit tools; institutional design (policy domain).

After the initial coding process, the process was repeated. During this second process, although no new codes emerged, some established codes were assigned to data that was missed during the initial coding process. Coding is a qualitative and reflective process, and an iterative process enables codes to be refined (Saldana 2013). The full sets of codes that were associated with the images, articles and interviewee statements can be found in Appendix C-4 and C-5.

Following the coding process, a frequency analysis of each of the codes was conducted. The purpose of this was to identify values that were repeatedly identified, and therefore highlighting potentially significant themes in the data. Following the frequency analysis, secondary codes that were frequently associated with the primary code were then identified. The purpose of this stage was to begin to draw out the themes within the data, and identify themes that could be linked back to the theoretical framework informing the research design. The frequency analysis and relationship between primary themes and sub-themes codes is illustrated throughout the reporting of findings in a diagram, as illustrated in **Figure 4-8**.

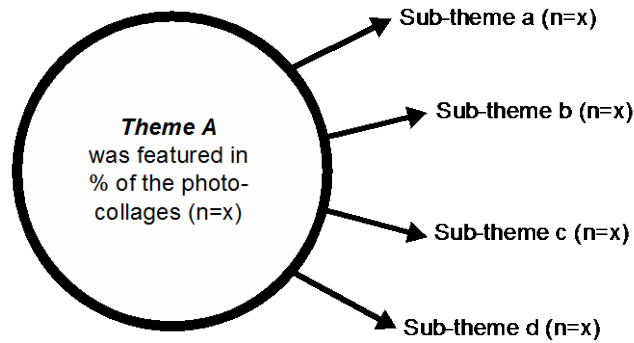


Figure 4-8: Example of the content and thematic analysis diagram

The full details of the content and thematic analysis of photo-collages, newspaper articles and interviews are provided in Appendix C-4 and C-5.

4.8 Ethics

Research with children has a range of potential ethical issues that require consideration during the research design phase (Morrow and Richards 1996). Furthermore, conducting research with children also requires the approval of a range of institutional bodies. **Table 4-7** illustrates the strategies and measures used to address ethical issues at various stages in the research process. All material relating to the ethical processes undergone in this research are contained in Appendix A-2 to A-12.

Table 4-7: Strategies to address ethical issues

Issue	Addressed by....
State regulations	Research conducted within schools in Western Australia requires approval from the Department of Education. Approval was received in November 2011 to conduct the research. The Western Australian government also requires that all employees engaged in child-related work to have a Working with Children Check (WCC). The WCC is a national search of criminal records of children-related crimes. The researcher applied and received a Working with Children Card prior to contacting the primary school.
School consent	The principal of the case study school was initially contacted by email and invited to participate in the research. After an expression of interest was received from the principal, a letter of introduction, details of the research project, and consent form were sent. A face-to-face meeting was arranged with the principal in order to discuss the project in

person, and address any questions. At the meeting the principal gave consent to participating in the research, and signed the consent form. A second meeting was arranged with the teaching staff in order to meet them, brief them on the research, and organise the logistics of the data collection process.

The school provided a class list from the three classes of children within the target age range – 9 to 12 years old. A package was prepared for each of the children, containing an information sheet explaining the details of the research project, a consent form for parents, and a consent form for the children. An information session was organised after school one day, in order to be available to parents to address queries.

As the data collection process was conducted during class time, good communication with the teaching staff was critical in order to achieve a good quality dataset. During the data collection process, the researcher liaised with a single teacher who co-ordinated the classes around our schedule. Survey return boxes were used in order to minimise disruption to class time. Following the data-collection process, the school principal and teaching staff involved were contacted and thanked for their participation in the research.

Parent’s and children’s consent

All parents and children from the three classes were provided a package. In the package there was information on the research project and separate consent forms for the parents and children. In both consent forms the parents and children were:

- Invited to participate in the research.
- Explained what was expected of them in the data collection process.
- Explained that they could change their mind and choose not to participate at any time in the research process.
- Explained what would happen to the data collected. They were informed that any reporting of the data in research publications would be anonymous.

Only children who gave consent and whose parents gave consent to participate in the research were included in the sample.

Interviews with practitioners

Interviewees were contacted by email, informed of the research project, and invited to participate. After receiving an expression of interest from the potential interviewees, an information letter and consent form were sent. The consent

form covered the same four points as those contained within the parents' and children's consent form. In addition, interviewees were asked if they gave consent for the interview to be recorded. Seven out of the eight interviewees consented to having the interview recorded. One refused, and detailed notes were taken as an alternative. All interviewees were provided with a full transcript of the interview, and only when the interviewee confirmed that they were happy with the transcript were they included in the sample.

Images of children in the photo-collages

A number of potential ethical issues arose in regard to the photo-collage exercise. The children were told they could take photographs of their friends and other children. Capturing images of social activities and places in the neighbourhood was important to the objectives of the research. In order to confirm to the research project's ethical commitments, children were de-identified in the reporting of the photo-collage material. In this thesis, each child was given an alias and their photographs were pixelated in order to protect their and other children's anonymity. Two researchers also vetted the full data set of photographs immediately after processing, to ensure no photographs of illegal material were included.

4.9 Limitations

There are a number of limitations of the research design that are important to note.

1. The research employed a single case study. As discussed above, single case studies are often criticised for a perceived inherent bias and an inability to generalise from findings. This limitation has been noted and addressed in section 4.41 above.
2. The analysis of surveys was descriptive and did not establish measures of association. The choice to use descriptive analysis, such as frequency counts and cross-tabulations, was based on the intent of gathering a broad picture of children's mobility within their local neighbourhood, and on comparing the results based on the average of preferences across the group. This aggregation of preferences and satisfactions was integral to understanding how differing concepts of wellbeing can be interpreted.
3. Although the case study context was Western Australia, the interviewees were selected from two other states in Australia. The decision to include a

sample from outside the case study area was made due to the limited availability of expertise in built environment auditing in Western Australia urban and transport planning practice. Although interviewees were drawn from a range of organisational contexts, the interpretation of data reflected this and organisational differences where highlighted where apparent.

4. The routes that were selected to be audited were not necessarily the routes that the children walked or cycled to school. The route sampling strategy was designed in order to address this limitation. Through selecting clusters of participating households and identifying the shortest route to the school, the sample of routes were selected based on the assumption that the children will chose the shortest path to school. Furthermore, the children and audit routes were aggregated for analysis; meaning that there was no link made between individual children and individual routes.

4.10 Conclusion

This chapter has outlined the theoretical framework underpinning the research design; the methodology and research design; methods and analytic techniques; and ethical issues that were addressed in the research process. A socio-ecological theory was explained as the theoretical framework that guided the selection of overall research approach and empirical methods. Socio-ecological models consider that individuals are nested within a variety of socio-spatial ecological systems that shape mobility patterns. Various socio-ecological models have already been discussed in the literature review, including Mitra's (2012) behavioural model of school transportation and Alfonzo's (2005) hierarchy of walking needs. Three socio-ecological concepts were then highlighted. The first was Bronfenbrenner's socio-ecological theory that highlighted a number of systems that operate at differing scales. These were micro-systems (the series of relationships in immediate settings); meso-systems (the collection of micro-systems that constitute everyday activity and mobility); exo-systems (other micro-systems that the individual is not involved in yet are nonetheless influential); and macro-systems (broader socio-economic scale systems and processes). The second concept was the activity setting, which was linked to micro-systems and also contained indications of relationships that occurred at other scales. The final concept was affordances. Affordances integrate an individuals' perception, behaviour and the qualities of the physical environment.

Affordances may be actualised, perceived, or constrained. These three socio-ecological concepts facilitate the analysis of empirical data of the thesis and enable links between children's active mobility, their wellbeing, and the evaluation of the built environment using audits.

The methodology and research design were then outlined. It was reported that a single case study, using a multiple method, two-strand research design was used to address the thesis research objectives. The primary school selected as the case study for this research was introduced. Five research methods were then described:

- surveys of children and their parents
- a photo-collage method
- a content and thematic analysis of local newspapers
- interviews with planning professionals
- a walkability audit

Each method was selected in order to investigate the relationships at varying scales according to a socio-ecological model – individual, household, neighbourhood, and policy. The techniques of analysis were then described, and the strategies and measures to ameliorate ethical issues were outlined.

The next two chapters report on the findings from the empirical research. Chapter 5 focuses on the individual, household and neighbourhood scale factors relevant to children's active mobility. The chapter draws on the children's and parents' survey findings, and the children's photo-collages in order to explore children's travel behaviour, parents' and children's attitudes and perceptions of the neighbourhood, activity settings that are important to children's active mobility, and the affordances associated with children's mobility and wellbeing. Chapter 6 draws on the interviews with practitioners, content and thematic analysis of the newspaper articles, and the walkability audit, in order to explore the policy and neighbourhood scale factors associated with children's wellbeing and active mobility in the case study.

5. Individual, household and neighbourhood factors related to children's active mobility and wellbeing: the case study findings

5.1 Introduction

The review of the literature regarding children's active mobility and their wellbeing in Chapter 2 highlighted a number of domains that were important to shaping children's mobility – the individual, household, and neighbourhood. This chapter draws upon three sources of data to explore these domains in the case study: the children's survey; the parents' survey; and the photo-collage method. This chapter is divided into two sections. The first section focuses on the relationship between the individual and household characteristics of the children in the case study. The second explores the children's and parents' attitudes towards and perceptions of the neighbourhood. The findings highlight the children's and parents' travel behaviour, attitudes towards aspects of children's active mobility, and perception of the quality of experiences afforded by the neighbourhood area, places and walking and cycling routes. The findings provide insight into the quality of children's wellbeing relating to their mobility environments.

5.2 Household context and parents' and children's individual travel behaviour

5.2.1 Introduction

In Chapter 2 the influence of household factors on children's mobility was discussed. Mitra's (2012) model of children's active and independent mobility identified household characteristics and activities as representing a significant influence on children's mobility. This section presents the findings from the surveys related to the household domain, including the broad socio-economic characteristics of the neighbourhood area, the location of households, and parents' mode of travel to work. It then explores the subject of children's independent mobility by establishing the licences children have to travel independently, and also the parents' and children's attitudes towards independent mobility. Finally, the characteristics of children's travel to a number of destinations, including school, local shops and parks, are explored in

detail. An understanding of the household's characteristics and travel activity provides a useful first step in developing a socio-ecological perspective of the case study.

5.2.2 Household characteristics and parents' travel to work

In order to understand the characteristics of children's active mobility and how these were linked to children's wellbeing, an indication of the broader socio-economic context of the urban area and household travel patterns was necessary. The Local Government area where the school was located was higher than the average for the Perth metropolitan area for a number of key socio-economic indicators. Australian Bureau of Statistics data (ABS 2012) reports that the median weekly household income was \$1,619 for the Melville Local Government area compared to \$1,459 for the Perth metropolitan area; monthly mortgage payments were \$2,167 compared to \$2,000 (metropolitan area); and median weekly rent was \$350, compared to \$320 (metropolitan area). Home ownership was the predominant form of housing tenure, with 77.1% (n=38) owning or having a mortgage on their home (compared to 69.1% in the Perth metropolitan area (ABS 2012)). The remaining (22.9%, n=11) rented their house (compared to 27.6% in the Perth metropolitan area (ABS 2012)). Parents were also asked how long they had lived in the neighbourhood. Only 12% (n=6) responded that they had lived in the neighbourhood for less than a year, whilst 20% (n=10) had lived in the neighbourhood for between 1 and 5 years. 64.7% (n=32) indicated that they had lived in the neighbourhood for more than 5 years.

These factors are important because children's active mobility, particularly the walk to school, is often influenced by the characteristics of their parents' travel to work, even when children reside within walking distance to school (Merom et al 2006). Some studies have found an association between higher rates of car ownership and lower rates of children's active travel to school (Ponte et al 2009). A comparison between the car ownership rates and travel to work modes of the case study households, the local government area, and the metropolitan area support other researchers' suggestions that Perth is a car-dependent city (Curtis 2005; Falconer et al 2010). More than half of the households (60.4%, n=31) had two cars, with some households having one car (20.8%, n=11) and a smaller amount with three cars (14.6%, n=7). The average number of cars within the case study households was

2.02. **Table 5-1** indicates that car ownership rates in the case study households differ from the Local Government and metropolitan context, with the range of households with two and three cars being within a range of 30% to 40%.

Table 5-1: Car ownership rates in metropolitan area, local government area, and case study sample (n=48) (Source: ABS and CATCH parents' survey).

Number of registered motor vehicles	Greater Perth (n)	%	City of Melville (n)	%	Case study sample (n)	%
None	38,591	6.2	1,976	5.6	0	0
1 motor vehicle	208,154	33.2	11,455	32.2	10	20.8
2 motor vehicles	242,997	38.7	14,333	40.3	29	60.4
3 or more vehicles	120,809	19.3	7,055	19.8	9	18.8

The dominance of the car in shaping household mobility patterns is further reflected in travel to work data. **Table 5-2** illustrates the travel to work data for the local government and metropolitan areas, and compares these to the parents' travel to work survey responses.

Table 5-2: Travel to work data for metropolitan area, local government area, and case study sample (n=49). (Source: ABS and CATCH parents' survey).

Travel to work, top responses	City of Melville (n)	%	Greater Perth (n)	%	Case study: Responding parent (n)	%
<i>Employed people aged 15 years and over</i>						
Bicycle	676	1.4%	9,312	1.1%	2	5%
Walked only	841	1.7%	19,907	2.3%	0	0%
People who travelled to work by bus or train	5,494	11.4%	90,938	10.6%	2	5%
People who travelled to work by car as driver or passenger	32,100	66.4%	575,432	67.1%	42	85%
Other	9262	19.1%	162042	18.9%	2	5%
TOTAL	48,373	100	857,631	100	48	100%

Travelling by car, either as a driver or a passenger, was the most frequent mode of travel to work. 85% (n=42) of parents from the participating case study households responded that they travelled to work by car, compared to 66.4% of the population over 15 years of age in the metropolitan area, and 67.1% of the population in the local government area. Few parents reported that they cycled or caught public transport, and none reported they walked to work. However, the local government area had slightly lower rates of travel by car and walking, and slightly higher rates for public transport travel and cycling, compared to the Perth metropolitan area. The parents were also asked to report on the average time of the trip to work and their responses are illustrated in **Figure 5-1**.

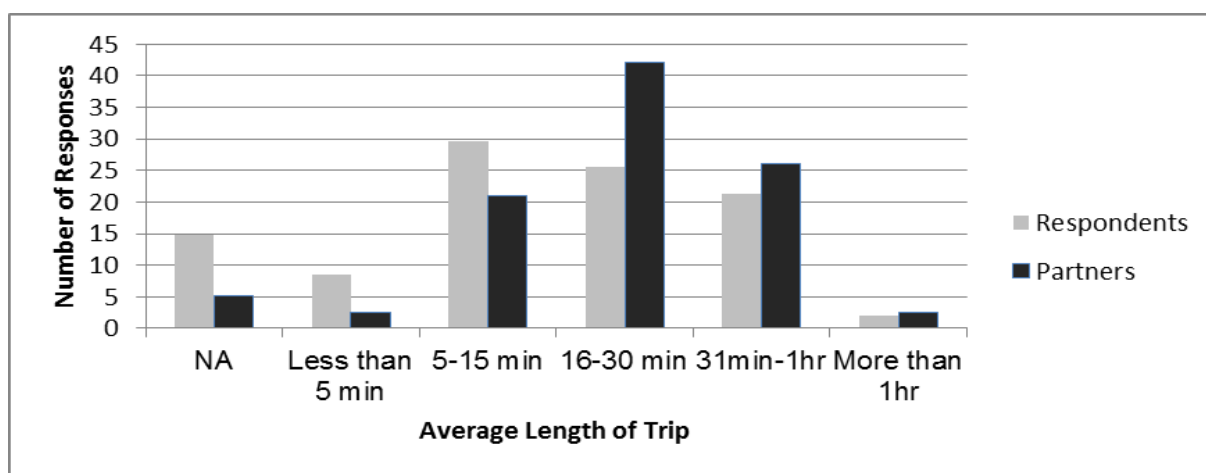


Figure 5-1: Average Length of Trip- Respondents (n=47) and Partners (n=38)

The majority of trips taken by the respondents (76.5%) and their partners (89%) were on average longer than 5 minutes. Few work trips took less than five minutes suggesting that the majority of work related trips of respondents and their parents occurred outside the local neighbourhood area.

5.2.3 Children's independent mobility

A key issue for the characteristics of children's mobility is the licences granted by parents for children to be independently mobile. As outlined in Chapter 2, being actively mobile has the potential to afford children wellbeing by affording the opportunities to develop independence, a deeper engagement with their local environment, and the development of civic skills. In order to understand the issue of children's independent mobility in the case study, a number of methodological strategies were employed. Firstly, the surveys contained questions that elicited an

understanding of parents' general attitudes to their own and other children's independent mobility. Following this, an approach based on the work of Hillman et al (1990) was used to establish the licences parents grant to children to be independently mobile. This approach used two measures of independent mobility: the ability to get around on foot, and the ability to get around independently by mechanised transport, either by bicycle or public transport. Finally, data from the surveys provided insight into children's attitudes towards and their preferences in regard to their independent mobility.

5.2.3.1 Parents' attitudes to independent mobility

The parents' survey contained questions regarding their attitudes to children's independent mobility. Firstly, parents were asked whether they thought their own child was able to walk or cycle in the neighbourhood without an adult.

Table 5-3 Parents' attitude to their own children's independent mobility (n=49)

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
I am confident that my child has the ability to walk or cycle in the neighbourhood without an adult	8.1%	14.2%	4%	48.9%	24.5%
I think it is important that my child develops skills to travel alone	2%	8.2%	4.1%	46.9%	38.8%

The results in **Table 5-3** show that 73.4% (n=36) of the parents agreed or strongly agreed that their children had the competence to walk or cycle independently around their neighbourhood without an adult. The majority of parents (85.7%, n=42) agreed or strongly agreed that they thought it important that their children develop skills to travel alone. The responses indicate that the respondents valued their own children's ability to be, or become, independently mobile. Parents were then asked two questions related to their perception of other children's independent mobility and how other parents might perceive their own children's independent mobility (**Table 5-4**). The intent of these questions was to gain an indication of the norms and expectations of parents in regard to children's independent mobility in general.

Table 5-4: Parent's attitudes to their own and other children's independent mobility (n=49)

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
It is irresponsible for parent to allow their children to walk or cycle in our neighbourhood without an adult	20.4%	42.9%	34.7%	0	2%
I think other parents would be concerned if I allowed my child to walk and cycle by themselves in my child's neighbourhood	10.2%	46.9%	30.6%	10.2%	2%

Most parents (63.3%, n=31) responded that they did not think it was irresponsible for other children to be independently mobile. Similarly, the majority of parents (57.1%, n=28) didn't think other parents would be concerned if they let their children walk or cycle unaccompanied by an adult. However, there was a significant number responded that they were neutral towards the statements (34.7%, n=17 and 30.6%, n=15). The responses suggest that, although the majority of the parents were generally supportive of the value of their own and other children's independent mobility, there was a degree of uncertainty or ambiguity regarding children's independent mobility held by many of the parents.

5.2.3.2 Children's licences to travel independently

Drawing on the seminal work of Hillman et al (1990) parents were asked a series of questions regarding the licences they grant to their children to be independently mobile. Roughly two thirds of the parents allowed their children to travel to school (69%, n=34) and from school (65%, n=32) without an adult present (**Table 5-5**), whilst 47% (23%) of parents allowed their children to cross main roads without adults present.⁹ Only a fifth of respondents allowed their children to cycle on main roads without an adult present. Only one of the parents allowed their child to catch public transport without adults. According to Hillman et al's (1990) research into children's

⁹ From the parents' response to Children's Licence a dichotomous variable (independently mobile/ not independently mobile) was established drawing on responses to the first three licences illustrated in Table 5-5 travel TO school; travel FROM school; and licence to cross main roads. A child whose parent responded 'yes' to each of these question was deemed independently mobile, and a child whose parent who answered 'no' to any of these questions was deemed not to be independently mobile. 44% of the children (n=49) were independently mobile and 56% were not. This variable will be used in cross-tabulation analysis below.

licences to travel, more children had a licence to get around on foot than had a licence to get around by mechanized transport (public transport or bike), and this finding is also reflected in the Perth case- albeit some twenty years later.

Table 5-5: Children Licences to Travel- Parents' Responses (n=49)

	Yes	No
Is your child allowed to travel TO school without an adult present?	69%	31%
Is your child allowed to travel FROM school without an adult present?	65%	35%
Is your child allowed to cross main roads without an adult present?	47%	53%
Is your child allowed to cycle on main roads without an adult?	20%	80%
Is your child allowed to travel on buses, trams, trains, or other public transport without an adult present (other than a school bus)?	2%	98%

As reported in the findings in the previous section, almost three quarters (73.5%, n=36) of parents considered their children to be capable of travelling independently. Although this percentage was slightly higher than the percentage of parents reporting as granting their child the licences to travel by walking, it was far higher than the responses to whether parents granted licences to get around by bicycle or public transport. This suggests that even if parents consider their children capable of independent mobility, there appears to be different expectation of the range of skills children require to cycle or catch public transport rather than walk.

An indication of the distance that parents allow their children to travel independently also provided insight into the quality of children's independent mobility. Parents were asked how far their children were allowed to travel from their homes, both on their own, and also with friends and siblings (**Figure 5-2**).

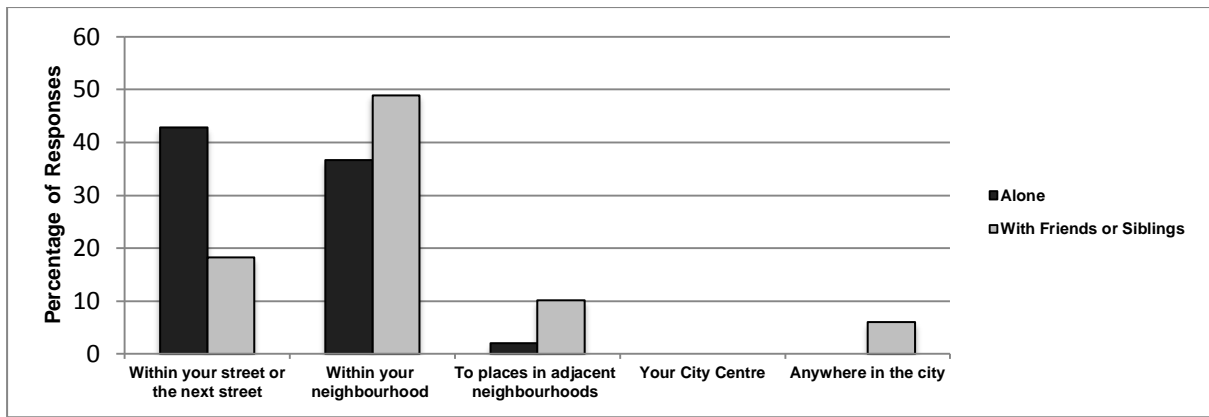


Figure 5-2: Children’s Range of Independent Travel Reported by Parents (n=41)

The majority of children were restricted to travelling alone within their immediate streets (42.8%, n=21), or within one kilometre of their home (36.7%, n=18). Independent travel, without any accompaniment was not allowed outside the neighbourhood area. Children’s range of independent travel appeared to increase marginally when children travelled with their friends or their siblings. 48.9% (n=24) of parents responded that they allowed their children to be independently mobile within the neighbourhood, and a small number reported that their children’s range of travel extended to the adjacent neighbourhood (10.2%, n=5) and anywhere in the city (6%, n=3) when they were accompanied by friends or siblings. These responses suggest that parents may have been more flexible with the licences they grant to children to travel when children travelled in groups, possibly due to the perception of ‘safety in numbers’.

The influence of age and gender was investigated. **Figure 5-3** shows the independent mobility of the children in relation to their age, and **Figure 5-4** illustrates independent mobility in relation to gender.

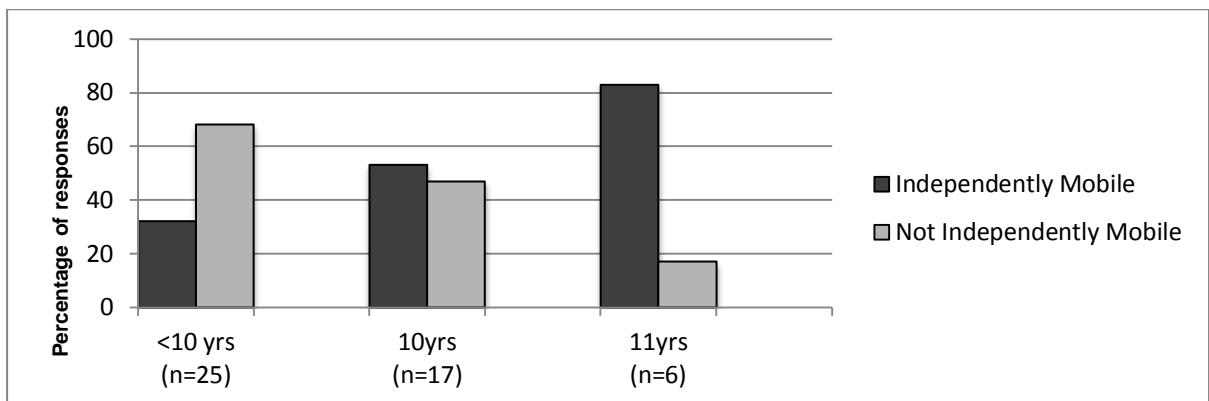


Figure 5-3: Independently mobile children by age group (n=48)

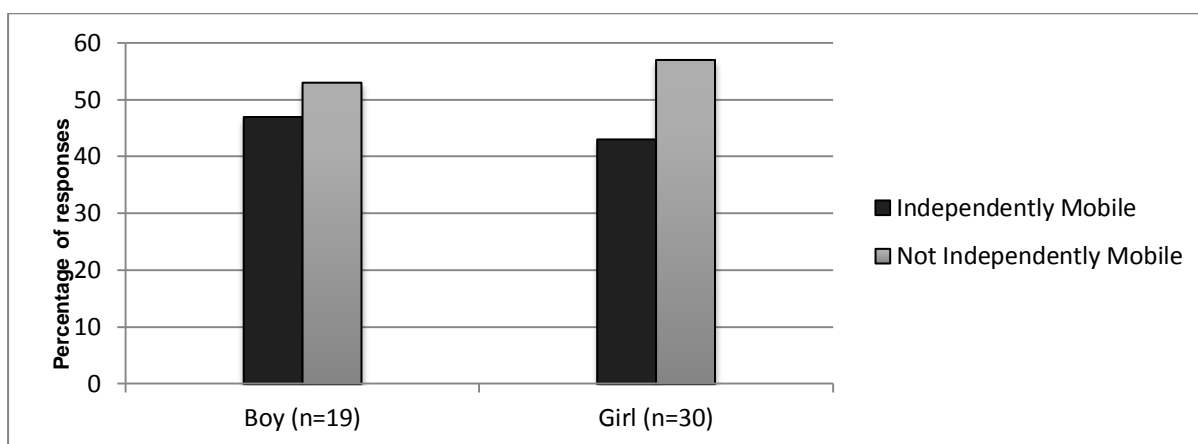


Figure 5-4: Independently mobile children by gender (n=49)

Despite the small sample of children, especially within the eleven to twelve year old age brackets, the findings support the research literature that suggests children aged ten to eleven seems the transition year (when the majority of children become IM) at least in the U.K. Brown et al (2008) reported in a UK study that there was a marked increase in a number of children's licences to be independently mobile when they reached 11 years of age, yet these licences were stricter for girls, particularly with regard to cycling. However it is important to view this finding to relation to historical precedent. Historically, the transition age for children's independent mobility was likely to be much younger. In the UK studies (Hillman 1970; Hillman et al 1990; O'Brien et al 1998) have shown there has been a decline in the percentage of ten and eleven year olds walking to school independently from a reported 94% in 1970, 54% in 1990 and 47% in 1998.

There is also a variation in the transition year across different type of children's mobility. The age where independence is granted seems to be different for various licences (school, crossing roads, cycling) and many children in contemporary developed cities may be independently mobile at a younger age than ten. For example, Brown et al (2008) in the UK noted that 60% of boys and 44% of girls aged eight to ten were allowed to go out on their own. The surveys also provided additional insight into a range of children's licences to travel independently, including the licence to ride a bike independent of adults. 88.2% (n=45) of children responded that they currently owned a bike, corresponding with a similar study of the national Australian context suggesting that bike ownership amongst children is generally very

high in Australia (Tandy 1999). However, the bike ownership rates do not reflect the amount of freedom children have to cycle independently in the neighbourhood in the case study. The children were asked whether they were allowed on the streets by themselves on a bicycle and their responses are illustrated in **Figure 5-5**.

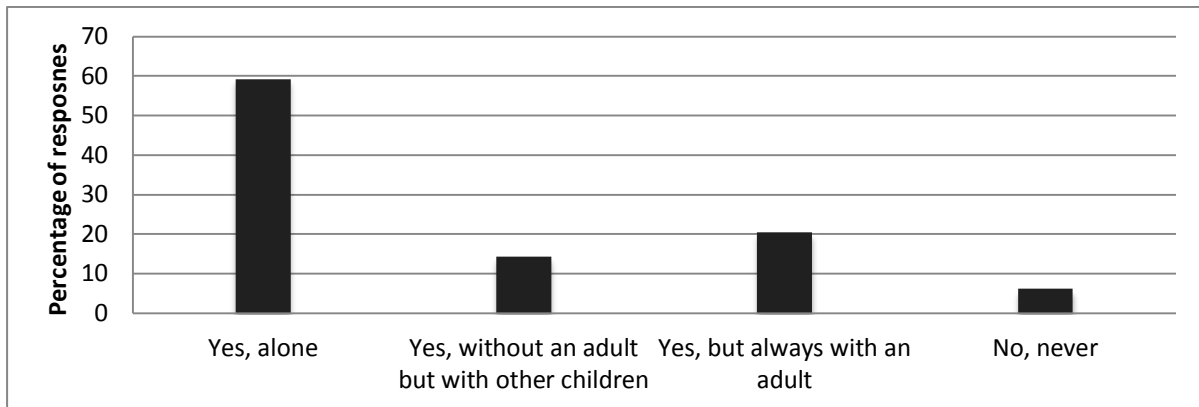


Figure 5-5: Children's licence to be independently mobile by bicycle- self-reported (n=51)

The majority of children (59.2%, n=30) considered that they were allowed on the streets with a bicycle by themselves, with 14.3% (n=7) responding that they were allowed without an adult but with other children. According to the children's response to the question, 26.5% (n=14) were not independently mobile, according to Hillman et al's definition; with 20.4% (n=11) requiring an adult to be present and 6.1% (n=3) reported that they were never allowed on the streets on a bicycle. The surveys indicated that whereas 80% (n=39) of parents responded that their children were not allowed to travel by bicycle on main roads, 73.5% (n=37) of children responded that they were permitted to travel on streets without adult accompaniment. Parents therefore may have restricted their child's travel to local streets rather than main roads, suggesting that there were different places in the neighbourhood that were governed by different sets of licences to be independently mobile.

5.2.3.3 Children's attitudes towards their independent mobility

Children's attitudes toward their level of freedom to go outside provided an indication of the normative views the children held regarding their independent mobility. The surveys revealed that parents gave their children licences with varying degrees of independence to walk, and little independence to cycle or catch public transport. Children were also asked in the surveys how often they played outdoors in their neighbourhood. A similar percentage of children responded that they played one to

two days (37%, n=19), three to four days (28%, n=14) and five or more days (31%, n=16). Only 4% (n=2) of the children responded that they never played outdoors in their neighbourhood. Of the 96% (n=49) of children who responded that they did play outside, 22% (n=11) reported that they played alone, and 66% (n=34) played without an adult but with other children. 12% (n=6) reported that they always played with an adult present. The amount of time the children in the case study school spent playing outside was more than other reported findings in the research literature (Veitch et al 2010). Playing appeared to be associated with the opportunity for independent activity in the neighbourhood for many of the children.

As wellbeing can be understood as a satisfaction of preferences, the children were asked whether they wished they had more freedom to go outside; that is, whether they were satisfied with their current level of independence. **Table 5-6** shows that the responses were almost evenly split between the children, with 47% (n=23) responding 'no' and 53% (n=26) 'yes'.

Table 5-6: Children's independent mobility and their freedom to go outside (n=49)

	Do you want more freedom to go outside? (%)		Total
	Yes	No	
Independently Mobile	59%	41%	100% (n=49)
Not Independently Mobile	49%	51%	
Total	53%	47%	

However, the responses also revealed that more of the independently mobile children wanted more freedom to go outside than those who were not independently mobile. This suggests that children's independent mobility is somehow associated with experience rather than their preferences of whether or not to have more freedom to go outside. The children who experienced independent mobility wanted more of what independent mobility afforded them. Alternatively, children may have been satisfied with their level of independence, and therefore attained a sense of wellbeing because their preferences were being satisfied.

Children were asked a further series of questions based on their initial response to the question of whether they wanted more freedom to go outside. The children who

answered 'yes' were asked what they would like to do and why they would like to do this. 59% (n=16) children referred to walking; 41% (n=11) indicated they would go to a park or their friend's place; and 25% (n=7) referred to riding a bike. The most predominant reasons given for wanting more freedom to go outside were to socialise with friends and have fun (77%, n=21); to just get out of the house (18%, n=5); to 'feel grown up' (18%, n=5); and to be active (11%, n=3). The children who wanted more freedom to go outside wanted to do it for reasons that relate to the wellbeing framework in Chapter 2: they wanted access to places, they wanted to be active and social, and they wanted to be independent.

The children who responded that they did not want more freedom were also asked to clarify why they had responded in that way. Most responses (80%, n=16) indicated that the children thought that they currently had enough freedom to play outside. A number of reasons were reported only once in the statements, including "I don't like strangers"; "I don't like going outside"; "I prefer to play Xbox"; "I get enough exercise"; and "I have a large backyard". That more children who were not independently mobile reported that they didn't need more freedom to go outside suggests that many children were satisfied with their degree of mobility, even if it was restricted. From a perspective of wellbeing based on the satisfaction of preferences, these children can be seen as achieving a degree of wellbeing comparable to the children who were more independently mobile.

5.2.4 The school journey

5.2.4.1 Children's reported travel mode to school

As explained in Chapter 2, the trip to school is an important routine travel activity for a child. It has the capacity to increase wellbeing, through enabling routine physical activity and therefore better health and in developing their independent mobility. Children were asked in the survey how they usually travelled to school and the children's responses are illustrated in **Figure 5-6**.

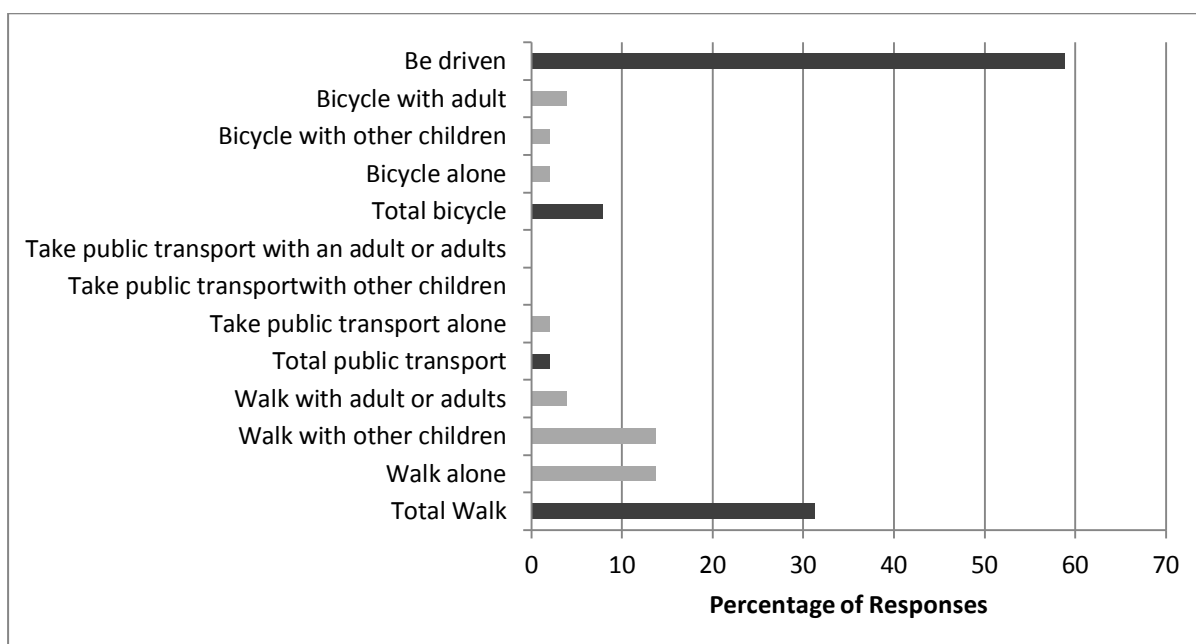


Figure 5-6: Children's self-reported usual travel mode to school (n=51)

58.8% (n=30) of the children reported that they were usually driven to school. 13.7% (n=7) walked alone and the same percentage walked with other children. 3.9% (n=2) walked with an adult or adults. 7.9% (n=4) of children cycled, either with an adult, with other children, or alone. The findings therefore revealed that 39.2% (n=20) of children reported they usually travelled to school by an active mode of transport and that 33.4% (n=17) reported usually travelling to school independent of adults. The rates indicating the children who usually walked and those who were usually driven to school are comparable to similar studies in the Australian context (Merom et al 2006; Wen et al 2008).

The question of how children usually travelled to school was used to establish an additional dichotomous variable for further analysis. Children who usually walked or cycled, either alone or with others, were identified as active travellers. The children who were usually driven or caught public transport, even if the public transport trip included some walking, were considered non-active travellers. This definition has been previously used in studies on children's active travel to school (Cooper et al 2003; Hinckson et al 2011). **Table 5-7** compares children who usually engaged in active travel to school with those who were driven, according to gender and age. Age has particularly been found to be an influence on children's active travel to school;

older children were more likely to be active travellers than younger children (Mitchell et al 2007).

Table 5-7: Children's reported usual travel mode to school (n=51)

		Active Travel to School		Non-active travel to school		Total
Gender	Boy	n= 8	42%	n=11	58%	n=19
	Girl	n=12	37.5%	n=20	62.5%	n=32
Total		n=20	39%	n=32	61%	n=51
Age	< 10 years	n=10	37%	n=17	63%	n=27
	10 years	n=9	52%	n=8	48%	n=17
	11 years	n=1	16%	n=5	84%	n=6
	12 years	na	na	na	na	n=1
	Total	n=20	39%	n=31	61%	n=51

The table indicates that active travel generally increases with age; however, when compared to the younger children, a higher percentage of children of 11 years of age were not usually active travellers; this may be a product of too few cases in this sample. In this study a slightly lower percentage of girls were active travellers to school compared to boys. **Table 5-8** illustrates a comparison between the children's usual mode of travel to school, with their degree of independent mobility.

Table 5-8: Comparison of usually mode of travel to school with degree of independent mobility

		Independently Mobile	Not Independently Mobile
How do you usually travel to school	Active travel, independent of adults	18% (n=9)	12% (n=6)
	Active travel with adults	2% (n=1)	6% (n=3)
	Driven or public transport	24% (n=12)	37% (n=18)

A higher percentage of the children who were not independently mobile were usually driven. On the other hand, 24% (n=120) children who were independently mobile were usually driven, reflecting Kytta's (2004) theory that children, despite being

permitted by parent’s licences to travel, may not actualise independent trips. However, it is also interesting to note that 12% (n=6) of the children were defined as not independently mobile (that is, did not have the licence to travel to and from school, and could not cross roads without adult accompaniment), yet still reported that they usually walked or cycled to school independent of adults. This suggests that the concept of licence to travel independently may not reflect the reality of independent mobility in contemporary urban environments.

5.2.4.2 Distance to school

The distance children have to travel is a key factor in whether children walk or cycle to school. In the surveys, the children and parents were asked to provide their street address. These addresses were geo-coded in ArcMAP 10.0, a GIS software package, allowing street network distances to be calculated for each of the children. The geo-coded households enabled a comparison between children who usually walked or cycled to school, and those who did not, in relation to the distance of their household to school. **Table 5-9** illustrates this comparison.

Table 5-9: Distance of households from school/ comparison between active travel to school and non-active travel to school (n=51).

	Street network distance between household and school						Total
	<400m	<800m	<1200m	<1600m	<2000m	>2000m	
Active travel to school	4 (100%)	5 (50%)	6 (47%)	3 (30%)	1 (20%)	1 (12%)	20 (39%)
Non-active travel to school	0	5 (50%)	7 (53%)	7 (70%)	4 (80%)	8 (88%)	31 (61%)
Total	4 (100%)	10 (100%)	13 (100%)	10 (100%)	5 (100%)	9 (100%)	51 (100%)

The table shows that over four fifths of the children lived within two kilometres walking or cycling distance from the school. A comparison of the number of children who usually walked or cycled to school, with that of those who were usually driven, revealed that as the distance from households to school increased, the percentage of children who were usually driven to school increased. The finding reflects existing research, indicating the distance of households to schools was correlated with higher rates of non-active travel to school (Bringolf-Isler 2008; Merom 2006; Yarlaga and Srinivasan 2008). This is not surprising, as distances need to be feasible for

children to walk or cycle to school. However, there are differing opinions regarding what a feasible distance is. In Western Australia, State Planning Policy defines a 400 metre distance as the basis for neighbourhood planning (WAPC 2007). The results in the table above illustrate that 400 metres is a modest representation of a walkable distance. Almost half of the children living between 800 metres and 1200 metres distance reported that they usually walked or cycled to school. There is the possibility therefore that a feasible distance for children to walk or cycle to school extends beyond the commonly accepted range of feasible walking distances as defined by policy, and planning to facilitate increased children’s active mobility needs to extend beyond the area immediate surrounding places such as schools.

5.2.4.3 Children’s preferred mode of travel to school

As children’s subjective wellbeing can be gauged by whether their preferences are satisfied, the children were asked how they would like to travel to school and these results are illustrated in **Figure 5-7**.

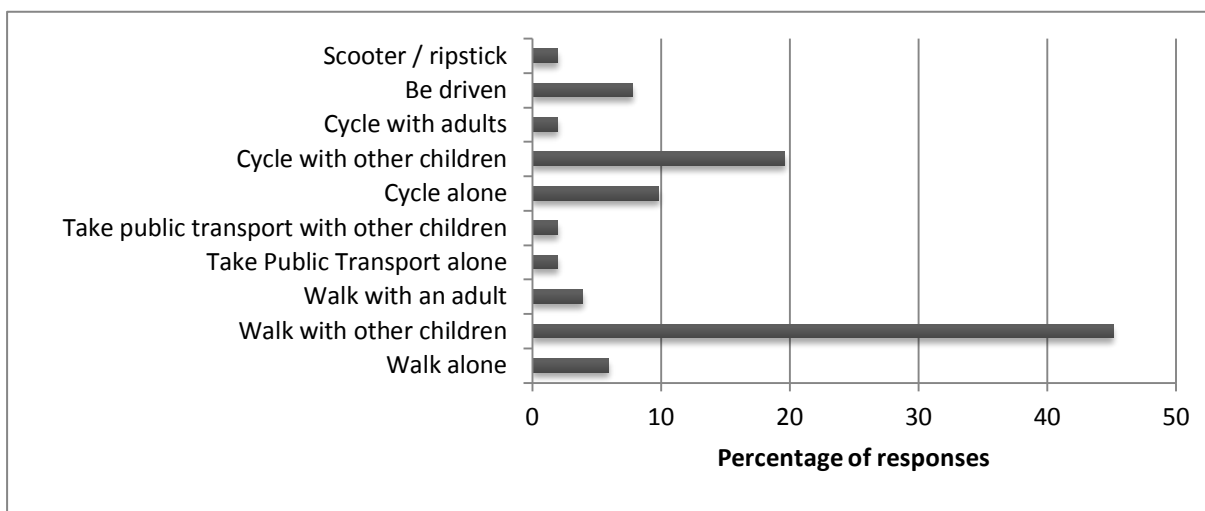


Figure 5-7: Children's preferred travel mode to school (n=51)

Car travel was the least reported preferred mode of travel by the children, yet it was the most frequent actual usual mode of travel to school. Walking to school with other children was identified as the preferred way of travelling to school for most of the children (45.1%, n=23), reflecting other findings that children identify the opportunity for social interaction during walking to school as one of the main reasons they prefer to walk to school (Wood et al 2010). Despite walking and cycling being the most preferred modes of travel (88.2%, n=45) of children reported that they would like to

travel to school by an active mode of transport, these rates were not actualised in the children's reported usual mode of travel to school. The overall difference between children's actual and preferred mode of travel to school was substantial and indicated that the children's preferences were not being satisfied in regard to travel to and from school.

To further explore the reasons why the children expressed preferences for certain modes of travel, they were asked why they would like to travel to school by their desired mode. The results are illustrated in **Table 5-10**.

Table 5-10: Reasons for children's preferred mode of travel (n=51)

Children's preferred mode of travel										
Reasons children provided for their preferred mode of travel	Scooter(%)	Be driven(%)	Cycle with adults(%)	Cycle with other children(%)	Cycle alone(%)	Public transport with children(%)	Public transport alone(%)	Walk with an adult(%)	Walk with other children (%)	Walk alone(%)
It's safer	-	2%	-	6%	-	-	-	-	6%	-
It's fun	2%	2%	2%	16%	6%	2%	-	2%	33%	2%
I feel more grown up	-	-	-	8%	2%	2%	2%	-	8%	-
It's quicker	-	4%	-	-	-	-	-	-	2%	-
I can avoid bullies	-	-	-	-	-	-	-	-	2%	-
I have a lot to carry	-	2%	-	2%	-	-	-	-	-	-
I can talk to friends along the way	-	-	-	20%	-	4%	4%	-	43%	2%
I can stop at places along the way	-	-	-	-	2%	-	-	-	6%	-
I live close to school	-	-	-	14%	2%	-	-	2%	20%	2%
I live a long way from school	-	2%	-	2%	4%	-	-	-	4%	-

Active modes were predominantly preferred because they afforded socialising, were seen to be fun, and were feasible for children who lived close to the school. The

most popular reasons given by children who identified walking or cycling to school with other children were that it was 'fun' and that they had the opportunity to 'talk to friends along the way'. More children prioritised the social aspects of active mobility than the more functional aspects of active mobility. This finding corresponds with research literature that found children consider the positive aspects of active travel to school as the opportunity to socialise and have 'fun' (Mitchell et al 2007). Children have highlighted the opportunity for social interaction from walking to school as one of the main reasons they prefer to walk to school (Wood et al 2010). The other reasons provided in the survey for their preferred mode of travel elicited fewer responses from the children. A small number of children identified that they would prefer to be driven there were a range of reasons chosen including that it was quicker, safer, fun, and that they had a lot to carry. For this minority car travel still held appeal.

5.2.5 Children's travel to places other than school

As explained in the literature, there are many other places within the neighbourhood area that have been identified as important for children's wellbeing and development, including recreation centres, libraries, skate parks, museums, and other places for extra-curricular activities (Freeman and Tranter 2011). Whereas the next section explores these places using the photo-collage data, this section explores the characteristics of children's travel to these places. The three survey questions regarding the school journey - their usual mode of travel; usual travel time; and desired modes of travel - were repeated for five other potential destinations. These were: local shops; to a friend's place in the neighbourhood; local parks; organised activities (such as sports club, church or recreational centre); and places outside the neighbourhood. **Table 5-11** shows a summary of the mode of travel for these places and the details for each place are explained in the sections below.

Table 5-11: Children's reported usual travel mode to activities (n=51)

Statements	Walk alone(%)	Walk with other children(%)	Walk with adult(%)	Public Transport alone(%)	Bicycle alone(%)	Bicycle with other children(%)	Bicycle with an adult(%)	Be driven(%)	Don't go here(%)
How do you usually travel to the local shops?	9.8	13.7	3.9	0	6	0	2	62.7	0
How do you usually travel to the local friend's house?	15.7	0	2	2	2	2	0	72.5	3.9
How do you usually travel to the local parks?	22.9	29.2	16.7	0	0	10.4	13.7	14.6	2.1
How do you usually travel to organised activities?	2	0	2	0	2	0	0	85.7	8.2

5.2.5.1 Local shops

The most common way the children usually travelled to local shops was by being driven (62.7%, n=32). The remaining children responded that they used active modes of travel, walking in particular, to travel to local shops. 19.6% (n=10) of children walked or cycled with other people, either children or adults, and 16% (n=8) responded that they either walked or cycled alone. Just under half of those driven to the shops (44%, n=14) reported that the trip took less than 5 minutes, and 50% (n=16) reported that the trip took 5-15 minutes. Most children who usually walked or cycled to their local shops (88%, n=16) responded that their trips usually took less than 15 minutes. The percentage of trips under five minutes (46%, n=23) for any mode of travel, suggests that local shops are potentially within feasible walking and cycling distances. As was seen with trips to school, walking with other children was by far the preferred mode of travel to local shops, with over 45% (n=23) responding they would like to travel this way. Overall, 96% (n=49) of children reported they would like to use active modes of travel to the local shops. There was therefore a greater discrepancy between the usual and preferred mode of travel to local shops than there was for travel to school.

5.2.5.2 Friends' homes in neighbourhood.

Being able to easily access friends' houses enables children to develop and maintain social networks within their local environment (Brown et al 2008). The survey showed that 72.5% (n=37) of the children reported that they were usually driven to their friend's houses in the local neighbourhood. 15.7% (n=8) reported that they walked only, and a small percentage responded that they cycled alone, or with other children, or walked with adults. When the children were asked about their preferred mode of travel to their friend's place the results differed from preferred modes of travel to other destinations. In this instance 30.6% (n=15) children stated that they would prefer to be driven, 24.5% (n=12) responded they would like to cycle alone, and 18.4% (n=9) would like to walk alone. The higher number of children who stated they preferred to be driven or to cycle rather than walk suggests that their friends' houses may not be feasible, or perceived to be feasible, to access by walking or cycling. As noted in the literature on neighbourhoods, there may be a discrepancy between the ideal of a neighbourhood, with social networks within close proximity to households, and the actual extent of social networks in contemporary urban environments. Being able to access friends' places independent of adults may require children to have a much more extensive range of mobility choices, such as cycling and access to public transport. However, of those who were driven, 38% (n=14) reported that the trip took less than 5 minutes, and just over half (51%, n=19) took between 5 and 15 minutes. Of those who walked, over 67% (n=6) took less than 5 minutes to travel to their friend's house. These results suggest that much of the children's potential travel to friend's houses could be undertaken by walking or cycling, yet was not.

5.2.5.3 Local parks

Parks afford children opportunities for play and physical activity. Access by walking was most apparent in children's trips to parks. When asked how they usually travelled to local parks only 14.6% (7.4%) of children reported being driven. 64.8% (n=33) of children reported walking, either alone or accompanied. 21.6% (n=11) of children reported that they usually walked alone to local parks. Local parks were therefore a significant opportunity for active and independent travel for the children. When asked how long trips to local parks took, 60% (n=28) of the children reported

that trips were usually less than 5 minutes, suggesting that most children had parks in proximity to their homes.

5.2.5.4 Organised activities

As children's travel to and from organised activities has been found to be associated with lower rates of active travel (Fyhri et al 2011) the children were asked about their usual travel to organised activities; explained as being local sports, church, or recreational centres. Most children reported that they were usually driven to organised activities (85.7% n=44). As 8.2% (n=4) reported that they didn't partake in organised activities, this means only 6.1% (n=2) usually walked or cycled to these activities. One explanation for the low rate of active modes of travel was that the places children participated in the activities were located at distances which walking or cycling were not feasible, or perceived to be feasible. This was supported by 17% (n=10) of the children reporting that their trips were within 5 minutes travel by walking, cycling or driving, suggesting that a large number of trips may be feasible by walking or cycling. Consequently, 60% (n=29) of children responded that would prefer to be driven to organised activities. Another explanation for the high rate of car travel to organised activities was that these activities take place at night when it may have been perceived to be unsafe for children to walk. Although the findings were inconclusive about the reasons why they were driven, it remains that the children's primary mode of travel to activities was by car.

5.3 The neighbourhood, children's active mobility and wellbeing: area, places and routes

5.3.1 Introduction

This section investigates the case study neighbourhood characteristics and activity settings that were relevant to the children's mobility. Moudon and Lee's (2003) model highlights the characteristics of the neighbourhood area where walking and cycling trips occur. Drawing upon the survey responses and photo-collage data, this section explores children's and parents' perceptions of the urban area they live in, the places that they can travel to in the neighbourhood, and the routes that they travel, are explored.

5.3.2 The neighbourhood area and children’s wellbeing

5.3.2.1 Children’s and parents’ perception of the quality of the neighbourhood area

For children and their parents, the perception that the neighbourhood environment is a safe and good place to live is one factor that contributes to the mobility patterns and range of activities available for children (Mitchell et al 2007). For instance, in an Australian study, Carver et al (2010) found parents’ perceptions of neighbourhood qualities influenced the extent that children were able to be independently mobile. To understand parents’ perception of the case study neighbourhood, the survey asked a series of questions regarding the quality of their neighbourhood. The parents’ responses are illustrated in Table 5-12.

Table 5-12: Parents’ perceptions of the neighbourhood (n=49)

Statements	Strongly disagree(%)	Disagree(%)	Neutral(%)	Agree(%)	Strongly agree(%)
Our neighbourhood is friendly	0	0	10.4	77.1	12.5
I know my neighbours well	2.1	16.7	27.1	45.8	8.3
We have several friends in the neighbourhood	2.1	18.8	6.3	52.1	20.8
The neighbourhood is a good place to live	2.1	0	8.3	54.2	35.4
My child or children often play with other children in the street	14.6	43.8	10.4	18.8	12.5
Assaults by strangers is a concern in my neighbourhood	10.4	52.1	18.8	10.4	8.3
Road traffic safety is a concern in my neighbourhood	2.1	21.3	21.3	46.8	8.5

The results indicated that most parents considered the neighbourhood to be friendly and a good place to live, despite some parents reporting that they didn’t know their neighbours well, or that they didn’t have friends in the neighbourhood. 31.3% (n=15) of parents reported that their children played out in the street. Informal and free play in the street provides children with an opportunity to be physically active and

independent from parents, albeit within proximity of the home. However, concerns about safety may limit children’s licence to access to streets and places such as parks. The survey showed that more parents agreed that road traffic safety issues were more troubling than concerns over physical violence. Concerns over the threat of violence by strangers were noted by 18.7% (n=9) of the parents, compared to 55.3% (n=27) who were concerned with road safety.

In order to capture parents’ perceptions of the neighbourhood as a place for walking, the survey required response to three statements, illustrated in **Table 5-13**

Table 5-13: Parent's perception of the neighbourhood as a place for walking (n=49)

Statements	Strongly disagree(%)	Disagree(%)	Neutral(%)	Agree(%)	Strongly agree(%)
I often see adults walking in my neighbourhood	2.1	6.4	6.4	63.8	21.3
I often see children walking in my neighbourhood	2.1	20.8	16.7	52.1	8.3
Our neighbourhood is a nice place to walk around	0	4.2	6.3	72.9	16.7

The responses indicated that the parents generally perceived the neighbourhood as a good quality environment for walking. 89.6% (n=44) of parents responded that they considered the neighbourhood a nice place to walk. 85.1% (n=42) of parents agreed or strongly agreed that they often saw adults walking in the neighbourhood. Similarly, 60.4% (n=30) similarly responded that they often saw children walking. The majority of parents perceived the quality of the walkable environment positively, despite 55.3% (n=27) responding that they were concerned about road traffic safety.

Parents’ perceptions of the neighbourhood were important because they potentially contributed to the defining of children’s licences to travel independently. Children’s perceptions of the quality of the neighbourhood were also important to capture as they provided insight into aspects of children’s subjective wellbeing, primarily their preferences and level of satisfaction with the neighbourhood area. **Table 5-14** shows children’s responses to three statements regarding the number of activities in the neighbourhood; concerns about strangers; and the visibility of people walking in the street. The responses were cross-tabulated with the children according to whether or

not they were active travellers (AT/NAT) and whether or not they were independently mobile (IM/NIM).

Table 5-14: Children's perceptions of the neighbourhood (n=51)

Statements		Strongly disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly agree (%)	Total
There are lots of activities in my neighbourhood.	AT	20	10	15	30	25	100% (n=20)
	NAT	10	23	26	20	23	100% (n=31)
	IM	14	14	23	23	28	100% (n=22)
	NIM	12	23	23	26	19	100% (n=27)
	TOTAL	14	18	22	24	24	100% (n=51)
I am worried about strangers in my neighbourhood.	AT	45	25	20	5	5	100% (n=20)
	NAT	23	23	29	13	13	100% (n=31)
	IM	32	28	23	5	14	100% (n=22)
	NIM	30	19	30	15	12	100% (n=27)
	TOTAL	32	24	26	10	10	100% (n=51)
You often see people out for walks in my neighbourhood.	AT	6	6	21	43	27	100% (n=20)
	NAT	4	10	13	36	39	100% (n=31)
	IM	0	9	14	32	41	100% (n=22)
	NIM	8	8	19	41	26	100% (n=27)
	TOTAL	4	8	16	38	24	100% (n=51)

Approximately half of all the children (48%, n=25) considered that there were lots of activities in the neighbourhood. Slightly more children who were independently mobile and active travellers to school reported that there were more activities in the neighbourhood. Whereas 56% (n=29) of all the children responded that they were not worried about strangers in their neighbourhood, a higher proportion of active travellers to school (70% (n=36) compared to non-active travellers (46% (n=23)) of responded that they were not worried. Many of the children (62%, n=32) reported

that they often saw people walking in the neighbourhood. The marginally higher rate of children who were active travellers and independently mobile who considered the neighbourhood positive in regard to safety and the activities available, indicated that children who are more actively mobile may have different expectations regarding what constitutes a good environment for walking. The responses overall suggest that most of the children considered the neighbourhood a place with activities and people walking, and strangers did not concern them.

5.3.2.2 Evaluating the neighbourhood for change

One of the objectives of the research thesis was to compare how parents and children evaluated the quality of their neighbourhood environment for walking, with that of planners' evaluation tools, such as walkability audits. In order to contribute to this objective, parents and children were asked to consider what changes they would like to see made to their neighbourhood. Asking what changes would be necessary in their local environment in order to facilitate more active and independent mobility for children encouraged the parents and children to reflect on the elements that were important to creating good quality walkable environments that encourage children's active and independent mobility. Both parents and children were given a range of options and asked: "Which of the following would likely increase the freedom of your child/ yourself to walk or cycle in your local neighbourhood without an adult". The parents and children were able to respond to more than one item. The responses of both parent and children are included in **Figure 5-8**.

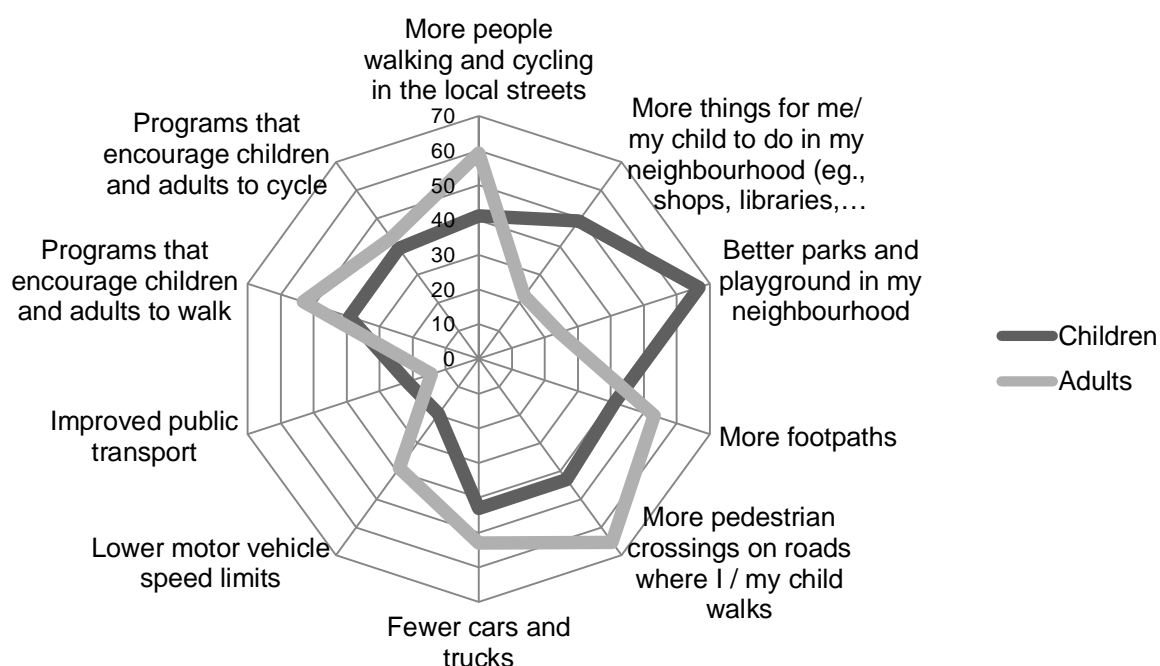


Figure 5-8: Parents' (n=49) and children's (n=51) responses to the questions: "Which of the following would likely increase the freedom of your child/ yourself to walk or cycle in your local neighbourhood without an adult".

The parents' responses suggested that having safer road crossings (65.3%, n=32), more people on walking and cycling on local streets (59.2%, n=29) and programs that encouraged their children to walk (53.1%, n=26) would lead to increased numbers of children being actively and independently mobile. Roughly half of parents (53.1%, n=26) responded that more footpaths, more programs that supported walking, and fewer cars and trucks would increase the freedom their child to be independent. Only 14.3% (n=7) of the parents indicated that improved public transport would lead to increased children's independent mobility, which was not surprising given the low number of parents who gave their children the licence to travel independently by public transport. The common issue underpinning parents' responses was the desire for an improvement in the safety of the neighbourhood; whether this was from improved infrastructure, developing children's capacity as safe walkers or from increased in neighbourhood social activity (more people on the streets).

The children’s responses differed from the parents’ responses in a number of ways. The most popular response by children (66.7%, n=34) was that better parks and playgrounds in the neighbourhood would enable them to walk or cycle more often without an adult. The next most popular response (49%, n=25) was that if there were more things to do in the neighbourhood. Furthermore, fewer children than parents considered that more pedestrian infrastructure and safer walking routes would increase their active and independent mobility. The children associated activities and places as the most important neighbourhood elements associated with their active and independent mobility.

In order to gain further insight into the reasons why the parents chose particular responses regarding the evaluation of their neighbourhood area, they were also given the option to include other comments relating to factors that would encourage them to allow their child to be independently mobile. The comments that were provided by parents are included in **Table 5-15** and coded according to themes.

Table 5-15: Other comments by parents “What would be likely to increase your child to be independently mobile (n=10)

Theme	Example comment
Infrastructure	<ul style="list-style-type: none"> • “Cycle ways around the neighbourhood, not just around rivers, beaches, city areas”. • “Safe bicycle roads/lanes. I am hesitant to cycle as an adult on the roads.”
Places	<ul style="list-style-type: none"> • “If my child’s friends were in close proximity to our house, or on route to school.” • “Pedestrian only public places.”
Traffic	<ul style="list-style-type: none"> • “Less car traffic when school is out. Lots of Four Wheel Drives.” • “More cul-de-sacs [sic]”.
Programs	<ul style="list-style-type: none"> • “Programs to encourage parents to let their children walk around the neighbourhood.” • “Walking School Bus.”
Competence and Social	<ul style="list-style-type: none"> • Child growing up- “She looks too young”. • “More children walking so my child could walk with them.”

Only ten parents provided responses and these generally reflected the issues identified in the neighbourhood area evaluation. The comments were distributed across five themes: improving infrastructure, particularly cycle lanes on roads; safe places in close proximity; less traffic around schools and in the local road network (cul-de-sac); behavioural programs to educate parents and help children walk to school; and children’s capacity to be independent on the local streets.

The children were also provided the opportunity to include suggestions on how to make their neighbourhood a better place for children and adults to walk and cycle, either by themselves or with friends. **Table 5-16** shows the most frequently included themes that were coded from the responses and one or two example statements. Some children’s responses contained more than theme.

Table 5-16: Children’s most frequent responses to the open question- “What are your suggestions about how to make the neighbourhood a better place for children or adults to walk or cycle, alone or with their friends?” (n=51)

Theme	Frequency	Example Statements
More paths	11	<ul style="list-style-type: none"> • “We need more footpaths because if a woman is walking with her baby then a car wouldn’t have to swerve around them and she would feel safe”
More social activities and people	8	<ul style="list-style-type: none"> • “Have all of the Neighbours become closer and make more activities happen”
More parks	7	<ul style="list-style-type: none"> • “There could be more dog parks and paths” • “More parks and footpaths and skate parks”
More road crossings	7	<ul style="list-style-type: none"> • “More pedestrian crossings” • “Zebra crossing with lollipop man”
Improve parks	6	<ul style="list-style-type: none"> • “Add more things to the park” • “Make more interesting parks.”
More sporting and recreation grounds	5	<ul style="list-style-type: none"> • “Sporting centre or gym would be great with a big skate park” • “Local swimming pool”
Safety	5	<ul style="list-style-type: none"> • “I would clean up the park, roads, benches and make it safe. People fight and drink.” • “Less big dogs”
Slower traffic	3	<ul style="list-style-type: none"> • “We have a dodgy corner on our street and I would like cars to slow down”

The most frequent responses to the open question concerned improvements to pedestrian infrastructure (footpaths and road crossing), more social activity in the neighbourhood, and better quality places such as parks and sporting grounds. One child’s comment suggests that children’s concerns regarding the experience of walking in the neighbourhood extended to the consideration of needs and wellbeing of others:

We need more footpaths because if a woman is walking with her baby then a car wouldn’t have to swerve around them and she would feel safe.

Although it was one comment among many it highlighted the potential for children to evaluate the built environment in regard to opportunities for and risks to the wellbeing of others, as well as themselves. This is suggestive that children have the

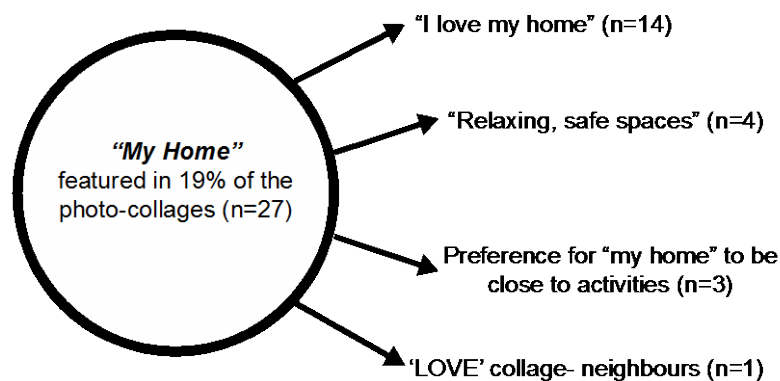
capacity to conceptualise wellbeing as eudamonic, rather than purely as hedonic, or based on their own feelings of pleasure or satisfaction. Children’s preferences for a better neighbourhood are linked to the reflection on broader social or ethical concerns, as well solely personal feelings of satisfaction or happiness.

5.3.3 Places in the neighbourhood and children’s wellbeing

As outlined in Chapter 2, Moudon and Lee (2003) identify ‘places’ – the origins and destinations of walking and of cycling trips – as a key concept relevant to active mobility. In relation to wellbeing, being able to access places provides children the opportunity to participate in activities important to their development, happiness and health. A better understanding of the affordances associated with neighbourhood places within children’s everyday mobility environments provides insight into the capacity of the local environment to provide children wellbeing. This section reports on children’s and their parents’ perceptions of places within their neighbourhood as identified in the surveys and photo-collages.

5.3.3.1 Children’s homes

Households are significant places in children’s mobility environments. As already explained, there were important household level relationships identified in the case study that potentially shaped the characteristics of children’s active mobility, such as household scheduling of activities and children’s licences to travel independently. The photo-collages provided additional insight into the quality and range of affordances available to children within the household environment. **Figure 5-9** illustrates the content analysis and sub-themes associated with the theme of “my home” and “backyard and frontyard” coded in the photo-collages.



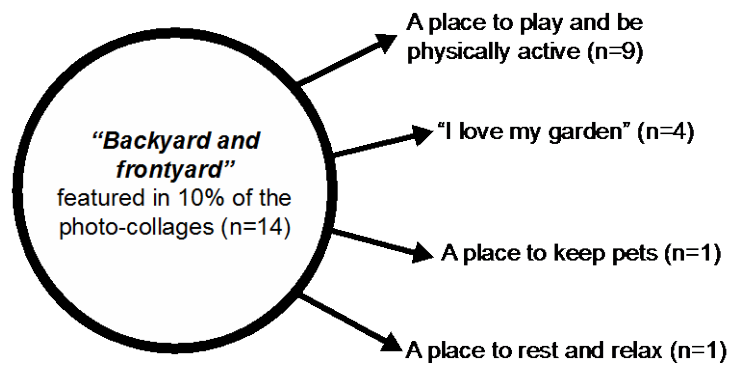


Figure 5-9: Content and thematic analysis of "My Home" and "Backyard and frontyard"

The images and annotations relating to "my home" were overall positive. 21% (n=10) of the 'PERFECT' collages and 32% (n=15) of 'LOVE' collages contained an image or reference to "my home". Only 5% (n=2) of 'HATE' collages contained any reference to the home and these related to expressions of dissatisfaction about the distance of the child's home to places. Having accessible places within proximity to the children homes was a major sub-theme identify in the analysis. Several of the children (n=17) expressed a desire to be living closer to places and activities. The children also used the photo-collages to express their love for their homes (n=14). The annotations of the photo-collages by the children also suggested that particular rooms in the home afford refuge and places for restoration; "relaxing spaces" as Jerrine wrote on her 'LOVE' collage. The findings confirm those of an Australian study by Hume, Salmon and Ball (2005) that found, using a similar photographic method, children could consider the family home a 'haven' and refuge from the outside world.

Back yards and front yards featured in several of the collages (n=14). Most of the houses of the survey respondents (90%, n=44) reported they had backyards that were suitable for their children to use and run around in. The content and thematic analysis of backyards and frontyards (**Figure 5-9**) illustrates that these spaces afforded the children a range of activities. The children included images of swimming pools, gardens, cubby houses, trampolines, and chairs. For the children, the backyard afforded opportunities for play, physical activities, and interactions with friends and families. For instance, Sibby's 'PERFECT' collage included only photographs of sporting equipment in her backyard. The space for Sibby afforded

physical activity and the development of skills in both volleyball and netball. Backyards also provided households with spaces to keep pets. As the survey indicated more than half (57%, n=28) of households reported having a dog, dogs were referred to in 7% (n=9) of the collages. Owning a dog potentially increases the frequency and duration of walking (Cutt et al 2007; Timperio et al 2008), and creates opportunities for social interaction (Baum and Palmer 2002). Keeping pets also provided an opportunity for the children to engage within the local neighbourhood space. For example, Theresa included a photograph of a sports oval in her 'LOVE' collage and noted: "This is the football oval. I like it because I take my dogs for a walk there". Having private outdoor space within the home environment therefore not only provided some children refuge, it also provided opportunities for children to engage in more activities in public, neighbourhood space.

5.3.3.2 Schools

As indicated in the literature and the findings above, the school is a key place within children's mobility environments. Schools featured in the children's photo-collages. They were places either hated (n=8), or loved (n=5), affording settings to learn, play and maintain connections with friends (n=11).

Schools have the potential to be active agents within local communities by communicating information, promoting dialogue, and reinforcing social norms about travel activity (Collins and Kearns 2001). In light of this the children's and parents' surveys contained questions about perceptions of the school community and how aware respondents were that the school supported active travel. Parents were asked whether they knew other parents at the school well in order to indicate the amount of social interaction within the school community. Three quarters of the respondents agreed or strongly agreed that they knew other parents well, and only a small percentage (14.6%) disagreed with the statement. When asked whether they were actively involved in their child's school 60.5% responded that they agreed or strongly agreed with the statement, whilst 16.7% disagreed. The responses suggest that most respondents, either through social connections or direct involvement in school activities, were socially connected to the school community in some way.

In order to further understand the role of schools in communicating messages about children's active travel, parents were asked a series of questions regarding the

school's role in encouraging active travel. Parents were asked whether, to their knowledge, the school encouraged students to walk or ride a bike to school. The responses suggested that the school is active in encouraged active travel. Most respondents (68.75%) noted the school encouraged both walking and cycling to school. A small percentage (10.4%) responded that the school encouraged walking only. The remaining did not consider that any active travel was encouraged (8.2%) or did not know (12.5%). These findings were compared with the data indicating whether children were active travellers to school or not. **Table 5-17** indicates that a much higher percentage of parents of active travellers considered that the school encourages active travelling, compared with parent's who did not or didn't know. Although these findings do not give any indication of the school's actual support for active travel, they do however show that parents of active travelling children perceive that encouragement is provided by the school.

Table 5-17: Cross tabulation- Active/Non-Active travellers and parents' recognition of school support for active travel.

	Does your child's school encourage students to walk or ride a bike to school?				
	Yes, walk only	Yes, walk and ride	No	Don't Know	
Active Traveller	15.7% (6.25%)	73.6% (29.16%)	0.5% (2%)	0.5% (2%)	N=19 (%n=48)
Non Active traveller	6.8% (4.1%)	65.5% (39.5%)	10.3% (6.2%)	17.2% (10.4%)	N=29 (%n=48)
Total	10.4%	68.75%	8.3%	12.5%	N=48

The parents who considered that the school encouraged their children to walk or cycle were then asked to note in what way the school encouraged walking and/or cycling. The range of responses to the open ended question and the frequency in which they were mentioned is listed in **Table 5-18**. Respondents were allowed to write more than one response.

Table 5-18: School Programs Encouraging Active Travel to School- Parents' responses

Type of encouragement	No.	Type of encouragement	No.
Walk to school days	18	Discussion in class	1
Bike racks/ lock up area for bikes	11	Parking	1
Crosswalk attendant	7	Formal walk groups	1
Newsletter	5	Park and stride	1
Rewards / stickers	2	Cycling awareness session	1
Formal talks about health	2	Walking buses	1
Formal school program	1		

Walk to School Days were the most frequently reported programs promoted by the school, reflecting the attention the initiative received in the local newspaper (19.5% of articles referring to programs or policy interventions were about the National Walk to School Day). The provision of bike racks at the school was the second most frequent response. The children’s survey included a question asking children their level of agreement with the statement: “There are safe places to leave my bike at school”. The children’s responses supported the parent’s consideration that the school provided bike racks and lock up area; 82% of children agreed or strongly agreed with the statement. The results suggesting the knowledge of the provision of bike infrastructure despite the very low rates of cycling at the school is interesting to note.

As travel to school is a major part of the everyday activities of urban households, the area around schools can be congested and risky for children walking or cycling. The areas around schools are designated ‘school zones’ with reduced speed limits in Western Australia. **Table 5-19** compares the responses of children who were active and non-active travelers to school in regard to two statements about their perceptions of the environment immediately surrounding the school.

Table 5-19: Cross-tabulation - Perceptions of the School Zone of Active/Non-Active Travellers to School

Statement		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Total
There is a lot of traffic outside my school	Active traveller	0	4 (20%)	6 (30%)	7 (35%)	3 (15%)	N=20
	Non-Active Traveller	0	1 (3%)	9 (29%)	16 (52%)	5 (16.1%)	N=31
	Total	0	5 (9.8%)	15 (29.4%)	23 (45.1%)	8 (15.7%)	N=51 (100%)
I feel safe crossing the road near my school	Active Traveller	0	2 (10%)	5 (25%)	5 (25%)	8 (40%)	N=20

Non-Active Traveller	3 (9.6%)	3 (9.6%)	5 (16.1%)	14 (45.1%)	6 (19.3%)	N=31
Total	3 (5.9)	5 (9.8)	10 (19.6)	16 (37.3)	14 (27.5)	N=51 (100%)

The results revealed that more of the children who were usually driven to school considered there was a lot of traffic outside the school (68.1%, n=21) than those who usually walked or cycled (50%, n=10). However, this difference was not reflected in the majority of children (64.8%, n=30) who responded that they felt safe crossing the road near the school. Overall, only a small majority (62%) of children considered the school zone was congested and that road crossings close to school weren't safe.

Schools also have the potential to actively shape children's mobility environments through communicating information to parents, promoting dialogue, and reinforcing social norms about children's travel activity (Collins and Kearns 2001; Witten et al 2001). The parents were asked a number of questions in order to establish the degree the parents were aware of messages that were communicated from the schools by newsletters and such. Most respondents (68.75%, n=33) considered that the school encouraged both walking and cycling to school. A small percentage did not consider that any active travel was encouraged (8.2%, n=4) or did not know (12.5%, n=6). 75% (n=36) of the parents agreed or strongly agreed that they knew other parents at their school well and 60.5% (n=30) responded that they were actively involved in the school community. The responses suggested that the school was largely effective in communicating messages about and encouraging children's active mobility.

5.3.3.3 Local parks

Parks can be important urban places for children (Veitch et al 2007; Wolley 2008; Tilt 2010). The findings so far have reported that parks attracted the largest percentage of walking and cycling trips out of all places the children's local area. In order to understand further what parks afford children and how they may be linked to their wellbeing, the children were asked to respond to two statements regarding the quality of parks in their neighbourhood; how safe the nearest park was to their house, and whether the park had interesting things to do in it. **Table 5-20** illustrates the

children's responses, distinguishing between active and non-active travellers, and independent and non-independently mobile children.

Table 5-20: Children's attitudes to parks in the neighbourhood (n=51)

Statement		Strongly disagree(%)	Disagree(%)	Neutral(%)	Agree(%)	Strongly agree(%)	Total
It is safe for me to play at the park closest to my house without an adult present.	AT	10	10	20	50	10	100% (n=20)
	NAT	7	13	17	36	29	100% (n=31)
	IM	5	14	19	41	23	100% (n=22)
	NIM	12	4	19	45	23	100% (n=27)
	TOTAL	8	12	18	42	22	100% (n=51)
The park closest to my house has interesting things for me to do.	AT	10	25	10	35	20	100% (n=20)
	NAT	4	23	20	42	13	100% (n=31)
	IM	9	32	14	28	19	100% (n=22)
	NIM	4	15	19	52	12	100% (n=27)
	TOTAL	6	24	16	40	16	100% (n=51)

Overall, the majority of children were satisfied with the level of safety (64%, n=33) and range of activities available at their local park (66%, n=34). There was little difference in how children perceived the safety of the local park between children who were active travellers or independently mobile. However, more independently mobile children (41%, n=21) disagreed or strongly disagreed with the statement that the park had interesting things to do, compared with those who were not independently mobile (19%, n=10). An explanation for this may be that children with greater independence had higher expectations of the standards of play environments than children who were less independent.

The photo-collage method provided more insight into how the children perceived the parks in their neighbourhood. Parks, playgrounds and natural spaces were the most identified place in the photo-collage exercise. Images of parks, playgrounds and

natural spaces were included in 48% (n=69) of the collages. **Figure 5-10** illustrates the sub-themes that were associated with images of parks.

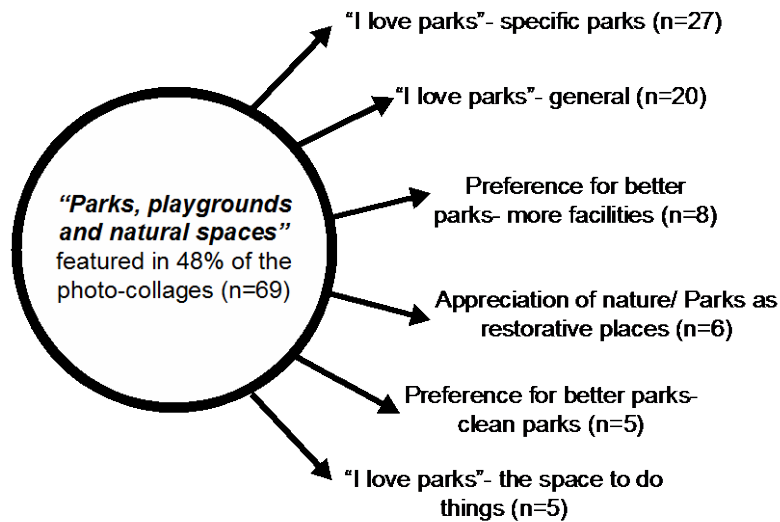


Figure 5-10: Content and thematic analysis of "parks, playgrounds and natural spaces".

The majority of references to parks in the collages were positive. The children made reference to either a specific park they loved, or expressed that they loved parks in general in 33% (n=47) of the photo-collages. Some children referred to their “local park” (for example, Reg in his ‘PERFECT’ collage) or “my park across the street” (Shania in her ‘LOVE’ collage), suggesting that the children felt some sense of ownership over particular parks.

The analysis of activities identified in the photo-collages¹⁰ revealed that play (n=20) and sports (n=15) were the key activities associated with parks, playgrounds and natural spaces. **Figure 5-11** illustrates an image of a playground in a park, a frequent motif within the children’s photo-collages.

¹⁰ See Appendix C-4.



Figure 5-11: Play as a social activity - Karla's LOVE collage

The photograph, in addition to providing an example of the type of play structures included in children's collages depict play as a social activity. Parks and playgrounds were represented as social settings. They were places where children could spend time with their friends. Similarly, images and references were to team sports and group sporting activities in 20.5% (n=30) of the collages featuring reference to parks. Open space and sporting facilities in parks provide a means for children to get together and partake in physical activity. Play has also been found to be associated with higher levels of children's independent mobility (Prezza 2007; Tandy 1999) and this was evident in the photographs. For example, Brien included a photograph of a playground in his 'PERFECT' collage and annotated it with: "If I could go here on my own". Parks therefore afforded children more than just a setting for the activity of play; they provide a means of enhancing children's social connections and independence. These affordances demonstrate that, when combined with the health benefits associated with more walking and cycling trips to parks, parks were fundamental to children's wellbeing in their local environment.

Sub-themes were also identified in the thematic analysis that were related to children's preferences for parks with better facilities (n=8), and parks that were cleaner (n=6). The photo-collages demonstrated that children readily engaged in the evaluation of parks. For example, the negative representations of parks reflected a particular aspect of a park that a child didn't like, or the absence of infrastructure rather than reflecting a general dislike for parks. The evaluation of parks' potential to

afford activities was reflected in Gunner's 'HATE' collage which made reference to the lack of facilities or maintenance of the park. He notes: "the grass in front of the goals has never been fixed". The photo-collages also revealed that children actively engaged in the evaluation of the quality of play areas and equipment. Two children's photo-collage annotations identified play areas as inadequate for types of play. For example **Figure 5-12** shows a photograph and annotation where the child didn't like the playground because: "it is very babyish".

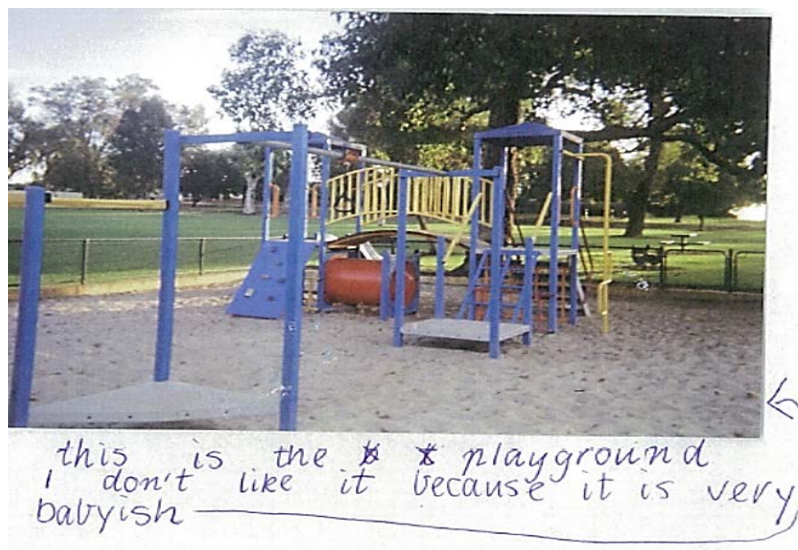


Figure 5-12: Babyish Playground - Ursulla's HATE collage

Another child, Pia, included a photo of a small playground area in her 'HATE' collage. Similar to the previous response, she annotated the photograph: "I hate this park because it is too babish (sic) and small". When asked about her written comment during the collage exercise she responded:

"Look at the playground. It's so small. Look at the size of the park and they have such a small playground."

The comments suggest that even though places for play may be present, the quality of space and infrastructure may not match the needs of a wide spectrum of ages. In Australia, Veitch et al (2006) found that one barrier to children's play that parents identified was age inappropriate playgrounds and that they wanted play equipment that was challenging and stimulating for their children. For an evaluation of adequate

park space for play in urban environments, the types of opportunities for a range of ages need to be made.

The photo-collages also demonstrated the children had expectations of the standards of cleanliness and maintenance of parks. One child, Sigfried, referred to a photograph of the park next to his house in his 'HATE' collage and commented: "I hate this park because of the graffiti". Some children considered that the parks in their local area were unsafe. For instance one child noted that she didn't like a park because it was too dark: "It's always dark here. Even during the day. I don't like it" (Aren, in her 'HATE' collage). Similarly, one child wrote in their 'HATE' collage: "Hoons are in the park" (Archie, in his 'HATE' collage). Children also used the images to assess space in the neighbourhood as to its potential to be park space. For instance one child referred to a large drain in a 'HATE' collage as a potential "pedestrian park" (Birgita, in her 'HATE' collage).

The photo-collages revealed that parks and natural spaces, for children, provided places that were a source of aesthetic and 'spiritual' value. The spiritual values associated with parks were exemplified in Natassia's 'LOVE' collage (Natassia) which included a photograph of a copse of trees in a park annotated with the statement: "Sacred ground". Natural features of the neighbourhood, as well as being valued by children for their aesthetic qualities, also afforded children other activities. **Figure 5-13** illustrates Dorey's 'LOVE' photo-collage.

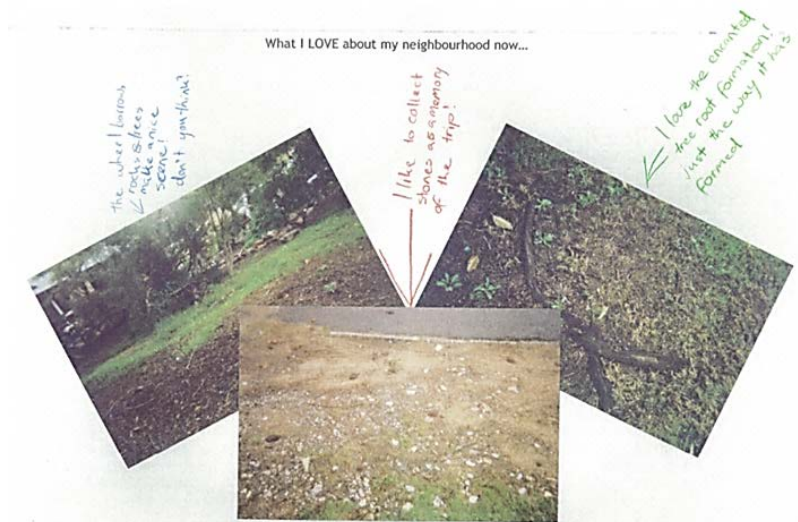


Figure 5-13: “A love of nature” – Dorey’s LOVE collage

The images provided a good example of the aesthetic values children associated with natural features within the broader neighbourhood area. Dorey’s collage features three photographs of the ground, highlighting such things as an old wheelbarrow, tree roots, and rocks. As Dorey notes, “I like to collect stones as a memory of the trip”. For Dorey, natural features and objects afforded a means of recording the cumulative experience of walking within the neighbourhood. Trees were depicted in the collages as affording children the activity of climbing and also as a place to spend time with friends. For example, Nisse’s ‘LOVE’ collage included a photograph of two children sitting in a tree, with the caption: “In the tree with a friend”. A similar image in Cordula’s ‘PERFECT’ collage has the caption that reads: “The neighbourhood tree”. The discussion of natural features, parks and open space in the neighbourhood demonstrated the potential for urban places to be symbolic places that afford children important aspects associated with their wellbeing, such as a connection to the natural world. They provide places for physical activity; socialising; play, such as sports and climbing trees; contemplation; and developing an appreciation of the natural world.

5.3.3.4 Local shops

The survey findings presented above indicated that local shops attracted a low proportion of trips by active modes of travel with only 20% (n=10) of the children reporting they usually walked to their local shops. To understand more about

children's attitudes to local shops the children were asked whether there were great shops in the neighbourhood and whether they thought it was safe to get there without an adult. The children's responses are illustrated in Table 5-21.

Table 5-21: Children's attitudes to local shops (n=51)

Statement		Strongly disagree(%)	Disagree(%)	Neutral(%)	Agree(%)	Strongly agree(%)	Total
There are a lot of great shops in the neighbourhood.	AT	15	15	25	40	5	100%(n=20)
	NAT	4	33	26	33	17	100%(n=31)
	IM	9	14	19	41	19	100%(n=22)
	NIM	4	26	27	30	13	100%(n=27)
	TOTAL	8	20	26	36	12	100
It is safe for me to go to the local shops without an adult.	AT	0	15	15	45	25	100%(n=20)
	NAT	7	20	29	29	17	100%(n=31)
	IM	0	0	23	37	41	100%(n=22)
	NIM	8	30	23	37	4	100%(n=27)
	TOTAL	4	18	24	36	20	100

48% (n=24) of children agreed or strongly agreed that there were lots of great shops in the neighbourhood, whilst 28% (n=14) responded that they disagreed or strongly disagreed. Although a smaller percentage 28% (n=14) disagreed or strongly disagreed that there were great shops in the neighbourhood, the finding is inconclusive. A more interesting picture emerged when the findings were compared between the types of children based on their licences to travel. Although there was little difference between active and non-active travellers, children who were independently mobile were more likely to respond that they considered the neighbourhood had great shops; perhaps because they could visit more shops. Children who were independently mobile were more likely to consider that it was safe to go to the local shops without an adult, than children who were not independently mobile. To explore this finding in more depth, children's travel to local

shops was compared between children who were independently mobile and those who were not. **Table 5-22** shows that children who were independently mobile were more likely to walk alone or with other children to local shops. Consequently children who were not independently mobile mainly travelled to the local shops as a passenger in a car.

Table 5-22: Travel to shop/ Independent Mobility Cross-tabulation (n=51)

	Independently Mobile	Not Independently Mobile	Total
walk alone	100%	-	N=5
walk with other children	72%	28%	N=7
How do you usually travel to the local shops?	walk with adult	na	N=2
	bicycle alone	na	N=3
	bicycle with adult	na	N=1
	be driven	27%	73%
Total			N=48

The photo-collage exercise provides further insight into how shops and larger shopping centres were considered by children. **Figure 5-14** illustrates the sub-themes associated with images containing reference to shops and shopping centres in the photo-collages.

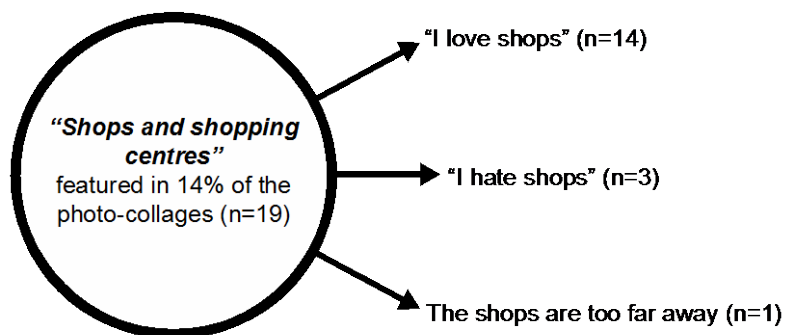


Figure 5-14: Content and thematic analysis of "shops and shopping centres"

The children who included images of shops and shopping centres were generally positive about shops and shopping. Only three photo-collages contained images that represented shops negatively, and these three images were of smaller local shops, rather than larger shopping centres. The cross-analysis with the theme “*driving in a car*”¹¹ revealed that 43% (n=6) of the photo-collages with the sub-theme “*shops*” were taken from within a car. Although the number of photo-collages is small, it does reflect the survey findings that identify the significant car mode share to local shops as reported by children. Local shops appeared to be valued by many of the children as important places in their neighbourhood area, but their association with motorised vehicle trips raises issues for increasing rates of the children’s active mobility.

5.3.3.5 Friends’ houses

Neighbourhoods have the potential to support social activity for children within feasible walking and cycling distances (Jenks and Dempsey 2007). Residential based social networks can shape how children perceive the quality of sense of place or neighbourhood. Being able to walk independent of adults enables children to connect socially with their friends on their own. However, as the survey findings illustrated, the children in the case study were mainly driven and also preferred to be driven to their friends’ houses. In order to explore this aspect in more detail, the survey contained a question asking children whether they played outdoors with lots of friends in their neighbourhood. **Table 5-23** indicates that children who were active travellers and those who were independently mobile were more likely to respond that they play outside, than those children who were not.

¹¹ See Appendix C-4.

Table 5-23: Children’s outdoor play with friends (n=51)

Statement		Strongly disagree(%)	Disagree(%)	Neutral(%)	Agree(%)	Strongly agree(%)	Total
I play outdoors with lots of friends in my neighbourhood.	AT	0	15	25	45	15	100
	NAT	7	23	16	33	13	100
	IM	0	19	19	46	19	100
	NIM	8	23	34	26	12	100
	TOTAL	4	20	26	38	14	100

The theme of *“friends and other children”* was identified in the collages. Figure illustrates the content analysis and sub-themes associated with the theme in the photo-collages.

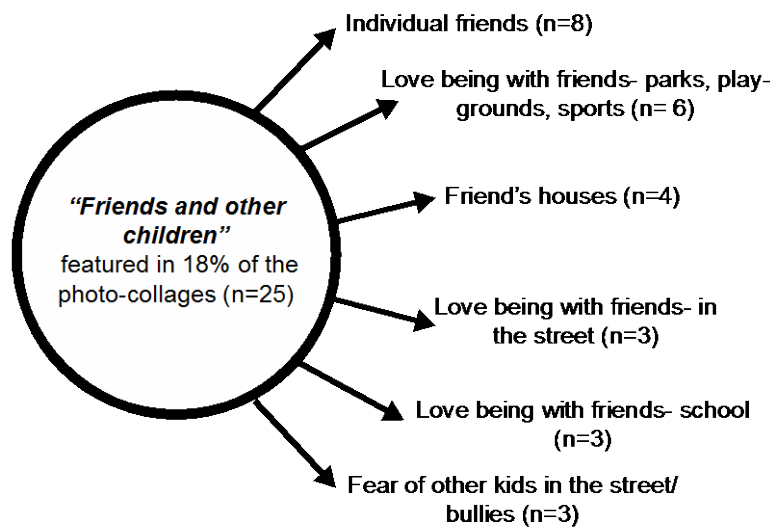


Figure 5-15: Content and thematic analysis of "friends and other children"

Most of the representations of *“friends and other children”* were positive however. Children included photographs of individual friends (n=8) and playing with friends in parks, playgrounds and sporting activities (n=6) in their ‘LOVE’ and ‘PERFECT’

collages. Some children (n=4) also identified *'friends' houses'* as places that they would like to have access to in their local neighbourhood. For example, Corrie has included in their 'LOVE' collage a detailed map of a couple of streets, labelling various houses "Hag's House", "Rabbit Louse House", and "Mary's House". In the top right hand corner of the collage there was a house labelled as "Ivean's house" and a caption next to it stating, "I wish Ivean's house was less far away". The statement supports the earlier inference that the children may perceive their friend's houses to be outside of feasible walking distances, therefore accounting for children's preference to be driven to their friend's houses.

5.3.3.6 Sporting activities and places

Children in contemporary urban settings participate in a diverse range of extra-curricular activities (Wright, MacDonald and Groom 2003) and this was reflected in the inclusion of images and references to organised sports in the photo-collages. **Figure 5-16** illustrates the content analysis of photo-collages and illustrates the sub-themes associated with "***playing and practicing sports***" and "***sporting grounds, recreation centres, and public pools***".

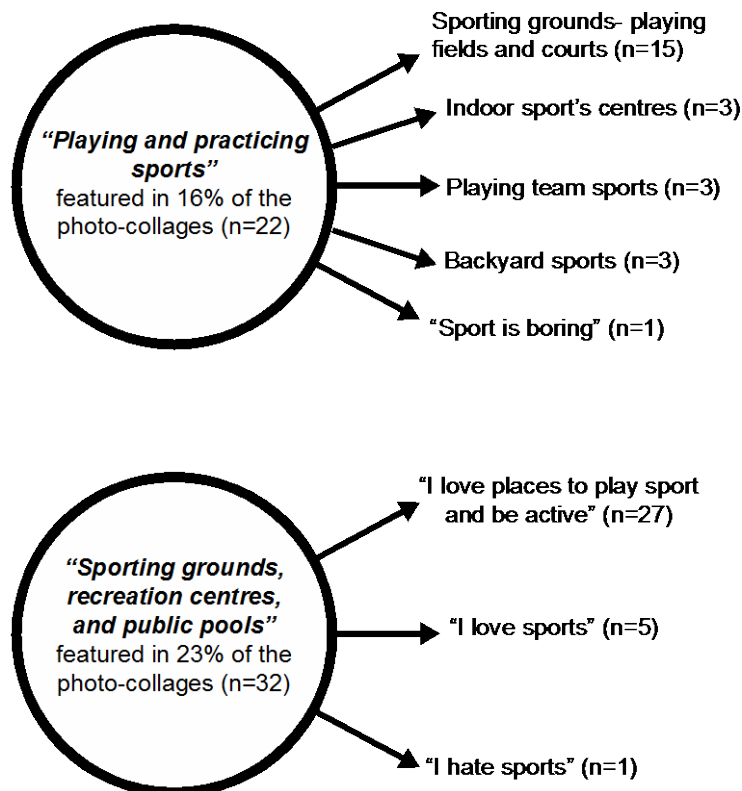


Figure 5-16: Content and thematic analysis of "Playing and practicing sports" and "Sporting grounds, recreation centres, and public pools"

Of the 16% of all collages that made references to sporting activities most were positive. Representations of sporting grounds, such as playing fields, ovals, and tennis, basketball and netball courts, was the most prevalent sub-theme identified in the collages (n=15). Sporting activities afforded children several key aspects related to their wellbeing. Beside the physical activity inherent in sport and the physical and mental health benefits associated with it, sport also affords children the opportunity to socialise. This was a key factor identified in the collages, with many photographs showing children engaging in organised team sport activities. These were frequently included in 'LOVE' or 'PERFECT' collages. Photographs sometimes involved children huddled in teams (for example, in Cordula's 'LOVE' collage). However, not all children considered all sporting activities positively. Pia included a photograph of an oval with football goal posts in her 'HATE' collage and annotated the photograph "Footy is boring to watch!" Alternatively she included a photograph a ballet studio in her 'LOVE' collage noting: "This is my favourite place! Ballet. I go there every day."

There is a need to be cognisant of the diverse range of physical activities that contemporary children can be engaged in. The range and frequency of reference to sporting places and activities suggests that individual children have multiple sporting interests, therefore relying on a range of different facilities that may be spatially dispersed throughout the urban area.

5.3.4 Children's walking and cycling routes and wellbeing

The third category of Moudon and Lee's (2003) model of built environment elements associated with active mobility concerned the walking and cycling routes within the neighbourhood area. This section addresses the children's perceptions of the walking and cycling routes in the neighbourhood area: streets, pathways and roads. Children included images and annotations of their walking and cycling trips in the photo-collages and these provided insight into how children experience routes and how this reflected issues of wellbeing.

5.3.4.1 Streets, pathways and children's active mobility

The content and thematic analysis of photo-collages revealed a number of important themes and sub-themes associated with the streets and pathways along which children's walking and cycling trips took place. **Figure 5-17** illustrates the sub-themes associated with two themes that were important to understanding the quality of the children's walking and cycling routes as perceived by the children: ***“the experience of active mobility”***¹² and ***“the neighbourhood street”***¹³.

¹² ***“The experience of active mobility”*** consisted of the codes: walking, riding a bike, journey to school, riding a scooter, and walking the dog.

¹³ ***“The neighbourhood street”*** consisted of the codes: ‘My street’, streetscape, footpath, alleyway, and cul-de-sac.

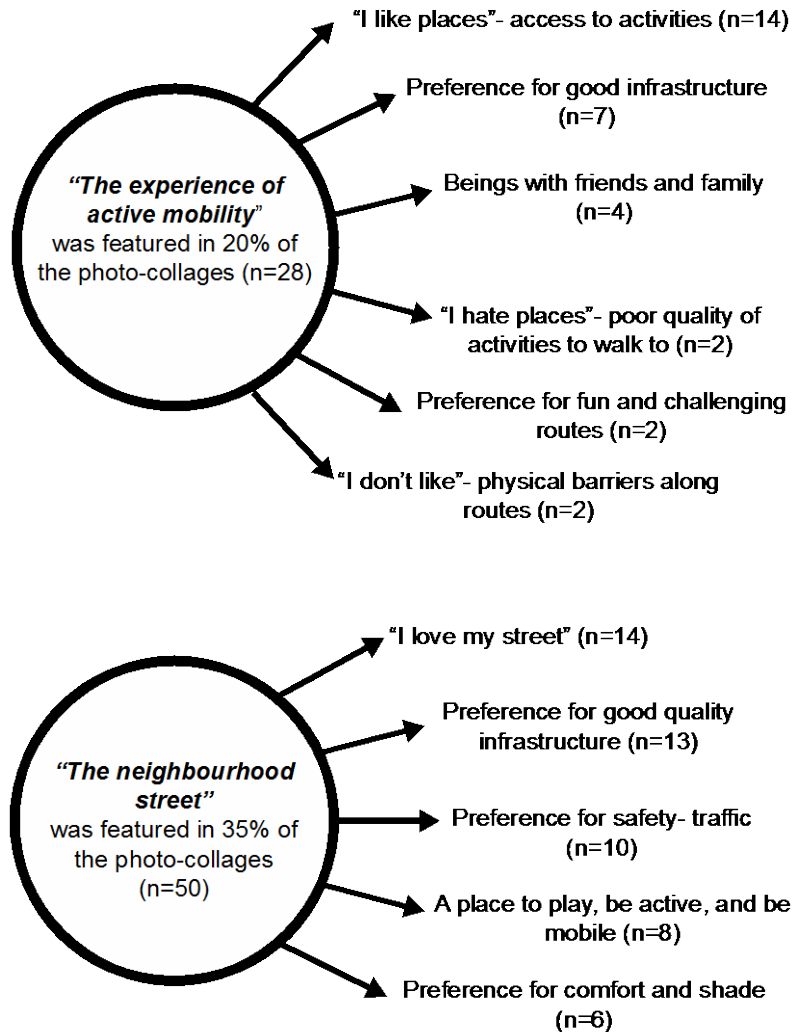


Figure 5-17: Content and thematic analysis of "the experience of active mobility" and "the neighbourhood street".

The thematic analysis revealed that several of the children (n=14) included the streets they lived on in their 'LOVE' and 'PERFECT' collages. Together with the sub-theme illustrating that some children liked comfortable and shaded streets (n=6), the streets children potentially walked and cycled along in their neighbourhood were valued by the children. For instance, one collage included a photograph of a footpath extending through the frame of the photograph, the annotation reading: "How peaceful it is". In regard to "*the experience of active mobility*", the most frequently (n=14) occurring sub-theme identified related to children's access to activities. The children used the images to identify that active mobility afforded access to places they wanted to go such as school, parks, and playgrounds.

Active mobility was depicted as a social activity in several of the photo-collages, reinforcing the notion that routes afford more than just the function of movement for children. For example, Sal's 'LOVE' collage contains a photograph of two people crossing the road and the image was annotated: "I love the fact I can walk to school with my friends. And not have to worry about walking alone all the time". Vanda included a photograph of her walk to school in her 'LOVE' collage, the photograph showing two children walking away from the camera and was annotated: "Me walking to school with my sister." Thus, the routes of travel were not valued solely as a means to an end. Rather it was what the activity of walking and the mobility environment afforded the child - the company and social interaction - that was valued by some children.

In addition to the positive aspects of routes revealed by children in their photo-collages, barriers to access were also identified by some children. In the analysis of the theme "***the neighbourhood street***" a sub-theme was evident in the analysis of photo-collages was that several of the children (n=13) wanted better infrastructure, particularly footpaths. This sub-theme was also evident in the analysis of "***the experience of active mobility***" (n=7). For example one child, Ursulla noted: "This is the street I walk down to get to the park. It would be nice if there was a path". The value of good pedestrian infrastructure to some children's concept of a good neighbourhood - either what they love now or what they consider an ideal - was also evident in the collages. For instance, Shania noted that her perfect neighbourhood would have "lots of pavement and trees". Another child commented in a 'PERFECT' collage (Natassia's 'PERFECT' collage) that she would like: "Lots of footpaths and nice places to walk." The themes indicated that some children were aware that access to activities was dependent on good quality infrastructure and the access afforded by footpaths was incorporated into their concept of ideal neighbourhood environments.

As well as the barrier to access created by poor or no infrastructure, a small number of children highlighted additional physical (n=2) and perceptual (n=2) barriers to active mobility along the streets in the local neighbourhood. For example, Brigita's 'HATE' collage contains a photograph of a truck that was parked across the footpath. The annotation reads: "House getting built. Truck parked in the middle of the

footpath ☹️". **Figure 5-18** illustrates a further example of a perceptual barriers identified by a child.

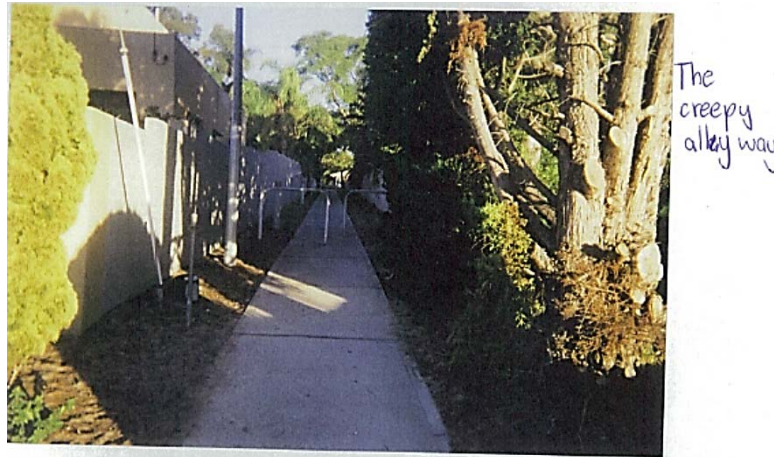


Figure 5-18: "The creepy alleyway" – Molli's HATE collage

The photo of the "creepy alleyway" suggests that places along walking and cycling routes that are perceived as unsafe can be barriers to children's active mobility. However, the same spaces were referred to positively in other photo-collages. For example, Sal made reference to wanting more access-ways and annotated their photos describing them as "useful" and expressing a desire for "lots more of these" in the collage of his perfect neighbourhood. Aren annotated a photograph in her 'PERFECT' collage stating that the access-ways had "all the best riding places". In addition to their function of improving pedestrian access within the neighbourhood, places such as pedestrian access-ways also afford children other activities, such as play, during travel.

5.3.4.2 Cars, roads and children's active mobility

In order to understand children's walking and cycling routes, perceptions of the road environment are important to capture. In Western Australia, unlike adults, children are permitted to cycle on local street network pedestrian infrastructure (Office of Road Safety 2013). However, some images highlighted that roads afforded children mobility by providing places to cycle. As illustrated in Roley's 'PERFECT' collage (**Figure 5-19**), roads can be "great places to ride" for children. In each of the images,

there were no pedestrian pathways evident, indicating that cycling on the road may have been necessary.



Figure 5-19: Roads as "fun" places to ride – Roley's PERFECT collage

Roads were also places where children played with other children. One photo-collage contained a photograph of children sitting on a skateboard in the street. Case annotated the photograph: "I like playing with the kids on my street..." Research in Northern California, U.S, by Handy et al (2008) has found that cul-de-sac street design was an important predictor of outdoor play among children aged between 6 and 12. Similarly in Australia Veitch et al (2006) found that parents considered cul-de-sac streets as providing safe spaces for children to play and develop social ties. Reinforcing these findings, the photo-collages revealed that culs-de-sac street designs provided a safe space where children could play with other children and participate in a range of activities. During the collage workshop, Ruthy was asked why she didn't want her neighbourhood to change. She referred to the cul-de-sac in one of her collages and stated: "We can ride our scooters here and when other kids come out of their houses we can see them." Similarly, Javena stated in conversation during the collage exercise:

*This is my street. I don't want it to change. [Referring to her cul-de-sac]
We can ride our scooters here and when the other kids come out of their house we can see them.*

Ben also noted in his ‘LOVE’ collage that:

I love my cul-de-sac because I ride around without worrying about any noisy cars.

For Javena and Ben, both who did not have the licence to be independent on foot or by bicycle, the street outside their homes was valued as it afforded mobility, socialising and play. The images and annotation suggested that the spaces in proximity to their homes signified a ‘transitional space’, between the private sphere of the home, and that of the wider, public realm. The children’s ‘home’ or their ‘street’ was a part of a ‘local space’ rather than ‘public space’ (Harden 2000) that afforded feelings of relative safety.

The volume and speed of vehicle traffic can contribute to perceptions of children’s walking and cycling environments being unsafe (Hillman et al 1990; Tranter and Pawson 2001). Children were asked whether they considered car traffic made it hard for them to get around their neighbourhood. The results are illustrated in **Table 5-24**.

Table 5-24: Children's perception of car traffic (n=51)

Statement		Strongly disagree(%)	Disagree(%)	Neutral(%)	Agree(%)	Strongly agree(%)	Total(%)
Car traffic makes it hard for me to get around my neighbourhood.	AT	15	45	30	10	0	100
	NAT	17	49	29	7	0	100
	IM	23	46	23	9	0	100
	NIM	4	52	37	8	0	100
	TOTAL	16	47	30	8	0	100

The children’s responses indicated that most children did not perceive traffic to be a barrier to getting around the neighbourhood. However, there were 30% (n=15) of children who responded that they did not agree or disagree with the statement. The content and thematic of the photo-collages provided more detailed picture of roads and traffic in the local area. **Figure 5-20** illustrates the content and thematic analysis of the theme “*cars and traffic*” in the photo-collages.

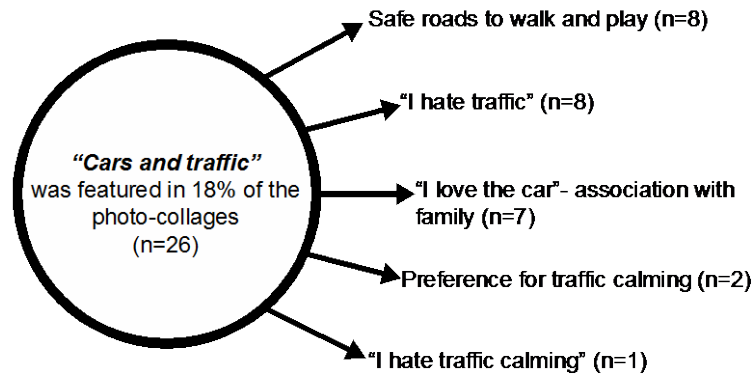


Figure 5-20: Content and thematic analysis of "cars and traffic"

In contrast to the survey responses that indicated most children didn't consider traffic as a barrier to getting around in their neighbourhood, the photo-collages revealed that a diverse range of concerns relating to traffic were identified by the children. The most frequently occurring themes in the photo-collages that contained references to traffic and cars, was a dislike for traffic and, alternatively, a wish for safe roads to walk, cycle or play. For example in Dorelle's 'HATE' Collage, the image of a road was annotated: "I hate this road because people speed down it." Similarly, Corrie included in his 'HATE' collage a simple drawing of a speeding car, noting his desire for: "Less fast cars!" The volume of traffic was also raised as an issue. Rosalie includes two photos of cars in her 'HATE' collage with the annotation: "So much traffic". Parked cars and car parks featured several times in the collages. One of these features a car parked part of the way over a footpath near the entrance to the primary school with the annotation reading: "Not much parking" (in Shania's HATE collage)". Despite these negative representations of traffic, cars were featured in children's 'LOVE' and 'PERFECT' collages. A frequently noted theme was that the association of the car with family and the home. Ernestine's 'LOVE' collage shows a photograph of a car with the caption: "Seeing family after school". The themes reflect research that found cars are increasingly become important places for a range of children's activities such as completing homework, and socialising with friends and family (Barker 2009).

Only 15.7% (n=8) of the children responding in the surveys that they felt unsafe crossing the road near the school. However, safely crossing the road was valued by

several of the children in the photo-collages. **Figure 5-21** illustrates the content and thematic analysis of the theme *“crossing the road”*.

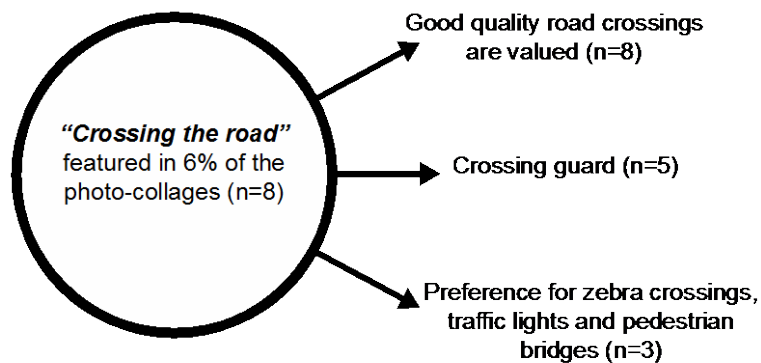


Figure 5-21: Content and thematic analysis of "crossing the road".

These children valued the safe and designated road crossings at critical places within the neighbourhood. For example, in a ‘PERFECT’ collage Vanda included a drawing of children crossing the road at a designated crossing, the photograph labelled: “Zebra crossing with traffic lights”. Karla noted in his ‘LOVE’ collage that: “having a crossing guard is great because we can cross the road safely”. Similarly, Birgita included a photograph of a smiling crosswalk attendant in their ‘LOVE’ collage writing: “School cross walk guy - Helpful.” These children valued the assistance given by guided traffic crossings. Designated crossings were represented in the images as places populated with other children. The survey findings indicated that children liked the social aspect of walking and cycling to school and other places, and the photographs revealed that crossings were places that social interaction occurs. Perhaps also, there was an aspect of safety in numbers, as children travelling in groups may feel safer crossing roads and were more likely to be seen by approaching cars.

5.3.5 Individual, household and neighbourhood factors related to children’s active mobility and wellbeing: a summary

The first objective of this research thesis is to explore the relationship between the built environment, children’s active mobility and children’s wellbeing. To achieve this objective three research questions were formulated, drawing on the literature relating

to the built environment, children's active mobility and their wellbeing. These questions are:

Question One: What factors are important in the relationship between active mobility and children's subjective wellbeing?

Question Two: What factors are important in the relationship between active mobility and children's needs?

Question Three: What factors are important in the relationship between active mobility and children's capabilities?

The first section of this chapter mapped out some of the key household characteristics of the case study that were important for an examination of the issue of wellbeing and children's mobility. The second section of this chapter identified and explored the factors of the children's mobility environments in the case study local neighbourhood area linked to their wellbeing. These aspects were framed within the three areas identified in Moudon and Lee's (2003) built environment model: the neighbourhood area; the places children potentially walk or cycle to; and the routes along which they travel. The survey elicited children's perceptions of such factors as the safety of the area, from both the perspective of crime and of traffic; whether the neighbourhood was a good place to walk and cycle; the accessibility of interesting places to walk and cycle to; and the characteristics of important areas such as the school zone. As parents are instrumental in shaping children's licences to be actively and independently mobile, the parents of the children were also asked similar types of survey questions. The children's photo-collages provided an additional qualitative perspective of the aspects of the neighbourhood area, places and routes. The photo-collage enabled an exploration of the particular aspects of the neighbourhood that were valued by the children, using an evaluative framework: "what I love about my neighbourhood", "what I hate about my neighbourhood", and "what I think my perfect neighbourhood would be if I could explore it without adults". The knowledge developed through the analysis of the survey and photo-collages provided a holistic description of a range of factors associated with the children's active mobility and their wellbeing.

The findings presented indicated that the children lived in a suburb that had income levels and land and housing values marginally higher than the wider metropolitan area. The households had a level of car ownership higher than the metropolitan average, and the primary mode of travel to work was by car. For the children, although most were usually driven to school, two fifths did walk or cycle. Children, however, stated that their most preferred mode of travel to school was to walk or cycle with their friends. The discrepancy between children's actual modes of travel and preferred modes of travel is problematic for a notion of children's wellbeing based on their satisfaction of preferences. The children's wellbeing, understood as the satisfaction of preferences, was clearly compromised by their usual modes of travel to and from school.

Several findings pointed to the positive aspects afforded by active mobility, providing insight into the first research question of this thesis regarding children's experience of active mobility and how this related to their subjective wellbeing. The photo-collages revealed that children appreciated the aesthetic values of the neighbourhood. Nature and natural features were integral to the aesthetic evaluations made by the children. Trees and vegetation, clean ponds, and the incidental natural objects, such as stones and trees roots, provided a means of connection to nature for the children. The neighbourhood area also contained spaces that afforded some children a sense of ownership over their local space ("my park"), providing an important means for children to develop 'a sense of place', or belonging in their local neighbourhood. Lim and Barton (2010) suggested that these symbolic associations represent richer and more complex relationships than purely aesthetic association. The representations of footpaths in the photo-collage suggested that walking or cycling routes were both functional means to get children to places within their neighbourhood, and 'places' with their own range of activities and affordances.

As identified in Chapter 2, the evaluation of needs can provide insights into children's wellbeing and mobility in neighbourhood contexts. Needs can be conceptualised and evaluated separately from the experience of individuals. The challenge for developing a needs based approach to children's wellbeing and active mobility is identifying the key factors that constitute children's needs. As highlighted in Alfonzo's (2005) hierarchy of walking needs, accessibility is one of the fundamental 'needs' for

walking. The concept of 'local accessibility'- of having both good quality activities in proximity, and feasible, safe, and comfortable means to access them- appeared to be important to the children's evaluations of their neighbourhood environment. Whereas the methods used in this thesis did not capture an 'objective' measure of the accessibility of the case study, the children's responses to the survey provided insight into how access to places was related to subjective wellbeing. The children's desire to have places and activities of interest within close proximity was evident in several of the photo-collages (n=17). The proximity of households to places, such as schools, influences the ability and willingness for children to walk or cycle (Ewing et al 2004; Mitra and Buliung 2012). The proximity to destinations is also influential on children's licences to travel independently and their level of access to activities (Timperio et al 2006; McMillan 2007). The children also identified good quality footpaths and road crossings as important to their ideal neighbourhoods. For neighbourhoods to be accessible for active mobility, a range of good quality activities need to be within feasible, safe and comfortable walking or cycling distances (Handy and Clifton 2001).

Children's needs can also be evaluated through an examination of the range and quality of places accessible by walking and cycling. This chapter has highlighted that parks and open space were integral places for children in the local neighbourhood. These places not only provided space for children to play, be active and socialise, they were also associated with the children's active and independent travel. The photo-collages revealed that children are actively engaging in the evaluation of different aspects of places, such as parks. The children actively evaluated the affordances provided by playground space, natural features, and open grassed areas. Other places such as local shops, recreation centres, sports practice and friends' houses, although not attracting a significant share of children's active and independent travel, were identified as valuable places by many of the children. A diverse range of activities within accessible distances was a reoccurring preference reported in the surveys and photo-collages by the children.

The third research question asked, what were the important factors related to children's active mobility, children's capabilities and wellbeing. As discussed in Chapter 2, children's independent mobility is an important part of children's wellbeing, when approached from a capability perspective. Approaching the

children's wellbeing through a lens of independent mobility produced a more ambiguous relationship between the children's mobility patterns and their wellbeing. Parents are key to shaping children's mobility patterns. The parents were generally supportive children's independent mobility, and many parents reported that they gave their children licences to walk to school and cross roads unaccompanied by an adult. Most children reported that they did play outside without adult accompaniment, highlighting the potential for play to facilitate some autonomy for the children. More children also preferred to walk or cycle to places with other children; the connections between friends were an important part of walking and cycling. Despite these various findings that suggest a supportive household environment for walking, few of the children walked or cycled to many places within their local neighbourhood. Children's usual travel to school, local shops, their friend's houses, and organised sporting and recreational activities, was dominated by car travel. The one exception was travel to parks, where most of the children reported they walked or cycled to their local park. When wellbeing was compared to children's potential mobility, the findings were similarly indefinite. Many children valued their potential to be independently mobile yet did not actualise this potential. Furthermore, more children who were independently mobile than not, reported that they wanted more freedom to go outside; raising the question of whether children who are independently mobile develop a preference for independence because they had experience of what independence afforded them.

Through comparing the findings of the neighbourhood level factors (area, places and routes) with the household characteristics identified in the previous section, further insight is provided into the children's independent mobility. Most parents and children considered the neighbourhood was a friendly place and a good place to walk; children identified active mobility as the preferred mode of travel; the parents were supportive of children's independent and active mobility; and that many children did have the licence to travel independently. However, the findings of the survey also indicate that most of the children's travel to places such as school, shops, friends' homes, and organised activities was by car, supporting others (Karsten 2005; Valentine 2004) that suggest children are 'retreating from the street'. One explanation for the incongruity, postulated by Kytta (2004), is that the conceptual tools used to understand the characteristics of children's active and independent

mobility, such as children's licences to travel, may not adequately reflect children's mobility. The photo-collages revealed that, despite most children being restricted by a variety of licences, on the whole the children were still able to find niches within their local area for independent play and active mobility. For example, pedestrian access ways were identified by one child as 'the best place to ride a bike'. Safe streets and culs-de-sac outside children's homes and front-yards were associated with a range of activities including playing with friends, physical activity, and practicing sport. As suggested by Jones (2000), physical and symbolic boundaries of children's geographies are permeable. The boundary separating the household domain from the neighbourhood domain, and the boundaries dictated by licences to travel are permeable and flexible; accommodating children's agency in forming and reforming their geographies. Understanding children's autonomy in regard to their mobility, as Kulman (2010) and Benwell (2013) suggest, may require new conceptual frameworks that recognize the transitional nature of children's independent mobility.

This thesis is concerned with comparing the way audits, children and their parents evaluate the built environment. The findings presented in this chapter provided insight into the aspects of the built environment that were included in children's and parents' evaluation of the walkability. Whereas most children and parents generally reported in the surveys that the quality of the neighbourhood was satisfactory in regard to safety and aesthetics ("a good place for walking"), the data provided by the photo-collages revealed a more detailed picture of the children's perspective on these issues. The photo-collages revealed that many children could clearly identify aspects of their local neighbourhoods that they considered restricted their independent and active mobility. Some of these aspects were unsafe places, such as dangerous parts of the road, or 'creepy places' that were hidden from view. Other aspects related to the lack of adequate infrastructure that supported their ability to walk or cycle safely. These concerns were raised in regard to the lack of pedestrian paths; adequate crossing; or good quality parks to go to. Finally, children were aware of places that were in disrepair or generally untidy. The findings revealed that children actively evaluated their local environments, and in some cases identified solutions that they thought would address the issues.

The presentation of findings from the survey of children and their parents, and the photo-collage exercise has provided insight into the individual, household and

neighbourhood scale factors that are relevant to children's active travel and their wellbeing. The insights into the first research objective and three related research questions provide a holistic picture of the relationship between the built environment, children's active mobility and their wellbeing. The discussion in the final chapter explores in more depth how these findings sit within the empirical and theoretical literature on children's active mobility and wellbeing. The next chapter looks at the audits of the built environment and the policy environment they operate within.

6. Exploring the built environment audits and their policy context

6.1 Introduction

Chapter 5 presented the findings of the children's photo-collages and surveys. The findings revealed key characteristics of the mobility environments of children in the case study including: children's and their parents' travel behaviour; their perceptions of their local environment; and their attitude towards children's active mobility. This section extends the findings of that chapter by exploring the policy environment relevant to children's mobility environments, before conducting an audit of the walkability of the case study. Chapter 3 outlined several important aspects of the policy environment that informed the analysis presented in this chapter. These included: formal policy documents and strategies; the range of policy agents that address active mobility policy issues; the rules and regulations that influence the extent of policy agents' power to act; and the resources that policy agents can draw upon to address policy issues relevant to children's mobility. The tools and instruments that planners and policy makers draw upon to guide decisions are an important part of this policy environment.

Three sections make up this chapter.

1. The findings are presented from the interviews with transport planners and community advocates who had knowledge and/or experience with built environment audits. These findings provide insights into the practical contexts associated with audits.
2. The policy context of the case study is explored next. The issues that are focussed on include the principal government agencies, planning strategies, regulations, and the laws governing children's mobility environments within the case study area. A content and thematic analysis of the local newspaper coverage was drawn upon here in order to highlight important issues related to children's active mobility. The analysis identifies the primary themes and narratives that emerge in relation to the management and governance of children's mobility environments within the case study area.
3. The final section of the chapter reports on a walkability audit of the case study's built environment. The audit evaluated nine walking and cycling routes that the children potentially used to access school.

6.2 Interviews with practitioners

The first section of this chapter reports on the findings from interviews with eight professionals who had experience or knowledge of the use of built environment audits¹⁴. Built environment audits are increasingly being used to evaluate the quality of urban environments for walking and cycling (Lewis 2012a; 2012b). Audits can contribute to children's active mobility by evaluating key areas of children's mobility environments (Meiklejohn and Bagnati 2013). However, to be effective in shaping these mobility environments, it is important to understand the policy environment of audits. The interviews contribute to developing this knowledge. An exploration of the various professional roles of the interviewees is presented, before the way issues related to the built environment and active mobility were defined and framed as problems by the interviewees are examined. The role of built environment audits is then discussed, and the different ways built environment audits are utilised to address policy issues are identified and explained.

6.2.1 Organisational roles of the interviewees

To begin, each of the interviewees was asked to briefly describe their organisation and their role in their organisation. Identifying these roles enables an understanding of the organisational settings that audit practitioners work within. Each interviewee was also asked to reflect on their experience with, and attitudes towards, built environment audits. A summary of the interviewees' responses is provided in **Table 6-1**. Three broad categories of professional roles emerged from the analysis of interviewees' responses and are identified in the table: the Advocacy Role; the Infrastructure Planning Role; and the Travel Behaviour Change Officer Role. It is important to note the interviewees, although primarily identified with the role they are assigned in the table, also took on one or more other roles to a lesser degree.

¹⁴ Transcripts of each of the eight interviews are provided in Appendix C-1.

Table 6-1: Description of interviewee's roles

1	Organisation	State Based Charity Walking Advocacy Organisation (Victoria)
	Role	Advocate for active travel
	Audit	Walkability Audit developed for website
	Identifier	ADVOCATE #1
2	Organisation	State Based Volunteer based Walking Advocacy Organisation (Queensland)
	Role	Advocate for active travel
	Audit	Expressed interest in using and developing a Walkability Audit
	Identifier	ADVOCATE #2
3	Organisation	State Government Department of Transport (Western Australia)
	Role	Walking, Active Travel and Access Policy Officer
	Audit	Walkability Audit developed for website
	Identifier	POLICY OFFICER #1
4	Organisation	State Government Department of Transport (Queensland)
	Role	Roads Engineer
	Audit	Road Safety Auditing- Road Crossings
	Identifier	TRAFFIC ENGINEER #1
5	Organisation	Non-government transport planning consultancy (Victoria)
	Role	Transport planner
	Audit	Conducted audits around schools
	Identifier	TRANSPORT PLANNER #1
6	Organisation	Local Government (Queensland)
	Role	Community Based Active Travel Planner
	Audit	Expressed interest in using and developing a Walkability Audit
	Identifier	TRAVEL BEHAVIOUR CHANGE OFFICER #1
7	Organisation	Local Government (Queensland)
	Role	Schools' Travel Behaviour Change Planner
	Audit	Expressed interest in using and developing Walkability Audit
	Identifier	TRAVEL BEHAVIOUR CHANGE OFFICER #2
8	Organisation	State Government Department of Transport (Western Australia)
	Role	Schools Travel Behaviour Change Planner
	Audit	Expressed interest in using and developing a Walkability Audit
	Identifier	TRAVEL BEHAVIOUR CHANGE OFFICER #3

6.2.1.1 The advocacy role

The first role identified from the interviews was an Advocacy role. Advocate #1 and #2 were members of a charity and volunteer organisation respectively, and were involved in advocating for active mobility for communities across their respective metropolitan areas (Brisbane and Melbourne). The advocacy role was described by Advocate #1 as one that developed strategies and initiatives: “designed for how communities could take action to make their neighbourhoods more walkable”. The role involved changing the attitudes and actions of community members towards the quality of their own mobility environments. The role involved being a public figure in

regard to issues of active mobility, and using this public role to draw attention to these issues. Advocate #2, who was at the early stages of establishing a volunteer walking advocacy organisation, stated that this organisation was intended to be a “lightning rod” for any individuals or groups interested or wanting to be involved in issues relating to walking.

6.2.1.2 The infrastructure planning role

The second role discernible from the interviewees’ responses was focused on the evaluation, design, and provision of pedestrian or cyclist infrastructure. Policy Officer #1 and Traffic Engineer #1 were both involved in transport policy issues at the State Government level (Western Australia and Queensland respectively). Policy Officer #1 was part of a policy unit focussed on issues of walking and access. Traffic Engineer #1 was a road engineer and described his practice as developing policy and programs involving road safety audits and crash investigations, reviewing road designs, running training sessions, and administering funding for infrastructure. The third interviewee in this role, Transport Planner #1 described his role as a sustainable transport consultant. Although some of his work involved behaviour change, the focus of Transport Planner #1’s work was “a mixture of communication, engagement, and infrastructure planning”, regarding walking and cycling, and auditing pedestrian infrastructure around schools.

6.2.1.3 Travel behaviour change role

The final role was a *travel behaviour change officer*. Travel Behaviour Change Officer #1, #2 and #3 were engaged directly with travel behaviour change at the community and school level, either in state and local government (Queensland for #1 and #2; Western Australia for #3). Travel Behaviour Change Officer #1 worked with schools in the Brisbane metropolitan area to implement strategies to increase walking, cycling, scootering, and public transport use. Travel Behaviour Change Officer #2 was involved in implementing similar strategies at the community level, and had practical experience in working with schools in Brisbane to further these aims. Travel Behaviour Change Officer #3 was part of a State Government organisation, and their role was to work with schools in the Perth metropolitan area to achieve travel behaviour change to more promote active travel. Travel Behaviour Change Officer #3 explained that their role as a travel behaviour change officer was to provide a program of change, whether in the form of education, facilitation, or by providing

incentives for behaviour change, such as prizes. Travel Behaviour Change Officer #3 described the type of work involved in travel behaviour change as, “strategic and multi-faceted”.

6.2.2. Problem framing in relation to active mobility

In Chapter 4, Curtis and Low (2012) were quoted as suggesting the way policy problems are framed and defined both limits and enables action. In other words, the manner in which problems associated with children’s active mobility are defined and understood, influences the actions taken to address them. According to Hoch (2009) the framing of complex urban problems involves both the selection of elements associated with urban issues, and their composition, or way in which issues and agendas are prioritised. Knowledge of the way practitioners, who use or develop built environment audits, define particular issues and problems can enable audits to better address the quality of children’s mobility environments. In order to develop this knowledge the interviewees were invited to identify and describe the issues they associated with the quality of the pedestrian environment, and also to describe the different ways they approached these issues in their professional practice.

Overall the interviewees identified a wide range of problems related to active mobility in general, including the absence of adequate pedestrian infrastructure, or alternatively the presence of sub-standard infrastructure. For example, the interviewees referred to unsafe traffic crossings; congestion and unsafe environments around schools; barriers to access created by parked cars; and the conflict between pedestrians and cyclists on shared pathways. Whereas the range of issues identified was similar, the manner in which actions and strategies were discussed by the interviews to address these problems differed. One distinction was apparent between the interviewees from the infrastructure planning role and those from the travel behaviour change role. This distinction was based on whether infrastructure should be provided before a travel behaviour change program had been implemented, or vice versa. Travel Behaviour Change Officer #2 stated, referring to schools: “We’d much rather give [a school] funding for infrastructure once [they’d] done our behaviour change program.” On the other hand, Transport Planner #1 disagreed with behaviour change programs preceding infrastructure provision, noting that without the promise of infrastructure by the government, the commitment to behaviour change programs in schools was unlikely to be sustained.

A further distinction was made amongst the interviewees as to whether policy action taken should be proactive or retroactive. Interviewees from the advocacy and travel behaviour change roles employed a proactive approach, which focused on building the capacity of individuals to identify and address problems in their own environments. Alternatively, a retroactive approach was described by the interviews within the infrastructure planning role. This approach framed problems as the issues that had been previously identified. For instance, Transport Planner #1 was involved in a process to rationalise an infrastructure agenda of a local government, prioritising a large number of schools according to their relative need for pedestrian infrastructure.

The final manner in which problems were described by the interviewees was in reference to the funding structures of organisations, as mentioned briefly above. The availability of funds and resources shaped the nature of possible action, and therefore influenced the issues that interviewees could potentially address. For instance, Travel Behaviour Change Officer #3 described a range of behaviour change strategies using a website to create on-line communities of schools. She indicated that the website and strategies had been developed due to limited resources and funding. The website allowed a central hub for disseminating knowledge of initiatives and strategies to increase children's active mobility. She went on to identify the problems associated with travel behaviour as that of attracting school 'buy in' and sustaining schools' commitment to travel plans published on the website. Alternatively, Transport Planner #1 stated the decision to base a school auditing program within the engineering department led to an extensive audit of forty-one schools in a local government area. He commented:

School travel plans or travel behaviour change work is often done by people in a planning, environment or sustainability section of local government, and the money is there. The money is with traffic engineering, because the money is there to build things.

Whereas in both examples built environment audits are used, they are used in very different ways, depending on the availability of resources. Funding structures and resources are an important policy environment factor that will shape the direction of built environment audits.

6.2.3. Evaluation of audits by practitioners

The interviewees were asked about their knowledge and/or use of walkability audits. Four interviewees (Advocate #1 and #2; Policy Officer #1 and Traffic Engineer #1) promoted formal walkability audits or road safety audits focussing on the pedestrian environment, and conducted the training for auditing through their organisation's websites. Travel Behaviour Change Officer #1, #2 and #3 did not promote audits through their organisations. However, all three interviewees expressed an interest or intention to develop walkability audits in the future. The intention to develop audits was suggested by these interviewees to be a high priority. For example, Travel Behaviour Change Officer #1 stated: "I can see us moving to a process where we do a community street audit¹⁵ as the first thing we do, out of anything." Only one interviewee, Transport Planner #1, had used audits directly. Overall, auditing for walkability was considered a useful practice for advancing the quality of pedestrian environments, yet was not utilised as a direct strategy by most of the interviewees.

Through the thematic analysis of the interviews, seven broad themes regarding the potential use of audits could be discerned.

1. Auditing as a means of evaluating the standards of design.
2. Auditing as a means of improving efficiency.
3. Auditing as a collaborative tool.
4. Auditing as a contribution to legitimacy.
5. Auditing as an argumentative tool.
6. The experience of conducting audits.
7. A strategic approach to auditing.

6.2.3.1 Auditing as a means of evaluating the standard of design

Interviewees from the travel behaviour change and infrastructure planning roles identified auditing as a means of evaluating pedestrian environments in relation to design standards for pedestrian and transport infrastructure. Australia has a nationally recognised series of guidelines for the management of transport infrastructure, including roads, footpaths, and cycleways (Austroads 2009a; 2009b).

¹⁵ The community street audit referred to the U.K group Living Streets audit, where a small group of people including local residents, politicians and planners, walked the streets together and identified issues and problems. See: <http://www.livingstreets.org.uk/sites/default/files/content/library/toolkits/creatinghealthyenvironments/3.1communitystreetaudits.pdf>

These national based standards and guidelines were referred to by Traffic Engineer #1 as quasi-legislation, noting that they were commonly accepted by professionals as the design norms and standards for pedestrian environment. Policy Officer #1 stated that national and state pedestrian design standards were used to develop their agency's walkability audit. The purpose of the audit, according to Policy Officer #1, was to evaluate the built environment in relation to how it conformed to good standards of design (reflected in the national guidelines). Traffic Engineer #1 was involved in designing safe road crossings and explained the types of data required to evaluate the quality of road crossings. The standards dictated the necessity of particular road designs and pedestrians crossings based on the volume of traffic on the road. For example, Traffic Engineer #1 identified the necessary data, by commenting:

You have to measure the crossing distance. You have to measure the [number of] vehicles in peak hour. You have to measure the pedestrians using it... You also need to investigate the crash history.

Improvements are then warranted when threshold measures of the quality of road crossings are crossed. The standards draw attention to micro-scale aspects of the built environment and influence the types of interventions needed. If audits are a means of reflecting standards of design, it is important to understand how these norms and standards relate to children's active mobility and wellbeing. Standards are therefore a part of the policy background that audits operate within, and an important factor in shaping the norms of design of children's mobility environments.

6.2.3.2 Auditing as a means of improving efficiency

The use of audits to enhance the efficiency of planning for active mobility highlights the critical role of resources within the policy environment. An 'audit culture' has been identified within the operation of professional organisations (Shore and Wright 1999; Power 1999), driven in part by the need to manage the allocation of organisational resources. The necessity of the efficient management of resources is reflected in the interviewees' consideration of audits. Walkability audits were reported as an important means of improving the efficiency of the data collection in the field. Built environment audits were identified by Transport Planner #1 as a means of efficiently managing the allocation of funding to infrastructure planning. Transport Planner #1

described how audits were used to rank schools in a local government area according to their need for critical infrastructure, such as crossings and footpaths. The audits contributed to a list of schools being established. As the interviewee noted:

The council is now working its way through the list of priority schools in terms of providing infrastructure to those schools...and trying to tackle three to five schools per year. Certainly [the local government] have said it has made it a lot easier in terms of managing their workload. (Transport Planner #1).

Transport Planner #1 went on to comment that council could refer to the list when schools lobbied for additional infrastructure. The need for constant consultations and follow-up with the schools was avoided because there was an apparent rational process. According to the interviewee, this allowed resources to be allocated to important matters like providing infrastructure.

The process of conducting audits was also considered resource intensive, reflecting findings within the literature on built environment audits (Brownson et al 2009). Policy Officer #1 noted that feedback from a pilot of a paper-form walkability audit indicated that the tool was too cumbersome. Conducting audits was also considered to be potentially too onerous for members of the public to conduct. Advocate #1 considered it a “big ask” to get citizens to take action through auditing as they don’t have the time. The time and effort required to conduct audits was not the only resource referred to by the interviewees. Some audits also required practitioners with suitable expertise. Some interviewees (Advocate #1 and #2 and Policy Officer #1) expressed an interest in the more technical, engineering audits, however, they commented that their organisations lacked suitably trained staff to conduct the audits. Policy Officer #1 stated that their organisation had “wanted something that could be easily used by local government officers. We wanted the tool to be very user friendly”. A fine balance therefore exists between audits’ capacity to manage and allocate resources, and their own inherent resource intensity. The resources required for some audits, including funding and expertise could discourage community members from participating. In order for audits to be employed efficiently to address issues relevant to children’s active mobility therefore requires some knowledge of the

resources, including funding, time, labour, and the level of technical expertise at hand.

6.2.3.3 Auditing as a collaborative tool

The interviews revealed that the process of auditing was a communicative process. Audits improved the capacity of the public to engage with the organisations that govern their everyday urban environments. Advocate #1 highlighted the importance of this aspect of auditing in allowing citizens to exert some control over the quality of their lives, saying:

It's about trying to create a dialogue between councils and groups....giving people, from a health promotion perspective, control over their own lives; to shape their lives, shape their own health, by impacting the local environment.

Advocate #2 supported this, referring to her intention of developing a program of auditing for walkability; one that brought community and civic leaders together. The audits would be conducted in a selected area and they would:

Invite local people, invite the local councillor, and walk a five hundred metre segment or a one kilometre segment. We would get several groups to walk along the streets and basically come back and pull it together as an audit.

Auditing was therefore a means of bringing citizens and organisations together around a planning issue, such as walkability. This function of auditing was supported by Travel Behaviour Change Officer #1, who referred to conducting the audit as a “social event”. This use of audits or street evaluations can be traced to Living Streets in the U.K, and the work of David Engwicht in Australia (2005). The use of audits in this way acts as a catalyst that creates opportunities for communication across institutions. For instance conducting an audit could allow mutual dialogue and communication between a number of key stakeholders in the quality of local environments. In regard to children’s mobility environments, this could include: parents and their children; local political members who may be representing their constituents and lobbying for change; and the organisations in charge of maintaining the functionality and quality of street and road environments. Given the potential for

greater participation in planning processes to enhance children's agency and wellbeing (Hart 1987; Chawla and Heft 2002), this function of auditing highlighted a potential for children to gain access to the planning processes that shape their everyday urban environments. Audits' capacity to facilitate children's participation in an evaluation process, and enable the collaboration of a range of governance and community institutions, will be discussed further in the next chapter.

6.2.3.4 Auditing as contributing to legitimacy

The interviewees explained that audits gave legitimacy to a range of elements in the policy environment. Interviewees reported that the formal process of auditing carried 'weight' and provided organisations' and community groups' legitimacy. For example, the interviewees representing the advocacy perspective noted that audits contributed to the legitimacy of community groups. Advocate #1 noted that:

...doing things like the audit provides a status to [walking action groups'] existence and their work and their lobby. They have had an impact because they have done things like an audit.

Furthermore, according to Advocate #1, conducting a walkability audit also legitimised his advocacy organisation:

[Audits] gave us more of an authority to speak....audits are really key for an organisation like us because...they enabled us to punch above our weight.

Equally, the status of organisations contributed to the legitimacy of the auditing process. Audits, according to Advocate #1, were more powerful if they were aligned with a particular organisation rather than an individual. The interviewee gave the example of Walking Action Groups that have used audits in the past:

You will get a lot more attention, or much more response, if you're a group. We know that the impact they can have will be far greater than if it's just one or two people.

Transport Planner #1 also referred to the ability of audits to give legitimacy to organisations and the operations of organisations. The interviewee referred to a comprehensive program of auditing schools, noting that the program allowed the

local government to both rationalise the provision of funding, and address any demands for infrastructure from individual schools through making apparent the local governments' commitment to address problems around schools. The interviewee stated that, when schools' requests were refused: "the schools are generally happy; they come back and say 'oh well, at least we're on the list'". The audits demonstrated that a legitimate process had been conducted. When designing and conducting audits to address issues of children's mobility planners need to take into consideration the formal organisations that are associated with the audit, and how this potential to project the image of legitimacy could be strategically employed.

6.2.3.5 Auditing as an argumentative tool

Another perspective highlighted by the advocates and travel behaviour change planners was that audits gave weight to arguments for change. The role of audits as a means of arguing for change is based on the legitimacy that audits provide as described above. Audits provide planners with a means to defend their decisions in political contexts. For example one interviewee, Travel Behaviour Change Officer #1 remarked:

If the council says 'why didn't you put shade in that street?' Instead of saying, we just didn't, we can say 'well we analysed the street and found it didn't need street trees'. We need to be able to back up our decisions.

As Travel Behaviour Change Officer #1 noted audits could be used as a means to 'settle' uncertainty in the community: "As soon as you show the community the facts, everything settles. It's so great." Providing evidence contributes to the persuasiveness of arguments. The implication for the use of built environment audits is that they are also political instruments, as they create knowledge that is employed strategically within the governance of urban environments (Shore and Wright 1999). Audits also have 'moral' weight as they define 'good built environments' (Lewis 2012). Friedner and Osbourne (2013, 45) recognised this when they commented: "Instead of producing accessible space, the authoritative claims made by access audit participants produced an imagined universal moral sphere". Audits therefore shape political and moral arguments regarding the quality of built environments for active mobility, and use their characteristics as legitimising and communicative tools

to frame agendas in the ongoing management and development of the built environment.

6.2.3.6 The experience of conducting audits

The interviewees revealed that the act of conducting an audit affords the auditor the experience of formal evaluation of the built environment. It enables the audit to develop tacit knowledge of the built environment within the evaluation framework provided by the audit. This approach highlights a phenomenological approach to walking reflecting the notion that, as de Certeau (1984) suggests, urban environments are made sense of by walking through them. The experience of auditing had the potential to allow issues relevant to pedestrian quality to materialize. Advocate #1 suggested this potential, noting:

...you can use walking audits and get people to start to think....actually doing this route, you know this pavement is no good. You know these cars are going fast. This is ridiculous. Why's this area sixty kilometres per hour when it could be forty kilometres per hour.

Audits in this way can be a catalyst for shifting perceptions of the urban environment. As Advocate #1 went on to say, "...changing people's perception of the environment is really the key step to an audit." Used strategically in this way, audits form a bridge between the direct experience of walking and the technical rationality that guides the planning and provision of pedestrian environments. Advocate #2 stated:

...[the auditing process] was really opening [the auditor's] eyes to what potential needs there were for walking. Then going out on site, doing audits and picking aspects of that environment and coming up with an action plan out of that audit.

Through the experience of conducting an audit, an auditor's values or groups of auditors' values may shift as the audit reveals pertinent issues. Advocate #1 considered that audits had a role in enabling people's values to shift. He stated:

You know that triangle (forms the image of a triangle with hands) and down at the bottom there's occasional walkers who don't care about anything but their car. Then there's the regular walkers. Then the promoters, you know the people who go on to facebook and go 'oh I just

went for a walk this morning.’ And up the top are the activists. So what we’re trying to do is to get people to, you know, sort of commit at a higher level. And up the top is where the walking audits sit.

The quote suggests that the way citizens think about their mobility environments is shaped by a plurality of capacities, needs and values held in regard to pedestrian environments. For example, a walking ‘activist’ is more likely to be critical and evaluative of the built environment, than an ‘occasional walker’. These values can shift through new knowledge and experiences. The audits provide an experience of evaluating actual urban space. Audits can play a role in leveraging the experience of evaluating built environments to enable people to ‘commit at a higher level’ and change the way they value their mobility environments.

6.2.3.7 A strategic approach to auditing

The interviews revealed that audits are used strategically to address the issues of quality in the built environment. The final theme identified in the analysis of interviews was a strategic approach to auditing; one that used different types of audits and drew on one or more of the six different purposes of auditing already described above. Contrary to efforts that sought to establish single, reliable forms of audits to measure a value of walkability (Pikora et al 2002; Clifton, Livi-Smith and Rodriguez 2006) the interviewees described a strategic approach where different types of walkability audits were selected and used in different ways to adapt to particular policy contexts. Advocate #2 reflected on the strategic approach, when she distinguished between a technical, standards-based approach and a community-based approach to auditing. She suggested that a technical, standards-based audit, when combined with a more “pedestrian perception” type of evaluation, would lead to more holistic overall evaluation. The combination of different types of audits allowed the strengths of each type of audit (the technical, linked to general standards of good design, and the experiential, allowing auditors to reflect on and contribute their own local knowledge of the audited area) to counterbalance the weaknesses in the other.

The emergence and popularity of new auditing technology seemed to increase the likelihood of the use of a strategic approach to auditing the built environment. This use of technology was particularly apparent in regard to the issue of limited resources. The interviewees reported on the usefulness of a combination of different

audits, audit processes, and auditing technologies. For example, as Travel Planner #1 suggested, rather than auditing all streets within a school catchment area, it was more efficient to focus direct attention on the most critical streets such as those adjacent to the school, and use desktop tools, such as Google Earth, to audit the remaining streets. The interviewees' responses also supported evidence that new emerging web applications and social media enable the inclusion of greater volumes of user-generated data into evaluation tools (Rantanen and Kahila 2009; Rinner et al 2008). Advocate #1 noted that his organisation used Facebook and Twitter as a way of extending the advocacy approach to walking issues. Rather than relying on a single type of tool, auditing involved a wide range of practices and the use of compatible types of technologies that feed into a broader evaluation process.

6.2.3.8 Summary

The interviews with various professional practitioners regarding built environment audits provide a useful introduction into the policy context of the case study. One of the key objectives for this thesis is to better understand how built environment audits can facilitate children's active mobility. The interviews with practitioners identified some key aspects of the policy environment that are important to consider in addressing this key objective. These aspects include: the various organisations and relationship between organisations that operate to address policy issues related to active mobility; the manner in which problems and issues related to active mobility are framed and constructed by key policy agents; the resources available to address policy issues, including time, labour, expertise; and the qualities and capacity of audits themselves to address policy issues. The interviews revealed that audits have various capacities for use: measuring standards; managing resources; enabling collaboration; increasing legitimacy; supporting arguments; and providing experience. However, an important limitation evident in the interviewee responses was that audits are rarely used in practice. Only one interviewee had experience of carrying out audits in a professional capacity. Furthermore, the primary benefits that emerged from the auditing that this interviewee reported related more to the audit's ability to rationalise the funding of infrastructure within a constrain budget environment. There was little evidence of audits leading to substantial change within built environments. The next section maps out the policy environment of the case

study, identifying important policy issues and agents that reflect many of the aspects highlighted in the interviews.

6.3 Policy context of the case study: organisation, rules, and policy settings relevant to built environment auditing

6.3.1 Introduction

This section explores some of the policy characteristics identified in the interview findings of the case study area, before reporting on the findings of built environment audits in the final section of the chapter. The section begins with an overview of the significant government organisations and policies that are relevant to children's mobility environments in Western Australia. The findings from the content and thematic analysis of the case study's community newspaper articles are then presented. Local newspapers provide a forum for 'public discussion' framing issues and presenting perspectives from key actors. As the newspaper is distributed amongst households in the local area, it therefore contributes to the public discourse and understanding of these issues and problems. Secondly, the newspaper itself is used strategically by many policy organisations to present their own agendas regarding the issues of children's active mobility and the management of the urban environment. The analysis provides an understanding of how policy issues manifest in the local area, contributing to the knowledge gained through the surveys and photo-collages presented in the previous chapter.

6.3.2 The policy context: thematic and content analysis of local newspaper articles

The content and thematic analysis of local newspaper articles provided a means of capturing the range of organisations, the rules and regulations, and the governance 'in action' of the settings that are central to children's mobility environments¹⁶. The following section explores the dominant content and themes related to policy that emerged from the analysis of the local community newspaper articles. Details of the methodology informing the analysis can be found in Section 4.6.3. The findings of

¹⁶ The full content and thematic analysis of articles is provided in Appendix C-5.

the content and thematic analysis are organised according to the framework used to structure the content and thematic analysis. The framework categories were:

- Policy organisations that contributed to the shaping of the children’s mobility environments.
- Policy interventions that addressed children’s active mobility.
- Places identified associated with children’s active mobility.
- Framing and representation of issues relevant to children’s active mobility.

Together the four categories contribute to an understanding of the policy and broader social factors that were at play within children’s mobility environments. Developing such an understanding is important to the objectives of this thesis as it provides details of the policy context that audits are likely to operate within the case study area.

6.3.2.1 Policy organisations shaping children’s mobility environments

The first category¹⁷ used to organise the coding of newspaper articles was the policy organisations and actors that were associated with children’s active mobility. **Table 6-2** illustrates the organisations and actors that were identified from the analysis of the newspaper articles.

Table 6-2: Content analysis of newspaper articles - policy actors associated with children's active mobility (n=67)

Organisation/ policy actor coded	Frequency (n)	Percentage
School	24	39%
Local Government	18	27%
Police – Management of road crossings	14	20%
State Government Agency- Transport, Health, Main Roads	14	20%
Police – Enforcing road rule	14	20%
Politician	6	9%
Heart Foundation	3	4%

The content analysis identified a range of State Government agencies that were reported as actively shaping children’s behaviour and mobility environments in the case study area. These included Main Roads; the Departments of Health, Transport, and Planning; and the police. Main Roads were primarily associated with the

¹⁷ For further explanation of categories see 4.7.2.

provision of road crossings (see 6.3.2.), whilst the transport, planning and health departments were associated with behaviour change programs. The analysis revealed that police played an important role within the governance of the streets surrounding schools. According to Blomley (2010) policing practices are a distinct form of governance of the street and contribute to the rationality of pedestrianisation, or reduction of mobility in the street to purely functional terms. Policing practices were evident in monitoring of speeds around school zones, the management of school crossings, allocation of resources and wardens to particular crossings that qualify under traffic and pedestrian ratio counts. The police were quoted in the papers regarding three main themes: reminding motorists when school was returning and indicating when lower traffic speeds were in place around schools (Melville Times February 5, 2009; July 28, 2009); reporting on the number of infringements being given to motorists around schools (Melville Times, February 12, 2013); and calling for community members to volunteer as traffic wardens (Melville Times, January 29, 2013). The newspapers provided police with a medium to communicate messages about appropriate travel behaviour, and actively presented their agenda regarding children's mobility environments within the local area. Policing practices therefore did contribute to maintaining some degree of quality for children's mobility environments. However, the necessity for the use of newspapers as a medium of control and the extent of violations and coverage presented in the analysis suggest that policing practices occur within a broader culture of violation of rules and laws by car drivers within children's mobility environments.

Local politicians were also represented in many of the articles. They were represented as spokespersons for community members, and as lobbyists for changes and interventions in the local area. The analysis revealed that politicians were active in shaping messages related to: the quality of children's mobility environments through organising and presenting petitions on behalf of residents' access issues (Melville Times, July 3, 2012); raising awareness of critical issues for children's safety and walking to school in order to attract community volunteers to operate school traffic crossings (Melville Times, May 26, 2009); advocating for infrastructure (such as electronic speed monitors) to be placed outside schools to assist in the monitoring of traffic speed (Melville Times, July 5, 2011); and arguing for the technical criteria used by Main Roads to be changed to better reflect community

expectations of safety (Melville Times, July 5, 2011). Politicians used emotive and persuasive discourse to frame problems relating to local environment. For example, one politician (Melville Times, November 14, 2006) argued: “the community should not have to wait for a child to be killed before the traffic warden is reinstated”. The emotive tone was in contrast with the more technical discourse used by government agencies, highlighting the competing rationalities of street users identified by Patton (2007).

The newspaper articles also focused on the role of teachers and school principals as significant agents in shaping messages about the local environment. School principals were represented as spokespeople for norms regarding children’s environments. In one article (Melville Times May 17th 2011) a principal was quoted, saying it is important to teach children to walk safely and that one way to do this was to warn them of the dangers of taking short cuts through bush areas. Such messages may shape attitudes and perceptions regarding children’s mobility environment through creating negative associations with particular places within the neighbourhood. School principals were also represented as sources of knowledge regarding the history of the local neighbourhood environment. For example, a principal advocating for a traffic warden at a crossing noted (Melville Times, May 19, 2009) that before a particular road crossing was originally implemented a child had been hit by a car and died at the crossing. In addition to principals, a number of other actors associated with schools were identified as spokespeople for issues of children’s active mobility in the articles. These included teachers, school safety officers and Parents and Community Groups (for example Melville Times, April 24, 2007; Melville Times, April 27, 2010). From a socio-ecological perspective, the school environment is important, not just as an activity setting and travel destination for children, but also as an active agent in framing issues regarding the walkable environment for the wider community.

6.3.2.2 Policy interventions to address children’s active mobility

The next category used to organise the coding of newspaper articles was the policy initiatives associated with children’s active mobility. Table 6-3 illustrates the policy initiatives, and the organisations associated with them, as they appeared in the newspaper articles.

Table 6-3: Content analysis of newspaper articles- policy initiatives associated with children's active mobility (n=67)

Policy intervention code	Associated Organisations	Frequency(n)	Percentage
Speed limit	Police; Main Roads	12	18%
Traffic lights	Main Roads; Police	7	10%
Walk Safely to School Program	Department of Health; Department of Transport	7	10%
Collaboration	Various	3	4%
Travelsmart	Department of Transport; school	3	4%
Black Spot Funding	Main Roads	2	3%
Incentives	Department of transport; school	2	3%
Student to vehicle ratio	Main Roads	2	3%
Walking School Bus	School	2	3%
Media campaign	School	1	2%
Teacher resource	School	1	2%
Traffic count	Main Roads	1	2%

The occurrence of policy initiatives in the newspaper demonstrates that children's active mobility was an ongoing social issue in the local area. The most frequently referred to initiatives regarding children's active mobility in the newspaper articles were related to the State and Local Government management of roads, addressing speeding traffic and unsafe road crossings. The National Government initiative, the annual Walk Safely to School Day, was another initiative that was frequently the focus of the local media attention. As well as a number of government initiatives, the analysis of articles also revealed that there was a range of initiatives that were driven by a more grassroots approach, highlighting the importance of collective responses to issues of road safety. Many of these were initiated by organisations or individuals associated with schools. An example of such an initiative was the Walking School Bus. The initiative was reported in two articles (Melville Times, November 14, 2006; August 26, 2008) as a means of addressing the issue of congestion around schools. Another article reported on children participating in a program to slow traffic down around their local school (Melville Times, May 4, 2010). The program saw children holding up hand-made signs outside schools to slow traffic down; the novelty and whimsy of the initiative was apparent in the coverage of the intervention. Another article (Melville Times, December 23, 2008) reported on a classroom-based initiative that involved students placing signs in the local neighbourhood identifying safe

routes to school. The articles highlight the importance of community driven initiatives to address the quality of children’s mobility environments. As explained in the previous section, audits provide a mechanism for community members to evaluate, communicate and legitimise issues regarding the quality of the built environment and therefore could form part of the suite of practices used by community based groups to manage the quality of their local urban environments. The presence of community based practices in the newspaper and the practice of auditing for walkability in this sense reflects the broader audit culture that places individuals at the centre of their own governance, and can be seen as a movement towards state or central governments transferring their rights and responsibilities onto citizens (Raco and Imrie 2000).

6.3.2.3 Places associated with children’s active mobility

The third category used to organise the coding of newspaper articles was the places associated with children’s active mobility. **Table 6-4** illustrates the places that were identified in the newspaper articles.

Table 6-4: Content analysis of newspaper articles - places associated with children's active mobility (n=67)

Place coded	Frequency(n)	Percentage
Road Crossing	17	25%
School Zone	12	18%
Footpath	6	9%
Park	6	9%
Shared Use paths	3	4%
Neighbourhood related	2	3%
Playground	2	3%
Shops	2	3%
Pedestrian Access way	1	2%

Road crossings were the most identified places in the content analysis of articles. **Figure 6-1** illustrates the content analysis and sub-themes associated with the theme “Road Crossings”.

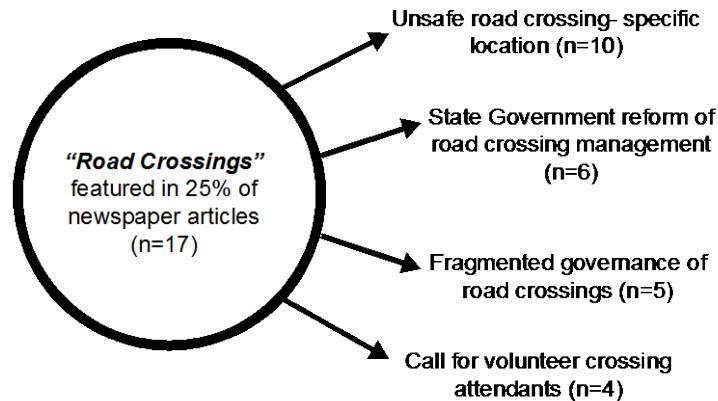


Figure 6-1: Content and thematic analysis of "Road Crossing" in the local newspaper articles.

The analysis revealed that the articles presented road crossings as a critical part of children’s active mobility environments, and the provision and management of traffic crossings was, as indicated above, frequently the focus of the articles. Two dominant characterisations of issues related to road crossings were disputes over the need for a crossing on a particular road (n=5), and disputes between organisations regarding the management of road crossings in general (n=6). Both themes demonstrated that road crossings were contested spaces. An opinion piece by the newspaper editor (Melville Times September 20, 2011) illustrated this, highlighting that there were differing expectations and norms regarding the responsibility of the management and provision of crossings:

The push earlier this month [from the State Government] to axe school crossings in the name of efficiency, seemingly neglects that such crossings are at the very heart of ‘frontline’ road safety measures.

The provision of managed crossings is determined by technical criteria, such as student to vehicle ratios (see Section 6.4.4). These ratios were used by Main Roads and the WA Police to justify the provision of school crossings in appropriate locations (Melville Times, October 23, 2012). The analysis demonstrated that the ratios and technical criteria that were employed to determine whether traffic wardens or signalised crossings are required at particular crossings were often at odds with community expectations. An example of this tension between technical measures and community expectations appeared in a series of articles that centred on a particular crossing at an intersection between two roads near a primary school. As explained in one article (Melville Times, November 14, 2006), in 2006, WA police

made the decision to remove a traffic warden from the crossing as, due to pedestrian to vehicle ratios conducted by Main Roads, it was deemed there were insufficient pedestrian numbers to warrant the traffic warden. Soon after the removal of the traffic warden, an accident occurred between two vehicles at the intersection. The accident prompted a local politician to lobby for improvements to the crossing, noting that vehicles were banking up across the intersection and drivers were behaving erratically and thus risking the safety of pedestrians. The principal of the nearby school argued that, due to increased safety concerns with regard to intersection, parents were increasingly choosing to drive their children to school. Two years later, another article reinforced the principal's claim (Melville Times, January 29, 2008), by including this statement from a parent: "Parents...are driving rather than walking their children to school and taking back streets to avoid the busy intersection". A subsequent article (Melville Times, March 4 2008) reported that, following extensive lobbying by the school, local community, and politicians, Main Roads agreed to paint 'Keep Clear' markings across the road, despite earlier suggesting that such a sign would be detrimental to pedestrian safety. Main Roads offered the justification that the keep clear signs were considered to be a way of allowing police to enforce road laws. Parents and the principal of the nearby school, whilst supporting the signs, continue to lobby for traffic lights. Main Roads was reported as saying that traffic lights would not reduce the amount of crashes, but instead would likely change the type of crashes. In August 11 2009, the newspaper reported that the State Transport Minister and Main Roads finally committed to lights being installed at the intersection. The story ends with traffic lights being installed at the intersection (Melville Times, December 15, 2009).

This narrative revealed an important aspect of the management of the quality of the built environment around schools. It highlighted that there are a number of distinct policy agents operating and driving change within particular settings within the local environments. In this case parents, the school, the roads agency, a politician, and the Police were active in shaping arguments relating to the quality of a critical location within a school environment. The management of the urban environment by government agencies is rules-based and operates in local environments guided by technical frameworks that are based on external standards and norms of safe design. The contrast between external standards and the local knowledge of

residents reinforces the notion that community members' norms, expectations and values regarding the quality of the street environment are often distinct from the technical frameworks. For example, in another article, a resident was quoted as saying that he had observed that, although a road 'ticked all the boxes' in relation to the standards of design for the designated speed limit, the nature of road traffic had changed over time, and more dangerous behaviour was being observed. The examples above highlight that these technical frameworks often may not reflect community expectations of what constitutes safe design. In a socio-ecological sense, the interaction between external standards, reflecting the policy domain within the neighbourhood scale, creates a range of potential relationships between different actors that are important to consider when planning for improved quality of children's mobility environments.

The second most frequently occurring place coded in the analysis was the area immediate to schools – the school zone. **Figure 6-2** illustrates themes most frequently associated with the school zone in the articles.

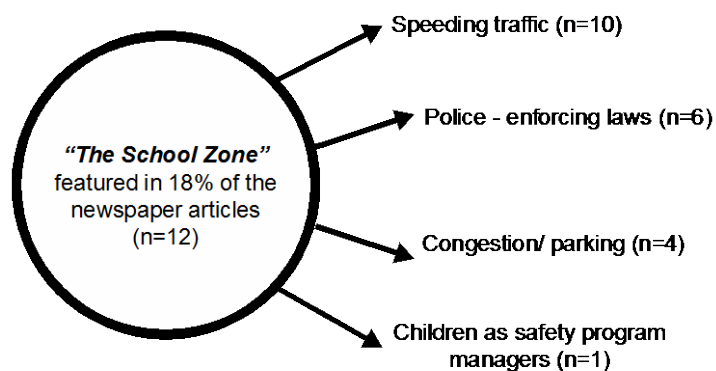


Figure 6-2: Content and thematic analysis of "The School Zone" in the local newspaper articles

The issue of driver behaviour, in particular speeding, was the problem most frequently associated with the school zone and was directly referred to in ten of the twelve articles on school zones. Two articles (Melville Times, November 2, 2010; Melville Times August 3 2010) presented a perspective on children's behaviour in the streets outside schools. The articles suggested that children's behaviour in streets was 'unpredictable', and that there was an increased risk of children being involved in accidents around schools due to driver behaviour. In one of the articles

(Melville Times August 3 2010), the editor suggested that it is ‘fact’ that children lack spatial awareness and common sense, arguing that ‘young children’ were noted to be inexperienced with traffic and therefore prone to misjudging the speed of traffic. This point of view is reflected in the State Government Road Safety Strategy, which states: “Most child pedestrian crashes are the result of errors made by the children. Children under 10 do not have the skills to negotiate roads without adult supervision” (Office for Road Safety 2013, 2). Such comments reflect the role of public agencies as risk-managers. Although the need for the management of risk is valid and necessary in school environments, the case study findings presented in Chapter 5 showed that 37% of children under 10 usually walked or cycled to school. An unintended consequence may be that the capacities of children to act as responsible and capable agents within their own mobility environments are disregarded (Valentine 2004). When children’s capacity to act is framed as ‘unpredictable’ and erratic, the laws and regulations designed to create a ‘protective spaces’ (Hartas 2008) may lead to a ‘controlling space’ where children’s freedom to be mobile is further restricted.

6.3.2.4 The framing and representation of issues relating to children’s active mobility

The final category used to organise the coding of newspaper articles regarded the manner in which issues relating to children’s active mobility were framed and represented in the newspaper articles. Table 6-5 illustrates the frequency of the various problem-framing codes that were identified in the newspaper articles.

Table 6-5: Content analysis of newspaper articles - problem framing of issues associated with children’s active mobility (n=67)

Problem framing coded	Frequency(n)	Percentage
Traffic safety	29	43%
Congestion	11	16%
Health promotion	10	15%
Equity	6	9%
Urban consolidation	5	7%
Independent mobility	5	7%
Funding / resources	5	7%
Access	4	6%
‘Stranger danger’	4	6%
Crime	3	4%
School expansions	2	3%

Traffic safety was by far the most prevalent issue identified in the content analysis. Issues related to congestion such as parking, and health promotion, largely through the walk to school initiatives were also frequently included in the articles. Issues related to ‘stranger danger’ and ‘crime’ were identified, but not common. An analysis of sub-themes associated with the theme of traffic safety is illustrated in **Figure 6-3**.

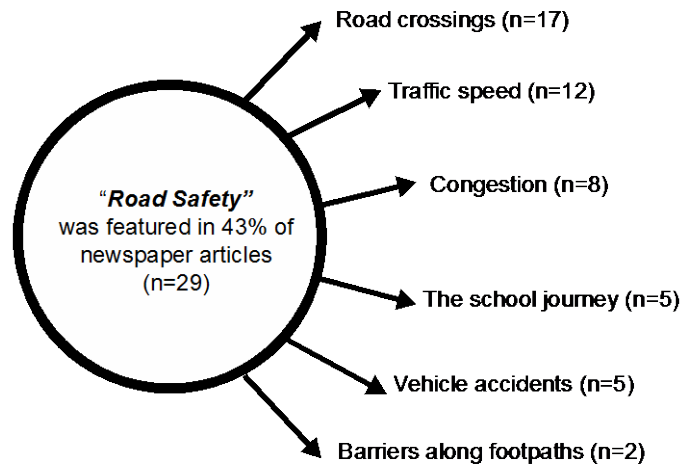


Figure 6-3: Content and thematic analysis of "Road Safety" in the local newspaper articles.

The thematic analysis revealed that issues of traffic safety were reported in at least one of three ways: the expression of general concerns over the safety of streets; concerns regarding specific places in the local area; or when reporting on community members advocating for change. General concerns regarding the safety of streets arose in response to the release of policy reports or academic research. These articles tended to focus on a particular organisation’s spokesperson presenting a response to the report or research. For example, a local politician used a recently released State Government study citing that road traumas were the leading cause of death and injury to children, to garner community support for the operation of road crossings (Melville Times, May 26, 2009). The next manner in which road safety issues were reported, that of concerns related to particular places, similarly arose in response to a catalytic event, such as an accident. These articles tended to be populated with political actors furthering an agenda. For example, one article (Melville Times, November 14, 2006) reported on a local politician advocating for a crossing at an intersection in response to a traffic crash. These incidents or events, such as an accident or release of a report, are used strategically by organisations to draw attention to issues and encourage further action towards achieving sustainable

mobility. This has relevance to the issue of conducting audits as a 'social event' as identified by one of the interviewees previously, as audits may have the potential to operate as catalysts for focusing attention on issues relevant to children's mobility. The final way in which road safety was reported in the articles was by focusing on local community members advocating for issues related to road safety. In one article (Melville Times December 4 2007) a resident was pictured outside his home with a hand painted sign reading: "Slow down 70 km/h not 170km/h. The article suggests the resident's action was precipitated by a nearby crash involving a speeding driver.

The pressures from increased congestion and the implications for active mobility were coded in eight of the articles. One issue that articles reported on was the proposed expansion of school sites in the area identifying congestion and parking as potential problems presented by local residents (Melville Times, February 20, 2007; October 9, 2007). The issue of funding and resources, although only appearing in five of the articles, is worth discussing as the interviewees raised it as an important aspect of built environment auditing. The issue of limited funding was reported as leading to governing organisations trading off infrastructure projects. In one article (Melville Times, July 3, 2012) reporting on new pedestrian infrastructure installed in response to complaints made by a pedestrian in a wheelchair, the Local Government commented that it had also made the decision to cancel additional plans to provide other footpaths in the area. The issue of funding and allocation of resources was also apparent in articles that featured a disagreement between different agencies, or levels of government, over the responsibility for urban services and infrastructure. For example, one such argument emerged following media releases by the State Government about the shifting of responsibility of the management of school crossings from the State to Local government (Melville Times, December 14, 2010; September 20, 2011). The ensuing debate was focussed on what level of government bore responsibility for the wellbeing of children. In an article (Melville Times June 15, 2010) related to this issue, a local politician stated:

Community and child safety is at the forefront of local councils and that is why they should take over managing traffic wardens.

The article goes on to quote the CEO of the local council cautioning that funds would be cut and the local government would be 'short-changed' if there was any shift in

responsibility for management (Melville Times, September 20, 2011). Such articles provide an indication of the political environment defining the resource capacities of organisations. The articles reinforce the importance of the resource contexts of audits, including the organisations that shape them, to audit designers who seek to strategically design and use audits to improve the quality of the children's mobility environments.

6.3.2.5 Summary

67 articles focusing on issues relevant to children's active mobility were analysed for their content and themes. The significant policy organisations that shape children's mobility environments were identified, and the relationship between different organisations was explored. The children's mobility environment in the case study was described as 'contested space'; that is organisations employed differing arguments regarding the management of children's mobility spaces. These arguments were sometimes based on differing expectations or norms regarding the design or spatial-behaviour within these spaces. Children's mobility environments were also shown to be resource constrained. The 'contested' and 'constrained' nature of children's built environments is important to highlight in regard to the conduct of audits. The next section reports on the findings from two built environment audits of the case study.

6.4 Evaluating the quality of the built environment for children's active mobility: the audit findings

6.4.1 Introduction

So far the presentation of findings from the interviews and the content and thematic analysis of local newspapers have highlighted important features of the policy environment relevant to auditing the built environment for children's active mobility. The interviews provided an overview of the practical contexts that audits are carried out in Australia. A number of different ways audits were used and an overall strategic approach was identified. The next section focussed on the range of organisations, rules and regulations influencing children's mobility environment in the case study area. The content and thematic analysis of the local newspaper coverage of issues relevant to children's active mobility revealed that the governance of children's mobility environments was fragmented and contested.

This section reports on the findings a walkability audit that evaluated the quality of the built environment of the case study. A walkability audit of the routes that children in the case study potentially used to walk and cycle to school was conducted. Moudon and Lee (2003) identify route-based audits as one of the means of evaluating the quality of the built environment for walking and cycling. The audit used was developed by the Western Australian Department of Transport and is available on their website (WA Department of Transport 2011). The rationale for using this tool was to audit the built environment with a typical evaluation tool readily available to planning practitioners or community members within the case study context. Furthermore, the tool is based on the standards for pedestrian and road infrastructure that guide planning, design and decision making in the case study context. These standards are primarily based on the Austroads Guides to Traffic Management and Road Design, and Australian Standards (Austroads 2009a; 2009b; WA Department of Transport 2011).

The use of the built environment evaluation technique provided an indication of the quality of important aspects of children's mobility environments within the case study area. The knowledge that emerged from the audit is used to contextualise the household and neighbourhood findings discussed in the previous chapter. A brief discussion of the background of the audit, its use within the Perth context, and its methodological characteristics begins the section. A meta-analysis of eight audits published by government agencies is then reported. The meta-analysis served to locate the audit within the field of tools available in the Australian and New Zealand context¹⁸. The methodology of the audit is then explained, before the findings of the audit are presented. The investigation of the audit background and meta-analysis is important to the objectives of this research, as the design and methodologies of audits have implications for evaluating wellbeing (Lewis 2012). The findings of the audit are then presented, drawing in discussion from the findings from other methods within this research.

¹⁸ The decision was made for New Zealand government websites to be included in the search strategy following the interview process. One interviewee identified the origins of some street auditing tools, and identified links between active mobility policy actors in Australia and New Zealand.

6.4.2 Meta-analysis of audits in the Australian context

In order to locate the Western Australian audit tool in a broader Australasian context, a meta-analysis of walkability audits published on the Australian and the New Zealand Government websites was undertaken. The meta-analysis enabled an understanding of the common types, content, and methodological characteristics of publicly available audit tools. The comparison places the Western Australian walkability audit in the field of similar audits. An initial search of twenty-one websites of transport and planning departments of Australian state and New Zealand national governments was conducted¹⁹. Five of the twenty-one websites contained an audit or a link to an allied organisation with an audit. The sample of audits that were selected for analysis is included in Table 6-6. When directed to websites outside of the government agency, usually allied government departments or non-profit organisations, the agency is specified.

Table 6-6: Search strategy for audits included in the meta-analysis

Nation or State	Agency	Additional Agency Link Provided	Audit URL
Western Australia	Department of Transport		WALKABILITY AUDIT TOOL http://www.transport.wa.gov.au/activetransport/24033.asp#23344
Victoria	Department of Transport	Heart Foundation	NEIGHBOURHOOD WALKABILITY CHECKLIST http://www.heartfoundation.org.au/active-living/walking/Pages/welcome.aspx
		Victoria Walks	WALKING AUDIT TOOL http://www.victoriawalks.org.au/Walking_audit/
			BIKEABILITY TOOLKIT: Quick area audit http://www.travelsmart.gov.au/bikeability/index.html
New South Wales	Department of Transport	Travel Smart	BIKEABILITY TOOLKIT: Detailed area audit http://www.travelsmart.gov.au/bikeability/index.html
			BIKEABILITY TOOLKIT: Route based audit http://www.travelsmart.gov.au/bikeability/index.html
Queensland	Department of Transport		PEDESTRIAN SAFETY AND ACCESSIBILITY AUDIT TOOLS http://www.tmr.qld.gov.au/~media/6297b7a9-d9c9-42f3-8f3d-0e9078618996/trumvolume3311.pdf
New Zealand	New Zealand Transport Agency		GUIDE FOR UNDERTAKING COMMUNITY STREET REVIEWS http://www.nzta.govt.nz/resources/community-street-reviews/docs/csr-guide.pdf

Auditing for cycling was also included in this search. A total of five additional audits were found for analysis. One of the five audits (the New South Wales TravelSmart Bikeability Toolkit) had three distinct parts: one being a quick audit of an area; one a

¹⁹Keywords used in the search were: “walkability”; “walking”; “cycling”; “pedestrian”; “audit”; “toolkit”; “checklist”; and “instrument”.

more detailed audit of an area; and one a route based rather than area-based evaluation. In order to provide a comparison of each of the audits identified in the search, a review of the key characteristics of the audits was conducted. The meta-analysis focussed on a number of key categories²⁰.

A summary of the review of audits is provided in **Table 6-7**.

²⁰ An explanation of these categories can be found in Appendix B-7.

Table 6-7: Review of built environment audits from Australian and New Zealand websites

Name	Author	Items	Evaluation	Rating/output	Unit of analysis	Supporting information	Different groups included	Intended use	Additional notes
<i>Community Street Review</i>	New Zealand Transport Agency	Items notes include safety from traffic; safety from falling; obstacle free; secure; pleasant; efficient; delay; and direct.	There is a rating from very bad to very good, each with example statements.	Review is to provide supporting evidence in a submission to authorities.	Route. Street section/segment. Two elements: path length and crossing.	Extensive supporting material	Participant information section asks question whether the auditor could walk unaided.	Community group, possibly in partnership with planners.	None
<i>Walking Audit Form</i>	Victoria Walks	6 Items identified , each with a number of related issues: footpaths; facilities; crossing the road; traffic; safety (personal); and aesthetics	Includes a rating from 0 to 3. Space for auditor observation.	No overall rating. Findings are to inform a report, based on whether the issue will be a problem for no-one, some people or everyone.	Route, but area and specific location can be evaluated.	Each issue has explanatory notes.	Yes. One rating identifies the issue as relevant to children, elderly or people in prams.	Individuals and groups; community sector.	None
<i>Neighbourhood Walkability Checklist</i>	Heart Foundation	4 Items with a number of related questions: walker friendliness; comfort; safety; and convenience and connectedness.	Yes or no. Positive responses are accumulated.	Results in an overall walkability score that ranges from good to bad walkability.	Route	Brief introduction. No additional support material provided for questions.	Several questions relate to comfort and safety of children, elderly, wheelchairs and prams.	Individuals and groups; community sector.	None
<i>Pedestrian Safety and Accessibility Audit Tools</i>	Queensland Main Roads	14 items: land use and pedestrian context; footpaths; pedestrian facilities and accessibility; catering for pedestrian target groups; pedestrian and traffic volumes; around schools; traffic and road environment; temporary road-works; signing; pavement marking; lighting; visibility; pedestrian fencing; and pedestrian amenity.	Yes or no. Space provided for additional comments.	Audit checklist to accompany a report. The intent of the checklist is to identify specific problems.	Route	Limited supporting information. It is suggested auditors should be accredited road safety auditors.	Yes. Individual questions relate to access for wheelchairs, elderly. Schools are a distinct item	Road authority practitioners.	Also contains a questionnaire survey for pedestrians and an observational survey for pedestrian behaviour.

Bikeability Toolkit: Brief LGA Checklist	Australian Government Travelsmart	4 items related to spatial issues- coherence; directness; attractiveness and convenience; and safety and comfort.	Rating: satisfactory, issues, and N/A. Space for additional notes and comments.	The total responses are added together and a star rating is used to evaluate the area. For example, 4 stars represents a good cycling route.	Area	Brief, two page explanation of the audit and some guidance on how to use it.	Some points relate to school zones.	Practitioners from local and state government, developers and community groups.	
Bikeability Toolkit: Detailed LGA Checklist	Australian Government Travelsmart	Items relate to level of service: network; signage and information; level of facilities; maintenance; shared paths. Other items include comfort and attractiveness; end of trip facilities; and security.	Rating: satisfactory, issues and N/A. Space for additional notes and comments.	The total responses are added together and a star rating is used to evaluate the area. For example 5 stars is a good cycling route.	Local government area, including policy and organisational characteristics of the local government.	Brief, two page explanation of the audit and some guidance on how to use it. Many individual items have additional explanation.	Some points relate to school zones.	Practitioners from local and state governments, developers and community groups.	Some of this checklist is related to the strategic direction and policies of local governments.
Bikeability Toolkit: Route Based Checklist	Australian Government Travelsmart	7 items: coherence; directness; comfort and convenience; safety; intersections; off-road paths (if applicable); and end-of-trip facilities.	Three types of cycling category are available for evaluation: commuting; recreation; and primary school student. For each of these there is a rating satisfactory / issues / or N/A. There are two additional columns so that issues can be described.	The total responses are added together and a star rating is used to evaluate the area. For example 5 stars is a good cycling route.	Route	Brief, two page explanation of the audit and some guidance on how to use it. Many individual items have additional explanation.	The bikeability for children can be evaluated separately.	Practitioners from local and state governments, developers and community groups.	
Walkability Audit Tool	Western Australian Department of Transport	7 Items: Overall impression; pathways; crossings; street furniture and signage; personal safety; adjacent traffic; and aesthetics.	Combination. Yes or no. Rating: unsatisfactory/ unsatisfactory but acceptable; and satisfactory.	Audit is to accompany a report. The report template is provided.	Section, identified on a map. Routes are evaluated in the section.	Extensive supporting material.	Yes. Path accessibility, crossings and visibility.	Local government planners, consultants and community groups.	

Each of the audits focused on similar domains relevant to active mobility, including safety, the presence of supportive infrastructure, the quality of road crossings, and the aesthetic quality of mobility environments. All audits, except two of the three bikeability audits, used a route, or segments of a route as the primary unit of analysis. The audits differed in the level of detail that they included in their evaluation. For example, whereas most audits contained seven or less items for evaluation, the Pedestrian Safety and Audit Accessibility Tool contained fourteen items. Within each item evaluated by the audits, there were several criteria. The advocacy audits (from Victoria Walks and the Heart Foundation) contained significantly less criteria for evaluation than the more technical based audits, most likely due to the intended auditors being lay members of the community. The bikeability audits contained more references to road and traffic engineering technologies (bike boxes, rumble strips and skid resistance paving), highlighting the importance of technical instruments to the management and facilitation of multi-modal mobility within streets, and particularly on roads (Patton 2007).

Another point of difference between the audits is the way audits were designed to capture different perspectives based on age and gender. A children's perspective within the audits was captured in different ways. In some audits (*Pedestrian Safety and Walkability Audit Tool (Queensland)*, and the *Walkability Audit Tool (WA)*) questions were contained that required the auditor to adopt the perspective of a child in the evaluation. For example, one question asked whether a child would have enough time to cross the road. The *Bikeability toolkit- route based measure (NSW)* required all questions to be addressed from the perspective of a child – a separate column is included labelled 'children'. The other two *Bikeability Toolkits* instead contained questions regarding specific places in the neighbourhood frequented by children, including the school zone and parks. However, what remains unclear is how these audit items were to include children's perspectives; that is whether auditors were intended to make assumptions about a child's perspective on the audited items.

For this research thesis, given the location of the case study within the Western Australian context, the Walkability Audit Tool developed by the Western Australian Department of transport was selected as the audit tool used to evaluate the case study built environment. The meta-analysis shows that the tool is indicative of the

range of audit tools available within the broader Australian context. The tool focuses on a range of comparable domains and refers to existing standards of pedestrian design.

6.4.3 The walkability audit methodology in the case study

The first step in planning for auditing the case study area was the selection of children's walking and cycling routes to audit. Carefully planned route-based audits can provide a valid representation of the walkability of an area. For example, McMillan et al (2010) found in a selection of street segments in Houston, that a sample of as little of 25% of segments within 400 metres of a development was representative of the total street segment quality. Urban contexts do vary and it is important to carefully assess the urban form before selecting areas to include within the sampling frame. However, it remains that not all street segments need to be evaluated in order to establish valid findings.

For this research, nine routes were selected to be audited. The nine routes were selected in order to link the school with the total number of households participating in this research that were located within two kilometres of the primary school. These household locations were geocoded in ArcMAP 10 and nine distinct clusters of participating households were identified. A starting point of each of the routes was selected based on its relationship with each of the households in each cluster. The starting point was deemed to be the intersection closest to the household within the cluster that was furthest away from the school. **Figure 6-4** indicates the nine clusters of households and the point chosen to begin the walkable route. The only apparent exception to the above selection rationale is Route 4, which began a distance away from the furthest household. This is because the maximum length of the walkable route was capped at 2 km.

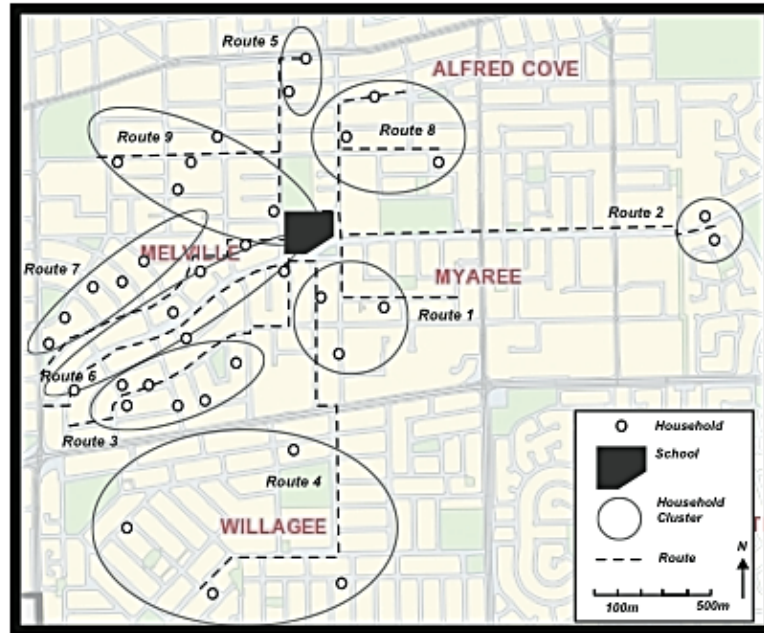


Figure 6-4: Map of household cluster and walking routes. Source: author. Basemap: City of Melville (2013)

Once the starting point for each cluster was selected, a route to the school was mapped. The route was based on the shortest distance path to the school. The shortest path was determined using ArcMAP 10 and was based on road network data. This method of mapping pedestrian routes has potential problems with validity, as road networks do not necessarily capture pedestrian paths, open space, or other short cuts that may improve the pedestrian network connectivity (Chin et al 2011). In order to address this issue a desktop audit of each of the routes was conducted using GoogleEarth. Remote sensing software, such as GoogleEarth, has been found to provide measures of the built environment with acceptable validity, as long as they are confirmed through some secondary observation (Ben-Johnson et al 2013). The desktop audit revealed a number of missing links in the pedestrian network, primarily as a result of cul-de-sac road designs with pedestrian accessways. One significant change in the location of a route resulted because of the presence of a pedestrian footbridge in proximity to Route 4. The pedestrian bridge was selected as a defining feature of the route as it crossed a very busy highway and the route was redesigned to take this into account. **Table 6-8** illustrates a summary of each of the routes and provides a brief description of significant qualities.

Table 6-8: Brief description of the routes

	Route Length (to nearest 50m)	Number of Sections	Route Description
Route 1	1150m	1	The route begins with a short segment along a residential street with no pedestrian paths, followed by a direct route to the school alongside a main road with crossing.
Route 2	2000m	2	This route follows a main road to the school. There are two sections divided by a major inter-suburban arterial road.
Route 3	1350m	1	The route follows a number of local roads with one main road crossing.
Route 4	2000m	2	A major highway divides two sections.
Route 5	870m	1	Straight path to school entrance. No major road crossings.
Route 6	1280m	1	Direct path along a main road. Road will be crossed at the safest point along the route.
Route 7	1350m	1	Route consists of a number of local roads. No major road crossings.
Route 8	1050m	1	Primarily a straight path to the school entrance. No major road crossings.
Route 9	1200m	1	Route is along two local roads to the school entrance. No major road

The researcher walked and audited each of the routes on separate days during January, February and March in 2013. The audits were carried out at various times between 8am to 3pm. Inter-rater reliability tests were not carried out and as such this is noted as a limitation of the current study (Brownson et al. 2004). However, the primary purpose of the current study was not to test the reliability of the audit, rather to investigate the findings of a publicly available walkability audit in relation to children's evaluations of the same space (drawn from photo collage and children's survey).

There are methodological limitations with the sample selection of routes described above and these are important to outline in order to improve the validity of inferences made from reading the findings. The sample size of households was insufficient in order to infer causal relationships or associations between the built environment and individual children's behavioural characteristics. Several of the routes only had two households in close proximity and it is tenuous to infer that there is any relationship

between the quality of the route and the behaviour or attitudes of parents and children in the households. That being said, the characteristics of the routes and attitudes of parents and children analysed together provides qualitative insights into the relationships between the cohort of children and the route characteristics captured by the audit. As Lewis (2012a; 2012b) posits, audits evaluate the extent that built environment potentially supports collective wellbeing. Auditing a number of routes and comparing the findings with the children's and their parents' evaluation of the same place, provides an insight into how the audit evaluates the built environment in relation to the collective wellbeing of the children.

6.4.4 Findings of the walkability audit

The walkability audit was separated into six categories: general information; paths; road crossings; safety; traffic; and aesthetics and amenities. Each category contained a number of questions that captured the qualities of the route. A full table of findings from the audit is provided in Appendix C-2. A summary of the audit findings for each category is provided below.

6.4.4.1 Category one: general information

The first category of the route audit captured general information such as significant land uses, and allowed comments regarding the quality of the route to be made. The types of land-uses recorded indicated that the area was primarily residential, with a limited number of small commercial sites observed. Parks and playgrounds were identified on four of the nine routes. Some light industrial land-uses were noted along Route Two. Two routes recorded local shops. The findings indicate that there was modest diversity of land uses. The general comments captured highlighted some of the significant features of each of the routes. These are noted within **Table 6-9**.

Table 6-9: General comments captured by the route-based audit

Route	General comments
1	The main feature noted is the lack of pedestrian path along two segments
2a	Main road; however good pedestrian infrastructure
2b	Main road; however good pedestrian infrastructure
3	There are two segments along this route that do not have any pedestrian paths
4a	The first part of this route is characterised by lower standard of housing stock than housing recorded closer to the school
4b	There is a moderate hill along this route
5	The route is of good quality, however several linking street segments do not have any pedestrian infrastructure
6	The route is of good quality. It is along a main road.
7	The route is generally of good quality, although one link has no path. There are rubbish bins all over the pedestrian path on this particular day.
8	The primary pedestrian link along this route is of good quality. However there is another link which is of poor quality with no pedestrian paths and many barriers.
9	This route is overall of good quality. There is a construction site midway along the route and the pedestrian pathway is damaged and would be difficult to navigate for people in wheelchairs or with prams.

6.4.4.2 Category two: paths

The audit contained several categories of questions relating to paths, including the type of path, path width, path conditions, the presence of obstructions along the path and the connectivity of the path. The types of questions were predominantly inventory style questions, for example identifying the presence and location of paths, and/or the presence of physical barriers. Although good quality paths were recorded along each of the routes, five of the nine routes had a path on only one side of the street for a section of the route. More significantly, four out of the nine routes had a section of the route in which a pedestrian path was absent from the street altogether. The absence of paths along the route did not comply with acceptable standards of neighbourhood design in Western Australia. The Liveable Neighbourhoods policy sets out the accepted standard of footpath provision in neighbourhoods stating that:

(f)ootpaths should ideally be provided on both sides of the street. For costs reasons, footpaths may be omitted from one side of the lower order access streets, unless the street forms an important pedestrian link (eg to a school, centre or station) (WAPC 2007, 48).

The previous chapter revealed that the absence of footpaths appeared several times in children's photo-collages of what they hate in their neighbourhood. The issue of the absence of path infrastructure was also revealed in the analysis of newspaper articles, with one article (Melville Times, July 3, 2012) reporting on the local government installing footpaths along one street in response to complaints by a resident in a wheelchair who was continually being forced to travel on the road. The audit measured the standards of design and infrastructure regarding paths and found that five out of nine of the routes were problematic. There was therefore a correspondence between the focus of the audit's evaluation of paths, and the children's experiences and values regarding active mobility.

The audit also evaluated the width of paths. In the audit form, these questions referred to the acceptable minimum standards of quality of paths as contained in pedestrian infrastructure design guides (Austroads 2009a). The average width of paths along each of the routes was measured as ranging between 1.3 metres to 2.1 metres. 1.3 metres was marginally above the minimum recommended pedestrian path width for single wheelchair use in Western Australia, which was 1.2 metres (WA Department of Transport 2011,10). The audits indicated that the width of paths along all routes were within the acceptable range according to design standards. The audit also recorded minor issues related to path conditions, including uneven surfaces, debris and sand. However, these were evaluated as not being significant enough to create a barrier for walking, cycling or other forms of mobility such as wheelchairs and prams. Some permanent partial obstructions in the form of shrubs that had overgrown the path were observed along two of the routes. However, the most significant barriers to movement were noted in the temporary obstructions categories²¹. Temporary obstructions were recorded along five of the nine routes. In four cases these were cars that were parked either partially or fully across the pedestrian path (**Figure 6-6**) within the street environment surrounding the school at the beginning of the day. In the other case, rubbish bins left out on the street for

²¹ Temporary obstructions included parked cars, rubbish bins, building materials, temporary signs etc.

collection formed either partial or total barriers (**Figure 6-5**). This issue was also apparent in the newspaper analysis (one article (Melville Times, October 26, 2010) identifying bins lining the street along the footpath forcing pedestrians onto the road) and the children 'HATE' collages (temporary obstructions such as parked cars and building materials were recorded).



Figure 6-5: Rubbish bins as barriers along the footpath. Source: author.



Figure 6-6: Parked cars as barriers along the footpath. Source: author.

The issue of temporary obstructions along paths could reduce children's real freedom to access opportunities, even if good quality paths were present. Theoretically, the barriers forced children onto roads and increased the risks of injury and potentially contributed to negative perceptions regarding safety of walking or cycling in the neighbourhood. Barriers were noted at particular times. Cars were identified when the streets around the school were most congested and the bins were identified on only one day the audit of routes was conducted. The point highlights the importance of using audits to capture the range of conditions as built environments may change over time.

6.4.4.3 Category three: road crossings

The audit captured several qualities relating to road crossings. These included: the type of crossing; the ability, or time it took the auditor to cross the road; the conditions of the crossing; and access at the crossing for pedestrians with a disability. Similar to the previous questions on pathways, design standards were used to provide examples of good road crossing design. The case study school was located at the intersection of a busy neighbourhood connector road and a local residential street. Five of the nine routes required the crossing of at least one 'busy road'. Route two and four required the crossing of a neighbourhood distributor, and route four required the crossing of a major highway. Each of the identified significant road crossings had a measure included to assist the crossing, either a signalised traffic light crossing or a temporary warden controlled school crossing. Of the routes that did not cross the main road, most minor roads had some form of crossing infrastructure such as a refuge island. The audit identified that the design of all crossings was of good quality. No hazards or design issues were apparent. The design of significant crossings was of good quality, with directional and warning Tactile Ground Surface Indicators; acceptable kerb gradients; and grab rails. At the signalised crossing, the time provided to cross was more than sufficient for the auditor. However, the auditor was an able-bodied adult and noted within the audit that the crossing would need to be evaluated in relation to pedestrians with differing capabilities, such as children, the elderly and the mobility impaired.

In order to gather a more detailed evaluation of the conditions at the significant road crossings near the school, an observational survey and pedestrian and vehicle count were conducted at two crossings directly adjacent to the schools. The crossings were selected because they were located on a district distributor and the road was identified as a potential barrier to accessing the school. **Figure 6-7** illustrates the locations of the crossing in relation to the school. Crossing A was a designated school crossing that was, ideally, supervised by a volunteer traffic warden between 8.15 a.m. and 9 a.m. and 3 p.m. and 3.45p.m each school day. Crossing B was a signalised crossing at traffic lights.

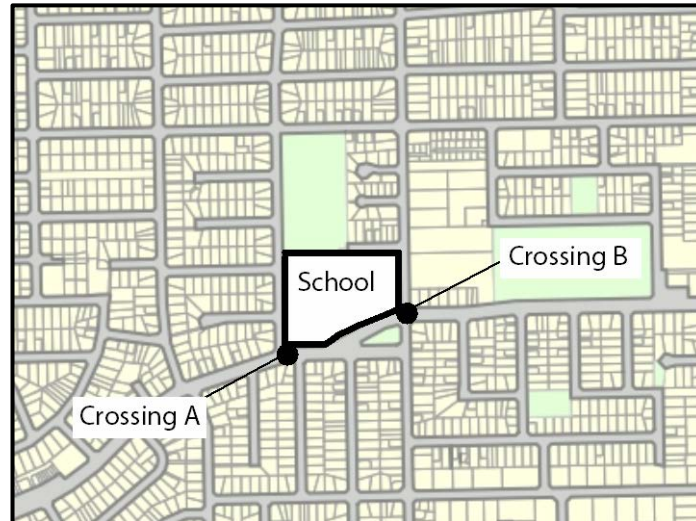


Figure 6-7: Location of crossings (Source: Author)

A count of vehicles and pedestrians was undertaken at each of the crossings in the morning and afternoon over three weekdays (the two crossings were observed over six days in total). The temperature and weather conditions were recorded on each of the days of the observations. Average temperatures and little rain were observed, ruling out any atypical travel activity for those days. A one and a half hour period in the morning (7.30 a.m. to 9.00 a.m.) and a one hour period in the afternoon in the afternoon (2.45 p.m. to 3.45 p.m.), were selected for the counts to be recorded, based on the expected times that children would be utilising the crossing. The template used to record the vehicle and pedestrian rates was based on the template used in Western Australia to evaluate school crossings (WA Police 2013) and is included in Appendix B-6. In addition to the counts, the template allowed observations to be made. In reading the findings it is important to note that no recording of observed ages was made; therefore the reporting of children in the findings may reflect children of ages higher or lower than the children participating in the case study research.

The proportion of pedestrian types (children / adults / walking /cycling) for the morning and afternoon period at Crossing A is illustrated in **Figure 6-8** and **Figure 6-9**.

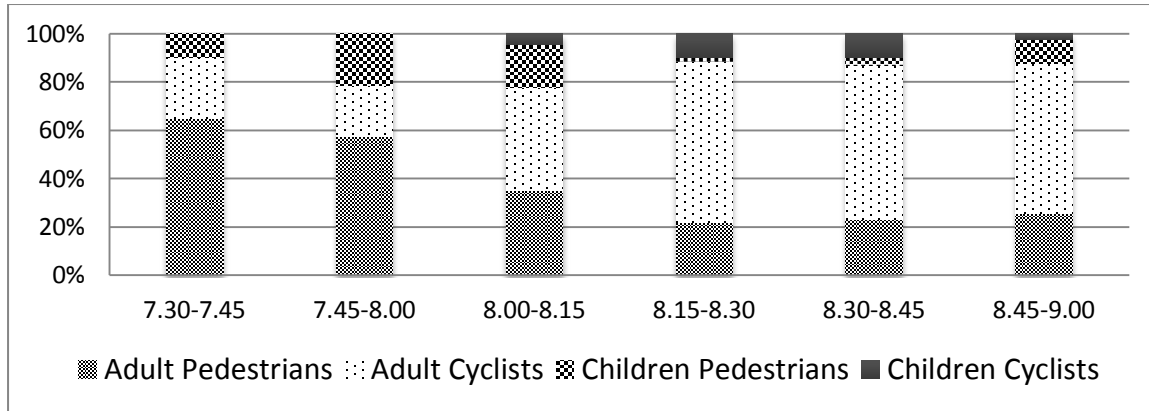


Figure 6-8: Crossing A - Proportion of pedestrian according to type (A.M.)

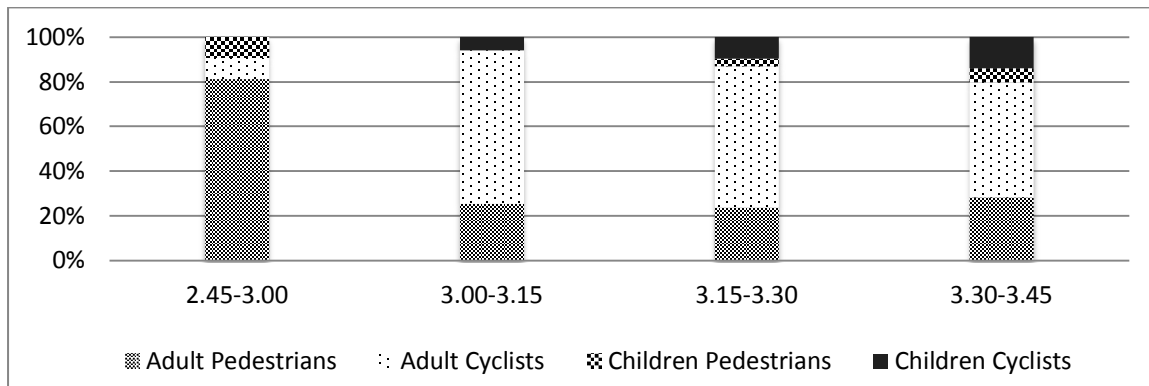


Figure 6-9: Crossing A - Proportion of pedestrians according to type (P.M.)

The first two graphs indicate the proportion of the different types of pedestrians or cyclists recorded at each of the crossings. At Crossing A, the designated school crossing with a traffic warden, adults represented over 75% of the recorded individuals using the crossing at each recorded time period. Child pedestrians were more prominent early in both the AM and PM period, whilst children cyclists were recorded in the latter parts of both of these periods. The observational notes made by the auditors indicated that almost 90% of the children crossed in groups, either arriving at the crossing with adults, friends or siblings, or arriving at the same time as other children or adults. Just over 10% of road crossings by children were made unaccompanied. The observational survey also documented that on the three days the traffic warden arrived at different times from 8.05 am to 8.35 am, indicating that many of the crossings undertaken were unsupervised. The absence of a reliable safe crossing may have increased parents' concerns of the safety of road crossings; however, this was not evident in the findings presented in the previous chapter.

A similar analysis was conducted for Crossing B (**Figure 6-10** and **Figure 6-11**).

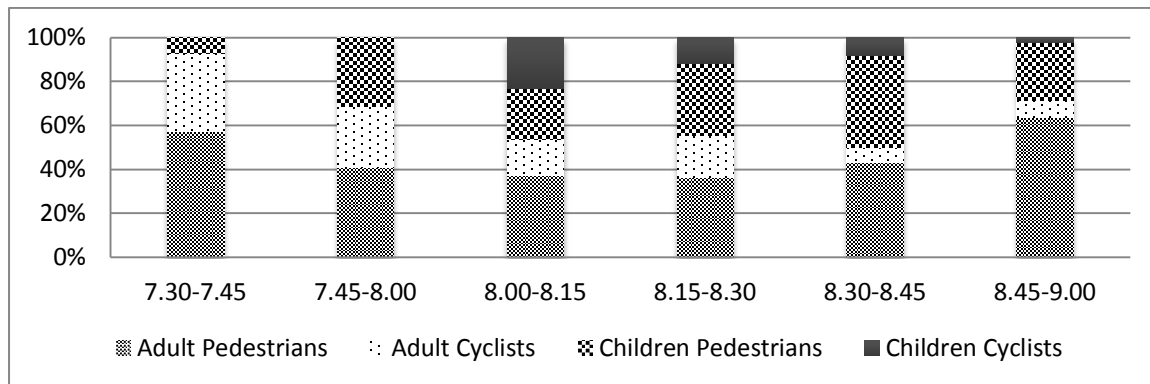


Figure 6-10: Crossing B - Proportion of pedestrian according to type (A.M.)

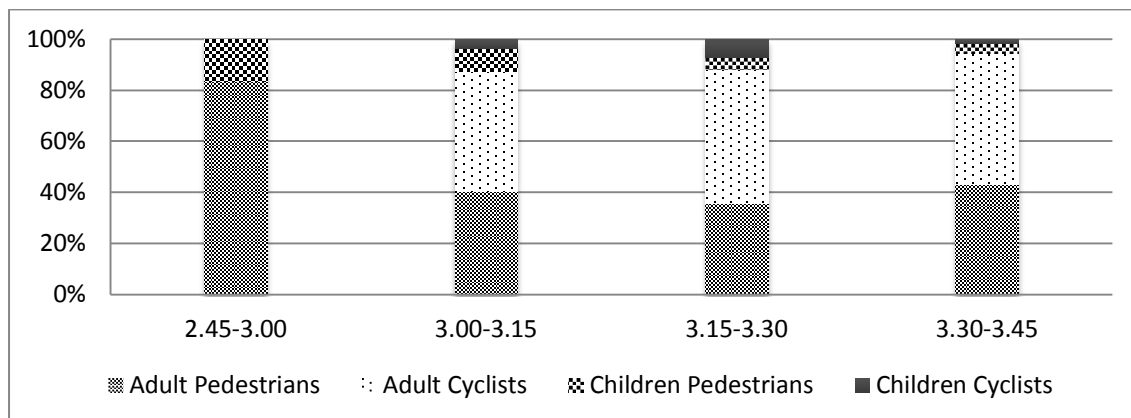


Figure 6-11: Crossing B - Proportion of pedestrian according to type (P.M.)

At Crossing B, the signalised crossing, there was a higher proportion of children crossing, although the total number of children using the crossing was less than at Crossing A. This was reversed in the afternoon period where there was a higher volume of pedestrians using the crossing in the afternoon period but a smaller proportion of children.

Table 6-10 illustrates the number of children and adult utilising the crossing and compares this with the number of vehicles recorded, giving a vehicle to pedestrian ratio.

Table 6-10: Vehicle to pedestrian conflict ratios - Crossing A and B

Crossing	1 Hour Period	Total number of vehicles/ average over the 3 day period	Total number of children pedestrians/ average over the 3 day period	Vehicle to pedestrian conflict ratio - primary school children
A	7.30 - 8.30	935	28	33:1
	7.45 -8.45	1026	52	19:1
	8.45 - 9.00	1124	59	19:1
B	7.30 - 8.30	873	21	41:1
	7.45 -8.45	959	29	33:1
	8.45 - 9.00	1040	28	37:1
A	2.45-3.45pm	1247	63	19:1
B	2.45-3.45pm	1263	65	19:1

Warrants are minimum standards that are required to be met before traffic infrastructure or traffic wardens are assigned to crossings. In Western Australia, a minimum number of 20 primary school children and 200 vehicles (i.e. ratio of 10:1) are required before a traffic warden is assigned to crossing (WA Police 2013). The table above suggests that the ratio for both crossings exceeded minimum numbers; at both crossings the ratio exceeded the minimum for a Warrant A crossing by as much as four times. The observational survey noted the fluctuating start times of the traffic warden at Crossing A; a crossing that, according to Table 6- had a high vehicle to pedestrian conflict ratio, especially in the morning period. The data highlighted the importance of the need for careful consideration of timing for audit evaluation.

6.4.4.4 Category four: street furniture and signage

The audit contained a series of questions regarding street furniture, shade and signage. There was a mix of question types in this category, some identifying the presence of infrastructure, while others measured the perception of the comfort and legibility of the walking routes. By focussing on these perceptual qualities of the built environment, the built evaluation audit represents a utilitarian evaluation, or audit of satisfactions (Lewis 2012). By evaluating auditor satisfaction, the assumption is made that all individuals have equal access to the same level of satisfaction. The route audit identified that there was a range of benches, low walls to sit on and public toilets that could be accessed within a public park adjacent to the school. In regard to

shade and comfort, half of the routes audited were found to have long sections of the walkable paths unshaded. Children likely valued shade and trees, as they were identified in the 'PERFECT' and 'LOVE' photo-collages. Street signage and road markings were present along all routes and these were well-maintained and clearly visible. Overall, the audit assigned a high rating to street furniture and signage features of the routes; however, it was noted these features were all in close proximity to the school.

6.4.4.5 Category five: personal safety

Issues of personal safety were captured in the audit through a series of questions regarding the auditor's perception of: how safe the route felt during the day and the night; whether there were people in the street; visibility from surrounding properties; and the presence of street lighting. The assumption of an ideal built environment in these questions was one in which the presence of people and passive surveillance lead to the perception of safety. Similar to the previous category, the audit items evaluating personal safety related to Lewis' 'satisfactions audit' that evaluated the "generalisable, psychological impacts of the physical environment" (Lewis 2012, 52). The audit evaluation indicated the area was safe during the day. During the audit, the auditor noted that street lighting was present; however, since the audit took place during the day the actual quality of lighting could not be verified. All walking routes were recorded as being visible from the majority of surrounding houses.

There was inconsistency between children's own evaluation of the safety of places and the manner that personal safety was evaluated by the audit. A pedestrian access way was recorded along one of the routes. According to the audit that valued passive surveillance, this aspect of the route was flagged as a potential barrier to walking. This notion of safety is also reflected in an article (Melville Times, April 29, 2009) that reported that the Local Government was seeking State Government approval for the closure of a pedestrian access way due to safety concerns relating to poor visibility from the connecting streets.

6.4.4.6 Category six: adjacent traffic

As well as the questions relating to road crossings, the walkability audit evaluated other various environmental characteristics related to pedestrian safety. Estimates of

traffic volumes and the speed of traffic²² were recorded and the presence of traffic management infrastructure and signage, such as speed humps, chicanes, projecting kerbs, and school speed zones, were recorded by the audit along all routes. Whereas the presence of traffic management infrastructure was effectively recorded in the audit (it was noted that these aspects were primarily situated in the area immediately surrounding the school), the volume and speed of traffic difficult to evaluate. The audit enabled only subjective assessments on the characteristics of the traffic speed and volume. For example, a number of questions related to the perspective of people using the paths (one question asked “is oncoming traffic clearly visible to pedestrians at crossings?”), and also of drivers (“are all types of pedestrians, including children and people in wheelchairs, visible to approaching vehicles?”).

In order to provide a more detailed evaluation of the nature of traffic volumes an observational survey was conducted of the traffic adjacent to the two road crossings described in Section 6.4.4.3 above. **Figure 6-12** illustrates the morning peak hour period, and **Figure 6-13** the afternoon period.

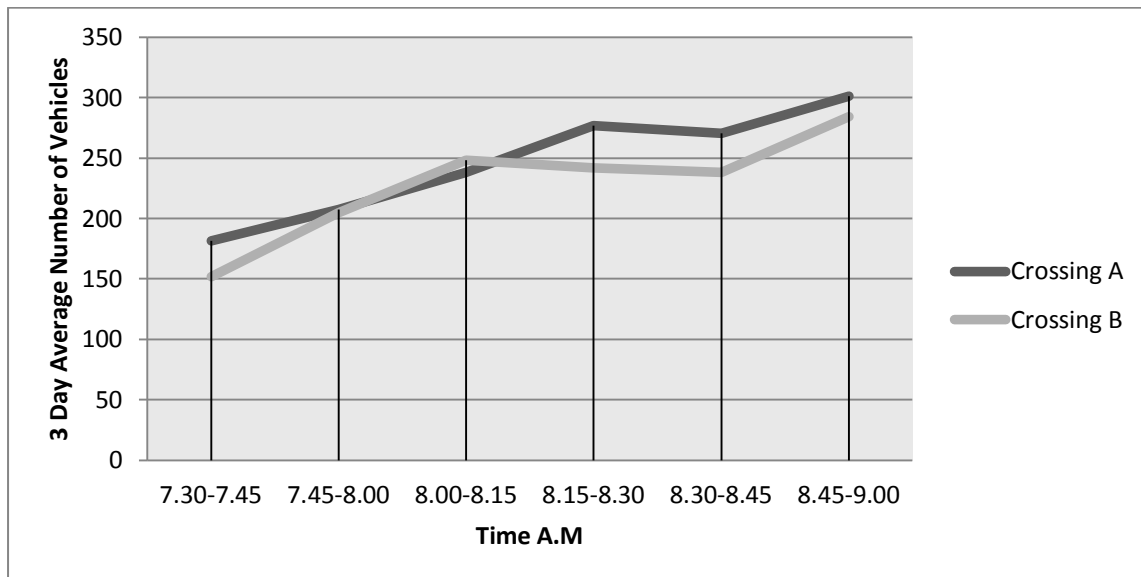


Figure 6-12: Average number of vehicles over the three day survey period (A.M.)

²² The speed of traffic was estimated in response to the audit question: Is the motorised traffic speed or volume satisfactory for pedestrian safety and amenity?

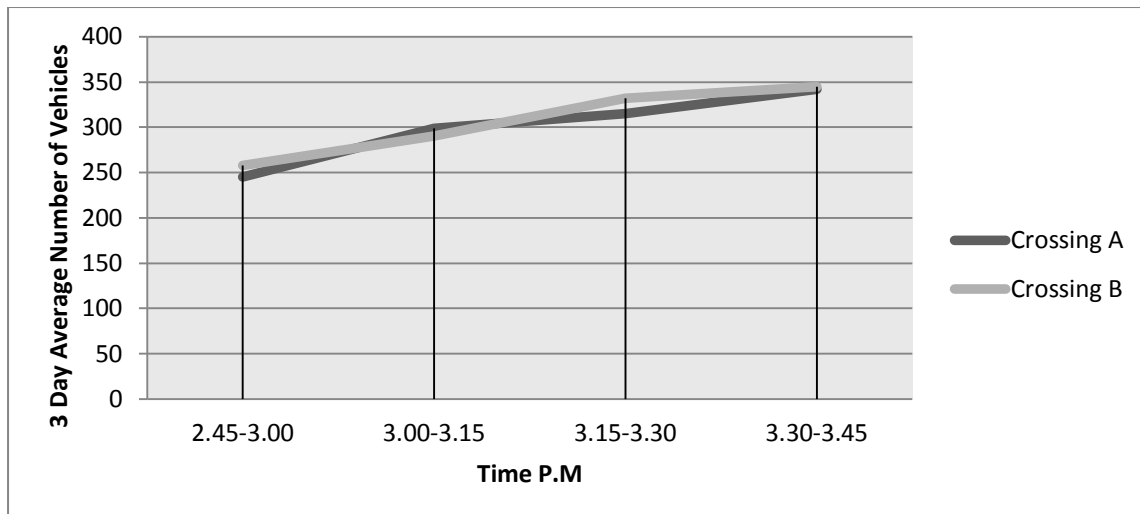


Figure 6-13: Average number of vehicles over the three day period (P.M.)

The amount of traffic passing by the crossings almost doubled over the one and a half hour morning period the vehicles were being recorded, with the amount of traffic increasing significantly in the final half hour. The observational notes show that this increase was due primarily to the large increase of traffic associated with the ‘school drop off’. In the afternoon the increase of traffic over the observed hour is less dramatic, although the volume of traffic was higher than the morning period.

The main issue regarding traffic that was identified in the audits related to high volumes of traffic, particularly around school drop-off and pick-up times (as noted above). This issue was also identified in the surveys, children’s photo-collages, and the newspaper articles. The volume of traffic was identified as an issue in the local newspaper articles. Traffic congestion around schools has implications for children’s active mobility, through creating unsafe street environments at the school gates (Collins and Kearns 2001). Congestion was reported to cause problems such as higher risks of vehicle crashes, and traffic banking up across school crossings (Melville Times, January 29, 2008). Parking, however, was the predominant issue focused on in the articles. Illegal parking was framed as a frequent problem in areas surrounding schools (Melville Times, October 9, 2007), forcing pedestrians onto the road and reducing the visibility of pedestrians to drivers (Melville Times October 11, 2011). However, what was not picked up by the audit evaluation was the issue of speeding and erratic driver behaviour. This issue was evident in both the children’s photo-collages and the analysis of local newspaper articles. For audits attempting to capture aggregate readings of the quality of the walkable environment, attention

must be paid to developing methodological approaches to capture such irregular occurrences and behaviour in urban environments, as these events may have a significant influence on active mobility.

6.4.4.7 Category seven: aesthetics and amenities

The audit contained four questions relating to the aesthetics and amenities of the routes. These related to the overall attractiveness of the route, whether the route was free of graffiti or visible rubbish, whether it was free of excessive air pollution and whether there was no excessive noise. All of the routes, with the exception of Route Four, were found to be positive in regard to aesthetic features. Few incidences of graffiti or rubbish were identified along any of the routes. Part of Route Four was adjacent to a major highway with large volumes of freight traffic, and therefore both noise and air pollution from vehicle fumes were noted. The children identified the aspects contained in audits regarding aesthetics as an important part of their neighbourhood. The aesthetic value of neighbourhoods was identified in children's photo-collages and reflected an important part of children's subjective wellbeing as it relates to their active mobility. For example, children highlighted the lack of maintenance of places and streets, and the presence of graffiti, as negative factors of their neighbourhood. These questions regarding aesthetics further reflect Lewis' 'audit of satisfactions' (2012), in which the mental satisfaction of urban environments is valued as a positive factor in walkable environments. However, aesthetics were identified as a less critical 'need' in Alfonzo's (2005) hierarchy of walking needs. The comparison between audit findings and children's own evaluations regarding aesthetics are inconclusive. While the audit and the children, on the whole, evaluated the routes and neighbourhood area as containing good aesthetic qualities, as the findings in Chapter 5 suggested, there was a diverse representation of what was valued aesthetically amongst the children. Along six of the nine routes that were audited only residential land uses were identified, indicating that the area was lacking in a variety of destinations, amenities and places for children to walk and cycle to. Parks were identified along four routes, and in three case these routes also contained commercial lands uses.

6.4.4.8 Overall rating

The audit form concluded with an overall rating, reflecting the data collected regarding the seven categories. The overall rating of the audit valued each of the

categories equally. The rating indicated that all routes were of very good quality. However, the comparison between the audit categories and findings from the survey and photo-collages show that parents and children placed different values on various built environment aspects. For instance, while road crossings and the safety of the pedestrian environment were revealed as important factors in the surveys and photo-collages, there seemed to be less consensus concerning the aspects of the built environment that were positive in regard to aesthetics and personal safety. The inability of the audit to reflect children's differing values of built environment elements regarding personal safety and aesthetics was an issue that affected the quality of the route-based audit evaluation. This finding suggests that for audits to effectively capture the quality of the built environment as reflected in children's and parents' consideration of the important aspects of children's mobility environments, some means of weighting the various categories is critical.

6.5 Conclusion

The second research objective of this research thesis is to understand how built environment audits could address children's wellbeing through facilitating active mobility. Two questions were raised in order to address the research objective:

- *How do built environment audits evaluate built environments in relation to the children's active mobility and wellbeing?*
- *How can a socio-ecological approach advance built environment auditing for children's active mobility?*

This chapter has explored the policy environment that audits operate within, and presented the findings of a walkability audit of the case study. The chapter began with the presentation of findings from the interviews with planning professionals. Each of the interviewees were involved in the policy, planning or management of pedestrian infrastructure, and had developed, used, or planned to use audits to address policy issues relating to active mobility. Several conclusions were drawn from the thematic analysis of the interviews. First, the interviewees assumed three roles in their professional activity towards facilitating active mobility: a civic advocacy role; an infrastructure planning role; and a travel behaviour change role. Whilst all three roles addressed issues related to increasing rates and improving the quality of the pedestrian environment, all roles were also involved in promoting their own

agendas and objectives in regard to advancing active mobility. These agendas sometimes did not balance, evident from the argument about whether infrastructure improvements should take precedence over travel behaviour interventions, and vice versa. The interviewees also described either taking a proactive role (building capacity for individuals to identify and address issues, and shaping values and changing the behaviour of individuals in regard to walking and cycling), or a retroactive role (acting on problem previously identified) in addressing active mobility.

Second, the interviewees provided evidence that audits played a role in the framing of agendas. From the analysis of interviews, six inter-related approaches to built environment auditing were identified.

- Audits were used to measure pedestrian infrastructure against design standards. This aspect of auditing highlighted the importance of standards of design and guidelines as an external factor that shaped the characteristics, processes and outputs of audits.
- Audits were identified as a means to enhance the efficient allocation of resources, including labour and funding for infrastructure. However, the interviewees conversely described audits as resource intensive.
- Audits were used as a collaborative tool to bring together a range of stakeholders in a process of 'collective evaluation'. Although children were not explicitly mentioned in this regard, there may be the potential for audits to facilitate greater participation in planning and evaluation processes for children.
- Audits were noted as a means to legitimise organisations involved in planning for active mobility. 'Conducting an audit' involved approaching issues of built environment quality and active mobility with a rational process. This rational process was said to contribute to the legitimacy of groups such as civic advocacy groups for walking and cycling.
- The rationality of the auditing process also contributed to the use of audits to add weight to arguments within the political realm. The outcomes of audits were considered a result of a systematic and scientific process. Using audits to argue for particular courses of action.

- Audits also provided an ‘experience’ of evaluation. This experiential aspect of auditing had the potential for auditors to shift their values relating to active mobility, and to allow issues and problems regarding the built environment quality for active mobility to emerge from a ‘collective’ experience of auditing.

Third, although some approaches were more associated with some professional roles than others – for example, the infrastructure planners predominantly used audits to measure against standards – it was more apparent that the interviewees selected and used audits in a strategic manner. This strategic approach emerged from the necessity to adapt audits to particular policy contexts. The policy contexts were shaped by a number of factors, including the range of policy actors that were active; the resources available; various organisational rules and regulations; and the nature of the problem that was being addressed. The interviewees described how trade-offs were made based on getting the best quality data from audits from within policy contexts bound by resource constraints. Importantly, there was little evidence of audits actually being used in practice and therefore calling into question the potential of their current use to substantially influence the quality of children’s mobility environments.

The second section of the chapter described characteristics of the policy and social environment of the case study. A content and thematic analysis was conducted of 67 articles featuring issues relating to active mobility. The analysis provided a means of understanding some of the representations of neighbourhood scale social issues relevant to children’s active mobility. A number of significant organisations that shaped the nature of issues were identified in the analysis. Schools were critical agents in communicating issues regarding children’s active mobility. They played a role in drawing attention to the benefits of active mobility, guiding norms regarding safe travel, and alerting the community of changes in the built or policy environments regarding active mobility. Some State Government agencies, like the Police and the Department of Transport, played a similar role in advocating for active mobility, or communicating policy initiatives. Interactions between State Government agencies, however, were characterised by tensions and disagreements regarding resources or responsibilities. A theme that was apparent in the analysis was that there was a conflict over values or norms about what is constituted as safe. The policy environment relevant to children’s active mobility was identified as a ‘contested

space'; one in which there were conflicting views of the standards and norms regarding the quality of the built environment.

The final section of the chapter reported on a walkability audit evaluation of the case study area. The audit of several likely routes the group of children would walk or cycle to school was then described. The route-based tool used was developed and made publically available by the State Government Department of Transport, and a meta-analysis revealed that it was similar to other audits in range of other audit tools provided by Australian and New Zealand planning agencies. The evaluation of the case study area revealed that the walkability of the selected routes in the case study as of a very good standard. However, it did identify problems with path connectivity (no paths along routes) and the presence of barriers along some of the routes. Some of the issues with the quality of walkable area were identified only by chance; for example, one of the audits took place of rubbish collection day and identified multiple physical barriers to walking along the footpath. The timing of audits was therefore critical to capturing an evaluation the quality of the environment as likely to be experienced by those who conducted everyday activities and travel in the area.

When considered together, the analysis of the three types of data – the interviews, the newspaper articles, and the audit of the built environment – provide an insight into the policy environments relevant to built environment auditing for children's active mobility. The findings presented in this chapter offer a link to the empirical findings presented in the previous chapter, by developing an understanding of the policy scale factors relevant to active mobility that operate within the neighbourhood area. The next chapter draws together the empirical findings, literature review and theoretical review, and addresses the two research questions relevant to the objectives of the thesis.

7. Discussion and conclusion

7.1 Introduction

This chapter integrates the literature and theoretical reviews conducted in Chapter 2, 3 and 4 and the empirical research reported in Chapters 5 and 6, to address the research objectives of this thesis. The chapter begins by addressing each objective and its related research questions. The significance of the research findings is then explained. Finally, the chapter concludes with a summary of conclusions.

7.2 Objective one: exploring the relationship between the built environment, children's active mobility and children's wellbeing

The following discussion addresses the three questions identified to address Objective One, and focuses on children's experience during travel, children's access to places and activities, and children's independence afforded by active mobility.

7.2.1 Research question one

The first research question asked: *What factors are important in the relationship between active mobility and children's subjective wellbeing?* One way of evaluating subjective wellbeing is through an exploration of a range of experiences of individuals, and whether these experiences positively or negatively shape an individual's utility. The insight provided by the surveys and photo-collages enabled knowledge of the children's subjective experiences manifest within their everyday mobility environments. The findings illustrated that many of the routine experiences of active mobility elicited positive feelings for children. Modes of active mobility – walking, cycling, and skateboarding – were featured in the children's *Love* and *Perfect* photo-collages. Walking afforded children the opportunity to travel with siblings and meet friends, and cycling provided challenges such as riding fast down hills. De Vos et al. (2013) identified that mobility can also be linked to wellbeing by providing the opportunity to engage in activities whilst travelling. The empirical findings presented indicated that children used their travel to conduct a range of activities including socialising with friends, walking their dogs, and foraging for objects and keepsakes. These types of activities that the children participated in during travel appeared to be a central factor of children's active mobility as it related to a positive subjective experience of wellbeing.

An indication of the children's level of satisfaction in their current mobility patterns and mobility environments provided further insight into subjective wellbeing (de Vos et al. 2013). In this study, as in others (Romero 2010; Zwerts et al 2010), active mobility was the preferred mode of travel for the children. This was evident in the surveys, with most children stating their preference for active modes of travel, particularly with their friends, to and from school and other locations, such as parks. Even taking into consideration the possibility that children may adapt their preferences to existing conditions, a key criticism of relying on an evaluation of preferences as an indication of levels of wellbeing, the majority of children preferred walking and cycling to most destinations in their local environment, especially with their friends or other children. However, children's preferred modes of travel were not reflected in the majority of children's usual modes of travel. Less than half the children reported that they usually walked or cycled to school. This incongruity between preferred modes of travel and usual travel modes was even more evident in children's travel to other places, such as shops and organised, extra-curricular activities. From the perspective of wellbeing as based on the satisfaction of preferences, it could be said that for most of the children, wellbeing was not being afforded by their routine mobility.

Using the satisfaction of preferences as the basis to evaluate wellbeing could also be considered problematic however, especially when wellbeing was evaluated across the collective of individual children. When evaluations of wellbeing are based on the satisfaction of preferences across a group of individuals, the evaluation is averaged across the group; that is, all individuals are assumed to be equal, and to hold an equal portion of the value of 'good' (Lewis 2012). Such evaluations of wellbeing do not accommodate the range of experiences identified within the group and may hide inequities based on culture, socio-economics or gender. With this in mind, there were differences noted amongst the children in the case study. Some children associated active mobility with feelings of insecurity and fear. For example, a group of high school children were featured walking along the street in one child's Hate collage, perhaps reflecting Percy-Smith and Matthew's (2001) notion that streets can be 'tyrannical spaces' for some children, even if they are convivial environments for most children. In another, mention was made of the heavy traffic and the 'noise' along one road along the child's walking route, suggesting that for some children, the

walk to school did not afford the same degree of wellbeing as it did for others. There was a diverse range of children's perceptions of particular places. For instance, one child considered a pedestrian access way as a 'scary' place; while another considered access ways as providing the 'best places to ride a bike'. Therefore, an evaluation of children's experience of active mobility, based on their feelings of pleasure or 'satisfaction', provided some useful indications about good built environments for children. However, in evaluating the collective wellbeing of the children, as audits were noted to do (Lewis 2012a), the ambiguity regarding the children's subjective wellbeing was problematic. The issue of the ambiguity of evaluating subjective wellbeing related to children's active mobility is further addressed in the discussion below.

7.2.2 Research question two

The second research question asked: *What factors are important in the relationship between active mobility and children's needs?* Needs can be evaluated as the means to achieve wellbeing and an evaluation of needs is not necessarily reliant on an understanding of the direct experience of individuals. Neighbourhood accessibility is a potentially important 'need' related to children's active mobility and wellbeing (Alfonzo 2005). Walking and cycling affords children wellbeing by providing the means to access activities. Evaluating access to activities encompasses both the ease of getting to places, and the types and qualities of activities available at places (Handy and Niemeier 1997). Approaching the issue of access from a needs perspective provides further insight into the link between local accessibility and wellbeing. The hierarchy of walking needs approach posited by Alfonzo (2005) identified accessibility as a fundamental need, preceded only by the feasibility of walking. Feasibility refers to the individual characteristics that influence whether walking occurs, such as physical ability or whether there is time in a daily schedule to walk. Accessibility, on the other hand, refers to activities and the ease of travelling to them. Lewis' (2012a; 2012b) notion of the *opportunities* approach is useful in understanding the relationship between accessibility and wellbeing. Lewis argued that if the opportunity to walk is afforded, that is the means to walk are made available, the built environment can then be evaluated as accessible. The relationship between wellbeing and the built environment is therefore evaluated objectively, through focusing on whether the means to engage in active mobility are

provided. Evaluating accessibility from an opportunities approach therefore includes some measure of the quality and presence of infrastructure to support walking, such as paths (Alfonzo 2005, 826). Good quality paths that are connected to the places children want to go provide the opportunity to walk or cycle. Building more footpaths was identified by many of the children as one of the more important ways that their neighbourhood could be improved to sustain more active travel. Many children also reported that their neighbourhoods had good quality paths. Positive representations of road crossings also reflected the importance of access to the children, and reinforced the notion that children's wellbeing can be evaluated by identifying supportive infrastructure. The presence of a good quality path network and of safe road crossings were linked to the children's subjective experience of wellbeing, as both are part of what the children considered a good and preferred neighbourhood.

The audit findings informed an evaluation of the means available to children to access places in their local neighbourhood. The audit demonstrated that, despite the absence of paths along some of the routes, more routes had paths than did not, and the quality of the walking infrastructure along the routes was rated highly overall, according to the audit standards. The opportunity to walk and cycle identified along the routes, and the children's preference for walking and cycling, would suggest that many of the feasible walking or cycling trips would be actualised. That the number of children who reported that they usually travelled to many everyday places as car passengers outweighed the number who walked or cycled, suggested that some opportunities to walk were not being taken by the children. Furthermore, although walking and cycling were the most preferred ways for children to get around, and most parents were supportive of their children walking or cycling in some capacity, journeys by these modes were not common. The investigation of the opportunities afforded by the built environment did not evaluate whether opportunities were actualised; a key point in Lewis' (2012a; 2012b) argument. In order to explore this issue in more depth, the next section discusses the notions of independent mobility, agency and potential travel.

7.2.3 Research question three

The third research question asked: *What factors are important in the relationship between active mobility and children's capabilities?* So far, this discussion has touched on the notions of subjective wellbeing and needs in the children's

experience of activity mobility, and the affordances associated with places and activities. The capability approach is another way the link between wellbeing and mobility has been theorised. Nordbakke and Schwanen (2013) link the capability approach to wellbeing and mobility in three ways: mobility provides access to a variety of functionings (or affordances) at different places; there are functionings associated with mobility itself; and mobility offers individuals the ability to enhance one's functionings. Whilst the first two ways have been discussed in the previous sections, the link between the third, characterised as potential mobility, and wellbeing is worth exploring here. De Vos et al. (2013) identify potential mobility as an important part of subjective wellbeing; that is, an individual's perception of their own capability to be mobile, and therefore the potential to access all that mobility affords. Potential mobility is closely related to children's independent mobility. When children can get around by themselves they have a greater set of mobility options available to them. Being independently mobile was identified as an important aspect of children's subjective wellbeing in the research findings. Most children identified a preference to be able to walk or cycle autonomously or with their friends to many places within their neighbourhood. Furthermore, most children perceived that they were allowed to be independently mobile, the majority of children wanted to travel to places without adult accompaniment, and most parents reported that they were supportive of their child's independent mobility. Key aspects of children's subjective wellbeing were therefore based on the feeling of being independent of adult supervision whilst walking or cycling. Independence and potential to be mobile are therefore important aspects of children's own subjective wellbeing.

A capabilities approach necessitates an evaluation of the subjective experience of mobility and freedom to be mobile in relation to the range of factors that may restrict or afford mobility. A cursory overview of the neighbourhood built environment quality suggests that it is well suited to children's independent mobility. For instance, most parents reported that they considered their neighbourhood a friendly place, that they were not concerned about assaults by strangers, and that the neighbourhood, overall, was a nice place to walk. However, referring to Lewis' (2012a) and Kytta's (2004) theories, it is evident that even if the opportunity for active mobility is made available, it does not mean the opportunity is taken. In this thesis, this seems to be the case. Most children reported that they were usually driven to many regular

activities and places in the neighbourhood. There was also a discrepancy between the number of parents who reported that they allowed their children to walk or cycle without adult accompaniment, and the number of children who reported that they usually travelled independent of adults. Children also identified preferences to cycle to locations and good quality places to cycle were featured in the photo-collages. However, despite some evidence in the photo-collages that children road their bikes, the surveys indicated that few children engaged in regular cycling trips. Part of the reason for this was due to household scale restriction on cycling. Most children were not permitted to travel on main roads by their parents. But parental restrictions only account for some rationale as to why children did not cycle. Children are permitted to cycle on footpaths in Western Australia most children owned bikes and the majority reported they were allowed on the streets on their bikes. There is apparent potential for children to increase rates of cycling, however there remains substantial barriers that were not captured in this research. When children do not actualise their potential independent travel, they are not accessing the opportunities or affordances associated with active mobility.

The concept of appropriation (Kaufmann et al. cited in de Vos et al. 2013) provides some insight into the way that potential active mobility was not being actualised in the case study. Appropriation refers to children's actual utilisation of accessibility activities (de Vos et al., 2013) and addresses the gap identified in the opportunity approach. It is a key aspect of Lewis' (2012a; 2012b) capability approach to wellbeing. When children make use of the opportunities to walk afforded by good quality paths, these opportunities are said to be appropriated. The appropriation of resources embedded in the notion of 'walkability' – health, freedom, social interaction - was therefore linked with wellbeing as it indicated that many of the children were not actually engaging in the potential mobility or activities available to them that afforded them wellbeing. Furthermore, although half the children reported they already had enough freedom to go outside and were therefore somewhat satisfied with their level of mobility, more of the independently mobile children reported they wanted more freedom to go outside. The experience of being independently mobile reported by the children appeared to be associated with children's desire to have more freedom to be independent.

7.2.4 Addressing the first research objective

The first objective of this thesis was to *explore the relationship between the built environment, children's active mobility and children's wellbeing*. The discussion of findings of the three questions that inform Objective One, illustrates that the relationships between children's mobility and their wellbeing are diverse and sometimes contradictory depending on how a concept of wellbeing is framed. That being said, the research findings provided insight into the children's subjective experience of their everyday mobility. The children's mobility when analysed through the lens of wellbeing defined by feelings of pleasure and happiness, and the satisfaction of preferences, indicated that the experience of mobility, whether traveling to school or riding a bike in the street outside the house, is important to children's wellbeing. Active mobility afforded the children social connections, physical activity and feelings of independence. However, there was also ambiguity and differences across the experience of active mobility across the group of children. There was more consensus of opinion amongst the children regarding what Alfonzo (2005) theorised as the fundamental needs of walkability. Accessibility was a 'need' that was identified by the children as central to their wellbeing. A fundamental factor relating to accessibility was identified by several of the children as the presence of safe and connected walking and cycling infrastructure, especially paths and road crossings. However, although many of the children and the audits also evaluated other aspects of the built environment as being of good quality, the children did not participate in the level of walking trips that they would prefer. Opportunities appeared not to be actualised by the children. The issues of independent mobility and potential mobility are an important means of highlighting aspects of the wellbeing of children based on their agency to actively participate in the opportunities provided by their mobility environments, as they indicate whether children have 'real freedom' (Lewis 2012a) to make use of opportunities to enhance their wellbeing. Yet, the issue that children do not appropriate the opportunities to the extent that could be expected points to the need to go beyond the direct relationships between children and the built environment factors that are part of their everyday mobility.

There are two possible explanations for this that are apparent when approaching the issue of children's mobility and wellbeing from a socio-ecological perspective. First, is that there are fundamental socio-spatial norms and processes that are shaping

children's everyday mobility within the case study. As the socio-ecological model illustrates, individual, household and neighbourhood scale behaviours are shaped by broader socio-political processes. The literature review identified automobility as a dominant socio-spatial regime operating within the social ecology of children's everyday mobility. Since Hillman et al (1990) there has been an extensive body of literature developed examining the varied influence the culture of automobility has shaped children's travel. Although some of this research focuses identifying issues within a broader cultural framework of automobility, many studies limit their focus on the direct relationships between individual, household and neighbourhood scale factors. The findings presented in this thesis suggest that the limited focus of these factors is inadequate to explain the relationship between children's wellbeing and their mobility. An investigation of the dominant socio-spatial regimes, in this case automobility, is essential for planners to address children's mobility and wellbeing. The second possibility, also related to automobility, is that the external policy systems associated with planning practice may shape behaviours and mobility environments in a manner that either further sidelines modes of sustainable mobility or alternatively opens the possibility to challenge the hegemony of automobility. These issues will be explored in more detail in the responses to question 4 and 5 in the following sections.

This section has provided an overview of the issues related to the relationships between children's wellbeing, the built environment, and their active mobility. The discussion of findings regarding Objective One, was not intended to lead to establishing a definitive relationship between children's wellbeing and mobility. Rather, it was to offer an exploration of the range of relationships evident between the children and wellbeing, in order to provide a platform for the discussion of the second research objective. The question remains as to how planners can make sense of these issues in order to shape children's mobility environment to facilitate children's active mobility. The discussion of responses to the fourth and fifth research question addresses this issue.

7.3 Objective two: understanding how built environment audits address children's wellbeing through facilitating active and independent mobility.

7.3.1. Research question four

The fourth research question asked: *How do built environment audits evaluate built environment elements in relation to children's active mobility and wellbeing?* In order to address the research question it was necessary to gain knowledge of the main features that built environment audits value and how they evaluate them, comparing this knowledge with the insights into relationships between children's active mobility and wellbeing identified in the previous sections.

The ability of the audits to reflect children's wellbeing is indicated in the similarities and differences between the types of evaluations made by the audit and those based on children's subjective experience and needs. There were several key similarities between these two types of evaluation evident in the findings. There was a correspondence between some of the problematic elements identified by the walkability audit tool, and the children's own evaluation of their neighbourhood environment. For instance, the absence of path infrastructure along several routes to the primary school was identified as one of the key issues in the walkability audit. As indicated in the discussion above, the presence of paths was linked to children's wellbeing, primarily by affording them access to locations. The parallel between some of the children's evaluations and the audit was further reflected with regard to the presence of physical barriers along pathways. Parked cars and rubbish bins were recorded as temporary barriers to movement along paths in the walkability audit, and barriers were also reflected in a small number of the photo-collages. Although this research thesis did not seek to establish any causal relationships between built environment elements and the decisions relevant to children's active mobility, the absence of path infrastructure and the presence of barriers along paths may be an important contributor in limiting children's active mobility. The presence of good quality pedestrian infrastructure and a continuous network of pathways have been found to be associated with higher rates of walking (Hess et al 1999; Pikora et al 2003). Children's evaluation of the quality of their mobility environments therefore corresponded with evaluations made by the walkability audit suggesting that

planning tools may provide the means for focusing planning attention on key aspects of the built environment relevant to enhancing children's active mobility.

Despite the correspondence between the case study audit and the children's own evaluations of their neighbourhood, there were also some aspects of the children's photographic evaluations that were distinct from those identified by the audit. Some of the spaces that children identified as the best places to walk, cycle, and play, such as pedestrian access ways and bushland, were spaces that the audit tool evaluated as 'unsafe', due to little passive surveillance and no evidence of lighting. The audit's focus on the functional aspects of the pedestrian environment over these less controlled and less predictable spaces is suggestive of the priority of the function and circulation of bodies within the street over the civic humanist aspects central to Blomley's notion of pedestrianisation (2010). Overall, there was more ambiguity apparent between the range of issues identified by children when compared to the audit's findings regarding aesthetics, comfort, and safety. These more subjective notions of the quality of the built environment were evaluated through an 'audit of satisfactions', critiqued by Lewis (2012a; 2012b) because they poorly reflect the diversity of individuals within a collective evaluation. When satisfactions or perceptions of built environment qualities are aggregated across a group of children, an audit averages the value of satisfactions across the group, limiting knowledge of the range of children's experience of wellbeing. The prioritisation of the functionality and the 'auditing of satisfactions' of streets and neighbourhood places important for children's wellbeing can hide deeper, structural inequities that are barriers to children's access to mobility environments that encourage more walking and cycling.

There was also a distinction between the normative aspects of urban planning and street designs, and that of the capacity of streets as sustainable mobility environments for children. For example, the audit valued the connectivity of routes as a positive feature of the walkable environment by giving higher ratings to grid pattern street design, and lower ratings to cul-de-sac street design, reflecting research that has found there is a link between street connectivity and adults' mobility (Saelens, Sallis and Frank 2003). The audit valued the 'opportunity' that well connected streets afforded for direct and efficient access to places (Lewis' (2012a). Whereas, a direct and connected walking route may be important for children's access to school, this provides a limited reflection of the range of potential

opportunities for children to access. Children revealed in their photo-collages that cul-de-sac street designs, not evaluated as walkable by the audit, were important places for safe play and social interaction. These 'safe spaces' also afforded children a 'transitional' space (Kullman 2010) between the public and private realm, where children could learn the skills to be more independently mobile.

In order to reflect Lewis' (2012a) capability audit, an evaluation of a range of barriers to children's access to the 'goods' that built environments afford (walkability and access for example) was necessary. In order to capture these barriers evident in the case study, a more wide ranging evaluation of factors provided by a simple inventory of infrastructure was required. For example, auditors would need to understand the changing characteristics of the built environment over different days and weeks. The rhythms of children's everyday mobility environments, such as the increased road traffic at the beginning and end of the school day, were identified as an issue across all the data. In order for the audit to reflect these temporal barriers to children's active mobility the timing of audits was therefore critical to the quality of the evaluation. An audit conducted outside of the peak access-to-school periods would not be able to identify the issues apparent when children used the space, such as parked cars blocking the pathway, and increased road traffic. A further issue that reflected the importance of planning for the timing of audits was the presence of rubbish bins along the path on rubbish collection day. The audit required additional information to inform the full range of built environment factors that potentially restricted mobility. These factors, whilst not fully captured in the walkability audit employed in this study, could be addressed through the careful design of audits and inclusion of additional knowledge of the built environment, such as the traffic count data illustrated in Chapter Six. However, a capability audit should address all relevant barriers to children's access to good quality environments for walking and cycling. The following section deals with further barriers to auditing the built environment for children that are beyond the scope of audit design.

7.3.2. Research question five

The fifth research question asks *how can a socio-ecological approach improve built environment auditing for children's active mobility?* Socio-ecological approaches encompass a range of scales a number of domains that shape everyday activities

and behaviours. Mitra's (2012) model identified in Chapter Two outlined the factors influencing children's active and independent mobility using a socio-ecological approach. The case study research presented in this thesis has captured aspects from a number of socio-ecological scales and domains within a school environment in an Australia inner urban neighbourhood. The previous section showed that, at the individual scale, audits potentially reflect many factors important to children's mobility environments. In regards to wellbeing, the audit captured features of the built environment that were related to, in Lewis' (2012a; 2012b) terms, children's satisfactions and the opportunities available to them to convert built environment resources into wellbeing. In this sense it can be argued that audits are valuable policy tools that could be utilised by planners to positively shape children's mobility environments to facilitate increased rates of active mobility. However, insight from a capability approach to wellbeing revealed that many children were not regularly appropriating opportunities to be actively mobile.

Approaching the practice of auditing from a socio-ecological perspective provided some insight into how planners can address the issue of children's active mobility addressing potential barriers to children's appropriation of opportunities. An important barrier identified in the surveys, photo-collages and analysis of newspaper relates to the dominance of the car within children's local environments. Although active mobility was identified as an important activity within the social ecology of the case study, the normative values and needs of pedestrian mobility, such as those represented in Alfonso's hierarchy of walking needs, were framed in relation to the dominant regime of automobility. In the competing rationalities of automobility and mobility by walking and cycling, trade-offs are often made in favour of the car (Patton 2007). The ideals of automobility – uninhibited flow and speed – are entrenched objectives in the engineering practices guiding road design. The design of streets to prioritise the mobility of vehicles over the mobility of pedestrians or cyclists is a decision based on values (Patton 2007). However, regimes of automobility obscure a discussion of values by appealing to notions of efficiency, speed and functionality (Blomley 2007). Audits have a role to play to actively shape the quality of children's mobility environments within a regime of automobility. Framing evaluations of children's mobility environments by using audit tools that draw upon traffic engineering standards and legal geographies related to rights to mobility and access

to the street adds weight to advocacy for sustainable mobility environments for children. As Patton (2007) notes that such tools, when used in the same arena as standard traffic evaluation tools, can contribute to the rationalization of pedestrian needs and the prioritization of streets as places rather than just conduits for moving vehicles. Audits also have the potential to draw in a range of political agents within children's local social ecologies – schools, local politicians, and walking action groups. In this way audits provide opportunities for a range of sustainable mobility policy actors to utilise the means of evaluating streets that are accepted within the dominant paradigm of automobility.

Despite the broad support for audits that was evident in the interviews, there was little evidence of the actual use of audits in practice, and furthermore little evidence that audits have made substantive changes to built environments in Australia. From a socio-ecological approach, two explanations may be derived. The first is that audits are a necessary tool to the reproduction of built environments catering to the needs of the car rather than a tool that provides genuine alternatives to the dominant socio-political regime of automobility. As explained in Chapter 2, automobility creates the need for institutions, such as a road safety, traffic management and the policing of streets, to address the problems associated with the dominance of car travel. These institutions represent the 'antagonisms of automobility' according to Bohm et al (2006) and are necessary to the ongoing functioning and reproduction of automobility. Walkability audits provide evaluations of pedestrian quality in relation to the ongoing functioning of the street according to the notion of 'pedestrianisation' (Blomely 2007). In this sense, audits are then part of the process that ensures the functioning of circulation of all objects in the street – cars, cyclists and pedestrians – rather than providing an alternative paradigm of urban mobility that accommodates the range of potential benefits to wellbeing that were suggested in the children's responses to the surveys and photo-collages. The second explanation relates to the role of audits in the functioning of modern planning bureaucracies charged with managing the quality of streets. The interviews demonstrated that walkability audits are effective in determining the allocation of priorities of infrastructure funding, albeit without actually informing the level of investment required. Like other auditing practices emblematic of an audit culture found in various institutional contexts, walkability audits are tools for achieving the neoliberal objectives of efficiency,

standardization and self-monitoring within the organisational contexts focused on improving pedestrian environments. The interviews revealed that audits were most extensively used in practice as a tool for rationalizing the funding for infrastructure, rather than advocating for the needs of pedestrians or for the need for more funding for walking or cycling infrastructure. In this way, audits share a similarity with their role as a tool that facilitates the orderly functioning of the street without substantially addressing the quality of the built environment for cyclists or pedestrians. To improve the wellbeing of children through increasing their appropriation of streets for walking and cycling, auditing needs to move beyond the current state of practice and target the underlying barriers that inhibit rates of children's active mobility. The next section will provide some insight into how this could be done.

7.3.3 Addressing the second research objective

The second objective of this thesis sought to understand how built environment audits could better address children's wellbeing through facilitating active mobility. This final objective is the overarching goal of the thesis and to address it consideration of all five of this thesis' research questions is required. As a way of integrating the responses to the five questions and facilitating a discussion of the final objective, three key contributions made by this research are identified and discussed.

1. Planners may address the problems associated with children's declining rates of active mobility through the **better design of built environment audits**. Lewis' (2012a; 2012b) capability audit provided a useful means for understanding the potential relationship between audits and children's active mobility and wellbeing. Whereas audits that focused on evaluating only the satisfactions of children, or the opportunities provided to children to be actively mobile, a capabilities approach necessitates the consideration of a wide range of end states, or experiences of wellbeing, and means, or opportunities to enhance wellbeing, in relation to the factors that enable or inhibit children's capacity to access ends and means. Reflecting a growing body of research on children's mobility, this research confirmed that parental restrictions of mobility, growing distances between activities and increased traffic and safety concerns are barriers for many children. However, this research also showed that there were many children who preferred to walk and cycle

to places in their neighbourhood and had licences to travel independently, yet usually travelled to most destinations in the local neighbourhood as a passenger in a car. Furthermore, the neighbourhood environment was reported as a good place to walk and this was, on the whole, supported by the built environment audit.

To reflect a holistic notion embodied within a capabilities approach, audits need to be designed to capture the range of potential barriers to children's active mobility. The surveys and photo-collages highlighted that some aspects of children's mobility (for example, the absence of a continuous path network, and the presence of temporary barriers along paths) were more important than others. In contrast, the audit valued all built environment elements equally in its evaluation. In order to reflect the difference of values associated with built environment elements in future audits for children's active mobility, some weighting of built environment criteria is essential. Weighting, as demonstrated in other research with built environment measures (Witten, Exeter and Field 2003) may be conducted by enhancing children's participation in the auditing process, through conducting additional methods such as surveys or focus groups. Audit processes also need to also make use of technology that is suitable and appealing to children. Technology will no doubt play an increasing role in future auditing processes. Knowledge of the potential for different technologies to reflect local knowledge about children's mobility environments will be increasingly important (Bamberg 2010). For example, GIS technology and practices are being radically altered by the incorporation of web-based methods, creating the potential for public participation in the creation of data for GIS. The work of Santo, Ferguson and Trippel (2010) and Dennis Jr (2006) suggest that new technologies have a story-telling potential that is attractive to children. The evidence that children actively engaged in the photo-collage method demonstrates that they can effectively evaluate built environments with images and visual representations. The synergies between the children's photo-collages and the audit suggest that the images children produce when evaluating their local environments are compatible within the standards and norms of planning and urban design. As these types of visual methods are being readily incorporated into new technologies, there is an opportunity to use technology to facilitate this evaluation technique for children.

2. Planners may also positively act to influence the quality of children's mobility environments by acknowledging the **counter-hegemonic potential of built**

environment auditing. The literature concerning audit culture and the responses from the interviewees suggested that there is the potential for audit tools to challenge the dominant hegemony of automobility and the ‘pedestrianisation’ of planning for children’s mobility environments. The presence of several of the narratives identified in the analysis of local newspapers provided evidence of a public discourse that counteracted the hegemony of traffic engineering practices that address safety issues within a paradigm of unfettered mobility for the car. This discourse was evident within the local newspaper as reactive to specific issues, providing arguments for alternative street design and reconceptualising risk for street users other than the car. Audits can play a role in rationalizing elements of streets associated with walkability (Patton 2007). In this way audits construct a notion of walkability; in other words, what counts is what’s counted (Porter 1995). Children have agency in regard to their mobility (O’Brien et al 2000), and realizing this agency by including children in auditing practices has implications for children’s wellbeing. The children in the case study demonstrated that they were engaged and competent evaluators of their own mobility environments, able to interpret key factors of planning knowledge about streets – the presence of paths, connectivity to places and safe, monitored road crossings – within their own framework of understanding their everyday mobility environments. In this way audits have the potential to transform contemporary modes of ‘safeguarding’ (McLaren and Parusel 2012) children’s mobility within the streets into more a more proactive form of evaluation, drawing on children’s local knowledge and capacity to evaluate their own mobility environments. Children’s inclusion in the planning processes that shape their everyday world would afford children the ability to shape factors important to their wellbeing (Chawla and Heft 2002). The combination of children’s competency for evaluating their mobility environments, a public counter hegemony challenging regimes of automobility, and the ability of audits to legitimize local knowledge within a broader scientific paradigm, suggests a rich potential for audits to further enhance children’s mobility environments to support greater levels of walking and cycling.

3. The final contribution this research has made towards understanding the role of built environment auditing for children’s mobility and wellbeing is that there needs to be an **ongoing critical reflection of the role of audits in relation to the socio-political institutional contexts in which they operate.** Auditing for walkability

remains a nascent practice within planning organisations in Australia. The situation is not the same for planning for roads and for car mobility. To challenge the dominance of automobility in shaping the quality of streets, auditing practices need to move beyond the realm of, in Blomley's (2007) words, the 'traffic logic' of engineering practices and into one of 'civic humanism' of the political realm of the streets. An approach based on 'civic humanism' has the capacity to address the broad range of experiences highlighted in this research related to wellbeing that children derive from their everyday mobility. As suggested above, built environment auditing undoubtedly has an important role to play in the ongoing management of children's mobility environment. However, planners who act in response to the mobility needs of children need to be cautious of the role of audits as serving a purely functional role aimed at maintaining the circulation of objects and bodies within the street; a role that the literature has shown maintains the dominant mobility of the car. This research thesis has shown that despite many positive factors relating to the built environment, the rates of children engaging in active modes of travel do not match the latent potential for improving children's wellbeing through more sustainable modes of mobility.

Conclusion

The objective of this research thesis has been to use the practice of built environment auditing as a means to explore the relationship between children's active mobility and wellbeing. As stated by Canter (1983), quoted in the introduction, there is a need to understand how human experience is translated by the tools and instruments of urban planners, urban designers, transport planners and architects into knowledge that shapes spatial design and practices. In order to develop this knowledge this thesis has drawn upon a range of methods to capture the behaviour and attitudes of children and their parents, the quality of the built environment, the framing of issues relating to children's mobility within the local media, and the practical activity of auditing from the perspective of transport planners, engineers and advocates. These methods have been applied to a case study of a Western Australian school in order to reveal the variety of relationships representative of the social ecology of children growing up in modern, developed urban environments.

Children's everyday mobility is an important factor to their overall wellbeing. Walking and cycling are evidently important to their subjective wellbeing, their feelings of pleasure and satisfaction related to travel and the activities that travel affords. The supportive infrastructure of places to travel to, good quality paths and safe road crossings provide the means for children to walk and cycle in their local environments, and may shape the licences their parents impose on their freedoms to travel. Built environment auditing provides a method for planners to evaluate both children's subjective responses and the recording of infrastructure in order to develop strategies and guide decision making to improve rates of active mobility. However, these functions of auditing will not be enough to provide a substantial change in the trend of declining rates of walking and cycling by children. More importantly, audits may play a role in addressing the barriers to children's active mobility by enabling the collective evaluation of built environments and facilitating political action towards substantive changes. In order for this to occur, auditors need to pay careful attention to the design of audits so that they can capture meaningful information relating to barriers that may exist and understand the role of audits as a tool to challenge the hegemony of the dominant regimes of mobility that sideline modes of travel other than the car. An ongoing critical reflection of the role of audits in practice is necessary in order for planners to move towards facilitating concrete changes to cities that have greater capacity to support children's wellbeing through active mobility.

References

- Aitken, Stuart C. 2001. *Geographies of Young People: The Morally Contested Spaces of Identity* / Stuart C. Aitken. London: Routledge.
- Alfonzo, Mariela A. 2005b. "To Walk or Not to Walk? The Hierarchy of Walking Needs." *Environment and Behaviour* 37 (6): 808-836. doi: 10.1177/0013916504274016.
- Andresen, Sabine, Isabell Diehm, Uwe Sander, and Holger Ziegler, eds. 2010. *Children and the Good Life: New Challenges for Research on Children*. Dordrecht, Netherlands: Springer eBooks.
- Australian Bureau of Statistics. 2012. Census. Accessed 16 November 2013, <http://www.abs.gov.au/>.
- Banister, David. 2008. "The Sustainable Mobility Paradigm." *Transport Policy* 15 (2): 73-80. doi: <http://dx.doi.org/10.1016/j.tranpol.2007.10.005>.
- Barker, J., Kraftl, P., Horton, J. & Tucker, F. 2009. "The Road Less Travelled – New Directions in Children's and Young People's Mobility." *Mobilities*, 4, 1-10.
- Barker, John. 2011. "'Manic Mums' and 'Distant Dads'? Gendered Geographies of Care and the Journey to School." *Health and Place* 17 (2): 413-421. doi: <http://dx.doi.org/10.1016/j.healthplace.2010.04.001>.
- Barratt Hacking, Elisabeth, Robert Barratt, and William Scott. 2007. "Engaging Children: Research Issues around Participation and Environmental Learning." *Environmental Education Research* 13 (4): 529-544. doi: 10.1080/13504620701600271.
- Barton, Hugh, and Marcus Grant. 2006. "A Health Map for the Local Human Habitat." *The Journal of the Royal Society for the Promotion of Health* 126 (6): 252-253.

- Baslington, Hazel. 2009. "Children's Perceptions of and Attitudes Towards, Transport Modes: Why a Vehicle for Change Is Long Overdue." *Children's Geographies* 7 (3): 305-322.
- Baum, Fran, Anna M. Ziersch, Guangyu Zhang, and Katy Osborne. 2009. "Do Perceived Neighbourhood Cohesion and Safety Contribute to Neighbourhood Differences in Health?" *Health & Place* 15 (4): 925-934. <http://www.sciencedirect.com/science/article/B6VH5-4VVXT11-1/2/df411472479fbbc77a4a5f13147e47be>.
- Baum, Fran, and Catherine Palmer. 2002. "'Opportunity Structures': Urban Landscape, Social Capital and Health Promotion in Australia." *Health Promotion International* 17 (4): 351-361. doi: 10.1093/heapro/17.4.351.
- Beckmann, J. 2004. Mobility and safety. *Theory, Culture & Society*, 21: 81-100.
- Bedimo-Rung, Ariane L, Jeanette Gustat, Bradley J Tompkins, Janet Rice, and Jessica Thomson. 2006. "Development of a Direct Observation Instrument to Measure Environmental Characteristics of Parks for Physical Activity." *Journal of Physical Activity and Health* 3: S176.
- Bell, Martha. 2011. "The Feel of Mobility: How Children Use Sedentary Lifestyles as a Site of Resistance." *Sport, Education and Society* 16 (3): 385-397. doi: 10.1080/13573322.2011.571882.
- Benwell, Matthew C. 2013. "Rethinking Conceptualisations of Adult-Imposed Restriction and Children's Experiences of Autonomy in Outdoor Space." *Children's Geographies* 11 (1): 28-43. doi: 10.1080/14733285.2013.743279.
- Bertolini, Luca. 2010. "Coping with the Irreducible Uncertainties of Planning: An Evolutionary Approach." In *The Ashgate Research Companion to Planning Theory: Conceptual Challenges for Spatial Planning*, eds P. Healey and J. Hillier. Farnham, Surrey, England; Burlington, VT: Ashgate.

- Bertolini, Luca. 2006. "Fostering Urbanity in a Mobile Society: Linking Concepts and Practices." *Journal of Urban Design* 11 (3): 319-334. doi: 10.1080/13574800600888269.
- Beyazit, Eda. 2011. "Evaluating Social Justice in Transport: Lessons to Be Learned from the Capability Approach." *Transport Reviews* 31 (1): 117-134. doi: 10.1080/01441647.2010.504900.
- Blomely, N. 2010. *Rights of Passage: Sidewalks and the Regulation of Public Flow*, Hoboken : Taylor and Francis.
- Boarnet, Marlon, and Randall Crane. 2001. "The Influence of Land Use on Travel Behavior: Specification and Estimation Strategies." *Transportation Research Part A: Policy and Practice* 35 (9): 823-845. doi: [http://dx.doi.org/10.1016/S0965-8564\(00\)00019-7](http://dx.doi.org/10.1016/S0965-8564(00)00019-7).
- Bohm, S., Jones, C., Land, C. & Paterson, M. 2006. "Conceptualizing Automobility: Introduction: Impossibilities of automobility." *Sociological Review*, 54: 1-16.
- Boyatzis, Richard E. 1998. *Transforming Qualitative Information : Thematic Analysis and Code Development*. Thousand Oaks, CA: Sage Publications.
- Bringolf-Isler, B., L. Grize, U. Mader, N. Ruch, F. H. Sennhauser, C. Braun-Fahrlander, and Scarpol team. 2008. "Personal and Environmental Factors Associated with Active Commuting to School in Switzerland." *Preventative Medicine* 46 (1): 67 - 73.
- Brody, Jason. 2013. "The Neighbourhood Unit Concept and the Shaping of Land Planning in the United States 1912–1968." *Journal of Urban Design* 18 (3): 340-362. doi: 10.1080/13574809.2013.800453.
- Bronfenbrenner, Urie. 1979. *The Ecology of Human Development : Experiments by Nature and Design*. Cambridge, Mass.: Harvard University Press.

- Brown, Belinda, Roger Mackett, Yi Gong, Kay Kitazawa, and James Paskins. 2008. "Gender Differences in Children's Pathways to Independent Mobility." *Children's Geographies* 6 (4): 385-401. doi: 10.1080/14733280802338080.
- Brownson, Ross C., Jen Jen Chang, Amy A. Eyler, Barbara E. Ainsworth, Karen A. Kirtland, Brian E. Saelens, and James F. Sallis. 2004. "Measuring the Environment for Friendliness Toward Physical Activity: A Comparison of the Reliability of 3 Questionnaires." *American Journal Of Public Health* 94, no. 3: 473-483. *Business Source Complete, EBSCOhost* (accessed August 31, 2013)
- Brownson, Ross C, Christine M Hoehner, Laura K Brennan, Rebeka A Cook, Michael B Elliott, and Kathleen M McMullen. 2004. "Reliability of Two Instruments for Auditing the Environment for Physical Activity." *Journal of Physical Activity and Health* 1: 191-208.
- Canter, David. 1983. "The Purposive Evaluation of Places: A Facet Approach." *Environment and Behavior* 15 (6): 659-698.
- Carver, Alison, Anna Timperio, and David Crawford. 2008. "Playing It Safe: The Influence of Neighbourhood Safety on Children's Physical Activity--a Review." *Health and Place* 14 (2): 217.
- Carver, Allison, Anna Timperio, Kylie Hesketh, and David Crawford. 2010. "Are Children and Adolescents Less Active If Parents Restrict Their Physical Activity and Active Transport Due to Perceived Risk?" *Social Science and Medicine* 70 (11): 1799-1805.
- Castonguay, Geneviève, and Sylvie Jutras. 2009. "Children's Appreciation of Outdoor Places in a Poor Neighborhood." *Journal of Environmental Psychology* 29 (1): 101-109.
- Caughy, Margaret, Patricia O' Campo, and Jacqueline Patterson. 2001. "A Brief Observational Measure for Urban Neighborhoods." *Health and Place* 7 (3): 225-236.

<http://www.sciencedirect.com/science/article/B6VH5-43CHB7F-6/2/289b258b007523c1e055df4ea68f062f>.

Cerin, Ester, Brian E Saelens, James F Sallis, and Lawrence D Frank. 2006. "Neighborhood Environment Walkability Scale: Validity and Development of a Short Form." *Medicine and Science in Sports and Exercise* 38 (9): 1682-1691.

Certeau, Michel de. 1984. *The Practice of Everyday Life / Michel De Certeau Translated by Steven Rendall*. Berkeley, Calif.: University of California Press.

Chawla, Louise. 2002. "Insight, Creativity and Thoughts on the Environment': Integrating Children and Youth into Human Settlement Development." *Environment and Urbanization* 14 (2): 11-21.

Chawla, Louise, and Harry Heft. 2002. "Children's Competence and the Ecology of Communities: A Functional Approach to the Evaluation of Participation." *Journal of Environmental Psychology* 22: 201-216.

Christensen, Pia, Miguel Romero Mikkelsen, Thomas Alexander Sick Nielsen, and Henrik Harder. 2011. "Children, Mobility, and Space: Using Gps and Mobile Phone Technologies in Ethnographic Research." *Journal of Mixed Methods Research* 5 (3): 227-246. doi: 10.1177/1558689811406121.

Christie, Nicola, Richard Kimberlee, Elizabeth Towner, Sarah Rodgers, Heather Ward, Judith Sloney, and Ronan Lyons. 2011. "Children Aged 9–14 Living in Disadvantaged Areas in England: Opportunities and Barriers for Cycling." *Journal of Transport Geography* 19 (4): 943-949. doi: <http://dx.doi.org/10.1016/j.jtrangeo.2010.12.003>.

Church, Richard L., and James R. Marston. 2003. "Measuring Accessibility for People with a Disability." *Geographical Analysis* 35 (1): 83-96. doi: 10.1111/j.1538-4632.2003.tb01102.x.

Clifton, Kelly, Andréa Livi Smith, and Daniel Rodriguez. 2007. "The Development and Testing of an Audit for the Pedestrian Environment."

Landscape and Urban Planning 80 (1-2): 95-110.
<http://www.sciencedirect.com/science/article/B6V91-4KRY3H5-1/2/5fd0460a845e7bc1c794413aa8d268e2>.

Cole, Rachel, Matthew Burke, Eva Leslie, Maria Donald, and Neville Owen. 2010. "Perceptions of Representatives of Public, Private, and Community Sector Institutions of the Barriers and Enablers for Physically Active Transport." *Transport Policy* 17 (6): 496-504. doi: <http://dx.doi.org/10.1016/j.tranpol.2010.05.003>.

Coleman, Roger. 2003. "Living Longer." In *Inclusive Design*, ed. John Clarkson, 120-141. Vienna: Springer.

Collins, Damian C. A., and Robin A. Kearns. 2001. "The Safe Journeys of an Enterprising School: Negotiating Landscapes of Opportunity and Risk." *Health and Place* 7 (4): 293-306.
<http://www.sciencedirect.com/science/article/B6VH5-4489TK8-4/2/6f7de06d11983d8c464642eadc35f35c>.

———. 2005. "Geographies of Inequality: Child Pedestrian Injury and Walking School Buses in Auckland, New Zealand." *Social Science and Medicine* 60 (1): 61-69. <http://www.sciencedirect.com/science/article/B6VBF-4CTCSR1-1/2/2c9fed5c8ce295a2779b0dc90136aa10>.

———. 2010. "Walking School Buses in the Auckland Region: A Longitudinal Assessment." *Transport Policy* 17 (1): 1-8. doi: <http://dx.doi.org/10.1016/j.tranpol.2009.06.003>.

Considine, Mark. 1994. *Public Policy: A Critical Approach*. South Melbourne: Macmillan Education Australia.

Cooper, Ashley, Lars Anderson, Niels Wedderkop, Angie Page, and Karsten Froberg. 2005. "Physical Activity Levels of Children Who Walk, Cycle, or Are Driven to School." *American Journal of Preventive Medicine* 29 (3): 179-184.

- Cooper, Ashley, Angie Page, Lucy Foster, and Dina Qahwaji. 2003. "Commuting to School: Are Children Who Walk More Physically Active?" *American Journal of Preventive Medicine* 25 (4):273-276.
- Cozens, Paul, and David Hillier. 2008. "The Shape of Things to Come: New Urbanism, the Grid and the Cul-De-Sac." *International Planning Studies* 13 (1): 51-73. doi: 10.1080/13563470801969962.
- Creswell, John W. 2007. *Qualitative Inquiry and Research Design : Choosing among Five Approaches*. 2nd ed. Thousand Oaks: Sage Publications.
- Curtis, Carey. 2005. "The Windscreen World of Land Use Transport Integration: Experiences from Perth, WA, a Dispersed City." *Town Planning Review* 76 (4): 423-454.
- Curtis, Carey, and Nicholas Low. 2012. *Institutional Barriers to Sustainable Transport*. Farnham: Ashgate Publishing Ltd. <http://CURTIN.ebib.com.au/patron/FullRecord.aspx?p=1019382>.
- Curtis, Carey, and Reena Tiwari. 2008. "Transitioning Urban Arterial Roads to Activity Corridors." *Urban Design International*, suppl. SPECIAL ISSUE: An International review of liveable street. 13(2): 105-120.
- Cutt, Hayley E., Billie Giles-Corti, Lisa J. Wood, Matthew W. Knuiman, and Valerie Burke. 2008. "Barriers and Motivators for Owners Walking Their Dog: Results from Qualitative Research." *Health Promotion Journal of Australia* 19 (2): 118-24.
- Darnall, N., Seol, I. & Sarkis, J. 2009. "Perceived stakeholder influences and organizations' use of environmental audits." *Accounting, Organizations and Society*, 34: 170-187.
- Day, Kristen, Marlon Boarnet, Mariela Alfonzo, and Ann Forsyth. 2006. "The Irvine-Minnesota Inventory to Measure Built Environments: Development." *American Journal of Preventive Medicine* 30 (2): 144-152. <http://www.sciencedirect.com/science/article/B6VHT-4J5Y9JG-7/2/546fe85969fa91b90d6aee2adbf2c3cf>.

- De Vos, Jonas, Tim Schwanen, Veronique Van Acker, and Frank Witlox. 2013. "Travel and Subjective Well-Being: A Focus on Findings, Methods and Future Research Needs." *Transport Reviews* 33 (4): 421-442. doi: 10.1080/01441647.2013.815665.
- DeBord, Karen, LL Hestenes, RC Moore, NG Cosco, and JR McGinnis. 2005. *Preschool Outdoor Environment Measurement Scale (Poems)*: Lewisville, NC: Kaplan Early Learning Company.
- Dennis Jr, Samuel F. 2006. "Prospects for Qualitative Gis at the Intersection of Youth Development and Participatory Urban Planning." *Environment and Planning A* 38: 2039-2054.
- Di Peitro, Gayle, and Ian Hughes. 2003. "Travelsmart Schools - There Really Is a Better Way to Go!" In *Australian Transport Research Forum, Wellington, New Zealand*. September 29-October 1, 2003.
- Doherty, Catherine, Barbara Rissman, and Bronwyn Browning. 2012. "Educational Markets in Space: Gamekeeping Professionals across Australian Communities." *Journal of Education Policy* 28 (1): 121-152. doi: 10.1080/02680939.2012.692394.
- Dolmans, DHJM, HAP Wolfhagen, AJJA Scherpbier, and CPM Van Der Vleuten. 2003. "Development of an Instrument to Evaluate the Effectiveness of Teachers in Guiding Small Groups." *Higher Education* 46 (4): 431-446.
- Duncan, Mitch J., Hannah M. Badland, and W. Kerry Mummery. 2009. "Applying GPS to Enhance Understanding of Transport-Related Physical Activity." *Journal of Science and Medicine in Sport* 12 (5): 549-556. doi: <http://dx.doi.org/10.1016/j.jsams.2008.10.010>.
- Earls, Felton, and Mary Carlson. 2001. "The Social Ecology of Child Health and Well-Being." *Annual Review of Public Health* 22 (1): 143-166. doi: 10.1146/annurev.publhealth.22.1.143.
- Emery, James, Carolyn Crump, and Philip Bors. 2003. "Reliability and Validity of Two Instruments Designed to Assess the Walking and Bicycling

Suitability of Sidewalks and Roads." *American Journal of Health Promotion* 18 (1): 38-46.

Engwicht, David. 2005. *Mental Speed Bumps: The Smarter Way to Tame Traffic*. Annandale, N.S.W.: Annandale, N.S.W. : Envirobook.

Evans, G. 2009. "Accessibility, Urban Design and the Whole Journey Environment." *Built Environment* 35 (3): 366-385.

Evenson, Kelly., Daniella Sotres-Alvarez, Amy Herring, Lynn Messer, Barbara Laraia, and Daniel Rodriguez. 2009. "Assessing Urban and Rural Neighborhood Characteristics Using Audit and GIS Data: Derivation and Reliability of Constructs." *International Journal of Behavioural Nutrition and Physical Activity* 6 (1): 44. <http://www.ijbnpa.org/content/6/1/44>.

Ewing, Reid, Ross Brownson, and David Berrigan. 2006. "Relationship between Urban Sprawl and Weight of United States Youth." *American Journal of Preventive Medicine* 31 (6): 464-474. <http://www.sciencedirect.com/science/article/B6VHT-4MJJDFV-2/2/af6482a4d3943924d32df162a81e47aa>.

Ewing, Reid, Otto Clemente, Susan Handy, Ross Brownson, and Emily Winston. 2005. "Measuring Urban Design Qualities Related to Walkability." *Final Report prepared for Active Living Research, Robert Wood Johnson Foundation*.

Ewing, Reid, and Susan Handy. 2009. "Measuring the Unmeasurable: Urban Design Qualities Related to Walkability." *Journal of Urban Design* 14 (1): 65-84. doi: 10.1080/13574800802451155.

Ewing, Reid, Susan Handy, Ross C Brownson, Otto Clemente, and Emily Winston. 2006. "Identifying and Measuring Urban Design Qualities Related to Walkability." *Journal of Physical Activity and Health* 3: S223.

Falconer, Ryan, Peter Newman, and Billie Giles-Corti. 2010. "Is Practice Aligned with the Principles? Implementing New Urbanism in Perth, Western Australia." *Transport Policy* 17 (5): 287-294. doi: <http://dx.doi.org/10.1016/j.tranpol.2010.01.014>.

- Flyvbjerg, Bent. 2006. "Five Misunderstandings About Case-Study Research." *Qualitative Inquiry* 12 (2): 219-245. doi: 10.1177/1077800405284363.
- Forrest, Ray, and Ade Kearns. 2001. "Social Cohesion, Social Capital and the Neighbourhood." *Urban Studies (Routledge)* 38 (12): 2125-2143. doi: 10.1080/00420980120087081.
- Forsyth, Ann, Justin Jacobson, and Katie Thering. 2010. "Six Assessments of the Same Places: Comparing Views of Urban Design." *Journal of Urban Design* 15 (1): 21-48.
- Forsyth, Ann, J. Michael Oakes, Kathryn H. Schmitz, and Mary Hearst. 2007. "Does Residential Density Increase Walking and Other Physical Activity?" *Urban Studies (Routledge)* 44 (4): 679-697. doi: 10.1080/00420980601184729.
- Foundation, Robert Wood Johnson. 2013. Active Living Research. Accessed July 23, <http://activelivingresearch.org/toolsandresources/all>.
- Frank, Lawrence, Jacqueline Kerr, Jim Chapman, and James Sallis. 2007. "Urban Form Relationships with Walk Trip Frequency and Distance among Youth." *American Journal of Health Promotion* 21 (4).
- Frank, Lawrence, and Gary Pivo. 1994. "Impacts of Mixed Use and Density on Utilization of Three Modes of Travel: Single-Occupant Vehicle, Transit, and Walking." *Transportation Research Record* 1466: 44-52.
- Frank, Lawrence D., and Peter O. Engelke. 2001. "The Built Environment and Human Activity Patterns: Exploring the Impacts of Urban Form on Public Health." *Journal of Planning Literature* 16 (2): 202-218. doi: 10.1177/08854120122093339.
- Franklin, Samuel S. 2010. *The Psychology of Happiness : A Good Human Life / Samuel S. Franklin*. New York, NY: New York, NY : Cambridge University Press.

- Freeman, Claire, and Robin Quigg. 2009. "Commuting Lives: Children's Mobility and Energy Use." *Journal of Environmental Planning and Management* 52 (3): 393-412. doi: 10.1080/09640560802703280.
- Freeman, Claire, and Paul J. Tranter. 2010. *Children and Their Urban Environment : Changing Worlds*. Washington, DC: Earthscan.
- Friedner, Michele, and Jamie Osborne. 2012. "Audit Bodies: Embodied Participation, Disability Universalism, and Accessibility in India." *Antipode* 45 (1): 43-60.
- Fusco, Caroline, Fiona Moola, Guy Faulkner, Ron Buliung, and Vanessa Richichi. 2012. "Toward an Understanding of Children's Perceptions of Their Transport Geographies: (Non)Active School Travel and Visual Representations of the Built Environment." *Journal of Transport Geography* 20 (1): 62-70. doi: 10.1016/j.jtrangeo.2011.07.001.
- Fyhri, Aslak, and Randi Hjorthol. 2009. "Children's Independent Mobility to School, Friends and Leisure Activities." *Journal of Transport Geography* 17 (5): 377-384. doi: <http://dx.doi.org/10.1016/j.jtrangeo.2008.10.010>.
- Fyhri, Aslak, Randi Hjorthol, Roger L. Mackett, Trine Nordgaard Fotel, and Marketta Kyttä. 2011. "Children's Active Travel and Independent Mobility in Four Countries: Development, Social Contributing Trends and Measures." *Transport Policy* 18 (5): 703-710. doi: <http://dx.doi.org/10.1016/j.tranpol.2011.01.005>.
- Gallimore, Jonathan M., Barbara B. Brown, and Carol M. Werner. 2011. "Walking Routes to School in New Urban and Suburban Neighborhoods: An Environmental Walkability Analysis of Blocks and Routes." *Journal of Environmental Psychology* 31 (2): 184-191. doi: 10.1016/j.jenvp.2011.01.001.
- Garrard, J. 2009. *Active transport: Children and young people*. Melbourne, Victoria: Vichealth.
- Gibson, James J. 1979. *The Ecological Approach to Visual Perception*. Boston: Houghton Mifflin.

- Giles-Corti, Billie, Sally Kelty, Stephen Zubrik, and Karren Villanueva. 2009. "Encouraging Walking for Transport and Physical Activity in Children and Adolescents: How Important Is the Built Environment?" *Sports Medicine* 39 (12): 995-1009.
- Giles-Corti, Billie, Anna Timperio, Fiona Bull, and Terri Pikora. 2005. "Understanding Physical Activity Environmental Correlates: Increased Specificity for Ecological Models." *Exercise and Sports Science Review* 33 (4): 175 - 181.
- Glanz, Karen, James F. Sallis, Brian E. Saelens, and Lawrence D. Frank. 2007. "Nutrition Environment Measures Survey in Stores (Nems-S): Development and Evaluation." *American Journal of Preventive Medicine* 32 (4): 282-289. doi: <http://dx.doi.org/10.1016/j.amepre.2006.12.019>.
- Government of New South Wales. 2013. "Draft Metropolitan Strategy for Sydney." New South Wales: Sydney.
- Government of Queensland. 2009. "South-East Queensland (Seq) Regional Plan " edited by Infrastructure and Planning Department of State Development.
- Government of South Australia. 2010. "30-Year Plan for Greater Adelaide." Department of Planning and Local Government, South Australia: Adelaide.
- Government of Victoria. 2002. "Melbourne 2030 - Planning for Sustainable Growth." edited by Planning and Local Infrastructure Department of Transport, Melbourne: Victoria.
- Government of Western Australia. 2010. "Directions 2031 and Beyond." Department of Planning, Perth: Western Australia.
- Granner, Michelle L., Patricia A. Sharpe, Ericka L. Burroughs, Regina Fields, and Joyce Hallenbeck. 2010. "Newspaper Content Analysis in Evaluation of a Community-Based Participatory Project to Increase Physical Activity." *Health education research* 25 (4): 656-667. doi: 10.1093/her/cyp049.

- Gray, R. 2002. "The social accounting project and Accounting Organizations and Society Privileging engagement, imaginings, new accountings and pragmatism over critique?" *Accounting, Organizations and Society*, 27: 687-708.
- Guell, C., J. Panter, N. R. Jones, and D. Ogilvie. 2012. "Towards a Differentiated Understanding of Active Travel Behaviour: Using Social Theory to Explore Everyday Commuting." *Social Science and Medicine* 75 (1): 233-239. doi: <http://dx.doi.org/10.1016/j.socscimed.2012.01.038>.
- Hall, Peter Geoffrey. 2002. *Cities of Tomorrow : An Intellectual History of Urban Planning and Design in the Twentieth Century*. 3rd ed. Oxford, UK: Blackwell Publishers.
- Hall, Tony. 2010. "Goodbye to the Backyard?—the Minimisation of Private Open Space in the Australian Outer-Suburban Estate." *Urban Policy and Research* 28 (4): 411-433. doi: 10.1080/08111146.2010.496715.
- Handy, Susan, Xinyu Cao, and Patricia Mokhtarian. 2008. "Neighbourhood Design and Children's Outdoor Play: Evidence from Northern California." *Children, Youth and Environments* 18 (2): 160-179.
- Handy, Susan, and Kelly Clifton. 2001. "Evaluating Neighborhood Accessibility: Possibilities and Practicalities." *Journal of transportation and statistics* 4 (2/3): 67-78. http://sfx.lis.curtin.edu.au/sfx_local?sid=google&auinit=SL&aualast=Handy&atitle=Evaluating_neighborhood_accessibility%3A_Possibilities_and_practicalities&title=Journal_of_transportation_and_statistics&volume=4&issue=2%2F3&date=2001&spage=67&issn=1094-8848.
- Hansen, Dorte, James Peart, and Gary John. 2012. "Engaging Young Minds. Addressing School Travel Challenges through Innovation." In *Australasian Transport Research Forum, Perth, Western Australia*. <http://www.patrec.org/atrf.aspx>.

- Harden, Jeni. 2000. "There's No Place Like Home." *Childhood* 7 (1): 43-59. doi: 10.1177/0907568200007001005.
- Hart, Roger. 2002. "Containing Children: Some Lessons on Planning for Play from New York City." *Environment and Urbanization* 14 (2): 135-148.
- Hart, Roger. 1979. *Children's Experience of Place*. New York: Irvington.
- Hartas, Dimitra. 2008. *The Right to Childhoods : Critical Perspectives on Rights, Difference and Knowledge in a Transient World*. London ; New York: Continuum International Pub. Group.
- Healey, Patsy. 2009. "The Pragmatic Tradition in Planning Thought." *Journal of Planning Education and Research* 28 (3): 277-292. doi: 10.1177/0739456x08325175.
- Department of Health. 2013. Australia's Physical Activity and Sedentary Behaviour Guideline. Accessed November 11, 2013, <http://www.health.gov.au/paguidelines>.
- Heft, Harry. 1988. "Affordances of Children's Environments: A Functional Approach to Environmental Description." *Children's Environments Quarterly* 5 (3): 29-37. doi: 10.2307/41514683.
- Hillman M. 1970, *Mobility in New Towns*, PhD Dissertation, University of Edinburgh
- Hillman, Mayer, John Adams, and John Whitelegg. 1990. *One False Move: A Study of Children's Independent Mobility*. London: Policy Studies Institute.
- Hinckson, Erica A., Nick Garrett, and Scott Duncan. 2011. "Active Commuting to School in New Zealand Children (2004–2008): A Quantitative Analysis." *Preventive Medicine* 52 (5): 332-336. doi: <http://dx.doi.org/10.1016/j.ypmed.2011.02.010>.
- Hjorthol, Randi, and Aslak Fyhri. 2009. "Do Organized Leisure Activities for Children Encourage Car-Use?" *Transportation Research Part A: Policy and Practice* 43 (2): 209-218.

<http://www.sciencedirect.com/science/article/B6VG7-4V7KBR1-1/2/518dab85bb0a7896dc5e801a8238fe89>.

Hoch, Charles. 2009. "Planning Craft: How Planners Compose Plans." *Planning Theory* 8 (3): 219-241. doi: 10.1177/1473095209105528.

Hoehner, Christine, Laura Brennan, Michael Elliott, Susan Handy, and Ross Brownson. 2005. "Perceived and Objective Environmental Measures and Physical Activity among Urban Adults." *American Journal of Preventive Medicine* 28 (2S2): 105-116.

Hoehner, Christine, Andrae Ivy, Laura Brennan Ramirez, Brandi Meriwether, and Ross Brownson. 2006. "How Reliably Do Community Members Audit the Neighborhood Environment for Its Support of Physical Activity? Implications for Participatory Research." *Journal of Public Health Management and Practice* 12 (3): 270-277.

Hoehner, Christine M, Andrae Ivy, Laura K Brennan Ramirez, Susan Handy, and Ross C Brownson. 2007. "Active Neighborhood Checklist: A User-Friendly and Reliable Tool for Assessing Activity Friendliness." *American Journal of Health Promotion* 21 (6): 534-537.

Holt, N. L., J. C. Spence, Z. L. Sehn, and N. Cutumisu. 2008. "Neighborhood and Developmental Differences in Children's Perceptions of Opportunities for Play and Physical Activity." *Health and Place* 14 (1): 2-14. <http://www.sciencedirect.com/science/article/B6VH5-4NBBYXR-1/2/b54d01fc14f9531b28753f7282c5d1a3>.

Hume, C., J. Salmon, and K. Ball. 2005. "Children's Perceptions of Their Home and Neighborhood Environments, and Their Association with Objectively Measured Physical Activity: A Qualitative and Quantitative Study." *Health education research* 20 (1): 1-13. doi: 10.1093/her/cyg095.

James, A., and A. Prout. 1990. *Constructing and Reconstructing Childhood : Contemporary Issues in the Sociological Study of Childhood*. London ; New York: Falmer Press.

- Jansson, Märit, and Bengt Persson. 2010. "Playground Planning and Management: An Evaluation of Standard-Influenced Provision through User Needs." *Urban Forestry and Urban Greening* 9 (1): 33-42. <http://www.sciencedirect.com/science/article/pii/S1618866709000673>.
- Jenks, Mike, and Nicola Dempsey. 2007. "Defining the Neighbourhood: Challenges for Empirical Research1." *The Town Planning Review* 78 (2): 153-168,170-177.
- Jones, Natalia R., Andy Jones, Esther M. F. van Sluijs, Jenna Panter, Flo Harrison, and Simon J. Griffin. 2010. "School Environments and Physical Activity: The Development and Testing of an Audit Tool." *Health and Place* 16 (5): 776-783. doi: <http://dx.doi.org/10.1016/j.healthplace.2010.04.002>.
- Jones, O. 2000. "Purity, Disorder, Childhood and Space." In *Children's Geographies: Playing, Living, Learning*, eds S. Holloway and G. Valentine. London Routledge.
- Kaczynski, Andrew T, Sonja A Wilhelm Stanis, and Gina M Besenyi. 2012. "Development and Testing of a Community Stakeholder Park Audit Tool." *American Journal of Preventive Medicine* 42 (3): 242-249.
- Kaplan, Stephen. 1995. "The Restorative Benefits of Nature: Toward an Integrative Framework." *Journal of Environmental Psychology* 15 (3): 169-182. doi: [http://dx.doi.org/10.1016/0272-4944\(95\)90001-2](http://dx.doi.org/10.1016/0272-4944(95)90001-2).
- Karsten, Lia. 2005. "It All Used to Be Better? Different Generations on Continuity and Change in Urban Children's Daily Use of Space." *Children's Geographies* 3 (3): 275-290.
- Kearns, Ade, and Michael Parkinson. 2001. "The Significance of Neighbourhood." *Urban Studies* 38 (12): 2103-2110.
- Kearns, Robin A., Damian C. A. Collins, and Patricia M. Neuwelt. 2003. "The Walking School Bus: Extending Children's Geographies?" *Area* 35 (3): 285-292. doi: 10.1111/1475-4762.00177.

- Kerr, Jacqueline, Dori Rosenberg, James Sallis, Brian Saelens, Lawrence Frank, and Terry Conway. 2006. "Active Commuting to School: Associations with Environment and Parental Concerns." *Medicine and Science in Sports Exercise* 38 (4): 787 - 794.
- Kerr, Jacqueline, Jordan A Carlson, Dori E Rosenberg, and Ashley Withers. 2012. "Identifying and Promoting Safe Walking Routes in Older Adults." *Health*, 4:720-724
- King, A.C, D Stokols, E Talen, G Brassington, and R Killingsworth. 2002. "Theoretical Approaches to the Promotion of Physical Activity: Forging a Transdisciplinary Paradigm." *American Journal of Preventive Medicine* 23 (2S): 15-25.
- Kingham, Simon, and Shannon Ussher. 2007. "An Assessment of the Benefits of the Walking School Bus in Christchurch, New Zealand." *Transportation Research Part A: Policy and Practice* 41 (6): 502-510. doi: <http://dx.doi.org/10.1016/j.tra.2006.11.008>.
- Korpela, Kalevi, Marketta Kyttä, and Terry Hartig. 2002. "Restorative Experience, Self-Regulation and Children's Place Preferences." *Journal of Environmental Psychology* 22 (4): 387-398. <http://www.sciencedirect.com/science/article/B6WJ8-477GD6C-6/2/556e18d084d0468b6ae9c81e0e68441e>.
- Krippendorff, Klaus. 2004. *Content Analysis: An Introduction to Its Methodology*. 2nd ed. Thousand Oaks, Calif.: Sage.
- Krizek, Kevin J. 2003. "Operationalizing Neighbourhood Accessibility for Land-Use-Travel Behaviour Research and Regional Modelling." *Journal of Planning Education and Research* 22: 270-287.
- Krohn, Wolfgang. 2008. "Learning from Case Studies." In *Handbook of Transdisciplinary Research*, eds Gertrude Hirsch Hadorn, Holger Hoffmann-Riem, Susette Biber-Klemm, Walter Grossenbacher-Mansuy, Dominique Joye, Christian Pohl, Urs Wiesmann and Elisabeth Zemp. Bern: Springer.

- Kuhn, Thomas S., and Ian Hacking. 2012. *The Structure of Scientific Revolutions*. 4th ed. Chicago: University of Chicago Press.
- Kullman, Kim. 2010. "Transitional Geographies: Making Mobile Children." *Social and Cultural Geography* 11 (8): 829-846. doi: 10.1080/14649365.2010.523839.
- Kullman, Kim, and Charlotte Palludan. 2011. "Rhythmanalytical Sketches: Agencies, School Journeys, Temporalities." *Children's Geographies* 9 (3-4): 347-359. doi: 10.1080/14733285.2011.590709.
- Kytta, Marketta. 2004. "The Extent of Children's Independent Mobility and the Number of Actualized Affordances as Criteria for Child-Friendly Environments." *Journal of Environmental Psychology* 24: 179-198.
- Kytta, Marketta. 2002. "Affordances of Children's Environments in the Context of Cities, Small Towns, Suburbs and Rural Villages in Finland and Belarus." *Journal of Environmental Psychology* 22 (1-2): 109-123. <http://www.sciencedirect.com/science/article/B6WJ8-462T8K3-B/2/cb2a9408f9cb7b966fcb266dba48ff7b>.
- Lang, Debbie, Damian Collins, and Robin Kearns. 2011. "Understanding Modal Choice for the Trip to School." *Journal of Transport Geography* 19 (4): 509-514. doi: 10.1016/j.jtrangeo.2010.05.005.
- Lee, Chanam, and Anne Vernez Moudon. 2004. "Physical Activity and Environment Research in the Health Field: Implications for Urban and Transportation Planning Practice and Research." *Journal of Planning Literature* 19 (2): 147-181. doi: 10.1177/0885412204267680.
- Lee, Chanam, and Anne Vernez Moudon. 2008. "Neighbourhood Design and Physical Activity." *Building Research and Information* 36 (5): 395-411. doi: 10.1080/09613210802045547.
- Lee, Rebecca, Katie Booth, Jacqueline Reese-Smith, Gail Regan, and Hugh Howard. 2005. "The Physical Activity Resource Assessment (Para) Instrument: Evaluating Features, Amenities and Incivilities of Physical Activity Resources in Urban Neighborhoods." *International Journal of*

Behavioral Nutrition and Physical Activity 2 (1): 13.
<http://www.ijbnpa.org/content/2/1/13>.

Lewis, Ferdinand. 2008. "A Capability-Based Approach to Defining Performance Characteristics of the Built Environment." Faculty of the School of Policy, Planning and Development, University of Southern California.

Lewis, Ferdinand. 2012a. "Auditing Capability and Active Living in the Built Environment." *Journal of Human Development and Capabilities* 13 (2): 295-315. doi: 10.1080/19452829.2011.645028.

———. 2012b. "Toward a General Model of Built Environment Audits." *Planning Theory* 11 (1): 44-65. doi: 10.1177/1473095211408056.

Lin, Jen-Jia, and Yu Tzu-Pen. 2011. "Built Environment Effects on Leisure Travel for Children: Trip Generation and Travel Mode." *Transport Policy* 18: 246-258.

Lo, Ria Hutabarat. 2009. "Walkability: What Is It?" *Journal of Urbanism: International Research on Placemaking and Urban Sustainability* 2 (2): 145-166. doi: 10.1080/17549170903092867.

Lounsbery, Monica AF, Thomas L McKenzie, James R Morrow, and Kathryn A Holt. 2013. "School Physical Activity Policy Assessment." *Medicine* 45 (1): S131-S141.

Lynch, Kevin. 1971. *Site Planning*. 2d ed. Cambridge, Mass.: M.I.T. Press.

Lynch, Kevin, and Tridib Banerjee. 1977. *Growing up in Cities : Studies of the Spatial Environment of Adolescence in Cracow, Melbourne, Mexico City, Salta, Toluca, and Warszawa*. Cambridge, Mass.: MIT Press.

Mackett, R, Lindsey Lucas, James Paskins, and Jill Turbin. 2005. "The Therapeutic Value of Children's Everyday Travel." *Transportation Research Part A* 39: 205-219.

- Mackett, Roger, Belinda Brown, Yi Gong, Kay Kitazawa, and James Paskins. 2007. "Children's Independent Movement in the Local Environment." *Built Environment (1978-)*: 454-468.
- Malone, Karen. 2007. "The Bubble Wrap Generation: Children Growing up in Walled Gardens." *Environmental Education Research* 13 (4): 513-527. doi: 10.1080/13504620701581612.
- Maslow, Abraham H. 1999. *Toward a Psychology of Being*. 3rd ed. New York: Wiley.
- Martin, G. 2002. "Grounding Social Ecology: Landscape, Settlement, and Right of Way." *Capitalism Nature Socialism*, 13, 3-30.
- Matthews, Hugh, Mark Taylor, Barry Percy-Smith, and Melanie Limb. 2000. "The Unacceptable Flaneur: The Shopping Mall as a Teenage Hangout." *Childhood* 7 (3): 279-294.
- McCormack, Gavin, Billie Giles-Corti, Max Bulsara, and Terri Pikora. 2006. "Correlates of Distances Traveled to Use Recreational Facilities for Physical Activity Behaviors." *International Journal Behavioural Nutrition and Physical Activity* 3: 18.
- McDonald, Noreen. 2008. "Children's Mode Choice for the School Trip: The Role of Distance and School Location in Walking to School." *Transportation* 35 (1): 23-35. doi: 10.1007/s11116-007-9135-7.
- . 2007. "Active Transportation to School: Trends among U.S. Schoolchildren, 1969-2001." *American Journal of Preventive Medicine* 32 (6): 509-516. <http://www.sciencedirect.com/science/article/B6VHT-4NTNRY5-B/2/6092047ec9614abe7c28e225f046e795>.
- McDonald, Noreen C., Elizabeth Deakin, and Annette E. Aalborg. 2010. "Influence of the Social Environment on Children's School Travel." *Preventive Medicine* 50, Supplement (0): S65-S68. doi: <http://dx.doi.org/10.1016/j.ypmed.2009.08.016>.

- McGill, Joanne, Nicola Church, Danielle Gleeson, Adam Rogers, and Kellie Doonan. 2012. "Not Everyone Gets a Back Pack; Developing a Targeted Approach to Travel Behavior Change." In *Australia Transport Research Forum, Perth, Western Australia*. <http://www.patrec.org/atrf.aspx>.
- McKenzie, Thomas L, Deborah A Cohen, Amber Sehgal, Stephanie Williamson, and Daniela Golinelli. 2006. "System for Observing Play and Recreation in Communities (Soparc): Reliability and Feasibility Measures." *Journal of Physical Activity and Health* 3: S208.
- McKenzie, Thomas L, Simon J Marshall, James F Sallis, and Terry L Conway. 2000. "Leisure-Time Physical Activity in School Environments: An Observational Study Using Soplay." *Preventive Medicine* 30 (1): 70-77.
- McLaren, Lindsay, and Penelope Hawe. 2005. "Ecological Perspectives in Health Research." *Journal of epidemiology and community health* 59 (1): 6-14. doi: 10.1136/jech.2003.018044.
- McMeeking, Diana, and Bandana Purkayastha. 1995. "'I Can't Have My Mum Running Me Everywhere": Adolescents, Leisure and Accessibility." *Journal of Leisure Research* 27 (4): 360-378.
- McMillan, T. 2007. "The Relative Influence of Urban Form on a Child's Travel Mode to School." *Transportation Research Part A* 41: 69-79.
- Meiklejohn, D. & Bagnati, L. 2013. School travel planning an engineer will love: using audits and surveys to identify capital works priorities. *Australian Transport Research Forum*, 2-4 October 2013, Brisbane, Australia.
- Melville, City of. 1998. Suburb and Street History. Accessed 10 October 2013, <http://www.melvillecity.com.au/newproxy/service/api/node/workspace/SpacesStore/59283eb6-0fb2-48da-9366-48cd86f7ab78/city-of-melville-suburbs-and-street-history.pdf/content/city-of-melville-suburbs-and-street->

history.pdf?alf_ticket=TICKET_a7d52e392cfbf077bb725fe41a05c5eec7efdf11.

———. 2013. Online Maps. Accessed 15 November 2013, <http://www.melvillecity.com.au/index.php>.

Merom, Dafna, Catrine Tudor-Locke, Adrian Bauman, and Chris Rissel. 2006. "Active Commuting to School among NSW Primary School Children: Implications for Public Health." *Health and Place* 12 (4): 678-687. <http://www.sciencedirect.com/science/article/B6VH5-4HG6CB2-1/2/f497f8eb8bdb4739d538d83f4b0c09b4>.

Merriman, Peter. 2006. "'Mirror, Signal, Manoeuvre': assembling and governing the motorway driver in late 1950s Britain" in Bohm, S., Jones, C., Land, C. and Paterson, M. 2006. *Against Automobility*. Blackwell Publishing: Malden, MA.

Michael, Yvonne, Erin Keast, Habib Chaudhury, Kirsten Day, Atiya Mahmood, and Ann Sarte. 2009. "Revising the Senior Walking Environmental Assessment Tool." *Preventive Medicine* 48 (3): 247-249.

Mikkelsen, Miguel R., and Pia Christensen. 2009. "Is Children's Independent Mobility Really Independent? A Study of Children's Mobility Combining Ethnography and GPS/Mobile Phone Technologies." *Mobilities* 4 (1): 37 - 58.

Miller, Jada A., John Austin, and Don Rohn. 2004. "Teaching Pedestrian Safety Skills to Children." *Environment and Behaviour* 36 (3): 368-385. doi: 10.1177/0013916503260880.

Mitchell, H, R Kearns, and D Collins. 2007. "Nuances of Neighbourhood: Children's Perceptions of Space between Home and School in Auckland, New Zealand." *Geoforum* 38: 614-627.

Mitra, Raktim. 2012. "Independent Mobility and Mode Choice for School Transportation: A Review and Framework for Future Research." *Transport Reviews* 33 (1): 21-43. doi: 10.1080/01441647.2012.743490.

- Mitra, Raktim, and Ron N. Buliung. 2012. "Built Environment Correlates of Active School Transportation: Neighborhood and the Modifiable Areal Unit Problem." *Journal of Transport Geography* 20 (1): 51-61. doi: 10.1016/j.jtrangeo.2011.07.009.
- Mitra, Raktim, Ron Buliung, and Matthew Roorda. 2010. "Built Environment and School Travel Mode Choice in Toronto, Canada." *Transportation Research Record: Journal of the Transportation Research Board* 2156 (-1): 150-159. doi: 10.3141/2156-17.
- Mokhtarian, Patricia L., and Ilan Salomon. 2001. "How Derived Is the Demand for Travel? Some Conceptual and Measurement Considerations." *Transportation Research Part A: Policy and Practice* 35 (8): 695-719. doi: [http://dx.doi.org/10.1016/S0965-8564\(00\)00013-6](http://dx.doi.org/10.1016/S0965-8564(00)00013-6).
- Morrow, Virginia. 2001. "Using Qualitative Methods to Elicit Young People's Perspectives on Their Environments: Some Ideas for Community Health Initiatives." *Health Education Research: Theory and Practice* 16 (3): 255-268.
- Morrow, Virginia, and Martin Richards. 1996. "The Ethics of Social Research with Children: An Overview1." *Children and Society* 10 (2): 90-105. doi: 10.1111/j.1099-0860.1996.tb00461.x.
- Moudon, A.V., and C. Lee. 2003. "Walking and Bicycling: An Evaluation of Environmental Audit Instruments." *American Journal of Health Promotion* 18 (1): 21-37.
- Murphy, Kylie. 2012. "How Is It Travelling? Evaluating the Travelsmart Local Government Program." In *Australian Transport Research Forum, Perth, Western Australia*. <http://www.patrec.org/atrf.aspx>.
- Myers, Dowell. 1988. "Building Knowledge About Quality of Life for Urban Planning." *American Planning Association. Journal of the American Planning Association* 54 (3): 347-358 <http://search.proquest.com/docview/229587279?accountid=10382>

- Nordbakke, Susanne, and Tim Schwanen. 2013. "Well-Being and Mobility: A Theoretical Framework and Literature Review Focusing on Older People." *Mobilities*: 1-26. doi: 10.1080/17450101.2013.784542.
- Nordstrom, Maria. 2010. "Children's Views on Child-Friendly Environments in Different Geographical, Cultural and Social Neighbourhoods." *Urban Studies* 47 (3): 514-528.
- Nussbaum, Martha Craven, and Amartya Kumar Sen. 1993. *The Quality of Life*. Oxford: Clarendon Press.
- O'Brien, Margaret, Deborah Jones, David Sloan, and Michael Rustin. 2000. "Children's Independent Spatial Mobility in the Urban Public Realm." *Childhood* 7: 257 - 277.
- O'Donnell, Clifford, Roland Tharp, and Kathleen Wilson. 1993. "Activity Settings as the Unit of Analysis: A Theoretical Basis for Community Intervention and Development." *American Journal of Community Psychology* 21 (4): 501-520. doi: 10.1007/bf00942157.
- Oakes, J Michael, Ann Forsyth, and Kathryn Schmitz. 2007. "The Effects of Neighborhood Density and Street Connectivity on Walking Behavior: The Twin Cities Walking Study." *Epidemiologic Perspectives and Innovations* 4 (1): 16. <http://www.epi-perspectives.com/content/4/1/16>.
- Owen, N., N. Humpel, E. Leslie, A. Bauman, and J. F. Sallis. 2004. "Understanding Environmental Influences on Walking: Review and Research Agenda." *American Journal of Preventive Medicine* 27 (1): 67-76. <http://www.sciencedirect.com/science/article/B6VHT-4CNGPCD-C/2/95d3e481eac96db841c41e00cbbfa7bc>.
- Panter, Jenna, Andrew Jones, and Esther Van Sluijs. 2008. "Environmental Determinants of Active Travel in Youth: A Review and Framework for Future Research." *International Journal of Behavioural Nutrition and Physical Activity* 5: 1-14.

- Parusel, S. & McLaren, A. T. 2010. "Cars before Kids: Automobility and the Illusion of School Traffic Safety." *Canadian Review of Sociology/Revue canadienne de sociologie*, 47: 129-147.
- Patton, J. W. 2007. "A pedestrian world: competing rationalities and the calculation of transportation change." *Environment and Planning A*, 39: 928-944.
- Pelletier, A., S. Paquin, A. Chartrand, and Q. Montréal. 2007. "Are All Walking Audits Equivalent? A Comparison of Three Walking Audits in a Montreal Neighbourhood." In *Walk21*. Toronto, Canada: 1-4 October 2007.
- Percy-Smith, Barry, and Hugh Matthews. 2001. "Tyrannical Spaces: Young People, Bullying and Urban Neighbourhoods." *Local Environment: The International Journal of Justice and Sustainability* 6 (1): 49 - 63.
<http://www.informaworld.com/10.1080/13549830120024242>.
- Phillips, David. 2006. *Quality of Life: Concept, Policy and Practice*. London, New York: Routledge.
- Pikora, Terri, Fiona Bull, Konrad Jamrozik, Matthew Knuiman, Billie Giles-Corti, and Rob Donovan. 2000. "Systematic Pedestrian and Cycling Environmental Scan (Spaces)." *Medicine* 23: 187-194.
- Pikora, Terri, Fiona Bull, Konrad Jamrozik, Matthew Knuiman, Billie Giles-Corti, and Rob J. Donovan. 2002. "Developing a Reliable Audit Instrument to Measure the Physical Environment for Physical Activity." *American Journal of Preventive Medicine* 23 (3): 187-194.
<http://www.sciencedirect.com/science/article/B6VHT-46T9D7X-7/2/3f27ace595fd8b77f087c39d9b5d9ceb>.
- Pikora, Terri, Billie Giles-Corti, Fiona Bull, Konrad Jamrozik, and Rob Donovan. 2003. "Developing a Framework for Assessment of the Environmental Determinants of Walking and Cycling." *Social Science and Medicine* 56: 1693-1703.
- Pikora, Terri, Billie Giles-Corti, Matthew Knuiman, Fiona Bull, Konrad Jamrozik, and Rob Donovan. 2006. "Neighbourhood Environmental

Factors Correlated with Walking near Home: Using Spaces." *Medicine and Science in Sports and Exercise* 38 (4): 708-714.

Pont, K, J Ziviani, D Wadley, S Bennet, and R Abbott. 2009. "Environmental Correlates of Children's Active Transportation: A Systematic Literature Review." *Health and Place* 15: 849-862.

Pooley, Colin G., Dave Horton, Griet Scheldeman, Caroline Mullen, Tim Jones, Miles Tight, Ann Jopson, and Alison Chisholm. 2013. "Policies for Promoting Walking and Cycling in England: A View from the Street." *Transport Policy* 27 (0): 66-72. doi: <http://dx.doi.org/10.1016/j.tranpol.2013.01.003>.

Pooley, Colin G., Dave Horton, Griet Scheldeman, Miles Tight, Tim Jones, Alison Chisholm, Helen Harwatt, and Anne Jopson. 2011. "Household Decision-Making for Everyday Travel: A Case Study of Walking and Cycling in Lancaster (Uk)." *Journal of Transport Geography* 19 (6): 1601-1607. doi: <http://dx.doi.org/10.1016/j.jtrangeo.2011.03.010>.

Pooley, Colin, Duncan Whyatt, Marion Walker, and Gemma Davies. 2010. "Understanding the School Journey: Integrating Data on Travel and Environment." *Environment and planning. C, Government and policy* 42 (4): 948-965. [http://sfx.lis.curtin.edu.au/sfx_local?sid=google&auinit=C&aulast=Pooley&atitle=Understanding the school journey%3A integrating data on travel and environment&title=Environment and planning. C%2C Government %26 policy&volume=42&issue=4&date=2010&spage=948](http://sfx.lis.curtin.edu.au/sfx_local?sid=google&auinit=C&aulast=Pooley&atitle=Understanding%20the%20school%20journey%3A%20integrating%20data%20on%20travel%20and%20environment&title=Environment%20and%20planning.%20C%26%20Government%26%20policy&volume=42&issue=4&date=2010&spage=948).

Porter, T. M. 1995. *Trust in numbers: the pursuit of objectivity in science and public life*, Princeton, N.J. : Princeton University Press.

Power, M. 1995. "Auditing, Expertise and the Sociology of Technique." *Critical Perspectives on Accounting*, 6: 317-339.

Power, M. 1997. "Expertise and the construction of relevance: Accountants and environmental audit." *Accounting, Organizations and Society*, 22: 123-146.

- Power, M. 2004. "Counting, control and calculation: reflections on measuring and management." *Human Relations*, 57: 765-782.
- Prezza, Miretta, and Maria G. Pacilli. 2007. "Current Fear of Crime, Sense of Community, and Loneliness in Italian Adolescents: The Role of Autonomous Mobility and Play During Childhood." *Journal of Community Psychology* 35 (2): 151 - 170.
- Prezza, Miretta, Francesca Romana Alparone, Carmela Cristallo, and Secchiano Luigi. 2005. "Parental Perception of Social Risk and of Positive Potentiality of Outdoor Autonomy for Children: The Development of Two Instruments." *Journal of Environmental Psychology* 25 (4): 437-453. <http://www.sciencedirect.com/science/article/B6WJ8-4J616SG-1/2/e728bed6ac436de3b3f6c570e6585eb1>.
- Qizilbash, Mozaffar. 1997. "Needs, Incommensurability and Well-Being." *Review of Political Economy* 261 <http://search.ebscohost.com/login.aspx?direct=true&db=bth&AN=9709291799&site=ehost-live>.
- . 1998. "The Concept of Well-Being." *Economics and Philosophy* 14 (01): 51-73. doi: doi:10.1017/S0266267100004934.
- . 2006. "Well-Being, Adaptation and Human Limitations." *Royal Institute of Philosophy Supplements* 59: 83-110. doi: doi:10.1017/S1358246106059054.
- Quigg, Robin, Andrew Gray, Anthony I. Reeder, Alec Holt, and Debra L. Waters. 2010. "Using Accelerometers and GPS Units to Identify the Proportion of Daily Physical Activity Located in Parks with Playgrounds in New Zealand Children." *Preventive Medicine* 50 (5–6): 235-240. doi: <http://dx.doi.org/10.1016/j.ypmed.2010.02.002>.
- Raco, M., and R. Imrie. 2000. "Governmentality and Rights and Responsibilities in Urban Policy." *Environment and Planning A* 32 (12): 2187-2204.

- Rapoport, Amos. 1982. *The Meaning of the Built Environment : A Nonverbal Communication Approach*. Beverly Hills: Sage Publications.
- Raudenbush, Stephen W., and Robert J. Sampson. 1999. "Ecometrics: Toward a Science of Assessing Ecological Settings, with Application to the Systematic Social Observation of Neighborhoods." *Sociological methodology* 29 (1): 1-41.
- Reardon, Louise, and Saamah Abdallah. 2013. "Well-Being and Transport: Taking Stock and Looking Forward." *Transport Reviews*: 1-24. doi: 10.1080/01441647.2013.837117.
- Rietveld, Piet, and Roger Stough. 2005. *Barriers to Sustainable Transport Institutions, Regulation and Sustainability*. In *Transport, development and sustainability*. Oxon ; New York, NY: Spon Press. <http://link.lis.curtin.edu.au/cgi-bin/gw?url=http://www.CURTIN.ebib.com.au/patron/FullRecord.aspx?p=178800>.
- Risotto, A, and F Tonucci. 2002. "Freedom of Movement and Environmental Knowledge in Elementary School Children." *Journal of Environmental Psychology* 22: 65-77.
- Roe, Jenny, and Peter Aspinall. 2011. "The Restorative Benefits of Walking in Urban and Rural Settings in Adults with Good and Poor Mental Health." *Health and Place* 17 (1): 103-113. doi: <http://dx.doi.org/10.1016/j.healthplace.2010.09.003>.
- Roemmich, J. N., L. H. Epstein, S Raja, L Yind, J Robinson, and D Winiewicz. 2007. "Association of Access to Parks and Recreational Facilities with the Physical Activity of Young Children." *Preventive Medicine* 43: 447-441.
- Romero, Vivian. 2010. "Children's Views of Independent Mobility During Their School Travels." *Children, Youth and Environments* 20 (2).
- Rosenberg, Dori, Ding Ding, James F. Sallis, Jacqueline Kerr, Gregory J. Norman, Nefertiti Durant, Sion K. Harris, and Brian E. Saelens. 2009.

"Neighborhood Environment Walkability Scale for Youth (News-Y): Reliability and Relationship with Physical Activity." *Preventive Medicine* 49 (2–3): 213-218. doi: <http://dx.doi.org/10.1016/j.ypmed.2009.07.011>.

Ross, Nicola. 2007. "'My Journey to School...': Foregrounding the *Meaning* of School Journeys and Children's Engagements and Interactions in Their Everyday Localities." *Children's Geographies* 5 (4): 373-391.

Rudner, Julie. 2012. "Public Knowing of Risk and Children's Independent Mobility." *Progress in Planning* 78 (1): 1-53. doi: <http://dx.doi.org/10.1016/j.progress.2012.04.001>.

Saelens, B. E, and S Handy. 2008. "Built Environment Correlates of Walking." *Medicine and Science in Sports and Exercise* 40 (7S): S550-S566.

Saelens, Brian E, Lawrence D Frank, Christopher Auffrey, Robert C Whitaker, Hillary L Burdette, and Natalie Colabianchi. 2006. "Measuring Physical Environments of Parks and Playgrounds: EAPRS Instrument Development and Inter-Rater Reliability." *Journal of Physical Activity and Health* 3: S190.

Saelens, Brian E., James F. Sallis, Jennifer B. Black, and Diana Chen. 2003. "Neighborhood-Based Differences in Physical Activity: An Environment Scale Evaluation." *American Journal of Public Health* 93 (9): 1552-8.

Sager, Tore. 2006. "Freedom as Mobility: Implications of the Distinction between Actual and Potential Travelling." *Mobilities* 1 (3): 465-488. doi: 10.1080/17450100600902420.

Saldana, Johnny. 2013. *The Coding Manual for Qualitative Researchers*. London, UK.: Sage Publications.

Sallis, J, A Bauman, and M Pratt. 1998. "Environmental and Policy Interventions to Promote Physical Activity." *American Journal of Preventive Medicine* 15 (4): 379-397.

Sallis, James, Robert Cervero, William Ascher, Karla A Henderson, M. Katherine Kraft, and Jacqueline Kerr. 2006. "An Ecological Approach to

Creating Active Living Communities." *Annual Review of Public Health* 27: 297-322.

Santo, Charles A., Nathan Ferguson, and Andrew Trippel. 2010. "Engaging Urban Youth through Technology: The Youth Neighbourhood Mapping Initiative." *Journal of Planning Education and Research* 30 (1): 52-65.

Schaefer-McDaniel, N ., M. O'Caughy, P. O'Campo, and W. Geareya. 2010. "Examining Methodological Details of Neighbourhood Observations and the Relationship to Health: A Literature Review " *Social Science and Medicine* 70 (2): 277-292.

Schiefelbusch, Martin. 2010. "Rational Planning for Emotional Mobility? The Case of Public Transport Development." *Planning Theory* 9 (3): 200-222. doi: 10.1177/1473095209358375.

Schlossberg, Marc, Asha .W. Agrawal, and Katja. Irvin. 2007. "An Assessment of GIS-Enabled Walkability Audits." *Journal of the Urban and Regional Information Systems Association* 19 (2): 5-12.

Schwanen, Tim. 2007. "Gender Differences in Chauffeuring Children among Dual-Earner Families." *The Professional Geographer* 59 (4): 447-462. doi: 10.1111/j.1467-9272.2007.00634.x.

Shore, C. & Wright, S. 2004. "Whose Accountability? Governmentality and the Auditing of Universities". *Parallax*, 10: 100-116.

Shoup, Donald. 2006. "Cruising for parking." *Transport Policy*, 13: 479-486.

Shoup, Donald. 2010. "Putting Cities Back on Their Feet." *Journal of Urban Planning and Development* 136 (3): 225-233. doi: doi:10.1061/(ASCE)UP.1943-5444.0000024.

Shove, E. 2010. "Beyond the ABC: climate change policy and theories of social change (attitude, behaviour, and choice)." *Environment & Planning A*, 42: 1273-1285.

- Southworth, Michael. 2005. "Designing the Walkable City." *Journal of Urban Planning and Development* 131 (4): 246-257. doi: 10.1061/(asce)0733-9488(2005)131:4(246).
- Spence, C. 2009. "Social accounting's emancipatory potential: A Gramscian critique." *Critical Perspectives on Accounting*, 20: 205-227.
- Steg, L. 2005. "Car use: lust and must. Instrumental, symbolic and affective motives for car use." *Transportation Research Part A*, 39, 147-162.
- Stewart, Orion. 2011. "Findings from Research on Active Transportation to School and Implications for Safe Routes to School Programs." *Journal of Planning Literature* 26 (2): 127-150.
- Stoffers, M. 2012. "Cycling as heritage: representing the history of cycling in the Netherlands." *The Journal of Transport History*, 33: 92.
- Strife, Susan, and Liam Downey. 2009. "Childhood Development and Access to Nature: A New Direction for Environmental Inequality Research." *Organization and Environment* 22 (1): 99-122. doi: 10.1177/1086026609333340.
- Sutton, Liz. 2008. "The State of Play: Disadvantage, Play and Children's Well-Being." *Social Policy and Society* 7 (4): 537-549.
- Tandy, C. A. 1999. "Children's Diminishing Play Space: A Study of Inter-Generational Change in Children's Use of Their Neighbourhoods." *Australian Geographical Studies* 37 (2): 154-164. doi: 10.1111/1467-8470.00076.
- Tashakkori, Abbas, and Charles Teddlie. 2003. *Handbook of Mixed Methods in Social and Behavioral Research*. Thousand Oaks, California: SAGE Publications.
- Taylor, Michael A. P., and Elizabeth S. Ampt. 2003. "Travelling Smarter Down Under: Policies for Voluntary Travel Behaviour Change in Australia." *Transport Policy* 10 (3): 165-177. doi: [http://dx.doi.org/10.1016/S0967-070X\(03\)00018-0](http://dx.doi.org/10.1016/S0967-070X(03)00018-0).

- Teddle, Charles, and Abbas Tashakkori. 2009. *Foundations of Mixed Methods Research : Integrating Quantitative and Qualitative Approaches in the Social and Behavioral Sciences*. Thousand Oaks: Sage Publications.
- Tiesdell, Steven, David Adams, and ebrary Inc. 2011. *Urban Design in the Real Estate Development Process*. In *RICS research Real estate issues*. Chichester; Ames, Iowa: Wiley-Blackwell. <http://link.lis.curtin.edu.au/cgi-bin/gw?url=http://site.ebrary.com/lib/curtinuniv/Doc?id=10510477>.
- Tilt, Jenna H. 2010. "Walking Trips to Parks: Exploring Demographic, Environmental Factors, and Preferences for Adults with Children in the Household." *Preventive Medicine* 50, Supplement (0): S69-S73. doi: <http://dx.doi.org/10.1016/j.ypmed.2009.07.026>.
- Timperio, Anna, Kylie Ball, Jo Salmon, Rebecca Roberts, Billie Giles-Corti, Dianne Simmons, Louise Baur, and David Crawford. 2006. "Personal, Family, Social, and Environmental Correlates of Active Commuting to School." *American Journal of Preventive Medicine* 30 (1): 45-51.
- Timperio, Anna, David Crawford, Amanda Telford, and Jo Salmon. 2004. "Perceptions About the Local Neighborhood and Walking and Cycling among Children." *Preventive Medicine* 38 (1): 39-47. doi: <http://dx.doi.org/10.1016/j.ypmed.2003.09.026>.
- Timperio, Anna, Billie Giles-Corti, David Crawford, Nick Andrianopoulos, Kylie Ball, Jo Salmon, and Clare Hume. 2008. "Features of Public Open Spaces and Physical Activity among Children: Findings from the Clan Study." *Preventive Medicine* 47 (5): 514-518. <http://www.sciencedirect.com/science/article/B6WPG-4T3M64T-2/2/da1803b76363c88c68dc3b1b448c4f1d>.
- Tolley, Rodney, Les Lumsdon, and Karen Bickerstaff. 2001. "The Future of Walking in Europe: A Delphi Project to Identify Expert Opinion on Future Walking Scenarios." *Transport Policy* 8 (4): 307-315. doi: [http://dx.doi.org/10.1016/S0967-070X\(01\)00026-9](http://dx.doi.org/10.1016/S0967-070X(01)00026-9).

- Tranter, Paul, and Eric Pawson. 2001. "Children's Access to Local Environments: A Case-Study of Christchurch, New Zealand." *Local environment* 6 (1): 27-48.
- Trell, Elen, and Bettina van Hoven. 2010. "Making Sense of Place: Exploring Creative and (Inter) Active Research Methods with Young People." *Fennia* 188 (2).
- Troped, Philip J, Ellen K Cromley, Maren S Fragala, Steven J Melly, Hope H Hasbrouck, Steven L Gortmaker, and Ross C Brownson. 2006. "Development and Reliability and Validity Testing of an Audit Tool for Trail/Path Characteristics: The Path Environment Audit Tool (Peat)." *Journal of Physical Activity and Health* 3: S158.
- Urry, J. 2000. *Sociology beyond societies :mobilities for the twenty-first century*, London: Routledge.
- Urry, J. 2004. "The 'system' of automobility." *Theory, Culture & Society*, 21: 25-40.
- Valentine, Gill. 2004. *Public Space and the Culture of Childhood*. Aldershot, England: Ashgate.
- Van der Ploeg, Hidde, Dafna Merom, Grace Corpuz, and Adrian E Bauman. 2008. "Trends in Australian Children Traveling to School 1971–2003: Burning Petrol or Carbohydrates?" *Preventive Medicine* 46 (1): 60-62.
- Veitch, Jenny, Sarah Bagley, Kylie Ball, and Jo Salmon. 2006. "Where Do Children Play? A Qualitative Study of Parents' Perceptions of Influences on Children's Active Free Play." *Health and Place* 12: 383 - 393.
- Veitch, Jenny, Jo Salmon, and Kylie Ball. 2007. "Children's Perceptions of the Use of Public Open Spaces for Active Free-Play." *Children's Geographies* 5 (4): 409 - 422.
<http://www.informaworld.com/10.1080/14733280701631874>.
- WALGA. 2014. Western Australian Local Government Association. Accessed November 11, <http://www.walga.asn.au/>.

WAPC. 2007. Liveable Neighbourhoods. Western Australian Government.
<http://www.planning.wa.gov.au/650.asp>.

Ward, Colin. 1978. *The Child in the City*. New York: Pantheon Books.

Wen, Li Ming, James Kite, Dafna Merom, and Chris Rissel. 2009. "Time Spent Playing Outdoors after School and Its Relationship with Independent Mobility: A Cross-Sectional Survey of Children Aged 10-12 Years in Sydney, Australia." *International Journal Behavioural Nutrition and Physical Activity* 6 (15): 1-8.

Western Australian Police. 2013. Children's Crossings. Western Australian Government.
<http://www.police.wa.gov.au/Traffic/Childrenscrossings/tabid/1524/Default.aspx>.

Whitelegg, J. 1997. *Critical mass: transport, environment and society in the twenty-first century / John Whitelegg*, London, London : Pluto Press.

Whyte, William Hollingsworth. 1980. *The Social Life of Small Urban Spaces*. Washington, D.C.: Conservation Foundation.

Williamson, Oliver. E. 1994. *Institutions and Economic Organisation - the Governance Perspective*. Edited by World Bank. Washington, DC.

Witten, K., D. Exeter, and A. Field. 2003. "The Quality of Urban Environments: Mapping Variation in Access to Community Resources." *Urban Studies* 40 (1): 161-177.

Witten, Karen, Tony Blakely, Nasser Bagheri, Hannah Badland, Vivienne Ivory, Jamie Pearce, Suzanne Mavoa, Erica Hinckson, and Grant Schofield. 2012. "Neighborhood Built Environment and Transport and Leisure Physical Activity: Findings Using Objective Exposure and Outcome Measures in New Zealand." *Environmental Health Perspectives* 120 (7): 971-977. doi: 10.1289/ehp.1104584.

Witten, Karen, Rosemary Hiscock, Jamie Pearce, and Tony Blakely. 2008. "Neighbourhood Access to Open Spaces and the Physical Activity of

Residents: A National Study." *Preventive Medicine* 47 (3): 299-303. doi: <http://dx.doi.org/10.1016/j.ypmed.2008.04.010>.

Witten, Karen, Tim McCreanor, and Robin Kearns. 2003. "The Place of Neighbourhood in Social Cohesion: Insights from Massey, West Auckland." *Urban Policy and Research* 21 (4): 321-338. doi: 10.1080/0811114032000147386.

Witten, Karen, Tim McCreanor, Robin Kearns, and Laxmi Ramasubramanian. 2001. "The Impacts of a School Closure on Neighbourhood Social Cohesion: Narratives from Invercargill, New Zealand." *Health and Place* 7 (4): 307-317. doi: [http://dx.doi.org/10.1016/S1353-8292\(01\)00023-5](http://dx.doi.org/10.1016/S1353-8292(01)00023-5).

Wolch, Jennifer R, Zari Tatalovich, Donna Spruijt-Metz, Jason Byrne, Michael Jerrett, Chih-Ping Chou, Susan Weaver, Lili Wang, William Fulton, and Kim Reynolds. 2010. "Proximity and Perceived Safety as Determinants of Urban Trail Use: Findings from a Three-City Study." *Environment and Planning. A* 42 (1): 57.

Wood, Gina, Billie Giles-Corti, Terri Pikora, Max Bulsara, Gavin McCormack, and Anna Timperio. 2010. The TRavel, Environment and Kids Project: Preliminary findings report *Centre for the Built Environment and Health, School of Population Health, The University of Western Australia: Perth, 2010*.

World Health Organisation. 1948. *Preamble to the Constitution of the World Health Organisation*. New York: World Health Organisation.

Wridt, Pamela. 2004. "An Historical Analysis of Young People's Use of Public Space, Parks and Playgrounds in New York City." *Children, Youth and Environments* 14 (1): 86-106.

Wright, Jan, Doune MacDonald, and Lyndal Groom. 2003. "Physical Activity and Young People: Beyond Participation." *Sport, Education and Society* 8 (1): 17-33. doi: 10.1080/1357332032000050042.

Yang, Yizhao, Steve Abbott, and Marc Schlossberg. 2012. "The Influence of School Choice Policy on Active School Commuting: A Case Study of a

Middle-Sized School District in Oregon." *Environment and Planning A* 44 (8): 1856-1874. <http://www.envplan.com/abstract.cgi?id=a44549>.

Yarlagadda, Amith K, and Sivaramakrishnan Srinivasan. 2008. "Modelling Children's School Travel Mode and Parental Escort Decisions." *Transportation* 35: 201-218.

Yin, Robert K. 2009. *Case Study Research: Design and Methods*. 4th ed, *Applied Social Research Methods Series*. Thousand Oaks, California: Sage Publications.

Yousefian, Anush, Erin Hennessy, M Renee Umstattd, Christina D Economos, Jeffrey S Hallam, Raymond R Hyatt, and David Hartley. 2010. "Development of the Rural Active Living Assessment Tools: Measuring Rural Environments." *Preventive Medicine* 50: S86-S92.

Zhang, Yun, Peter Stopher, and Belinda Halling. 2009. "An Evaluation of Travelsmart Tools for Travel Behaviour Change." In *Australian Transport Research Forum, Auckland, New Zealand, 29 Sept.-1 Oct. 2009*.

Zwerts, Enid, Georges Allaert, Davy Janssens, Geert Wets, and Frank Witlox. 2010. "How Children View Their Travel Behaviour: A Case Study from Flanders (Belgium)." *Journal of Transport Geography* 18 (6): 702-710. <http://www.sciencedirect.com/science/article/B6VG8-4XPBSMT-1/2/947f7633c7f9077295a00941a6ea229b>.

Every reasonable effort has been made to acknowledge the owners of copyright material. I would be pleased to hear from any copyright owner who has been omitted or incorrectly acknowledged.

Appendix A-1: Details of the CATCH project

Background

This PhD research was part of a larger national study funded by an Australian Research Council Discovery Grant (CATCH: Children's Active Travel, Connectedness and Health DP1094495). The objective of the CATCH project was to examine how factors of the social and built environment influence the independent mobility, active travel and health of Australian children across a range of environments that broadly represent where the majority of children reside in contemporary Australian society. The CATCH project used several methods to gather data on children's health, level of activity, range of travel within their neighbourhood and perceptions of the neighbourhood. These methods were:

- Surveys of children and their parents.
- A photo-collage method
- GPS mapping
- Actiheart (accelerometer heart rate monitors)
- Travel diaries

The first two methods – surveys and photo-collages – were used in this research thesis.

The project was inter-disciplinary, drawing on researchers from public health, urban planning, and transport planning. The project investigated and compared different environments in three urban centres and one regional centre. Nine case study schools, reflecting a range of inner-urban, middle suburb, master-planned community and regional cities were selected for the study. 375 children participated in the CATCH project. One of those schools was chosen as the case study in this thesis. The objectives of the research for this PhD were aligned with, though distinct from the larger project. Some of the methodological choices and methods used in the CATCH project were drawn upon for this PhD.

Appendix A-2: Department of Education ethics approval



Government of Western Australia
Department of Education

Your ref :
Our ref : D11/0698973
Enquiries :

Department of Urban and Regional Planning
School of Built Environment
Curtin University
GPO Box U1987PERTH WA 6845

Thank you for your completed application received 27 October 2011 to conduct research on Department of Education sites.

The focus and outcomes of your research project, *Australian Research Council Discovery Project: Children, Active, Travel, Connectedness and Health (DP1094495)* *Australian Research Council Linkage Project: Independent Mobility, Active Travel and Children's Health (LP00100344)*, are of interest to the Department. I give permission for you to approach site managers to invite their participation in the project as outlined in your application. It is a condition of approval, however, that upon conclusion the results of this study are forwarded to the Department at the email address below.

Consistent with Department policy, participation in your research project will be the decision of the schools invited to participate, individual staff members, the children in those schools and their parents. A copy of this letter must be provided to site managers when requesting their participation in the research. Researchers are required to sign a confidential declaration and provide a current Working with Children Check upon arrival at the Department of Education site.

Responsibility for quality control of ethics and methodology of the proposed research resides with the institution supervising the research. The Department notes a copy of a letter confirming that you have received ethical approval of your research protocol from the Curtin University Human Research Ethics Committee.

Any proposed changes to the research project will need to be submitted for Department approval prior to implementation.

Very best wishes for the successful completion of your project.

Yours sincerely

17 November 2011

151 Royal Street, East Perth Western Australia 6004

Appendix A-3: Curtin University ethics approval – CATCH project



Memorandum

To
From
Subject
Date
Copy

Office of Research and Development
Human Research Ethics Committee

TELEPHONE 9266 2784
FACSIMILE 9266 3793
EMAIL hrec@curtin.edu.au

Thank you for your application submitted to the Human Research Ethics Committee (HREC) for the project titled "Australian Research Council Grants CATCH Project (Children's Active Travel, Connectedness and Health) and iMATCH Project (Independent Mobility and Active Travel in Children)". Your application has been reviewed by the HREC and is **approved subject to** the conditions detailed below:

1. Please provide clarification on the type of support and training given to the young people wearing the electronic devices.
2. Please clarify on why the researcher will be taking photographs of a child using a camera.
3. Please clarify if the photographs taken by the children will be seen by the parents/guardians prior to being used in the research.
4. Please provide advice on how the photographs taken by the students, intend to be used, and whether these will be included in any resulting publications.
5. Participant Information Sheet and Consent Form;
 - a. Please include an acknowledgement that the childrens' photos of themselves will be part of the study.
 - b. Please ensure all documentation to be provided to participants has the correct Curtin University logo. Please refer to the Curtin Brand website <https://brand-staff.curtin.edu.au/index.cfm>.
6. Please edit the investigators' comments on Page 2 (Question 3 and Question 6) in "Your child's travel and activity questionnaire".

Please do not commence your research until your response to the above conditions has been approved and final clearance has been granted by the Human Research Ethics Committee.

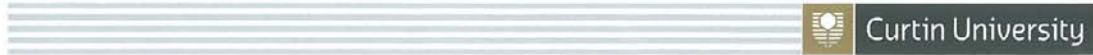
Please note the following:

- Reference Number: **HR 140/2010**. Please quote this number in any future correspondence.
- The following standard statement **must be** included in the information sheet to participants:

This study has been approved by the Curtin University Human Research Ethics Committee (Approval Number HR 140/2010). The Committee is comprised of members of the public, academics, lawyers, doctors and pastoral carers. Its main role is to protect participants. If needed, verification of approval can be obtained either by writing to the Curtin University Human Research Ethics Committee, c/- Office of Research and Development, Curtin University, GPO Box U1987, Perth, 6845 or by telephoning 9266 2784 or by emailing hrec@curtin.edu.au.
- It is the policy of the HREC to conduct random audits on a percentage of approved projects. These audits may be conducted at any time after the project starts. In cases where the HREC considers that there may be a risk of adverse events, or where participants may be especially vulnerable, the HREC may request the chief investigator to provide an outcomes report, including information on follow-up of participants.

Regards,

Appendix A-4: Curtin University ethics approval – interviews



Faculty of Humanities
School of Built Environment

Architecture & Interior Architecture
Construction Management
Urban & Regional Planning

Level 3, Building 201
GPO Box U1987
Perth Western Australia 6845

Telephone +61 8 9266 2282
Facsimile +61 8 9266 2711
Web curtin.edu.au

22nd of June 2012

Courtney Babb
GPO Box U1987
Perth, WA 6845

Dear Courtney,

This letter is to inform you that your Ethics Form C Application has been approved within our School for "Measures of Spatial Quality for Children in Urban Environments". Your Reference No. is **BE-80-2012**.

Thank you.

Appendix A-5: Letter of introduction to participate in research – principal

Dear Principal,

CATCH (Children’s Active Travel, Connectedness and Health)/iMATCH (Independent Mobility and Active Travel in Children) Project

We are conducting a research project that aims to provide an understanding of the impact of the built environment on children’s independent mobility and active travel. The project is being conducted by researchers from Curtin University, Griffith University, Central Queensland University, the University of Melbourne, and the University of New South Wales.

We would like to invite your school to take part in the project. This school is one of several across Australia that will be selected to be part of the research project. I have attached a document explaining the rationale behind the study.

What does participation in the research project involve?

We are seeking access to at least 100 students aged 10 through to 13 years and their teachers as well as the parents/guardians of these children.

I will keep the school’s involvement in the administration of the research procedures to a minimum, however, it will be necessary for the school to send home with students the information letters and consent forms for students and their parents.

Classes will need to set aside time to;

1. Receive instructions on the use of the GPS (global positioning system) and the combined accelerometers/heart rate monitors that we want all students participating in the study to wear for 4 days (2 weekdays and a weekend)
2. Collect weight, height and waist circumference of students involved in the study for the calibration of the GPS/accelerometer units only
3. Complete a photo activity (students will take photographs and complete a photo collage activity)
4. Receive instructions on the completion of travel diaries
5. Complete a student survey

A more detailed overview of the time anticipated to be required for each of the activities is attached to this letter and the research team members will negotiate the scheduling of activities with the principals and teachers involved prior to data collection so as to minimise the disruption to school and classes.

To what extent is participation voluntary, and what are the implications of withdrawing that participation?

Participation in this research project is entirely voluntary and participants are able to withdraw at any time.

There will be no consequences relating to any decision by an individual or the school regarding participation, other than those already described in this letter. Decisions made will not affect the relationship with the research team or respective universities.

What will happen to the information collected, and is privacy and confidentiality assured?

Information that identifies anyone will be removed from the data collected. The data is then stored securely at respective universities and can only be accessed by the researchers involved in the study. The data will be stored for a minimum period of 5 years, after which it will be destroyed. This will be achieved by shredding paper documents and deleting computer files related to the study

The identity of participants and the school will not be disclosed at any time, except in circumstances where the research team is legally required to disclose that information.

Participant privacy, and the confidentiality of information disclosed by participants, is assured at all other times.

The data will be used only for this project, and will not be used in any extended or future research without first obtaining explicit written consent from participants.

A summary of the research findings will be made available to the participating sites and the Department of Education by December 2013.

Is this research funded?

The research is funded under two Australian Research Council grants (ARC Discovery Project DP1094495 CATCH Project and ARC-Linkage Project LP100100344 iMATCH Project)

Is this research approved?

The research has been approved by participating universities, and has met the policy requirements of state education departments.

Do all members of the research team who will be having contact with children have their Working with Children Check (or equivalent)?

Yes. Under the Working with Children (Criminal Record Checking) Act 2004, people undertaking work in Victoria that involves contact with children must

undergo a Working with Children Check. The documents attached to this letter include a list of the research team who will be having contact with children through your school. They will provide the appropriate documentation.

Who do I contact if I wish to discuss the project further?

If you would like to discuss any aspect of this study with a member of the research team, please contact me on the number provided below. If you wish to speak with an independent person about the conduct of the project, please contact the Secretary, Human Research Ethics Committee, Curtin University, on 9266 2784 or hrec@curtin.edu.au.

How do I indicate my willingness for the school to be involved?

If you have had all questions about the project answered to your satisfaction, and are willing for your school to participate, please complete the **Consent Form** on the following page.

This information letter is for you to keep.

Sincerely,

Appendix A-6: Letter of invitation to participate in research – student

CATCH/iMATCH Project
Department of Urban and Regional Planning
Curtin University

Dear Student,

Please join our study! We are conducting research that aims to understand how the built neighbourhood environment affects children's independent mobility (like getting around your neighbourhood without adults) and active travel (like walking or biking to school). The project is being conducted by researchers from Curtin University, Griffith University, Central Queensland University, University of Melbourne, and University of New South Wales.

We would like to invite your school to take part in the project. This school is one of 8 across Australia that will be selected to be part of this exciting research project.

What would I be asked to do?

If you agree to take part, you will be asked to;

1. Complete a 15 minute survey (there is a survey for parents and a survey for children).
2. Take home a survey for your parent/carer to fill out and bring it back to school.
3. Wear a GPS (global positioning system) device and combined accelerometer/heart rate monitor for 4 days.
4. Have weight, height and waist circumference measured- completed on the day all monitoring equipment is handed out and for the purposes of calibrating the units only.
5. Fill out a travel diary- this will be filled out by you as you travel around (4 days also).
6. Over a week, take photographs of your local area (places you like and dislike) using a disposable camera provided to you. You will take photographs and complete a photo collage activity at school during class time.

Do I have to take part?

No. You are completely free to say yes or no. We will respect your decision whichever choice you make.

What if I wanted to change my mind?

If you say no, but then change your mind and want to take part, please let your teacher know.

You can stop at any time, even if you have said yes. Just let your teacher or mum or dad, or the person who looks after you know, and they will tell us.

What if I say something during the project that I don't want anyone else to know?

I may have to tell someone like your teacher if you tell me that you have been hurt by someone lately. But for all other things you tell me, I won't repeat them to anyone else.

What will you do with the information I give you?

We collect what each student has given to the project, and then I write about it in a journal, which is like a magazine, so that other adults can read about it and present the results to a big meeting called a conference. When we do this, we won't write or tell anyone your name, or the names of any other students or your school.

How do I get involved?

You have already talked with your mum or dad, or the person who looks after you, about what it means to take part in the project. Now you get to say for yourself.

If you **do** want to be a part of the project, please read the **Green Consent Form** attached and write your name in the space provided. Then return this to your school by the date given you so it can be collected by the researchers.

This letter is for you to keep and we are very excited to be working with your school and you on the research, if you agree to participate!

Sincerely,

Appendix A-7: Letter of invitation to participate in research – parent

Dear Parent/Guardian,

CATCH (Children’s Active Travel, Connectedness and Health)/iMATCH Project (Independent Mobility and Active Travel in Children)

We are conducting a research project that aims to provide an understanding of the impact of the built environment on children’s independent mobility and active travel. The project is being conducted by researchers from Curtin University, Griffith University, Central Queensland University, the University of Melbourne, and the University of New South Wales.

I would like to invite you and your child to take part in the project. Your child’s school is one of several across Australia that will be selected to be part of the research project. I have attached a document explaining details of the study.

What does participation in the research project involve?

Your child is invited to participate in the research project by completing the following;

1. Fill out a travel diary- this will be filled out by the child as they travel
2. Wear a GPS (global positioning system) device and combined accelerometer/heart rate monitor for 4 days
3. Take photographs of the local area (places they like and dislike) using a disposable camera(students will take photographs and complete a photo collage activity at school during class time))
4. Have weight, height and waist circumference measured- completed on the day all monitoring equipment is handed out
5. Complete a survey.
6. Return the parent/carer survey on the day all the monitoring equipment is handed out.

You are invited to participate in the study by completing the parent survey which will be given to you after you have made a commitment to participate.

Do my child and I have to take part?

No. Participation in this research project is entirely voluntary. This decision should always be made completely freely. All decisions made will be respected by members of the research team without question.

Since part of the project will occur during normal class time, another activity will be arranged for children not taking part, in conjunction with their teacher.

Your child has also been provided with a letter from us that we encourage you to discuss with him/her.

What if either of us was to change our mind?

Once a decision is made to participate, either you or your child can change your mind at any time.

There will be no consequences relating to any decision by you or your child regarding participation, other than those already described in this letter. These decisions will not affect your family's relationship with your child's teacher or your child's school.

What will happen to the information collected, and is privacy and confidentiality assured?

Information that identifies anyone will be removed from the data collected. The data is then stored securely at Curtin University and can only be accessed by the researchers involved in the research project. The data will be stored for a minimum period of 5 years, after which it will be destroyed. This will be achieved by shredding paper documents and deleting computer files.

Participant privacy and the confidentiality of information disclosed by participants, is assured at all times, except in circumstances where the research team is legally required to disclose that information.

The data will be used only for this project, and will not be used in any extended or future research without first obtaining explicit written consent from you and your child.

It is intended that the findings of this study will be reported in academic journals and conference presentations and papers by the researchers involved in the project. A summary of the research findings will also be made available upon completion of the project. You can access this by contacting the CATCH/iMATCH research team at the end of December 2013.

Is this research approved?

The research has been approved by all participating universities, and has met the policy requirements of participating state education departments.

How do I know that the people involved in this research have all the appropriate documentation to be working with children?

All persons undertaking research activities on school sites must complete a Confidential Declaration and will have appropriate permits for working with children. Evidence (where necessary) that these checks are current for each member of the research team has been provided to the Principal of your school.

Who do I contact if I wish to discuss the project further?

If you would like to discuss any aspect of this study with a member of the research team, please contact them using the details provided below. If you wish to speak with an independent person about how the project is being conducted or was conducted, please contact insert name and contact number of representative of ethics committee or equivalent area within relevant university.

How do my child and I become involved?

Please ensure that you:

- discuss what it means to take part in the project with your child before you both make a decision; and
- take up my invitation to ask any questions you may have about the project.

Once all questions have been answered to your satisfaction, and you and your child are both willing to become involved, please complete both **Consent/Consent Forms** on the following page (your child is also asked to complete the Consent Form attached to his/her letter).

This project information letter is for you to keep.

Appendix A-8: Letter of invitation to participate in research – interviewees

School of Built Environment

Faculty of Humanities

GPO Box U1987

Perth Western Australia 6845

CATCH/iMATCH Project
Department of Urban and Regional Planning
Curtin University

Dear Sir/Madam,

I'm a PhD student with the Department of Urban and Regional Planning at Curtin University. My PhD research is part of an Australian Research Council Discovery Grant. The CATCH (Children's Active Travel, Connectedness and Health) Project aims to provide an understanding of the impact of the built environment on children's independent mobility and active travel. The project is being conducted by researchers from Curtin University, Griffith University, Central Queensland University, the University of Melbourne, and the University of New South Wales. The project leader for the CATCH research is Professor Carey Curtis.

The particular focus of my research is the way that qualities of the built environment associated with walking are generally captured, measured and used in practice. Measures of walkability, such as GIS mapping and walkability audits, are being increasingly used. However little research has taken place on how they are being used, the quality of the information they provide, how this knowledge is then incorporated into the planning process and how they relate to children's travel and quality of life. It is hoped that by critically investigating the process that measures undertake, better practices can be developed that improve planning for children and the built environment.

I am hoping to interview planning practitioners, urban designers, policy makers or community members who have used, developed or intend to use a walkability audit for any purpose. Although I'm interested in qualities of the built environment for children, the intention of these interviews is to gather data from planning practitioners or community advocates who have used or intend to use audits of the built environment for the general population. **It is not necessary for the built environment measure to have focused on children.**

Who do I contact if I wish to discuss the project further?

If you would like to discuss any aspect of this study with a member of the research team, please contact project leader, Professor Carey Curtis, on the number provided below. If you wish to speak with an independent person about the conduct of the project, please contact the Secretary, Human

Research Ethics Committee, Curtin University, on 9266 2784 or hrec@curtin.edu.au or in writing C/- Office of Research and Development, Curtin University of Technology, GPO Box U1987, Perth WA 6845.

How do I indicate my willingness for the school to be involved?

If you have had all questions about the project answered to your satisfaction, and are willing for your school to participate, please complete the **Consent Form** on the following page.

This information letter is for you to keep.

Sincerely,

Courtney Babb
Postgraduate (PhD) Researcher

Appendix A-9: Consent form – principal

Consent Form for Principals

CATCH/iMATCH Project
 Department of Urban and Regional Planning
 Curtin University

- I have read the information document and understand the aims, procedures, and risks of this project, as described within it.
- For any questions I may have had, I have taken up the invitation to ask those questions, and I am satisfied with the answers I received.
- I am willing for this school to become involved in the research project, as described.
- I understand that participation in the project is entirely voluntarily.
- I understand that the school is free to withdraw its participation at any time, without affecting the relationship with the research team or Curtin University.
- I understand that this research may be presented in academic journals and as part of academic conference proceedings and papers, provided that the participants or the school are not identified in any way.
- I understand that the school will be provided with a copy of the findings from this research upon its completion.

Name of School		
Name of School Principal (printed)		
Signature		Date

Contact email/phone number	
-----------------------------------	--

Appendix A-10: Consent form - children

CATCH/iMATCH Consent Form for Primary School Children

CATCH/iMATCH Project
Department of Urban and Regional Planning
Curtin University

- I know that I don't have to be involved in this project, but I would like to be.
- I know that I will be
 1. completing a travel diary
 2. taking photographs of the local area and completing a photo collage activity related to these photographs during class time
 3. wear a Global Positioning Device (GPS) and combined accelerometer/heart rate monitor for 4 days (2 weekdays and a weekend)
 4. have my weight, height and waist circumference measured
 5. completing a survey
- I know that I can stop when I want to.
- I understand that I need to write my name in the space below, before I can be a part of the project.

Date	
Your Name	
Your Class	
Your Teacher	

Thank You! Please return this form to school along with your parents' signed consent form. They will be collected there by the researchers.

Appendix A-11: Consent form - parents

Consent Form for Parents/Carers

CATCH/iMATCH Project
Department of Urban and Regional Planning
Curtin University

- I have read and understood the information letter about the project, or have had it explained to me in language I understand.
- I have taken up the invitation to ask any questions that I may have and am satisfied with the answers I received.
- I understand that participation in the project is entirely voluntary.
- I understand what it means for me to participate in this project.
- I have discussed with my child what it means to participate in this project. He/she has explicitly indicated a willingness to take part, as indicated by his/her completion of the child consent form.
- I understand that both my child and I are free to withdraw at any time without affecting the family's relationship with my child's teacher or my child's school.
- I give permission for the contribution that my child or I make to this research to be published in journals, conference papers and presentations provided that my child, the school and I are not identified in any way.
- I give permission for my child to take photographs and be photographed as part of the "week with a camera" activity relevant to the development of the CATCH/iMATCH research and understand that photos may be used in research publications and in other presentations relevant to the CATCH/iMATCH research work only.
- I understand that I can request a summary of findings after the research has been completed.

Please sign on the reverse...

Consent for me and my child to participate in the CATCH/iMATCH Project

Yes No

- I am willing for my child to become involved in the project.
- I am willing to become involved in the research project, as described.

Name of Child (printed): _____

Name of Parent/Carer (printed): _____

Signature of Parent: _____ Date: / /

Phone/mobile / email (whatever your preferred means of contact is): _____

Thank You! Please return this form to school with your child (a date for return is on the envelope this letter came in). It will be collected there by the researchers.

Appendix A-12: Consent form - interviewees

School of Built Environment

Faculty of Humanities

GPO Box U1987

Perth Western Australia 6845

CATCH- Built Environment Measures Project
Department of Urban and Regional Planning
Curtin University

- I have read the information document and understand the aims, procedures, and risks of this project, as described within it.
- For any questions I may have had, I have taken up the invitation to ask those questions, and I am satisfied with the answers I received.
- I understand that participation in the project is entirely voluntarily.
- I understand that I am free to withdraw my participation at any time, without affecting the relationship with the research team or Curtin University.
- I understand that this research may be presented in academic journals and as part of academic conference proceedings and papers.
- I understand that my name and the name of the organisation I am employed with will not be used in any published material resulting from this research.
- I am willing to become involved in the research project, as described.

Date	
Name	
Signature	

Thank You.

Courtney Babb

Appendix B-1: Parent's survey

PARENT/CARER'S SURVEY

CATCH/iMATCH Project

*Children's Active Travel, Connectedness and Health/
Independent Mobility, Active Travel and Children's Health*

Thank you for agreeing to take part in this project.

This is a national study funded by the Australian Research Council looking at children aged 10 to 13 and how they use their neighbourhoods. The study is being conducted by researchers from CQUniversity (Rockhampton), Curtin University (Perth), Griffith University (Brisbane), the University of Melbourne, and the University of New South Wales (Sydney).

This survey is about how suitable your neighbourhood is for your child to walk, cycle or use public transport. The information you provide may be used by national, state and local governments to design neighbourhoods and programs that support children's active travel, independent mobility and improve children's health and wellbeing.

This survey will take you about 20 minutes to complete. Your assistance with completing this survey will help make our study a success. There are no right or wrong answers. Most questions can be answered by ticking a box, some by writing a response in a space.

The survey should be returned with your child to school. If you have more than one child involved in this study, it would be very helpful if you could fill in a separate survey for each child (as some answers may change depending on the different ages of your children).

Where can I get further information?

If you require any further information, or have any concerns, feel free to contact the researchers working in your child's school:

YOUR CHILD'S TRAVEL

Q1. Details about your child *(Please tick the appropriate box)*

- a. Your child's first name _____
- b. My child is in:
- Year 3 Year 4 Year 5 Year 6 Year 7
- c. My child is a girl a boy
- d. My child's age is _____ years and _____ months old
- e. How tall is your child? _____ (centimetres)
- f. How much does your child weigh? _____ (kilograms)

Q2. Is your child allowed to travel TO school without an adult present?

YES At what age was your child first allowed to travel TO school....

without an adult? _____ years

without an adult but with siblings/friends? _____ years

alone ? _____ years

NO At what age will you allow your child to travel TO school....

without an adult? _____ years

without an adult but with siblings/friends? _____ years

alone ? _____ years

Q3. Is your child allowed to travel FROM school without an adult present?

YES At what age was your child first allowed to travel FROM school...

without an adult? _____ years

without an adult but with siblings/friends? _____ years

alone ? _____ years

NO At what age will you allow your child to travel FROM school....

without an adult? _____ years

without an adult but with siblings/friends? _____ years

alone ? _____ years

Q4. Is your child allowed to cross main roads without an adult present? (note: by main roads, we mean roads with medium to heavy traffic, not local roads with limited traffic)

YES **At what age was your child first allowed to cross main roads without an adult?**
_____ years

NO **At what age will you allow your child to cross main roads without an adult?**
_____ years

Q5. Does your child have a bicycle in good working order? (Please tick one box)

YES

NO

Q5a. Is your child allowed to cycle on main roads without an adult?

YES **At what age was your child first allowed to cycle on main roads without an adult?** _____ years

NO **At what age will you allow your child to cycle on main roads without an adult?**
_____ years

Q6. Is your child allowed to travel on buses, trams trains or other public transport without an adult present (other than a school bus)?

YES **At what age was your child first allowed to travel on public transport alone?**
_____ years

NO **At what age will you allow your child to travel on public transport alone?**
_____ years

Q7. When you were the age your child is now, how did you usually travel to school?

(Please tick one box only)

Walked

Car

Local bus, train or other public transport

School bus

Cycled

Other (*please*

state) _____

Q8. How far is your child allowed to travel from home? *(Please tick one box on each line)*

	To places within your street or the next street	Within your neighbourhood (about one kilometre)	To places in adjacent neighbourhoods (e.g. shopping centres, cinemas)	Your City Centre	Anywhere in the city
By himself or herself	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
With friends or siblings but without adults	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

ATTITUDES ABOUT CHILDREN'S TRAVEL TO SCHOOL AND IN THE NEIGHBOURHOOD

The next few questions ask about how your child travels to places in and around the neighbourhood. There are no right or wrong answers.

Q9. Does your child's school encourage students to walk or ride a bike to school

(Please tick one box only)

YES walk only YES ride only YES walk and ride NO

Don't know

If **YES** in what way does the school do this?

If **NO** does your school discourage children from walking or riding a bike to school? How?

Q10. To what extent do you agree or disagree each of the following statements?

(Please tick one box each line)

	Strongly Disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
a. It is irresponsible for parents to allow their children to walk or cycle in our neighbourhood without an adult	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. I know other parents at my child's school well	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. I think other parents would be concerned if I allowed my child to walk and cycle by themselves in my child's neighbourhood	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. I am confident that my child has the ability to walk or cycle in the neighbourhood without an adult	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. I think it is irresponsible for other parents to drive their children to school	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f. I am actively involved in my child's school	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g. I am actively involved in neighbourhood – based	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
h. I think it is important that my child develop skills to travel alone	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
i. I think it is important that my child meet and/or play with other children on the way to school and other places	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

PLACES AND PEOPLE IN YOUR NEIGHBOURHOOD

The next few questions ask about your perception of your neighbourhood. There are no right or wrong answers.

Q11. How long have you lived in this neighbourhood? *(Please tick one box only)*

	Less than 1 year	1-2 years	3-5 years	More than 5 years
How long have you lived in this neighbourhood?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Q12. Please answer yes or no to the following questions.

	Yes	No
a. Can you get help from friends when you need it?	<input type="checkbox"/>	<input type="checkbox"/>
b. If you were caring for a child and needed to go out, could you ask a neighbour for help?	<input type="checkbox"/>	<input type="checkbox"/>
c. Have you visited a neighbour in the past two weeks?	<input type="checkbox"/>	<input type="checkbox"/>
d. When you go shopping in your local area are you likely to run into friends and acquaintances?	<input type="checkbox"/>	<input type="checkbox"/>
e. In the past 6 months, have you done a favour for a sick or absent neighbour (e.g. collected their mail)?	<input type="checkbox"/>	<input type="checkbox"/>

Q13. Do you agree or disagree with these statements about your neighbourhood? *(Please tick one box on each line)*

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
a. Most people can be trusted	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Most of the time people try to be helpful	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. People in this neighbourhood can be trusted	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. This is a close-knit neighbourhood	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. People around here are willing to help their neighbours	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f. People in this neighbourhood generally don't get along with each other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g. People in this neighbourhood do share the same values	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Q14. Which of the following would likely increase the freedom of your child to walk or cycle in your local neighbourhood without an adult? (Please tick each box that is relevant)

a. More pedestrian crossings on roads where my child walks	<input type="checkbox"/>
b. Fewer cars and trucks	<input type="checkbox"/>
c. More things for my child/children to do in my neighbourhood (eg., shops, libraries, organised sports)	<input type="checkbox"/>
d. Improved public transport	<input type="checkbox"/>
e. Lower motor vehicle speed limits	<input type="checkbox"/>
f. More footpaths	<input type="checkbox"/>
g. More people walking and cycling in the local streets	<input type="checkbox"/>
h. Programs that encourage children and adults to walk	<input type="checkbox"/>
i. Programs that encourage children and adults to cycle	<input type="checkbox"/>
j. Better parks and playground in my neighbourhood	<input type="checkbox"/>
j. Other (please describe _____)	<input type="checkbox"/>

Q15. Do you agree or disagree with the following statements about your neighbourhood? (Please tick one box only each line)

	Strongly Disagree	Disagree	Neither agree nor disagree	Agree	Strongly Agree
a. I often see adults walking in my neighbourhood	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. I often see children walking in my neighbourhood	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Our neighbourhood is friendly	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d. I know my neighbours well	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e. My child/ children often play with other children in the street	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
f. Assaults by strangers is a concern in my neighbourhood	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
g. Road traffic safety is a concern in my neighbourhood	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
h. Our neighbourhood is a nice place to walk around	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
i. We have several friends in the neighbourhood	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
j. The neighbourhood is a good place to live	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

ABOUT YOU AND YOUR FAMILY

Q16. What is your gender?

Male Female

Q17. What is your age? _____

Q18. What is your marital status?

Married/de facto Separated/divorced/widowed Single/never
married

Q19. Do you share care of your child/ children with another parent? (i.e. does your child live part time elsewhere)

YES NO

Q20. What is the total number of people (including children) who live with you on most days in the house?

_____ people

Q21. What are the ages of the children (under 18 years) who live with you on most days in your house?

	Child 1	Child 2	Child 3	Child 4	Child 5
Child's age in years					

Q22. Does your household have a dog?

YES NO

Q23. Which of these groups best describes the highest level of education you and your partner (if applicable) have completed? If you are currently studying, record the highest level already completed. (Please tick one box only for you and one box for your partner, if applicable)

	You	Your partner
Did not complete primary school	<input type="checkbox"/>	<input type="checkbox"/>
Primary school	<input type="checkbox"/>	<input type="checkbox"/>
Some secondary (high) school	<input type="checkbox"/>	<input type="checkbox"/>
Completed secondary (high) school – year 12	<input type="checkbox"/>	<input type="checkbox"/>
Trade/apprenticeship	<input type="checkbox"/>	<input type="checkbox"/>
Certificate/diploma - TAFE	<input type="checkbox"/>	<input type="checkbox"/>
Bachelor degree - university	<input type="checkbox"/>	<input type="checkbox"/>
Higher degree (Masters, PhD) - university	<input type="checkbox"/>	<input type="checkbox"/>
Other (Please specify below): _____	<input type="checkbox"/>	<input type="checkbox"/>

Q24. How many hours per week are you involved in voluntary or paid work (not including housework)? _____ hours/week

Q25. How do you and or your partner usually travel to work or study? (Please tick one box in each row only - if more than one mode is used, choose the mode used for the longest distance of the trip and/or most often)

	Not applicable	Walk	Bicycle	Drive car or motorbike	Driven by someone else	Public transport	Other
You	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Your partner	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Q26. How long does your (and/or your partner's) average trip to work or study take?

(Please tick one box in each row only)

	Not applicable	Less than 5 minutes	5-15 minutes	16-30 minutes	31 minutes-1 hour	More than 1 hour
You	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Your partner	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Q27. How many registered motor vehicles (cars, trucks, motorbikes) are there in your household? _____

Q28. Which of the following best describes the location of your home? (Please tick one box only)

	On a highway	On a busy road	On a minor road	In a cul-de-sac (dead-end street) or other road with almost no traffic
Location of home	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Q29. Do you have a back yard or other play area adjacent to your house (front yard, courtyard) large enough and suitable for children to run around outside?

YES NO

Q30. Do you rent or own your home?

Rent own (including holding a mortgage)

Q31. What street and suburb do you and your child live in?

Street: _____ House/Unit No: _____ Suburb: _____

Q32: What is your telephone number (so we could contact you regarding any questions on the survey or equipment for your child)?

Appendix B-2: Children's survey

CHILDREN'S SURVEY

CATCH/iMATCH Project

*Children's Active Travel, Connectedness and Health/
Independent Mobility, Active Travel and Children's Health*

Thank you for agreeing to take part in this project!

This survey asks you about how you get to school and other places in your neighbourhood. It also asks you what kinds of activities you do in your spare time and how you feel about the neighbourhood.

This is not a test, and there are no right or wrong answers. Please answer as many questions as possible. Many of the questions simply ask you to tick a box or a space in a table.

If you need help to answer the questions, please raise your hand and ask.

QUESTIONS ABOUT YOU

1. **What is your first name?** _____

2. **What year are you in at school?** *(please tick one box only)*

Year 3 Year 4 Year 5 Year 6 Year 7

3. **How old are you in years?** *(please tick one box only)*

under 10 10 11 12 13 older than 13

4. **Are you a boy or a girl?**

Boy Girl

5. **What street and suburb do you live in?**

Street: _____ Suburb: _____

6. **Do you have a bike?**

Yes

No

7. **Are you allowed on the streets in your neighbourhood on a bicycle?**

Yes, alone

Yes, without an adult but with other children

Yes, but always with an adult

No, never

8. **How do you usually travel to school and how long does it take you to travel there?**

(Please tick one box only)

	Less than 5 minutes	5 to 15 minutes	16 to 30 minutes	31 to 45 minutes	More than 45 minutes
Walk alone					
Walk with other children					
Walk with an adult or adults					
Take public transport alone					
Take public transport with other children					
Take public transport with an adult or adults					
Bicycle alone					
Bicycle with other children					
Bicycle with an adult or adults					
Be driven					

9. How do you usually travel to local shops and how long does it take you to travel there?

(Please tick one box only)

	Less than 5 minutes	5 to 15 minutes	16 to 30 minutes	31 to 45 minutes	More than 45 minutes
Walk alone					
Walk with other children					
Walk with an adult or adults					
Take public transport alone					
Take public transport with other children					
Take public transport with an adult or adults					
Bicycle alone					
Bicycle with other children					
Bicycle with an adult or adults					
Be driven					
Don't go here					

10. How do you usually travel to local friends houses and how long does it take you to travel there? (Please tick one box only)

	Less than 5 minutes	5 to 15 minutes	16 to 30 minutes	31 to 45 minutes	More than 45 minutes
Walk alone					
Walk with other children					
Walk with an adult or adults					
Take public transport alone					
Take public transport with other children					
Take public transport with an adult or adults					
Bicycle alone					
Bicycle with other children					
Bicycle with an adult or adults					
Be driven					
Don't go here					

11. How do you usually travel to local parks and how long does it take you to travel there?

(Please tick one box only)

	Less than 5 minutes	5 to 15 minutes	16 to 30 minutes	31 to 45 minutes	More than 45 minutes
Walk alone					
Walk with other children					
Walk with an adult or adults					
Take public transport alone					
Take public transport with other children					
Take public transport with an adult or adults					
Bicycle alone					
Bicycle with other children					
Bicycle with an adult or adults					
Be driven					
Don't go here					

12. How do you usually travel to organised activities at somewhere like a local sports club, church, or recreational centre and how long does it take you to travel there?

(Please tick one box only)

	Less than 5 minutes	5 to 15 minutes	16 to 30 minutes	31 to 45 minutes	More than 45 minutes
Walk alone					
Walk with other children					
Walk with an adult or adults					
Take public transport alone					
Take public transport with other children					
Take public transport with an adult or adults					
Bicycle alone					
Bicycle with other children					
Bicycle with an adult or adults					
Be driven					
Don't go here					

13. **How do you usually travel to places outside your neighbourhood like shops, cinemas or friends houses and how long does it take you to travel there?**

(Please tick one box only)

(Your neighbourhood is everywhere within a 10-15 minute walk of your home)

	Less than 5 minutes	5 to 15 minutes	16 to 30 minutes	31 to 45 minutes	More than 45 minutes
Walk alone					
Walk with other children					
Walk with an adult or adults					
Take public transport alone					
Take public transport with other children					
Take public transport with an adult or adults					
Bicycle alone					
Bicycle with other children					
Bicycle with an adult or adults					
Be driven					
Don't go here					

HOW YOU WANT TO TRAVEL TO SCHOOL AND OTHER PLACES

14. **If you could choose, how would you most like to go to school?** *(Please tick one box only)*

1. Walk alone
2. Walk with other children
3. Walk with adult
4. Take public transport alone
5. Take public transport with other children
6. Take public transport with an adult
7. Bicycle alone
8. Bicycle with other children
9. Bicycle with an adult or adults
10. Be driven

15. **Why would you like to go to school that way?** *(Please tick all that apply)*

1. I live a long way from school
2. I live close to school
3. I can stop at places on the way
4. I can talk with friends on the way
5. I have a lot to carry
6. I can avoid bullies
7. It's quicker
8. I feel more grown up
9. It's fun
10. It's safer
11. Other *(please tell us)*

16. **If you could choose how would you most like to travel to the following places and how would you like to get there?**

(In the example of travelling to the River, we ticked "Bicycle with other children" because that's how we want to travel there. Tick the one way you would most like to travel to each of the other destinations).

	Example River	Local Shops	Local Friends houses	Local Parks	Organised activities at somewhere like a local sports club, church or recreational centre	Places outside your neighbourhood like shops, cinemas or friends.
Walk alone						
Walk with other children						
Walk with an adult or adults						
Take public transport alone						
Take public transport with an adult or adults						
Bicycle alone						
Bicycle with other children	✓					
Bicycle with adult or adults						
Be driven						
Don't have one						

17. How often do you **usually** play outdoors in your neighbourhood, for example on the street, in a nearby park, bush area, or on a playground?

(By playing outdoors we do not mean organised sport, we mean for example riding your bike or scooter, skateboarding, kicking a ball around, jumping/running around.)

(Please tick one box only)

5 or more days per week 3-4 days per week 1-2 days per week
Never

17a. If you play outdoors, do you **usually** play

(Please tick one box only)

Alone Without an adult present but with other children Always with an adult present

18. Do you wish you had more freedom to go outside?

Yes No

If you answered yes, what would you like to do outside?

Why would you like to do this?

If you answered NO. Why ?

YOUR NEIGHBOURHOOD

(Your neighbourhood is everywhere within a 10-15 minute walk of your home)

19. Do you agree or disagree with these statements about your neighbourhood?

	Strongly Disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
	<i>(Please tick one box on each line)</i>				
a. Car traffic makes it hard for me to get around my neighbourhood					
b. I play outdoors with lots of friends in my neighbourhood					
c. It is safe for me to play at the park closest to my house without an adult present					
d. The park closest to my house has interesting things for me to do					
e. When I feel lonely, there are several people I could call to talk to					
f. You often see people out for walks in my neighbourhood					
g. I am worried about strangers in my neighbourhood					
h. There are lots of great shops that I like to visit in my neighbourhood					
i. It is safe for me to go to local shops without an adult					
j. My neighbourhood is friendly					
k. There are lots of activities (music lessons, sports lessons, youth clubs) in my neighbourhood					

20. Do you agree or disagree with these statements about your neighbourhood?

Strongly Disagree **Disagree** **Neither agree nor** **Agree** **Strongly Agree** **Don't know**

(Please tick one box on each line)

a. I know many people in my area						
b. I know my neighbours quite well						
c. There are lots of people in my area I could go to if I needed help						
d. People in this neighbourhood can be trusted						
e. This is a close knit neighbourhood						
f. People around here are willing to help their neighbours						

21. Which of the following would likely encourage you to walk or cycle in your local neighbourhood without an adult? (Please tick any you think would help)

a. More pedestrian crossings on roads where I walk	
b. Fewer cars and trucks	
c. More things for me to do in my neighbourhood (eg., shops, libraries, organised sports)	
d. Improved public transport	
e. Make cars travel slower	
f. More footpaths	
g. More people walking and cycling in the local streets	
h. Programs that encourage children to walk and cycle	
i. Programs that encourage parents to walk and cycle	
j. Better parks and playground in my neighbourhood	
j. Other (please describe) _____	

These next few questions are about your school and the area around your school.

22. Do you agree or disagree with these statements about your school?

Strongly disagree **Disagree** **Neither agree nor disagree** **Agree** **Strongly agree**

(Please tick one box on each line)

a. There is a lot of traffic outside my school					
b. I know lots of other kids who walk to school					
c. I know lots of other kids who cycle to school					
d. There are safe places to leave bikes at my school					
e. I have to cross a busy road if I walk to school					
f. I have to cross a busy road if I cycle to school					
g. I feel safe crossing the road near my school					

YOUR ACTIVITIES

23. Think about a normal school week, write down how long you spend doing the following activities before and after school each day.

Activity	Monday		Tuesday		Wednesday		Thursday		Friday	
	Hours	Minutes	Hours	Minutes	Hours	Minutes	Hours	Minutes	Hours	Minutes
Watching TV?	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Watching videos/DVDs?	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Using the computer for fun?	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Reading for fun?	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Doing crafts or hobbies?	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Sitting around (<i>chatting with friends/on the phone/chilling</i>)?	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Playing/practising a musical instrument?	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

24. Think about a normal *weekend*, write down how long you spend doing the following activities on the weekend.

Activity	Saturday		Sunday	
	Hours	Minutes	Hours	Minutes
Watching TV?	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Watching videos/DVDs?	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Using the computer for fun?	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Reading for fun?	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Doing crafts or hobbies?	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Sitting around (<i>chatting with friends/on the phone/chilling</i>)?	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Playing/practising a musical instrument?	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

25. Write down your suggestions you have about how to make your neighbourhood a better place for children and adults to walk and cycle by themselves, or with friends?

Thank you for filling out this survey!

Appendix B-3: Interview protocol

Interview Protocol			
Date:		Time of the Interview:	
Place:		Interviewer:	
Interviewee:		Position:	
Introduction:	<p>The purpose of this interview is to develop an understanding of how built environment qualities are measured and evaluated in urban and community planning. These qualities may include walkability; accessibility; safety; physical activity and health; and play for children. Ways that the built environment can be measured and evaluated include the use of GIS; audits (paper checklists); mapping technologies; safety audits. I am interested in either or both how these evaluations are developed and how they are used.</p> <p>(NOTE: the term evaluation is used here. At the outset of the interview it is important to establish the best term to use throughout the interview. For example it may be measure/ evaluate/ audit/ survey/ analyse/ collect etc)</p>		
Problem Framing Description of the context in which the measure was used.	Why was the evaluation needed? (For example, was it needed for general data collection/ address a particular problem/ related to a higher policy objective?)		
	Describe the background as to the development or use of the evaluation.		
Format I'd just like to ask you a couple of questions about the format of the evaluation tool. (By format I mean paper audit/ GIS/ desktop; workshop etc.)	Was the format of the evaluation tool pre-designed or did you design it specifically for the purposes of this context?		
	Pre-designed.		
	How did you choose the format of the tool/instrument for evaluation?		
	Who was involved in the evaluation process		
	Were you familiar with a similar format?		
	Had you heard whether this format worked well in other situation?		
	Who designed it?		
	Did you have any input into the design process of the evaluation?		
	Was any extra material provided to help you use this format? Eg. Guidelines, training etc.		
	Designed		
	How did you choose the format you designed?		
	Did you collaborate with others outside the organisation to design the evaluation?		
Have you used this format since? Why/why not?			

Content Refers to information about the conceptual content of measures i.e what do they measure?	Was the content of audit predetermined by the original format or did you adapt your own content?	
	How did you establish the content that needed to be required? Eg literature review/ survey	
	What type of things did the measures focus on?	
	Were these included in the original format or did you add?	
	Were they arranged in clear categories?	
	Can you provide an example of the type of built environment element that was evaluation?	
Process The purpose is to gain an understanding of the process and administration of the instrument/measure.	What was your role in the evaluation?	
	Briefly describe the process of undertaking the evaluation.	
	Were there others involved in the process? What level of training did they undergo?	
	Do you have any other reflections on the use or process of the tool- what were the easy/ enjoyable/ difficult aspects.	
Outcomes Establishing the outcomes of the process and the link to further planning or decision making.	Briefly describe the outcomes of the process.	
	What concrete forms of data resulted from the process?	
	Was this data used internally by the organisation or has it been passed on?	
Children	Were the needs of children/ children's mobility considered explicitly in designing or collecting data within the evaluation?	
Further discussion	Is there anything I have missed in this interview that may be relevant?	
	How do you think measures of the built environment relevant to your practice should be established?	

Appendix B-4: Photo-collage instruction sheet

Thanks so much for agreeing to take part on this “Week with a Camera” exercise!! The idea is to get an idea of how children see their neighbourhood. So, we are sending you out to be a photographer for a week!

Instructions:

1. Your name should be printed neatly on the back of the camera_(so we can be sure to get the right photos back to the right people).
2. Then, think of places around your neighbourhood that you either **REALLY LOVE** or **REALLY HATE**... then go out and take your photos!
3. There are **27 pictures** on the camera and you can take photos that you want but it would help us a lot if you could take some photos of the following:
 - ⇒ a photo on your way to school
 - ⇒ a photo on your way home from school
 - ⇒ a photo of a place you go in your neighbourhood, outside of school
 - ⇒ a photo of something you like to do or a place you like to go *without* adults (or would like to, if you were allowed)
4. Some basic photo tips:
 - ⇒ Make sure to ask permission if you take photos of people (a crowd shot where people’s faces aren’t really easy to identify is fine though).
 - ⇒ Don’t take photos into the sun or they won’t work out.
 - ⇒ Be careful not to have fingers or other objects over the lens when you take photos.
 - ⇒ Use the flash for indoor shots or pictures when it is getting dark outside or they may not work.
 - ⇒ Take your time so the camera isn’t jiggling when you take your photo or it will come out blurry.
5. **Have fun!** We’ll be returning to the school to help you turn your photos into collages, which you’ll be able to keep. Some of your photos and collages may be used in the final research report/s so be the great photographer we know you are!

6. You need to **bring your camera with you to school for collection** on the following date: **Monday 14th May**. Your teacher will gather these from you.

Appendix C-1: Interview transcripts

25 October 2012

Interviewee #1

Place: Melbourne

File on recorder: B #2

CB: There are really a couple of things that I'd like to talk to you about. We can start with the walkability audits; particularly about how you designed them; what you drew on; and to look at the format. Also, if you had any experience of them being used. After that I'd like to go into the mapping.

Interviewee #1: I think that's important. I think we need to come back to the mapping because there is a strategic intent about how they are used and how they link to the audits. That is an important bit so we'll come back to it.

CB: OK.

Interviewee #1: But I guess the idea of the audit is...there are a lot of audit tools all round the place, all round the world. We're not engineers. We don't have that expertise on staff. We'd love to have it but we don't. But I don't believe there is one definitive walkability audit tool around. We...when we first established in 09 and developed our website and our parent website- XXXXXX²³ was really a tool for local action for how it was designed. We were initially specifically walking for transport. After a year we brought a (focus) on health, fitness, recreation and leisure so our website evolved so it was not just a toolkit but it was designed for how communities could take action to make their neighbourhoods more walkable, increase the walkability. We initially developed a word document walkability audit tool which is on our website. After probably a few months we realised... we developed an online version, not where you could fill it in, it was more an information....if we say, you know if footpaths are cracked and rubbish then use a photo. What we realised what we needed to do was, one to get people to take action to use a walkable tool is a big ask. People don't have time. It's really hard to get local action. Also we needed to, because walking, if you like, advocacy is a very new concept in Australia, so to introduce it we needed to find ways to get people to start looking at their neighbourhood a bit differently. So really the first stage is to recognise that's crap- that footpath is cracked, that crossing, there's no one else around, lighting, all that stuff, to get them to think, actually this is not good. Because I don't think people to consciously assess their environment. You see... we then got the online tool to have some examples, photos that might get people to have a bit of a look. So part of our process is about educating someone. But you know...getting people to think more differently is a key part, so it might not be the end result for everyone to go on and take action but really trying to get people to look. Our audit tool is there and I can probably do a bit of a search through Google analytics and find out how many times people have looked over the years but we know it has gone out and about...we know because we've got a bit of feedback but we have no way of knowing how many people have used it- have actually filled out and done and audit. We do know of a few- one was one of our walkability action groups down near...um...Geelong. They did an audit it's up on their WAG page on our site. Yeah...the other one was XXXXXXXX...it was probably...might have been 2010. There's kids in year 9, often do volunteering in the community, it's part of an advance program and I sort of thought, I'd once worked for Office of Youth, that I would... get some of the kids to do an audit of the neighbourhood, as part of their volunteering, rather than volunteering at the senior citz centre- could they do a neighbourhood audit to find out around their senior citz centre what help we can get so the elderly can get... so it's about mobility inclusion. You know is there footpaths, is there seating, is there lighting, that was the idea. We would like to return to this later this year, next year. So XXXXXX did do that audit there.

²³ Many names contained within the interview transcripts have been de-identified using XXXXXX in order to comply with ethics.

CB: Did they work with you, or did they let you know that they were using the tool at the time.

Interviewee #1: How they found out about it was that I got the Office of Youth [state government] to post something on their intranet; to put it out that this is there. They then contacted us because they were interested. They then went off and did an audit. There's an audit report on our website that they did. Um, then basically they presented it to local council. Local council was interested as well. I not sure, to tell you the truth of the total outcome of it. But it was a way of engaging them. I know that they wanted to do it again, but that is the extent of their use of it. Does that make sense?

CB: Yes, that makes sense.

Interviewee #1: Short of this we didn't do it as a way of, "how many people have done it". We might look at it as a way to go through the on-line version, get an idea of what's wrong in the neighbourhood or pick out, some of our WAGS- walkability action groups- have picked out a specific issue in the neighbourhood, rather than doing a full scale audit.

CB: That was one of the questions I was wanting to ask. There are a few different forms of audits. One of them is a total area audit; the other focuses on routes. A lot of the audits I've seen around are route based.

Interviewee #1: Yeah.

CB: Was that a conscious decision to make the distinction?

Interviewee #1: Not so much for us. What we wanted to do was to get to people; because you know the idea of safe, inclusive, accessible streets is not about a particular thing like: "is the street safe and inclusive?"; "are there people around you?"; "do you feel comfortable?"- these things can be linked to a route. What we're really interested in is how can you create liveable, vibrant communities. Because that's the basis, apart from the physical infrastructure, it's both physical and social. So that social side is just as important for communities so we would like a broader appreciation of that.

I'll just digress briefly. This stuff links to stuff, you know our Department of Transport developed the Principal Pedestrian Network methodology of how councils can do principal pedestrian routes around activity centres. And some ways. I can leave you with some of those documents. But I think you can use walking audits and get people to start to think, in their local community, with say a school and that's where it links with the idea of a priority route to school. Now can a primary school get, now here's our three routes to school. So kids or parent's formally walking their kids or allowing their kids to walk to school know a way to, they've identified a route, how would they identify it, they've been identified so now what needs to happen to make that route safer. And these are ideas that we'll look at developing for our schools pack. How we can get either parents to start looking at some of those issues and/or a school at the look at the same time.

CB: This seems to tie in with the education aspect (you were referring to) rather than just the physical survey. It seems to tie in with travel behaviour change and those sorts of programs as well.

Interviewee #1: I'll just jump to walking maps. This I think is linked. We've developed our walking maps which are really for anyone, national; but we're only interested in Victoria. It allows people to share, or create and share their favourite walks with photos, points of interest and things like that. Embedded in social media, facebook, twitter and things like that. That sort of thing...and now, there's also a mobile side to it all. For example, define a walk based on your current location [in Victoria only]. One of the reasons we developed this is, as an organisation, we needed to have something that was a flagship; but also to develop - help build a mass supporter base for walking and walkability. And also for us as well as a non-profit organisation, to build your support base, particularly if you want to advocate, you need something behind you.

So, that was part of the reason for developing it. That we could build that support, have a one stop. So if people want to find a route. We become a one stop for anything to do with walking.

When people can load a walk and that can be a council, loaded by an individual - whatever, or we can load it ourselves. They can put in, it might be a route which exposes things like - one of our walk types, is local treasures, hidden little gems in every neighbourhood. The idea is to get people to think, oh that is nice - to walk around and see the neighbourhood; it's not as scary as what it was. It has really interesting stuff that might appeal to children. But when they put out a route, it might be through a neighbourhood and they pick out local little features, it might be something interesting it might be a front yard with a topiary.... or public art or, you know, down at the creek, good play area- all those sorts of thing. But we decided to put in that they could do things like identify or flag a hazard. So a point of interest might just be a hazard like "this road is dangerous to cross because the cars are going too fast". "This shared path is problematic because cyclists are going too fast and don't give way to pedestrians". And that's part of the idea of producing the idea, of getting people to look at their neighbourhood a bit differently. So, in a way, it's probably a subtle way of introducing a bit of an audit - so people can go "actually, doing this route, you know this pavement is crap. You know these cars are going too fast. This is ridiculous- why's this area 60 (speed limit) when it could be (40)".

So it's that subtlety of just getting people, if you like to, the ideal is to go on a bit of a journey. You know that triangle [forms the image of a triangle with hands] of - down at the bottom there's occasional walkers who don't give a shit about anything but their car. Then the regular walkers. Then the promoters, you know, people who will go on their facebook and go "oh I just went for a walk this morning". And up the top is the activists. So what we're trying to do is to get people to, you know, sort of commit at a higher level. And up the top is where your walking audits sit. At that level of action.

Our facebook page, which is going really well at the moment, has a lot of stuff on there. We do a lot of posting photos. It might be quirky little things, funny things. Such as, while I was walking I saw "blah". It might not appear to be obvious why this is an advocacy tool like audits and stuff, but it is like, can we get people to celebrate the ordinary, the quirky, and slip in things like, "while I was walking I noticed this car blocking the pavement"; "while I walking I saw..." So it's that subtle, can we bring them along on a journey. When we initially started, we were not thinking walking audits were a key part of our role, but rather how can we get people to that point. So all the other stuff like walking maps, facebook, e-newsletter, which is more formal which is done on the newsletter on the website, has more of the advocacy stuff as well as the fun. So there are different levels at which we get people to come at it....does that sort of make sense.

CB: Yes.

Interviewee #1: There's a bit of trial and error in that. It's good that, we're fortunate that we have really good committee of management. And on the committee is someone with digital media with advertising, and he's assisted with that direction to social media. So it's trying to - you know we're making the links, we're not necessarily leaving it up to other people, because ideally we need to get people to the point of action.

As background, we had a change of government, Nov 10. To conservatives; from Labour to Liberal. Which had a massive impact- walking and walkability are kind of off the agenda. We're slowly building back up. But with the previous State Government- they did a good job - you know it could have been better. A national sustainable transport strategy, a pedestrian access strategy. Now we were heavily involved in lobbying for that. Our walkability action group, one's quoted in there for the community. There were good things in there- totally unfunded- so that when they went and the new government came in they kind of dropped it. But part of the thing about, - if you like WAGS and action - in a way that it helped give us more of an authority to speak. So that idea of community action and audits is really key for an organisation like us because it give us, you know I think it enabled us to punch above our weight. So that links to what WAGs or audits and all those sort of things. Even though I don't think our audit tool is scientific, it's aimed at the general community, and we don't know how many people are using this. It's more a strategic tool in advocacy- more broadly.

CB: Are the WAGS groups linked to you or are they independent. Is it a local government....

Interviewee #1: No they're independent. We've got about - I don't know off the top of my head- about 20, but only 6 to 9 are what I call active, with varying levels of activity. The WAGs

have done things like; one of them, our first one, the east Ivanhoe WAG, which formed basically the day we went live- they formed on our website, effectively driven by one guy in Ivanhoe who's family, had been concerned with one major route into the city. It was just a crazy route for walkers - a roundabout. You had two or three lanes of traffic to get across. No pedestrian facilities. Bloody dangerous. They effectively lobbied for, led by him, and ended up with a signalised pedestrian crossing. So it was a big achievement. Now that WAG is around a single issue. When the convener left to go overseas, effectively that has stopped. Because a single issue had done its thing- it's gone. We try to get WAGS to be a bit more broad, in what they're doing. But another has lobbied for another signalised crossing. So they've done a few different things, but yes we try to get them to take a broad approach. Some of the WAGs that appeared in the last six months are more about liveability, neighbourhood liveability, community connection kind of stuff; around a particular area or particular street. And that's great because that about, for us, it might be obvious why it's walking but it's about slowing traffic and increasing walking and that's key to liveability. So the WAGs have come from individuals, or a couple of individuals who have a problem that might be aboutpeople ring up and say "I've got this problem about..." and we say "well, this is how we can help you". It's really supporting local community action. And that might be engaging with council. Now, a lot of the councils would like the idea of WAGs or local action, because when they want to do something like, slow traffic in a shopping centre, heaven forbid, take away a car parking space and put in bike racks or a seat, traders are up in arms. Their own worst enemy, car users developers- they need groups in the community to be saying this is a good thing, we support it and we want it to happen. So they know, strategically, that action groups can be quite key to furthering their works. It's about trying to create a dialogue between councils and groups. So that was kind of the reason behind it. And giving people from a health promotion perspective, control over their lives, to shape their own lives; shape their own health, by impacting the local environment. So, its community. There's one [WAG] which is incorporated- which is a separate incorporated association, but they were their own identity first. So some are just through us and some are linking into the network.

CB: It's interesting. When you were talking about the children presenting the audit to the local...

Interviewee #1: To the local council.

CB: Did you hear any information or feedback from the council about...

Interviewee #1: I didn't hear back from the council. You know with small organisations you sometimes lose track of the agenda, things fall off track. But no I didn't get directly back from the council. But I could have a bit of a hunt around and see...

CB: I'm interested in the potential of audits as a way to structure issues about the local environment and present them as a...

Interviewee #1: I think they have enormous [emphasized] potential but it's a question of how we can support communities to do that - you know, to do action around walkability. It's sustained over a long period and you have lots of losses and wins. So it's about how can we foster and support communities to take on that beyond one individual, or just a couple of people together. Having said that if WAGs become a WAG on our page, and it's like being "Dear Sir. I'm not a crackpot but why's my pavement not being fixed." Suddenly, even if it's only West Perth WAG, even if it's just you, you will get a lot more attention or much more response if you're a group or whatever. We know that the impact they can have will be far greater than if it's just one or two people.

The XXXXXX WAG - some of the stuff they've done, they now get consulted by the City of XXXXXX about walkability stuff on the XXXXXX Peninsular. So I think, doing things like things like the audit plus - their predominantly women but they're canny- retired or semi-retired women, very clever about how they do things - but doing things like the audit, provides a status to their existence and their work and their lobby. So they have had an impact because they have done things like an audit.

CB: Yeah. That is an interesting aspect.

Interviewee #1: It legitimises their work- their existence. I mean they've also done audits for three walking routes through the area; they've done on their maps. You know we gave out small grants to the WAGs if they applied. Last year when they developed a logo for XXXXXXX; so they have their own brand that they give out at festivals. So that did a lot of things both in promotion, but also advocacy you know in fixing paths. That sort of stuff. There is no doubt that as a tool...it's a question of how we can enough people doing it. Because, I'm sure you know, I know the previous transport minister said a couple of years ago, if he makes a crap decision that impacts cyclists he gets two hundred emails in his in box in a day or two. That stuff works. It works, particularly for governments who imply that they do listen. It's a bit harder with governments who don't listen.

CB: The mapping is interesting in this respect as well. In WA we have a tool that enables cyclist lobby groups to use smart phones to locate black spots and things. Again it adds legitimises a problem or frames a problem.

Interviewee #1: Our maps are on a particular route so you need to walk it in order to do it, the path we took. We are hopeful at some stage to have a fully integrated iphone app to go and do a walk as they're going, but use that as an advocacy tool. So we'll look at how we can do maps as an advocacy tool. It's like doing an audit and writing up an audit but if a school did it – "here's our route to school and here's ten points of interest and three were hazards" - that then can become an advocacy tool. So there's a link. Every walk has its own link that they can said to their local council, "here's a link here showing our issues". So using that as a more informal audit tool. So it's actually documenting the walk- they can do an automated pdf and generating a pdf document. That's kind of thing; an avenue to get them to do it.

CB: I find the use of technology your describing really interesting in terms of, you know, a paper tool is one thing but having it linked in to all these other potential tools is great.

Interviewee #1: Do you know *SnapSendSolve*?

CB: No.

Interviewee #1: *SnapSendSolve* is Victorian based, but I think it might be national. Its where, if you're out and about, you can take a photo and then it's an app where it can geolocate where you are. You can identify the issue, and you can then send it straight to the in-box of the council from where you are, which will be either litter or rubbish or roads or whatever. Unfortunately the things I identify are a general issue, but I use it quite frequently when I might do a car blocking the pavement. Unfortunately the response time is not enough to nab them. So you can actually do, bang, and send your report straight to the local council. So, this tree foliage is completely blocking the path. So you can take a photo, do an automated report and that technology is brilliant. I don't know how often it's used but it actually automates a report. You just fill in the boxes. The other thing what we do at the moment, we just got a- I don't if you use facebook but if you do have a look at facebook.

CB: I am linked and receive your updates.

Interviewee #1: OK. Look at facebook today because we had a photo-competition and last week, you can vote, and last week was walking wonders. Three photos. This week is walking grumbles. The idea is for them to take a photo when they see a grumble. There are three this week. One is a kids sign. The second one is a truck parked across a pedestrian crossing. And the third one is coppers parked on the footpath, blocking the footpath. Unfortunately it's a really crap quality photo. Because it is in the city, so the footpath is three quarters of it, so if you have a wheelchair you can't get past. So, that idea, even if you're taking a photo- that's part of getting people to go and take a photo "while I was walking I saw"..... and it's great. So it's changing people's perception of the environment is really the key step to an audit.

CB: This brings back the point you initially raised in that the purpose of the walks is to get them to become aware of the environment.

Interviewee #1: I know because of people I've walked around with who have pointed out things. They've said: "I've never thought about that". It's like when people know that they've got routes in their neighbourhood that they avoid, but they don't think about why they avoid them. Now there might be extreme things, like they know if it's really dangerous or whatever. But often people don't think because that this street has got no trees or the streets got uneven footpaths. Even people with all abilities will trip up - they'll just avoid them. Or they'll have their preferred route. But try to get people to think "why do you prefer that route?". If that footpath was fixed or active street frontages or whatever it might make it a potentially much better route.

CB: The last point is focussing on the issue of children and the elderly. How important are specific user groups' needs in thinking about walkability and walkability audits?

Interviewee #1: We should be creating some basic...ok...children, walking to school, mucking around, is probably the best marker of a healthy community at so many different levels. The same goes for seniors. If you're designing for children and seniors you are designing for everyone. When I say seniors I mean all ability seniors. It's really quite critical, particularly with their, over the age spectrum where they're not driving or who are dependent on walking or cycling. So we need to be catering for them for a lot of the physical activity, and inclusion, walkability and access; those sort of things. So I think, a fundamental thing is how we design our cities, socially and physically; to cater for them is a critical thing. You know it's like, even little things like, for young kids, like pram ramps and all these sort of things. But, more importantly it's having local destinations relevant to local life, within walking distance- and their everyday life. Which means schools, which means the shops, and social opportunities for seniors. Until we look at those, and you know whenever we talk about kids walking to school as a marker, people automatically say, we need a walking school bus- well shoot me- you know, you need that independent mobility, you need parents walking and valuing the local community space- wanting to see kids in the community walking. You know to get kids walking you need to change urban form. Now if we're doing those things kids will walk to school. Are we dealing with symptoms, and some symptom is a walking to school program. It's just not going to work. It's an important cog in the wheel but it's not... So that would be our approach.

We develop road safety- we've developed a new road safety strategy in Victoria, and you know it might be better than the last. But you know, road safety is - you know Vicroads and the previous road strategy? One of its key objectives is reducing pedestrian injuries and you know 'that sounds really good'. (COMMENT DELETED BY REQUEST OF INTERVIEWEE) So we don't have reducing pedestrian fatalities combined with increasing active travel. We have planning separated from transport. We need a holistic approach and it must centre on children, seniors and people with disabilities. If you don't, I don't know if disability advocates would agree or not, but if you're designing for seniors you are designing for people with disabilities.

END OF THE INTERVIEW.

28 March 2013
Interviewee #2
Place: Brisbane
File on recorder: B #5

CB: (Referring to a conversation that took place as we walked to the cafe where this interview took place). We were just chatting about this now, but could you give me a bit more info on XXXXXXXX. About the organisation; about your objectives, and how it came about.

Interviewee #2: XXXXXXXX is a very new walking advocacy organisation that is - well the objectives are on the website. They are to get improvements to the walking environment in Queensland and encourage more localised advocacy for walking across Queensland; to give pedestrians a voice in the political process. A few people and I had an idea that it would be, that it was something that was needed. And we thought it was time to just get started, we called a meeting and set up the organisation. Anyway we are now incorporated. So we've done some prioritisation of the work, and one of the things we are going to do is quarterly walks. Just pick an area of our town and go out and get...try to do a community street audit of it. Invite local people; invite the local councillor. And walk a five hundred metre segment or a one kilometre segment. We thought we'd try to get our sister organisation XXXXXX as technical facilitators. We've been looking at XXXXXX. That is out on the bayside of Brisbane. But get several groups to walk along the streets. And basically come back as...pull it together as an audit. The kind of model is the community street audits from Living Streets. To give the community a voice and let them tell us about the local environment because they're the ones who know it best. And to then pull it into a report that comes up with things that we should be addressing. Like the kerb ramps, or improvements that are low cost, and the cost imposts for medium term. And then the final [product] would be this is the best possible package of responses. We're looking into whether we can get some grants to help us run those audits. To do the reporting.

CB: I think on your website you have a paper audit form....

Interviewee #2: We just used the Victoria Walks audit form.

CB: So would you consider using something formal like that in the community street audit?

Interviewee #2: We haven't actually tested it yet but we thought we'd go, the executive would go to XXXXXX and do a test run of it all. Before we trial it for real members of the community. And also just to do our risk assessment, before we invite others to be involved. For Health and Safety and our responsibility as a community organisation. We wouldn't want anyone to get injured. We need to make sure that everyone is aware of the risks.

CB: Have you talked to others about how it works as a process and its link to policy making?

Interviewee #2: It's just something that we are very aware of, that we could do these audits and not have....The critical thing is that we do have some ownership of services in that region because, ultimately they're going to be the ones who are going to be receiving the outcomes of this report so that it's not just, "here there's just another bunch of whingeing community members". So we'd involve the councilor and possibly even the chamber of commerce. So show them that improving the walking environment is one of the better ways you can actually improve the business of the area. So that builds up some local support and therefore some sort of support from the councilor. Well they probably get footpath complaints, but probably don't really get the bigger picture. It's not actually just about people tripping over raised edges of paths. The benefit here is the economic uplift that comes from walking. When XXXXXX visited from the UK last year we got a few of the professional associations together and held an event, with seventy or eighty people who came along. So XXXXX was talking there about the Heart Foundation about how walking is good for business. He presented on the evidence internationally of walking.

CB: It's an interesting approach, the community walk audit. Through talking to people, they talk about the process either as professional or practitioner approach, or as community

members doing it themselves. That approach (the latter) usually involves a collaboration of different...

Interviewee #2: Yeah. Technical and community. There was a really interesting...lots of ideas came up when you were speaking earlier but..... there was a really interesting paper, perhaps you've seen it or read it, presented at the Barcelona walking conference. In about 2008. You'd know about the PERS audit tool in the UK. So transport for London and Living Streets got together and did an audit around the new King's Cross Station (in London) using PERS and they also did it using a community street audit and therefore combined highly technical with pedestrian perception type of material. I thought that was a very interesting approach. I think they found that there were basically there were holes in both approaches but they could be used in a complementary way that was very beneficial.

I suppose another thing in terms of the effectiveness of the use of an audit is as a technical approach. XXXXXX works for WALK21; she was involved. I think she wrote the, or helped develop the community street audit. The methodology for Living Streets. Did a lot of business development for them, ran a whole lot of local governments. And one of them, they did a series of them with the London Borough of Camden. And came up with the...so longacre for example, is a well-known shopping strip, is awful for pedestrians. So they did a walking audit for the whole of Longacre did the audit report. And the Borough of Camden actually turned it onto a program for pedestrianisation improvements. And they had funding through what was called the Clearzone Project, to basically to do those walking environment improvements. So it's air pollution and transport. And now at Longacre, or if you have a look at a whole lot of before and after shots of sections that have...I know at the end there is Camden road. It was just interesting to talk to people, if you lived in Camden and where involved in that whole project. And if you ever did want to talk to people I could put you in contact with them. XXXXX and XXXXX. XXXXXX used to work for Camden and XXXXXX now works for Transport for London, and she is running a walking program. I think that was really good case study of, well it wasn't highly technical, but it was run and organised by some people with some technical expertise. But it was really a community and trader led auditing approach that got turned into some really very beneficial programs. So all through that part of London there are some very interesting projects. The before and after shots are all on the website but if you have trouble getting them let me know.

CB: Is that on the Camden borough website.

Interviewee #2: I'm not sure. I think the Clearzone project has been shut down. But if you do a search for Clearzone. XXXXXXX would be an interesting one to interview.

CB: She's based in the UK?

Interviewee #2: Yes. You can contact her through Walk21. She did...well Living Streets have used that Community Audit very effectively. They fund their own organisation, because they make money out of it.

CB: Yeah. Just looking at, an overview of walking policy groups and government departments in New Zealand and Australia, the Living Street's community audit is used. The other is PERS which you mentioned. But it seems to be....

Interviewee #2: Its very much in the realm of the technical. The engineers love it because it gives a score. I guess it was the CABE report to that used it, used the PERS scoring system to do some evaluation. Streets that had a higher PERS rating.

CB: So you've talked about the community audits. Have you any other plans for XXXXXX.

Interviewee #2: The other kind of thing we want to do is media releases. Trying to encourage some local walking advocacy. We are going to run a photo competition, to do the 'love' 'hate' thing. You know, I love this because...Collect images of things they really like about the local area for walking. There will be a few things we can do in regard to the walking...I mean XXXXX will probably talk to you about this but we'd like to bring in XXXXXX as a partnership. For XXXXX and I it is a bit tricky to be involved in XXXXXXX because of the conflict of

interest. In theory in it a Queensland based organisation. XXXXX and I are publicly involved in things to do with the broader organisation. Promulgating the message across the state whereas the other members are involved in more of the local level. With the Active Communities program that Council has funded for over the next three years, four years in total, with 10 suburbs and 10 centres within suburbs. We want to bring in some of that community feedback with the auditing. We've got these community planning teams that have expressed an interest in getting involved in more of the decision making about what projects get up and get funded. They've got up to a couple of million dollars to do a whole range of minor improvements for each community. So I guess we're seeing whether we can just tie in some of the audits with some of that. SO do some audits and do some facilitation work. There are a number of local governments who are interested in improving walkability. But it's never that high on the agenda. It's useful to have people like XXXXXXX come in to get the community a bit fired up. Or get the political representatives and staff fired up about it. So I suppose XXXXXXX could be a lightning rod for anyone who's thought of being involved but hasn't had an organisation to work through. There are plenty of people who are potential target audiences for us. Like there are professionals who have had children. Women who are now at how with a baby and trying to use strollers, who have an interest in being involved. Or recent retirees who have an interest, it's that older age group who do tend to walk a lot. The other thing that I want to mention is a project XXXXXXX and XXXXXXX were both involved in is in Canada they ran a series of walking master classes. They did a project that we would have like to have got going. The Premiers Council of Active Living in NSW is also very interested in this approach. The walking master class was an organisation in Canada that picked several towns across regional Canada, smaller regional towns and had a two or three day event. They had XXXXXXX and XXXXXXX doing a breakfast for the business leaders and elected representativeness, talking to them and getting really fired up about how you can improve your local town and what were the economic benefits that could come from improvements to walking. And then the rest of the three days was focused on what were the technical changes that needed to happen to get changes happening to walking. It wasn't particularly focused on getting the community involved rather it was focusing on getting the technical staff learning to audit some of the critical pedestrian streets that should be pedestrian friendly in those towns and then to... I'm not sure what audit methodologies they were using but, whether it was more technically focused or whether it was... I mean in general they tended to be more of the engineering, community planning and transport planning type staff, so they'd have some awareness. But it was really opening their eyes to what potential needs there were for walking and then going out on site and doing audits and picking aspects of that environment and coming up with an action plan, out of that audit. The master class aspect was they would then pick an aspect of the pedestrian environment and really focus on it. The action plan was then something they would try to get funding for, drawing on this new awareness of the political representatives. The really good thing about the Canadian one was that they, it was six or eight months before the International Walking conference in Toronto. So they used the walking conference as a way to report back on all these master class that had taken place. SO it really got, it was a great focus for those towns to showcase how fantastic they were. So it was a really clever approach to walking advocacy and technical advocacy as well. You do need that triangle; you know the technical support, the community support and the political backing. But I'm not sure how much they brought in the community in that process. XXXXXXX done papers on it at various Walk21 conferences.

CB: I know Victoria has the WAGs. The Action Groups. And they were informal groups that formed, it seems under XXXXXXX; they have a central place to link with other groups. Is there anything like that in your state?

Interviewee #2: XXXXX might talk about that. We haven't yet but we haven't got much profile yet but it is our intention. We'll do media releases and photo-competitions just to get exposure of our organisations.

CB: That's about all I wanted to cover. Is there anything else you wish to talk about?

Interviewee #2: Well I suppose I just get bogged down in my other work. In regard to Victoria Walks, the organisation charter they've got, the Health funding to start the organisation. Like \$1 million over three years to do. I'm not sure how they're going with ongoing funding. We've

been in contact with a volunteer group in the ACT as well. We've roughly talking about coalitions across the states but we haven't done a lot. With the federal election looming there is a chance to get more involved. The ACT group has wanted to try to get a policy platform. So then they're in a position to talk to some of the politicians about it. They have a website.

END OF THE INTERVIEW.

9 January 2013
Interviewee #3
Place: Perth
File on recorder: B #3

CB: Could you provide me with some detail about the organisation you're involved in, the XXXXXXXXX.

Interviewee #3: It's a small unit within the Department of Transport.

CB: How many people are employed in the unit?

Interviewee #3: Just two.

CB: And what is main role of the unit?

Interviewee #3: Policy development. I'm the Principal Policy Officer.

CB: Okay, to begin with I was wondering if you could provide some context for the development of the audit. I understand there is a paper form of the audit and an ipad version. Could you talk about the paper audit to begin with?

Interviewee #3: Sure. The audit developed out of a survey that the Department of Transport was involved in. It was an attitudinal survey, so mainly qualitative. The findings of the survey suggested that people were more willing to walk if they were encouraged. Also, if there had to be adequate infrastructure. The built environment needed to be conducive to walking. You know, safe crossings, legible. The built environment should not be so car-based. We were also getting feedback from the Local Government officers, you know advocates, that there needed to be a way of measuring the walkable environment. This also ties in to the XXXXXX program from 2008 to 2009. Western Australia lacks measurement tools. So the tool developed out of the need to measure walkability, but also as a way of identifying what needs improvement.

In 2011 we were involved in the East Metropolitan Regional Council (EMRC) strategic plan for member councils. In this the pedestrian environment was highlighted as a concern and there was a decision made to develop a tool. So the EMRC, along with the associated state government agencies, DOP and PTA, WALGA, and also some outside interested organisations, like the Town of Victoria Park formed a working group. We commissioned the Australian Roads Research Board to develop the tool. We looked at one tool, PERS, but found it was too onerous for users. Maybe for traffic engineers, or those with a higher level of expertise, but we wanted something that could be easily used by local government officers. We wanted the tool to be very user friendly.

You know, the pedestrian design standards. Austroads has a separate pedestrian designs standard and a separate one for cycling. They pulled them apart. The standards were the basis for how the tools were developed. The criteria i that the audit tool assessed fitted within the design standards.

So the paper tool was initially piloted in the City of Swan by the working group. We went out and as a group audited a few streets.

CB: So the pilot fed into the final design of the tool?

Interviewee #3: Yes. That was the point of the pilot. The tool was released as a paper form in 2011. Since then we have had about 50 – 60 people go through a training course- since May 2011. These are people from consultancy firms and Local government. Also Local Government community developers who are involved in issues of access for people with disabilities; traffic engineers; and state-government authorities - MainRoads and the Department of Transport. The feedback we received was that the tool was cumbersome. There are seven forms. Once you go through all seven for one section of the route, you have to start again and go through again. The route-based approach was not user friendly. That was then we commissioned ARUP to come up with a digital version of the tool.

CB: Were there any significant changes in the format or the content?

Interviewee #3: No. No major changes.

CB: So at what stage are you currently at with regard to the tool? I understand it was launched last year.

Interviewee #3: We're currently testing it. We are giving it to a limited number of people who will be providing us with feedback. We conducted a trial- the unit- using it just outside here on a small section of Wellington Street. We've also trialed it down south in the Shire of Capel (Dalyellup). We showed the officers the tool and conducted a training session. We then had the launch where an number of LGA approached us and got the tool. I think City of Stirling used it. We will assess all the feedback before making it available to the App store. At this stage I'm not sure if there will be a fee or whether it will be downloaded for free.

CB: I'd just like to ask you about the relevance of the audits to children's travel. As you know my research is concerned specifically with children's travel. I'd just like to know if you've got any thoughts on the use of this tool in, say for example, school environments.

Interviewee #3: Well. There already is a lot the Department does for schools. We have a separate group dealing with Travelsmart for schools. They look intensively at a small number of schools. Say around 10, and work closely with them. They implement school travel plans. There is also the Walk safely to school campaign that works in conjunction with the Australian Pedestrian Council. Also the Walk to School day that the Department of Transport works with the Heart Foundation. These are mainly awareness raising campaigns.

For the Walking School Bus there is an environmental scan of the built environment around the school. This is done through engaging with parents through a survey. The Department of Education looked after what went on within the school boundary; the local government had apparent jurisdiction around the schools area; developers were concerned with their own parcels within school catchment; transport-related departments looked after the roads. I wanted to establish a Memorandum of Understanding of, at least government departments surrounding the schools, however this was not supported by the other departments.

(Interviewee #3 also used a personal reflection to highlight the issue of children walking to school. She said that she purposefully dropped her child about 100 metres from the school in order to incorporate some active travel into the school journey, albeit within an environment that had been identified as safe. She was criticised by a teacher and a parent. In the end she got involved in her school community and introduced a cycling education program, school crossing, and lobbied, and got a carpark installed. Only after that did she begin to advocate for travel to school. Her point was that effective measures in changing travel behaviour are based on strategic and multi-faceted approaches. She highlighted the need for a champion to push for these changes. She also noted that the built environment has a minor influence on children's walking behaviour).

END OF THE INTERVIEW.

27 March 2013
Interviewee #4
Place: Brisbane
File on recorder: B #3

Interviewee #4: Just reiterating the point I made in the email about XXXX policy. We don't directly get involved in walking issues but indirectly we do. So the first thing you ask in your email is how things are audited.

CB: Yes.

Interviewee #4: So this is the report of the last major audit we did of the cycle network which the majority of it is a shared network with pedestrians. It gives you an overview of the process that is involved. (Referring to the report) So this is the equipment we use; the data we collected; and the attributes that were recorded. So what you find is that it does depend on how much of a priority walking infrastructure is, which local government. But the ones that do prioritise it do something similar, they probably do have vehicles like this in the fleet (referring to data collection vehicle) and they'll do it on a regular basis. The ones, I suppose the more regional ones that don't have a lot of footpath type assets will generally do asset inventories from aerial photos when they get them, every three to five years. So in terms of the first part of your question on how is walkability audited I guess that the only thing I can really give you. Now the other thing is in terms of walkability and local service we have done a fair bit of research into bicycle and pedestrian interactions. So (referring to a report) this one is a key output, this is a design guide. So, number of pedestrians per hour, and number of bicycles per hour, and the recommended path widths according to segregation. So if it's less than that according to number of pedestrians, if it's less than that according to number of bikes, then it's fine. If it's more than that then we recommend segregating.

CB: Are these standards developed by your department or are you using other standards, like national standards?

Interviewee #4: There are no national standards. These are developed by the department based on some earlier work that VicRoads did. But that's contained in the document itself.

CB: Just to clarify, in your email you said the department dealt with crossings and access to public transport. This is a separate issue then.

Interviewee #4: Yes. Technically it's bikeways, but we recognise that pedestrians use them and we can't just ban pedestrians so we have to manage it and set the standards. So on that theme, this is a student report that we commissioned. It's all about bicycle speeds on shared paths and pedestrians. It's an interesting read. What the research found was that both users are basically self-moderating in terms of speed. What we found was bicycles tend to go fast in areas where there are a few pedestrians, and that when pedestrian density increases, bicycle speeds decrease. There are some recommended design interventions to slow down bikes, for most part it is unnecessary and it tends to result in territorialisation. Ok, so that's not directly related but...

CB: No, that's useful.

Interviewee #4: It shows you what we're doing. Now we talk about access to public transport and crossings. So this is our guide for provision of pedestrian crossings. This is available on the TMR website so you can download this. There's an adjoining spreadsheet. What you have in the spreadsheet is a whole lot of calculations. What it gives you is each of the different types of pedestrian crossings, such as pedestrian refuge, kerbs, zebra crossing, slip lane, children's crossing and finally grade separation.

CB: (Looking through the manual) So the spreadsheet... these are guides to standards of particular crossings.

Interviewee #4: No these are warrants. For each type of crossing you need to meet certain requirements in terms of number of vehicles, number of lanes on the road, in terms of the distance pedestrians have to cross. SO it's all spelled out in that document. So the other thing we do which is what I can send you an email of is a design course- designing for cyclists and pedestrians. This is the workbook and I've got a bit of an overview of the sessions. It is focused on cycling but we do focus a fair bit on pedestrians. The course is being advertised at the moment and we're running the course in May and looking to do another one in July and another one in September. So, that's pretty much the extent of involvement with regard to the department. So none of it is what you would understand as related to walkability directly. We don't get involved in the space between buildings.

CB: I'm interested in the level of service measures related to crossings. Do you publicly make these available so that planners at the local government level can use them? How does it work? The auditing of crossings?

Interviewee #4: So in regard to the auditing, we carry that out. I guess what you'll find is that you have the Australian standards which is what we would say is the minimum you can get national consensus on. And typically what you find is that each State will say "well we want to do it better than that" and for whatever reason the other states don't agree, or they don't want to have their hands forced to do anything. So they will come up with their own standards. To make it more complicated at the local government level they'll say "well we want to do it better than the State" or we want to do things differently so we'll write our own guides. SO you do tend to get a fair bit of variation. A lot of the reason for it...sometimes it comes down to personality, thinks they could do it better. Or its history. There's been some discrimination cases, there's been people in wheelchairs or there have crashes which involve pedestrians and that leads the standards to change in each state. Quite often, an event will happen, changes are made, and then ten years later no-one knows why it was there. So that it then gets taken out again. Basically when you read it you can see that it relates back to the Austroads guides. But what it does is that it makes it easier, in regard to the spreadsheet. As you can see there is a bit of data collection. You have to measure the crossing distance, you have to measure the vehicles in peak hour, you have measure the number of pedestrians using it. You also get the type of pedestrians, you know, adult, child. Mobility impaired or visually impaired pedestrians. Wheelchairs if there are any. And then you have to put all those into the spreadsheet. You also need to investigate the crash history. Now that data is available from the department. So now you put that into the spreadsheet and it will spit out an answer for you. What it typically says is that it can give you three or four different treatments you can use. And then it will be up to the designer to select what the best response is, for that situation.

CB: Have you had any experience or any feedback on using the audits?

Interviewee #4: The feedback has been good. A lot of the feedback we've received is that people want us to put more information into it. Things like lighting. Because lighting requirements.

CB: Can I clarify, you mean street lighting?

Interviewee #4: Well, crossing lighting. Often they add a significant amount of cost, to what would otherwise be putting down a couple of bits of paint. And a lot of different crash treatments, we look at the crash history and look at the types of crashes. Crashes do have a cost associated with them. So, our economics guys have down a whole heap of calculations on each. Crashes of different types have different societal costs. What we do is a cost-benefit analysis of what type of crashes that have occurred at that location. We look at the likely costs the crashes will have in the future if we don't change it. So we put that against the current cost of doing something about it. But quite often lighting requirements can cause the cost to triple or quadruple. The main piece of feedback they've put in at the moment is that they want us to put in information about lighting costs. So if they get exclusions about putting in types of lighting. And we're looking at that at the moment and we think that we'll probably put in a land use question. If there's like a pub nearby that closes at 2am then we'll say you need to put lighting in. If there's a twenty four hour hospital then yes, you'll have to put in

lighting. If there isn't, if it's on just a rural road, with farms on either side we'd say the necessity is low so you can put it in without lighting. Or if the intersection itself is sufficiently lit then by putting in an additional set of lights will get a higher level of luminosity but it may be sufficient as it is for the cars to see the pedestrians. And if you put in more lighting do you get the benefit from the extra cost. That's been the main piece of feedback we've received so far but most people do like it. You put it in a spreadsheet, you put all the information in. You can print it out and send it off.

CB: Who uses the spreadsheets? Is it local planners and engineers, or do community based group use it?

Interviewee #4: Mainly designers and engineers. I guess that's the thing, they don't come to us. They just download it off the website. We don't know how many people use it. So if you have a school, the consequences and likelihood that at 9 o'clock the potential of a pedestrian being involved in a crash is higher than at other times. And the consequences will be determined by the road speed limit. And similarly, if it's a pub that closes at 2 o'clock. The likelihood at 2 o'clock is higher than at any other time. And the consequences again will be determined by the speed of the environment and the mix of vehicles- so if you've got heavy vehicles or regular residential vehicles, motorbikes things like that.

CB: And this information comes from the counts. So the spreadsheet audit is available online.

Interviewee #4: It's available online. Do a search for... (Writes down search). TRUM is the transport and road users manual. Do you know about the MUTCD. That's another one to look for. Manual for Use of Traffic Control Devices. So, zebra crossings and all that are traffic control device. So there are national standards for traffic control devices but each state will typically have their own standards. And that covers things like, in Queensland we have cane rail and need signs and devices for that. In Melbourne they have trams. So they need devices for that. And even for the new light rail project that's being rolled out on the Gold Coast, it's function differently to the trams in Melbourne. So we're coming up with different devices for that. Basically those are the two manuals we work from.

CB: I should have asked this before, but in terms of the organisation and those involved in indirectly in pedestrians' environment, how large is the group?

Interviewee #4: There are four of us here and issues relating to walking, pedestrian issues, take up about 10% of our time. And most of that is with crossings or DDA lights. There's another training course where we run through the spreadsheet for the first part of the day, and for the second part of the day we run through TGSI (Tactile Ground Surface Indicator) and compliance with DDA requirements. But it's mainly about having compliant kerb ramps for wheelchairs and visually impaired pedestrians. So you've got the TGSI in place with design standard and you've got discernable edges. I do have some resources on that. (Goes and retrieves). So this is the design standard for design access and mobility. We work directly from the standards. We don't have our own. What we do have. OK. So these are our standard drawings. You can do a search on our website. This shows TGSI for kerb ramps for corners. And this shows compliant kerb lines. And this is for providing for pedestrians on slip lanes and cut throughs. So basically what the requirements are for positioning for TGSI and for discernable edges. This is the institute for engineers for public works of Australia. This is their own set of drawings, but pretty much we're on the design advisory panel. They take them from us. This is a service that they offer their members. They can download these documents themselves. What else do we have here? This is the premises standards awareness. We typically don't do too much with stairs and buildings per se. We do occasionally get involved in public transport.

These are some project that we previously provided advice to. I'll give you these. These are the slides that we use for the two workshops that we conduct.

CB: So how do you typically get involved in projects like these (referring to the previous point). Is it solely in an advisory capacity?

Interviewee #4: Well no. Most...we're broken up into regions. Most regions will have their own designers in house. So we run training courses for those designers and if need be we can review their designs. But our job, really we're the head office. Out in the regions we've got all our guys on the ground. We also have a training program for engineers and designers, and it starts at cadets and goes through to designers. We usually have a steady stream of cadets coming through doing our training course. The other thing is, the main roads philosophy is that we don't mind training people who then leave and go to work for consultancies because, typically they will work on projects for us and they've been trained by us and they know what we expect. So there is very much a training philosophy. We train them up and we try to do more capability building, than review them ourselves. But having said that I do have a couple of examples here. This was the original design. And the changes were more about the alignment of the TGSi more than anything else. The other issue we get is other people using the old standards of TGSi. And this one here, the cut thorough had to be three metres. And there was a discrepancy between the institute of public works drawing and our drawing. So we went back and this is an extract from the MUTCD and it says there it has to be three metres. So we found out that that was actually a queuing issue. If you have pedestrians queuing in the middle you have to have enough room to accommodate. That's a few things. I suppose the answer is, typically we don't get involved. We try to build capability in the region and let them work through the issues. And typically, if its not a new project it will come about from a complaint from the community. Or there's been a discrimination case made. And that's more about relationship building between your regional office and the local community. So we can be brought in as an independent third party. Though we work for the department, if there is a dispute between the community and the team from our regional office we're seen as independent. The other thing is, our team, we're all registered road safety auditor investigators, so if there is an issue we can go out and do an audit and say well you've got to fix up these things. Again, we tend not to do that unless there is an issue has escalated and escalated and they need someone independent to come and sort it out.

CB: Yeah. Well, as you know, my interest in particular is on the environment around schools. Do you have anything to add about the issue of the pedestrian environment around schools? In Western Australia there are a wide range of governing bodies that are involved in the pedestrian environment around schools- the police, local government, main roads. Is there anything you can add to this aspect?

Interviewee #4: What we typically have is road safety advisors. And you'll have your road safety advisor in a region and in that region they'll be allocated to a certain number of schools. And it's their job to go out to the school and advise on issues of road safety for grants programs for safety improvements around schools. Go on our website and do a search for the road safety advisors. The other thing you'd want to search for is the Safe Pedalling and Walking Program. It's a grants program for schools. What happens is that the school identifies the problem, like a lack of safe cycling facilities or parents are dropping kids off in inappropriate places, and they want to ban parking or they want to put in some parking places. They'll approach their road safety advisor who'll say there is this much money available. They'll then get some designs done up and they'll get a quote for what needs to be done. Then they can apply through the program. Some years the program has a particular theme or focus. One year it was bike ed. And they lined up a few bike ed suppliers and they tried to match them up with schools that had high numbers of kids cycling to school. School is another thing that we don't usually get involved in. Unless there is a request from the public or the local member. Or if the school is on a main road.

CB: Well one of the aspects of walkability audits I'm interested in, such as one that is provided by our department of transport in WA is...

Interviewee #4: There is a number of walkability audits available. It is a case that someone's not happy with the audit available or someone wants to tweak it. So when we're doing a road safety audit, we've got our own checklist that we go through.

CB: Could you see an audit as adding to making a claim to change something around a school?

Interviewee #4: Its difficult. There is a line between evidence and emotion. And quite often, particularly when there's been a crash and a child's been killed it's that all the emotion from the parents, the teachers, the community. You know they'll rally behind you know one thing or another and unfortunately if you turn around and say how about we reduce the speed limit or improve the footpaths, it may not get a good reception. But if you say that if we're going to put in more carparking spaces everyone is like, "well that'd be great. It would be so much easier for us to drive and park." As opposed to something that would make it more attractive to walk, they'd say "oh no, someone just got hit by a car walking. We have to make it easier for people to drive." And I suppose you can have all the research and the evidence but when that emotion comes in they'll just want something that makes it easier for them to drive. And the next thing is that fifty new car parking spaces are being put in. Is that something (referring to a sheet of paper I have on the table) that you downloaded from us.

CB: It is.

Interviewee #4: Yes. That's part of our Easy steps program. A design guide was done for local governments. It's one of those things, it was done up about 10 or 15 years ago. It goes on the website. We haven't heard anything about it since. We didn't get any requests to update it or to change anything. A lot of these things, we put them out there and we're not sure if they're being used. As long as no one complains. Or unless there's demand from a particular group to do something. I suppose that's one of the drawbacks at being at the head office is that you're not at the coal face dealing with the community. So we put these things out there but we don't know if they're being used or not.

For our work here we wouldn't get involved in that. We are involved in road safety audits, crash investigations, review designs and we run the training. I suppose the other thing we haven't really talked about is public transport access. There is a new program talked about recently targeting new funding. We've got a new funding program for bikeways and also shared paths. They're going to allocate a certain percentage of that funding to facilities that get people to public transport.

CB: For pedestrians?

Interviewee #4: Well, for pedestrians and cyclists. So I guess, that's how we work. I always say, working with local governments there are two ways to get them to do things. Provide funding or legislate. SO these standards and guidelines are quasi-legislation. And then the other thing is to provide funding. Through the grants program, the safe walking and pedaling program. We can get safer outcomes. Or the other thing is to change or to update the standards. But really those are the only two triggers.

END OF THE INTERVIEW.

6 December 2013

Interviewee #5

Place: Melbourne

File on recorder: B #9

CB: Just to get started, can I ask you what your role is there at (your organisation), and what work you're involved in.

Interviewee #5: Sure. I'm a senior consultant here. (My organisation) is... broadly speaking it is a sustainable transport consultation, but we have a specialist role in travel behaviour change. So we don't do big road projects. We have done some strategies before, like a walking strategy and a cycling strategy; but that's not the main part of our work. Our main work is designing interventions that look to change behaviour. So in the past that has ranged from very large scale travel smart programs; for example, household engagement programs in the gold coast in Queensland. But also things like, we work with workplaces. I've just been working over the last year with a hospital up in Sydney. So there's a mixture of communication, engagement, infrastructure and services. And more recently we've been working with schools to do these kinds of audits. The idea is that they will, not only identify what are the issues in terms of infrastructure around the schools, but also develop behaviour change interventions within the schools; to actually engage the students and their parents.

CB: I suppose, as an example, could you describe the project you've described in the paper with the (local government). Who initiated it? How did it come about?

Interviewee #5: (The project) came about with a tender that was released, but I know they had been doing work... so the background, from the Council's point of view first. They had been doing work with schools trying to get schools to take on a school travel plan, which a lot of councils had been doing. Do you know about school travel plans? What's generally involved with them?

CB: I have an idea, but I haven't had a direct involvement in travel plans.

Interviewee #5: They are supposed to be... a combination of an audit of existing facilities based on surveys of children's travel habits and attitudes, as well as their parents. And then you come up with a schedule of works or actions to change that. If you have a significant number of children being driven to school, you set targets about wanting to get that down to 40% and it's usually over a three year period. In practice, in Australia, a lot of those plans and programs have been heavily on the behavioural side of things; which means that they're fine in terms of engaging with the schools, they're handing their plans over to schools and Councils...they'll develop a school travel plan and bring it up to the school to implement it. A couple of problems about that approach; first, if you just hand it over to the school with no firm commitment from council for support or promise for infrastructure changes, then things are not going to go anywhere because schools are time poor and this is not one of their priorities. The other issue, which is an internal budgeting issue, is that the school travel plans or travel behaviour change work is often done by people in a planning, environment or sustainability section of local government, and the money isn't there. The money is with traffic engineering, because the money is there to build things. So what (the local government) did that was interesting is, they said OK, their background to this is that they had, on the one hand, been wanting to do school travel plans, on the other hand, their traffic engineering people were getting requests from schools for a school crossing or traffic calming in an area. They had no way of judging one against the other. So, what happens is that, they say "last month we got another request, how do I know which school is in greater need of doing this". And what they were doing was effectively running through their budget until the money ran out and then whenever any other schools came along with a request they would have to wait until the next financial year. So it was terribly satisfactory. The different thing about (the local government) was that they travel plan person, or the school transport active transport person was located within engineering, and that usually didn't happen. And that was critical. So what they decided to do was look at how they could strengthen delivery of the travel plan program as a whole, and getting closer with traffic engineering by doing audits of all of the schools and surveys of

all school across the municipality. And therefore come up with the list and be able to say to people, we we've assessed this and you're number x on the list now and we'll work our way down to you, we'll make reassessments in future years. Which school has a greater need because of safety issues, because of potential for change issues and so on. And that was really the whole thinking behind it. They put out a tender and we responded to the tender and we were fortunate enough to get it. And we carried out the work that we covered in that paper.

CB: It's interesting. Talking to others about this is that there is a divide between the behaviour change and the infrastructure side. A lot look at it as an 'either/or' or doing one before the other, or something like that. It's a good approach. In terms of, I suppose the audits themselves, could you just describe how that process was undertaken; whether you had a formal checklist; and the resources involved in that. 41 schools. How long that took, and how comprehensive it was.

Interviewee #5: Yeah. We have engineering staff; at that time we had some staff who were qualified as traffic engineers and they went out and did the audits. We got them to do the audits in the afternoon. We were looking for two groups of information. One, what is there on the ground in terms of infrastructure, and that was a walk around the immediate surrounds of the school. Usually up to about 3 to 4 hundred metres away. We did have a question of how far do we go out, recognizing that the catchment of where children come from is further than three or four hundred metres away. But it's a resource issue. In an ideal world, you would probably want to do an audit across the whole of the primary school catchment area. In Melbourne that is about one kilometre to about two kilometres. Anything up to that, children can be expected to walk, because you do want to capture crucial areas. So they went out and looked at those surrounding streets and recorded where things were, state of footpaths, obstructions, parking conditions and signage and so on. One thing I should say about gathering that information from a wider network- they did do that, but to a lesser degree. We did that through using Google maps and street view. We were able to say- well there is a major road about 1.3 kilometres away, where are the crossings on that road; it doesn't tell you things about traffic speeds or observations of the safety of the crossing, but it does tell you where those things are. Which is then useful when you're engaging with the school.

And then, after the look at what's on the ground they had a observational part of the audit that involved looking at the behaviours of people driving around the streets and picking up children in the afternoon. SO, it was looking at- how early were people getting there. Is it 45min before so they could get a good parking spot so they could pick up their child? Were they observing any of the parking restrictions around the school? Were children crossing the road safely. Or were they dashing between cars? What were traffic speeds? What were headways between cars? etc. So then they were looking at that observational side of things. They weren't doing things like, counts- vehicle counts- because we didn't have the budget to do it. It was more of an observational feel for, yes, this is running well. These are good or bad behaviours. You get an idea pretty quickly about what is good and bad. Some schools, for example, had a dead end right at the entrance to the school. So what was happening was that parents would park there and then struggle to get out. All trying to do a three point turn at the dead end of a narrow street. And with children running around as well. So what we were trying to pick up was that observational side of things, as well as the infrastructure.

CB: It seems as though the time aspect, picking the right time to conduct the audit is crucial. Conditions can change very quickly at around the beginning and end of the school day.

Interviewee #5: Yeah. We know from previous experience. We did have a debate about whether to go early in the morning or in the afternoon. But we chose to do the audits in the afternoon. Afternoons tend to be a bit more complicated. In the mornings, the child is dropped off and the child goes straight in through the gate. Things work a little more efficiently. In the afternoon the parents arrive earlier and you've got this long wait period. We wanted to capture the less ideal part of the day. But we did want that quiet period when we could look at the area and say- "this is what it looks like when it is quiet".

CB: Gathering from the paper, was that what you came up with was a weighting of the issues around the schools and these criteria contributed to the ranking of the schools in term of the weight. Was that the intention?

Interviewee #5: That's right. That was something we did in negotiation with the council. We worked closely with the council to identify what were their priorities. You could rate this in five different ways. But really what we were looking at was what the council wants to rank. And those were some things that they came up with.

CB: The school didn't see the audits? Did any of that information get fed back to them or was it purely for the council agenda, in terms of infrastructure.

Interviewee #5: There were two reports. The other part of the information gathering was the school survey. So the schools got reports back on what the children said they did, and how they thought about their travels, as well as the parents. Council got reports back on the survey and the audits. Now the reason the council didn't want to give the schools the audits was that they didn't want to raise false expectations. So schools could say: "well, we need this crossing because you've identified this in your audit". And therefore we're going to start ringing you every day to get it.

CB: Where is the project now and what plans do have in the future for the work with (the local government)?

Interviewee #5: I'm just trying to think. (X), who is our Council officer, our client from (the local government), she was also speaking at the conference. The council is now working its way through the list of priority schools in terms of providing infrastructure to those schools. They've been working through a priority list of school works and try to tackle three to five schools per year, depending on how much it costs in terms of the works around the school. So I think last year they got up to eight schools. Certainly they've said it has made it a lot easier in terms of managing their workload, in terms of being able to say to schools "you were 13 in the list and you're currently at 9 in terms of where the works are". Or, if a school is concerned about a crossing, they can say "well, we did the audit and we can't do it this year, but we can do it next year". They told us that one of the things that are good about this approach is that schools are generally happy, they come back and say oh well at least we're on the list. They can see there is actually a process. And that schools are now... they found out that school were following through and actually implementing their school travel plans. In the past, as I mentioned earlier, the schools were getting the travel plans, but without the actual works happening, schools were dropping the travel plan. And now they're finding that schools are actually implementing their school travel plans at a higher rate than they were before the program. That isn't one of the things that we expected.

CB: And the commitment to infrastructure, and the rational approach to funding is driving that support for travel plans?

Interviewee #5: Yes. Yes. In the past schools tended to look at the travel plan as an approach imposed on them by others. We have a number of priorities. We've asked Council, you know nothing else much is happening. You ask them to do all these behavioural interventions. Whereas, know if there's a commitment to have a new crosswalk put in next year, well that's almost like a sign of good faith from the council. So we'll do the behavioural stuff in the school travel plans.

The other thing I should mention is, the approach is increasingly being well regarded by other councils. We're doing a similar program with another council here. They basically chose to work with three schools per year to implement a school travel plan, which includes an audit. With an overall view to look at where those schools fit within the overall schools in the local government area. And they've being doing this with three schools a year, over three years now and they're getting an idea of where the work needs to be done across the council. You know, give people an idea of that overall context.

(Conversation about further contacts)

CB: One of the reason, noting the environment around schools is that there is fragmented control over particular area. For example school crossing are controlled by police. I'm wondering how the travel plans fit in with other agencies involved. Do you have any insight?

Interviewee #5: Yeah. It is a similar process here. For example crossings are the province of Vicroads. You need a warrant to be able to do that. But the warrants come from the local government. SO the audits identify the need but then you'd need to go through another audit which is a numbers audit of how many people are using the crossing. The council would need to do follow up work to make the case for a signalized crossing. Generally schools are on local roads which are controlled by local government. Again, all we do with the audits are highlight the issues to council and say we can address this, or no, we have to go to Vicroads to address this.

CB: Thanks. Just as a final question- part of my interest with audits was that- organisations are increasingly being provided through websites. Do you have any thoughts on the usefulness of that, as a strategy?

Interviewee #5: I like the Vicwalks approach to audits; because it does two things. It generates useful information, but it does it in a way that, the people who do the audits can understand how it can impact upon them. So there's that buy in there in the first place. If you've got a supportive local government or state government who are going to act on the outcomes of those audits then that's good. The danger is, the same issue that we faced with the school, is the raising of unrealistic expectations that can't be met. Say, I want a bench, or I want improved footpaths which a neighbourhood audit can come up with. The issue is then they take it to the local council, if it's not done with local council then they can say we haven't got money for this. So I think some combination of the two would be good instead of merging the two. Some councils are doing that. Where they are looking to get local input and feedback from people, but doing it in a way that is practical. Just trying to get that balance between something that is a formal process that council usually go through, and something that is a bit more organic. To try and make sure the two merge together, to deliver a better walkability audit and get a better outcome from that.

END OF THE INTERVIEW.

28 March 2013
Interviewee #6 and #7
Place: Brisbane
File on recorder: B #6

CB: I'll just begin by explaining what I'm doing in more detail. My PhD is with an ARC grant, you may know XXXXXX from XXXXXX, that's his project which is CATCH/iMATCH. I'm based in Perth with XXXXXX and we're looking at the built environment influences on children's active travel and independent mobility. But I'm also interested in policy approaches and strategies to address walking in general.

Interviewee #7: That would be a quick study in Australia.

CB: Yeah. Also looking at audits, the policy around them and how they relate to children's travel and walking in general. So if you do have some knowledge of audits or similar tools and techniques we'll get into that in a minute. But I'd like to start by talking about what your roles are in the...

Interviewee #6: So I'm in the School Active Travel team and we work with schools in the BCC area to implement strategies to increase walking, cycling, scootering and public transport. SO we work across those modes. The primary aim is to reduce congestion, also with the health benefits and environment benefits. And independent mobility. That's 21 schools a year. New schools. So we're dealing with anything up to 60 schools at a time.

Interviewee #7: It's a three year program.

Interviewee #6: A three year program. And the first year is very intensive. Second and third year we're a little bit more hands off; so we're allowing them to be a little more sustainable. But we work with an active travel to school committee within each school. We actually implement it. It has teacher, student school representation as well. So it's a self-nominating program. So, we invite all schools in Brisbane and target particular ones. They have to want to apply for it. They have to want to participate.

Interviewee #7: Work with the women.

CB: And is the response quite positive?

Interviewee #6: Look we're not (CHECK) schools are very much focused at the moment on the introduction of the new curriculum and a core requirement....

Interviewee #7: We behind in those things, and trying to catch up.

Interviewee #6: Yeah. We're at the bottom of the league tables so there's a lot of pressure to focus on the basics. But we still have quite a bit of success with the schools we work with.

Interviewee #7: Something that is being thought of at the moment is whether we go to an adaptive school program where we have different levels of...like a gold, silver and bronze, to attractive other schools. We're looking at an easier version for them and as part of the active communities that I manage, we may do a short school intervention as part of that; similar to, I'm not sure if you've seen it, but Sustrans - they've just started to do, I think it's called GoBike, a three week intervention that's largely web-based. Something like that, just to get the schools interested that are like "we're not going to do it for a year". We just want to say, this is easy, this is a bit of fun.

Interviewee #6: So a school does not have to do every initiative, but there are some key ones that they must do in order for us to achieve behaviour change.

Interviewee #7: It's not too hard.

Interviewee #6: If your problem's there, it's not too hard. If you have a problem and it's at the bottom of your priority pile, why would you act?

CB: What are some of your initiatives that you use?

Interviewee #6: So there's a focus active travel day. There are road safety components where we work with RACQ to deliver those. They provide such a great program, for each of the schools, across every classroom. It's no use us doing it, because they can do it much better than we can do it. There's cycling and scooter skills. There's a bus session where we are talking about on safety on buses. There's rail sessions if they're near a school. I do some work with Queensland rail in regard to that.

Interviewee #7: Park and stride.

Interviewee #6: Well, Park and Stride is one initiative that we have within walking. In walking we'll have...we're going away from walking school buses and using a more informal walking group. Only because you can't sustain a walking school bus, with the paperwork. (More) And park and stride.

Interviewee #7: Do you know about park and stride.

CB: No.

Interviewee #6: So if you are dropped a certain way away from...

CB: Yes. I know now.

Interviewee #7: You can promote the location.

Interviewee #6: Some kids think that park and stride is: "I get dropped at the car park and I walk in".

Interviewee #7: So we promote the locations, some schools do flags, some schools do balloons. They often do it one day a week. Some do it everyday of the week. That one particular location.

CB: How far are the distances?

Interviewee #7: 750 metres.

Interviewee #6: Well it varies.

Interviewee #7: It's got to be a location where there is good parking. Where there's a safe drop off.

Interviewee #6: We draw up an active travel map for each school and provide one to every family. So, we have a map of the local area with the school centred. One is to say, 500metres, or ten minutes. We used to draw this circle around the school and say, you want to be outside that perimeter. But with different topography and speed, what we're doing is putting suggested little men on the map. And those places would be ideally like a park with playground equipment, car parking available; a safe route to walking to school from there. But we say this is not a dumping ground. So, we never say, "kids walk alone". In some schools the teachers will walk with them. The language is always about walking with the group; or walking with your child. I know XXXXX is focused on independent mobility; we need to work with day to day perceived parental....

Interviewee #7: We're not quite ready for that.

Interviewee #6: No.

CB: I was just talking to XXXXXX from XXXXXX and they were talking about Road Safety Officers. Do you work with...

Interviewee #6: Yes we do. I've just met with TMR; their Southside region last week. So, we'll work with each of the regions. We'll work through the schools that we're both working on. We talk about what issues we're working with and this is what we're up to so that we have no surprises. We manage their crossing supervisors. They do road safety audits. They're more focused on driver behaviour- who's wearing seatbelts, who's not. And they've managed the lookout program for the two minute passenger loading zones, where they will go in a train volunteers and some of the students and teachers as well. So, the two minute zones work smoother. Managing that with a megaphone. The parent comes up, a visor comes up with the name, and off they go. We stay out of that, because that is actually not active travel. We don't want to. We need to be aware of it, we need that two minute zone working; but we also need to focus on how to get those cars out of there. So we sort of have to...it's a fine balance. Look you've got to run it like you're an army general and if you do that, you're fine.

Interviewee #7: That's the least popular person in school. The person who's got to tell parents to drive around.

Interviewee #6: Yeah. Yeah.

Interviewee #7: Did you want to talk about auditing?

CB: Yeah. Let's move on to that.

Interviewee #7: (To Interviewee #6) I mean I don't know what you guys do at the moment.

Interviewee #6: Not a lot. When we had the formal walking school buses, those routes were audited by a council staff member. You know, to look for safety issues. Um but we don't, at the moment we don't, aren't recommending routes. I mean the schools are putting park and stride points on a map. But we're actually not auditing; except for the infrastructure.

Interviewee #7: Oh that's right. The infrastructure.

Interviewee #6: With our transport network officers they would look around the school, but only in the immediate environment around the school area, and we'll look at signs and lines and safety issues around there.

CB: Is there are a reason for why the routes aren't being audited, or is it just not being done?

Interviewee #6: It's just not being done.

Interviewee #7: It's probably being done, somewhat subconsciously. You know looking at whether it's a wide road with a high speed environment - you're probably not going to go that way.

Interviewee #6: We're not formally doing it. There was a case this week at XXXXXX; we've got an 'adopt a cop' on our committee. She went there because there had been some public complaints about traffic in the afternoon. So, she went out there to do a bit of education, a bit of enforcement. Saw that the trees were over the signs, so she reports it to us and we get it fixed. Yeah, but its more on a needs to be basis. It certainly is at the beginning of the year when some schools start. Certainly an audit process conducted with our traffic officers. But obviously in an ideal world it would extend further out.

Interviewee #7: I think what we've moved towards is thinking whether it's going to happen to the active community. It's only ten suburbs over the three years. The schools are one of the key locations within the community. Not that our auditing processes will pick that up. We have two school buckets of money; separate from the active school travel team- safe routes to school, which is minor, some minor infrastructure. Then there's active school travel which is 50/50 with the state government. But that fairly much operates in response to requests. The

school complains about it; we have two officers that will go out and investigate the particular location, particular complaint, and try to look at bit more broadly around the school to see what the larger issue is, in response to a particular question. We're trying to move towards a bit more of a... I mean we're doing it a bit better than previously. But the active community will pick up issues, they'll farm them out to...well we have a bucket of money. We have 2 million dollars a year per suburb. But if we can't afford it we might farm it out to the safe routes to schools or bikeways program or any of those other pots of money.

CB: What sort of things does that funding go towards?

Interviewee #7: Well, the active communities are three phases. So we do community engagement phase at the start, and then design and construction of whatever the school came up with. And then a travel behaviour phase. That deals with community and schools, workplaces and businesses. So, the kind of things that we find we predominantly do are footpaths, either new or upgrading; bikeways- but for 2 million. Bikeway money can make your money disappear quite quickly: shade tree planting; crossings; pedestrian islands; refuges; signage; lighting; sometimes, public transport. So, it's early on, this is the first year of the program. So we don't know how much we'll get. The first two suburbs are at concept design stage at the moment. We'll see what we can afford with that money. We haven't really done an audit process...well we have. So we've identified the key routes, to schools and retail, public transport, and recreation, for walking and cycling. So we've evaluated them for safety, for comfort, and for attractiveness.

CB: Is that a formal process or is it an ad hoc thing that you do when you're out in the field?

Interviewee #7: You I suppose it's a thing we just look at. I mean some of these are just in response to what the community has just told us. You know if it's a 0.8 [metre] footpath, you can barely walk one wide let alone two. Then if you're out with the dog it's hopeless. So footpath width; footpath maintenance; footpath crossing; whether there's a crossing present; the width of the road; the turning circle; if the road is wide you can turn then the cars going to move faster; the presence of the shade; and the quality of the shade. So we don't have anything fixed, but that's more to do with resourcing. So we don't know what resources we have. Are you familiar with PERS.

CB: Yes.

Interviewee #6: So we thought about something like that and we were going to purchase the licence for that. But then we realised that we had the money to purchase that but not the expertise to do it.

CB: Those things are covered in audits anyway.

Interviewee #6: I know TMR do that training course. Designing for pedestrians or something.

Interviewee #7: Designing for pedestrians.

Interviewee #6: So they might be worth just checking their content.

CB: I did look at that and it focused mainly on crossings, the quality of crossings that are appropriate for situations. Not so much on the paths.

Interviewee #6: Within the school committee we also do a parent's survey at the beginning of the year where we ask people to identify barriers. And the results of all those surveys are collated and form the basis for us to do any assessment as the basis for us to do any change. But we do go into the school and say "don't go into this program if you want infrastructure because we want behaviour change". But we may be able to do something in a few years for you.

Interviewee #7: We'd rather give you infrastructure money if you've done our behaviour program.

Interviewee #6: So carrot before the stick.

Interviewee #7: I can see us moving to a process where we do a community street audit as the first thing we do; out of anything. Even if it's a small gathering of the community. Because, I think we're finding, we have a couple of people doing the planning who are - well they're planners not engineers - find that they're going out again and again and again to look at things. But if was a three day audit once at the start, photos, videos- they won't need to go out again. So they've gone out again to look at shade. They've been out a few times looking at shade, "I don't think we've got enough shade". Whereas, if you captured all that at the start we don't need to go again.

CB: I can see how that could aid in gathering that type of information. Do you think that once it is contained within a formal type of process or document that would aid in lobbying for certain changes?

Interviewee #7: I think it needs to do two things. It needs to (CHECK) it needs to come up with the rationale for making any changes to that particular area. But then it also has the technical- you know the kerb ramp is here substandard; the footpath width is 0.8 [metres] here. Exactly, you can say the trees in the street in this location are, there hasn't been one for twenty metres. You know exactly what you've got. You're not making subjective judgments; which then for us are quite hard to defend.

Interviewee #6: As soon as you show the community the facts, everything settles. It's so great.

Interviewee #7: If the council says why didn't you put shade in that street. Instead of saying, we just didn't, we can say: "Well we analysed the street and found that it needed street trees." We need to be able to back up our decisions. And you know so many people, I mean we're a really big organisation, so many people get involved in the decision making. If you've got to go back to square one with each of those [decisions], it wastes too much time. If we had it at the start it's all there for people to see. You can have a look at the photos; you can have a look at the standard of a particular location. We're aware of the XXXXXX audits, there are a few different audit processes out there; so if we have that data for each of them- it is so much easier.

CB: I guess that's covered most of what I wanted to cover. Is there anything else that you want to say about...?

Interviewee #7: I guess what else to say is that - so active communities from the word go, we're trying to build momentum and engage the community. We're about behavioural change. The way that we think about infrastructure is that we plan infrastructure that is based on behavioural change. Not just making it safer, but making people believe that the routes are more attractive. So we're enticing them out with these irresistible routes to the key destinations whether it's the library, the retail, the shopping, public transport. That's our aim and it's nice, having worked in XXXXX area to be able to do the infrastructure and the engagement.

Interviewee #6: I know that in the Noosa area they were doing their infrastructure before their behaviour change. And it all comes down to working with other organisations such as Education Queensland. So that when they're building schools, they're taking that into account.

Interviewee #7: Or even just getting into their manuals like TMR, their public transport publications. You know the scope for it may be that the location can be 100 metres and you know that's just not far enough. To consult well on their manuals, you know we can say no you need to be going further than that. I suppose they say "Our buses are full, we don't want anymore people to use them".

Interviewee #6: No they don't.

CB: So, that's great.

Interviewee #7: So is anyone doing auditing well?

Interviewee #6: People seem to be using it very differently. There are a lot of audits available. People have an idea of using them as a way of bringing together a whole...what they tend to do is formalise a process of going out and identifying specific problems. They produce an output that says we have done this, we have found these problems. I've been using an audit around my case study school in Perth using an tool the Department of Transport has developed.

Interviewee #7: I'd love to see it. I presume its GPS standard.

CB: You mark in the route you are going to audit. You then do the audit and that information is assigned to the route on the map.

Interviewee #7: That'd be great.

CB: Yeah.

Interviewee #7: We looked for something similar when we first started. We have this ridiculously expensive piece of equipment. I don't even know what it is called that is meant to GPS stamp data at a particular location. I don't even know how it works but what we want was to use the location, collect the information then present that data in a GIS environment.

CB: I found the audit process was long and involved. I was doing it myself. It would be great if there was a group of people who were guided through the process.

Interviewee #7: It's hard because you need to be confident that you are going to have consistency across everyone who is gathering the information. And I guess in our situation it's so much in its infancy here. I know XXXXXXX. He had a consultant use, to do the first trial of the software. Corridor planning. So, they used, they didn't have a PERS licence, and they didn't have anyone available. So they hired a consultant to do it, with the result that - I don't know if I trust what the consultant came up with was right. If you don't trust them - not that they're bad or anything - just that they're not thinking in a similar way. They had to ground truth everything that they had the consultant to do.

Interviewee #6: I was just thinking, it is a good consultancy. I mean the traffic count companies.

Interviewee #7: I mean if you're confident about what you think you would come up with. It's subjective. Unless you are going to be saying: "this location, x metres tall, this is the variety". I know what you are going to say. You were going to talk about XXXXXXX. We three sit on, with a number of other people, XXXXXXX, and one thing we want to do in regard to that, starting in June is, audits. So community street audits partnered with I guess a social kind of event. I guess to raise issues and raise a group of people who are competent and able to advocate for walking issues in their area. So we've only been going a couple of months now but we'll do that quarterly.

CB: Again, like you say there is a struggle with having an audit that is valid with the issue of subjectivity. But it is a great way to structure a community approach to looking at an area. As long as there is training to conduct the audit some of these issues may be addressed.

Interviewee #6: I'm wondering about our state department, who have money in the active travel programs.

Interviewee #7: Do they? We have money. I guess the other thing to mention that walking as a political idea is nowhere in Queensland at the moment.

Interviewee #6: It's not in the hierarchy.

Interviewee #7: To get any money...I mean this active communities we have money; but it's under a Bikeways area with people for who its just about cycling; to get them thinking a bit about walking. The other thing I should say is that the councilors in the city have a bucket of money that is footpaths and parks.

Interviewee #6: But it is so limited.

Interviewee #7: \$400,000 a year.

Interviewee #6: Footpaths are so expensive.

Interviewee #7: The biggest issue is with councilors who have picked them out of the area and say..

Interviewee #6: It's political.

Interviewee #7: But then they go to consultation on them, and a large proportion of them fall over in the consultation phase, because the public say, because its 50%+1. 50%+1 of the people who respond to the consultation. But a lot of people say that they don't want to have footpaths outside their homes. So, we're really aware that our processes for footpaths are terrible, but there's not really the political will to change it. We're pushing for that to happen; with some success. I did a lot of looking around. All I wanted was something that I could, when I was out, collect some information and then bring it back to the office and present it. Here's what we found at each of the locations. Rather than, we find the data capture is quite difficult. It is labour intensive anyway. You've got to go look anyway, and I tell you, the number of field visits our guys are making, if you'd done it two days in the field maybe at the start. It would be way less than what we spend now. And anything else he has to look at it, it's well let all go have a look.

END OF THE INTERVIEW.

10 May 2013

Interviewee #8

Place: Perth

File on recorder: B #7

CB: From the email I sent through there were a couple of questions I'd like to ask...to begin with, what kinds of policies are in place or what kind of strategies....

Interviewee #8: Well we have....we are a program delivery area rather than a policy making area. Basically the way that we deliver behaviour change...our behaviour change program to schools is a rewards and point system. So we encourage school to sign up to an online community. Not a government website, it's an online community website. And they sign up to that, they choose the level of involvement that they can manage. It's as onerous as the schools want it to be. We encourage them to do a hands up survey at the very start. Get a baseline measure of how many kids are walking and cycling to school. And then from there they can choose different activities. There are events that they can hold. Walk to school day or ride to school day. They can have the odd health breakfast to encourage. Or other low level, that is, not much work...just having random raffles. On a random day they may give out raffle tickets to every kid who walks to school and they could get a prize.

Where we then come in to that, we encourage them to blog. Write out their travel smart experiences. The blogs are awarded points and with those points we will give them prizes. They can exchange what points they're given for their blogs for prizes. But we don't just go out there and give prizes to whoever else is involved. They have to blog. They have to actually tell us what they're doing. It's a great way for us to evaluate the effectiveness of the program. To get some sort of idea about what is working out there.

We've found since we introduced this particular system, this blogging system where they get points...that was introduced in January [2013]. And the number of blogs has gone through the roof. It's really good.

CB: You sent me the link...

Interviewee #8: Yeah, and the number of schools that have got involved. We haven't got a lot of schools, but for one and a half staff members it isn't bad. There are around twenty five schools.

CB: How do you....do you advertise the website to schools? How does that work?

Interviewee #8: We haven't been going out and actively advertising, because we've just got the one and a half people. What often happens is that you will get a local government travel smart officer. Who wants to encourage active travel through your schools? And we have local government; we have contact through them. That's how some people found out. What tends to happen is that those travel smart officer that sit in local government, they come to various meetings throughout the year. And they'll be given updates on not just schools but households.

CB: The meetings are organised by yourself?

Interviewee #8: One of the people I work with organises it. She works just with local travel smart officers. But she gives them updates on all the current programs. And that works well because local governments. And some of them do have schools that approach them and say, well we have a real congestion problem, what can we do? We've got to get kids out of cars.

CB: The congestion issue comes up a lot. What do you think the primary issue is that makes schools get involved?

Interviewee #8: Congestion is one of them. I think some of the schools, having taken on the new curriculum, the new curriculum mandates sustainability. So some schools have come on board because of that. Where they have a sustainability, or an environmental focus, or because the physical education teacher, you know physical education or more active kids, and others come on board because they can't believe that kids don't walk like they used to.

So there's usually a champion in the school, either a principal or deputy, teacher or sometimes there's a really active parent, who brings it up as an issue. Some of these issues tend to come up in discussion - you know physical activity and congestion, and all these other things that support the promotion of travel smart. I guess, you asked me about issues regarding children's travel behaviour change. The biggest barrier that I can see, backed up by reports I've read through articles, is this perception of child safety. Where parents just believe that kids, whether kids walk to school...it's a strong influence. And it's not just the perception of safety in terms of road safety, its safety in terms of stranger danger. Um...even though there's no evidence to support that as an issue, there is still the perception of it. Um, I guess in terms of your question you're asking what the issue is in terms of the problems, we tend to promote our program a little bit differently. So in terms of going there's a problem and we can fix it. Rather, we have this really fun program. We promote the positives of walking to school rather than the negatives. So, everything is suppose to be aimed at, well we try to aim the project at the kids level. So try to promote the travel smart teams within the schools. So yes there may be an adult champion, who coordinates the program but the majority of the work, we try to get the actual students to do. Because we believe that will maintain the travel smart culture throughout the years. SO if you have a parent leading the travel smart program and leaves, then it's not carried through. What we're trying to do with the program is go walking is fun; sitting in the car is boring. Walking to school is environmentally friendly. Walking to school is good for your health. Walking to school is fun. We should. Kids don't generally engage in that kind of language. So that's how we try to sell the program. SO the blogging and the Ning?

CB: Sorry. What's the Ning?

Interviewee #8: Sorry, the online community. It's more useful, less bureaucratic.

CB: So some of the programs and projects related to travel behaviour are promoted on the website?

Interviewee #8: Yes. So...

CB: So the rules and the point system are explained and then published on the website then?

Interviewee #8: Yeah, it's a little bit more personal than that. When we allocate points we do it on the comments of their blog. And we write comments like if you provided photos we could have provided more points. There's that feedback on the quality of the regular blogs, that are getting better, because we're getting the feedback on...I mean most of the points they get are on their activity that they've done. It's not necessarily all the quality of the blog. If they write a one-liner that says we just held a healthy breakfast or they held a cycle for school day, they actually get quite a few points because the work that is done getting a healthy breakfast or event like that is huge. So if they write they've just held a healthy breakfast and they had seventy per cent cycle to school and here's some photos. This is how we went about holding a walk to school day breakfast and here is a guide. Because that is sharing knowledge they get quite high points. There's that balance between the activity itself and the quality of the blog. That gives them points. It still is very transparent. We actually have a system in place on how we should allocate the points. You know we all follow thee same guidelines on how to allocate the points- internally. Schools don't want to be inundated with a whole heap of...well no one wants to be inundated with a whole heap of material all the time. So getting it on there, onto the blog is personal.

CB: So no-one can see (each other's communication) on the blog. Or is it all public.

Interviewee #8: It's still public.

CB: So other schools can...

Interviewee #8: So other schools can learn from what's going on. And in terms of the blogging, we've had a few new schools and there are a few of the travel smart champions who are a little bit....they're not very confident in blogging. It might be my generation who are

not used to technology. We can also help people over the phone so that they can get used to the whole idea.

CB: What sorts of prizes do you....

Interviewee #8: Okay. Well um, I'm updating prizes at the moment. We give out a few kind of trinkety types of things...you know stickers and tattoos. We're kind of moving away from that and encouraging people to have, to do raffles, so that everyone who cycles gets a raffle ticket. And then there might be five main prizes. You may go into the raffle to win a voucher to Australian geographic. Things that are a little bit more useful. The idea behind that is to get parents engaged. Parents aren't interested in stickers and tattoos, but if you say you're going to get an \$80 athlete's foot voucher. Parents will support that. SO they say little Johnny should walk to school today. There are other prizes we've got including bike helmets, bike lights, pumps. There are a few novelty things like there are horns and bells. I'm updating the website at the moment so in about a week the website will have, will be there with all the new prizes. We're just doing a push now. We'll get some varying prizes. Bike helmets for little kids, bike helmets for big kids. We've also got rewards for the champions themselves. We recognise that they put in so much work that, so we have a bit of a budget this year for champions, so we can recognise them. Things such as personalised cards. So if they do something, we can write to them. We're trying to tie it to a personalised service rather than just a....

CB: So the champions are the ones who are blogging? The ones who have a presence on the website?

Interviewee #8: Although, I'll tell you, so of the student travel smart teams, the teams....we're encouraging them to write the blogs. To provide as much important....so I guess that then gets fed on to the website and then gets put into the system. You were asking about policy initiatives and programs in the department. So there's the travel smart to schools, obviously. Then there's XXXXX's walking unit. There's also Bikewest, the cycling unit.

CB: Do they have anything, specifically involved in schools?

Interviewee #8: They're involved in the national ride to school day. It is Bicycling WA that co-ordinate that, but it is bicycle network that provide a lot of resources, as in prizes and things like that. They still provide support.

CB: The walk to school day. Do you get directly involved in that?

Interviewee #8: In the planning stage.

CB: What sort of work does that involve?

Interviewee #8: Well, they want to do a case study, on a school that is having congestion problems. And we're recommending different schools that they can approach for that case study. And we're just feeding in a little bit of advice on how they might, you know, they organise library displays every year. And we provide a little bit of information on what should be in those displays. I'm also hoping that they will do a little bit of data collection so we can update some of the stats on walk to school day. They're involved in the national ride to school day. It is Bicycling WA that co-ordinate that, but it is bicycle network that provide a lot of resources, as in prizes and things like that. They still provide support.

CB: The walk to school day. Do you get directly involved in that?

Interviewee #8: In the planning stage.

CB: What sort of work does that involve?

Interviewee #8: Well, they want to do a case study, on a school that is having congestion problems. And we're recommending different schools that they can approach for that case

study. And we're just feeding in a little bit of advice on how they might, you know, they organise library displays every year. And we provide a little bit of information on what should be in those displays. I'm also hoping that they will do a little bit of data collection so we can update some of the stats on walk to school day. Just so we've got an accurate reflection of the figures of how many are walking to school. This year ride to school day, they asked everyone who had contributed in the program to conduct a hands up survey and submit those results after. So we have a lot of data there.

CB: It's interesting, such a simple exercise but if coordinated well it can provide great data.

Interviewee #8: Since I've been working here there is the walking unit and the bikewest unit...we sit in the same area anyway, but we're working with the infrastructure people on the connecting schools grant. Offering money for cycling infrastructure. To pay for cycling infrastructure. There's been a bit of interest in that. We work with the travel smart household area. Talking about the local government travel smart officers coming together. The household area, the workplace area. And we also collaborate on issues that are similar to each area. There's a new program called Your Move. Very new. And that comes out of a collaboration between the department of transport and the department of sport and recreation. And there's private sponsorship. So the main stakeholders and interested parties that we involve - within our travel smart to schools area, we deal with, or collaborate a lot with public transport authority, because they have an education wing. Because we're not just about walking and cycling but we're about promoting public transport. We've notice, particularly with the transition between primary school and high school that they're expected to catch a bus or a train, when they've gone straight from being driven in a car, and to catch a bus for the first time. So we promote the public transport program, they have a great program called get on board. Which is a program where they go into schools, it's a free program. Transperth will go into schools, teach the kids how to get a Smartrider card. And then they'll offer to help them with any type of school excursions. Another area is Nature Play. Have you heard of Nature Play?

CB: Yes I have.

[AT THIS POINT A GROUP OF PEOPLE SIT DOWN AT THE TABLE NEXT TO US AND IT BECOMES DIFFICULT TO HEAR THE CONVERSATION THROUGH THE RECORDING DEVICE]

Interviewee #8: We're in partnership with them. They have a passport. There are seven or eight missions on there that are. That might be worth having a look at. I can send you a list of missions if you like. We're also one of the Aussie alliance members. Aussies are the Australian alliance of sustainable schools. And there's the WA alliance. It's to do with sustainability and we look at the transport energy aspect. There's obviously DEC, who do Natureplay and education. If you look on the Aassie website. You'll find it there. Heart foundation, we work with them, they're great. Sedera is another one. It's the something drug education and road awareness. And it's very much focussed on safety.

CB: And through education programs I imagine.

Interviewee #8: Yes, through education. They have some school resources that I can't remember the name of. I'll have to send you the link. I think they're like class room activities and suggestions. Because their focus is safety, I think that is why we feel that with travel smart to school, it's not looked after but we don't want to double up unnecessarily. Therefore we have more of the positive behaviour change type of, you know, motivating type policies.

CB: It makes sense in terms of getting them to do a lot of the work, with limited resources. It's important.

Interviewee #8: Yeah. The beauty of having this blog is that with all these different connections we have with different agencies, we swap ideas and events and information. SO when sedera come to us or the Heart Foundation. We've got somewhere to put it instantly out there. SO they're already connected to it. It's a good system. Schools are the ones we see

most. We try to get out to see...some schools have a real strong Travel Smart culture and that's been going for 5 or 6 years and you want to keep them motivated with different ideas, and you know keep that going.

CB: So how does that aspect work? Going out to the schools and working with the teachers.

Interviewee #8: Sometimes its phone calls, sometimes it emails. We try to personalise, and not bulk emails all the time. Maybe once every semester. There are a couple of Belmont schools that are very active. The local government officer out there is very active. It's good to tee up a meeting where all the schools and the local government person is there.

CB: I'm just wondering whether it's up to the school to...if you have any schools that are not particularly active, do they get captured in the...

Interviewee #8: In the beginning we rely heavily on individual motivation. There has to be an issue that the school has identified. They can't just contact us because they want to get a heap of prizes. They need to show that... because you're not going to just....because of the behaviour change program we do get them, you know the school signs on and they get their programs and blog. It's only when they start acting on those suggestions that we then start to really work closely. It would be different if we had ten staff. You know prioritise that. People are the ones who really act. Our support is really different depending on the action of the school. If they have a real issue in terms of....let me think. If they need help on getting kids activated, then we'll work on that area. Or if it's a school that is really concerned about safety and wants to set up an active travel policy then we'll help them with that. It depends on what the issue is for schools. It's really hard to have a model. A one-size-fits-all. Department of Health has a healthy communities area that we work with as well. And obviously, the travel smart champions the parents and teachers and such. We have a bit to do with them.

CB: There are a large number of organisations.

Interviewee #8: As you can imagine there's a large number of people worried about children walking and cycling to school. Some people feel as though it is a way that people can influence the rest of the community. Yeah, the only other info I really have is that basically we're all about rewarding people. Expecting people to report what they're doing in exchange for the rewards.

CB: It's interesting to see the range of programs out there and approach and how these are targeting different aspects. It is a really complex issue and problem. And there are a range of people approaching it from different angles.

Interviewee #8: That's right. Some people have a real deficiency based model that they work from. But ours is different. We ask what does a school have, that they can work from, what kinds of amazing people are within the school already. What can we use for leverage. What kind of things can we do with a limited number of staff. This rewards system, the points system that has come in from January has just made our work so much easier, because we're getting great data, mostly behaviour change data. But schools are starting to support one another. There's a school out in Cockburn that joined up this year, and they did their initial survey and they found out that only 8% of children walked to school, and she was shocked and horrified. And that's what usually happens, the teachers can't believe the numbers. They think back in our day. So she blogged about that and she's been inundated by comments from other schools with all this support. So it has nothing to do with us, even though we are reading it. It's really good to see this whole community of schools coming together and supporting one another. That's been the loveliest and most unexpected things to come out of the system.

CB: That comment did stick out when I looked through the website.

Interviewee #8: And I don't know if you know this but the ride to school day this year, one of the schools that have been doing travel smart for a number of years. So it's fairly well embedded into their culture. They have a travel smart team. They have a walking day two

days a week. They, for ride to school day this year, celebrated the entire week, with classroom activities. So regular linked activities. They taught maths around ride to school day. Another one did art around ride to school. Another one did physical education. So some of these schools, because of the points system, because of the blogging system they end up sharing these ideas and there's a wealth of information.

CB: I'll have to have a closer look.

Interviewee #8: We do put feature blogs on there. So click on the feature blogs. There's a little list. Have a look at those. We try to pull up the ones that... There are some creative ideas that came out of our end of year event. At the end of each year we have an event with the teachers, a professional development day. So last year XXXXXXX came along. She wrote the book XXXXXXX. This great. It wasn't supposed to be a travel smart book, but it encourages children to focus on what they see during the trip to school, what they hear, what they smell and what they touch. And to really look at their trip to school. She did a workshop and we developed lesson plans. Taking it away from its good for the environment, and make it into what's good for me.

I've been asked to compile a simple audit tool; just a paper tool. So that some of our student teams could use. And not just the walk to school but the facilities at school – cycling and end of trip facilities. I think I'll put one together but I don't know how useful it is. I suppose they're like any of these travel smart activities we have. One of the things that I was going to do for the travel smart program which is similar to the Heart Foundation walkability audit is to have a letter to the local government that is with the audit. So to have for schools a letter about end of trip facilities; but have for the street network a letter for the local government.

END OF THE INTERVIEW.

Appendix C-2: Audit Findings

General Information											
	Route 1	Route 2a	Route 2b	Route 3	Route 4a	Route 4b	Route 5	Route 6	Route 7	Route 8	Route 9
Date Conducted	5-Mar-13	5-Mar-13	5-Mar-13	1-Mar-13	1-Mar-13	1-Mar-13	31-Jan-13	19-Feb-13	19-Feb-13	12-Feb-13	6-Feb-13
Time Conducted	11am	11.30am	12pm	2.30pm	3pm	3.30pm	11am	10am	9.30am	11am	10.30am
Land Uses											
Commercial	No	Yes	Yes	No	No	No	No	Yes	No	Yes	Yes
Residential	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industrial	No	Yes	No	No	No	No	No	No	No	No	No
School Site	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Other			Park	Park and Playground	Park and Playground		Park and Playground				Church
Weather Conditions	Fine and Overcast	Fine and Overcast	Fine and Overcast	Fine and Sunny	Fine and Sunny	Fine and Sunny	Fine and Sunny	Fine and Sunny	Fine and Sunny	Very Hot	Fine and Sunny

	Route 1	Route 2a	Route 2b	Route 3	Route 4a	Route 4b	Route 5	Route 6	Route 7	Route 8	Route 9
General Comments	The main feature noted is the lack of pedestrian path along two segments	Main road, however good pedestrian infrastructure	Main road, however good pedestrian infrastructure	There are two segments along this route that do not have any pedestrian paths	The first part of this route is characterised by lower standard of housing stock	There is a moderate hill along this route	The route is of good quality, however several linking street segments do not have any pedestrian infrastructure	The route is of good quality, however several linking street segments do not have any pedestrian infrastructure	The route is generally of good quality, although one link has no path. There are rubbish bins all over the pedestrian path on this particular day.	The primary pedestrian link along this route is of good quality. However there is another link which is of poor quality with no pedestrian paths and many barriers.	This route is overall of good quality. There is a construction site midway along the route and the pedestrian pathway is damaged and would be difficult to navigate for people in wheelchairs or with prams.

Pathways

	Route 1	Route 2a	Route 2b	Route 3	Route 4a	Route 4b	Route 5	Route 6	Route 7	Route 8	Route 9
Is a path present?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>Pedestrian Path</i>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>Pedestrian Path Near Property Boundary</i>	No	Yes	No	No	No	No	Yes	Yes	No	Yes	Yes
<i>Pedestrian Path near kerb</i>	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
<i>Shared Use Path</i>	No	No	No	No	No	No	No	No	No	No	No
<i>Separate Path</i>	No	Yes	Yes	No	No	No	No	Yes	No	No	No
<i>Unpaved Path</i>	No	No	No	No	No	No	No	No	No	No	No
<i>No Facility</i>	Yes	No	No	Yes	No	No	No	No	Yes	Yes	No
Is the Path Provided on Both Sides of the Street	No	Yes	Yes	No	No	No	No	Yes	No	Yes	Yes
Is the path suitable for pedestrian/cyclist volumes and types of user?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Route 1	Route 2a	Route 2b	Route 3	Route 4a	Route 4b	Route 5	Route 6	Route 7	Route 8	Route 9
Average Width of Path	1.9	1.9	1.9	1.8	1.6	2	2.1	1.8	2	1.3	1.35
Is the path wide enough for pedestrians/cyclists?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

	Route 1	Route 2a	Route 2b	Route 3	Route 4a	Route 4b	Route 5	Route 6	Route 7	Route 8	Route 9
Are there any hazards or maintenance issues?	No	No	No	No	No	No	Yes	Yes	No	No	Yes
What is the issue?	-	-	-	-	-	-	Uneven metal grates	Obstructing Branches	-	-	Debris and sand and missing path section
Are there any design issues?	No	No	No	No	No	No	No	No	No	No	Yes
What is the issue?	-	-	-	-	-	-	-	-	-	-	Inconsistent Path Widths
Is the head room of the path sufficient?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
Are there any permanent obstructions?	Route 1	Route 2a	Route 2b	Route 3	Route 4a	Route 4b	Route 5	Route 6	Route 7	Route 8	Route 9
Permanent obstructions	No	No	No	No	No	No	No	No	No	Yes	Yes
Are there any temporary obstructions?	Yes	No	No	No	No	Yes	No	Yes	Yes	Yes	No
Temporary Obstructions	Parked Cars	-	-	-	-	Parked Cars	-	Parked Cars	There were many bins that were blocking the paths. Some bins were upturned forming a total barrier across the path.	Parked Cars	

	Route 1	Route 2a	Route 2b	Route 3	Route 4a	Route 4b	Route 5	Route 6	Route 7	Route 8	Route 9
The minimum effective path width at the point of obstruction is x metres	0	No Obstruction	No Obstruction	No Obstruction	No Obstruction	0.3	No Obstruction	1	0	0	0.6
Is the effective path width suitable for pedestrian movement?	No	-	-	-	-	No	-	Yes	No	No	Yes
Is the path continuous?	Route 1 No	Route 2a Yes	Route 2b Yes	Route 3 No	Route 4a Yes	Route 4b Yes	Route 5 Yes	Route 6 Yes	Route 7 No	Route 8 No	Route 9 No
Is the path connected to form a network?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes
Is the path connected to destinations along the way?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
What destinations?	School; Park	Bus Stop; Shops; Industrial Area	School; Bus Stop; Shops; Park	School; Park	School; Bus Stop	School; Bus Stop	School; Park; Bus Stop	School; Shops; Bus Stop; Childcare	School	School; Park	School; Park; Church

Road Crossings

	Route 1	Route 2a	Route 2b	Route 3	Route 4a	Route 4b	Route 5	Route 6	Route 7	Route 8	Route 9
What type of crossing is present?	Median Island; Pedestrian Signal with Pushbutton	Median Island; Pedestrian Signal with Pushbutton	Median Island; Pedestrian Signal with Pushbutton	Median Island; School Crossing	Median Island; Overpass; School Crossing	Median Island; Overpass; School Crossing	Median Island; Speed bump at the Pedestrian Crossing	Median Island; School Crossing	No Facility	Median Island	Median Island
How many lanes are there to cross?	4	4	4	2	4	4	2	2	2	2	2
Is the crossing suitable for the type/volume of users?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Don't Know	Yes	Yes
At the signalised crossing is there enough time to cross? Is the waiting time short enough to discourage people from ignoring the signals?	Route 1	Route 2a	Route 2b	Route 3 N/A	Route 4a N/A	Route 4b N/A	Route 5 N/A	Route 6 N/A	Route 7 N/A	Route 8 N/A	Route 9 N/A
Allows x seconds to cross				N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Took x seconds waiting time before signal phase began				N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
At the unsignalised crossings do the gaps in traffic allow pedestrians to cross?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

	Route 1	Route 2a	Route 2b	Route 3	Route 4a	Route 4b	Route 5	Route 6	Route 7	Route 8	Route 9
Are there any hazards at the crossings?	No	No	No	No	No	No	No	No	No	No	No
Are there any design issues at the crossings?	No	No	No	No	No	No	No	No	No	No	No
Is the waiting area sufficient to accommodate the expected pedestrian volumes?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Is the crossing sufficiently well marked, wide enough, at a logical location and clearly visible?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Are the kerb ramps and waiting areas lined up with the crossing, median and refuge areas?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Are kerb ramps provided at the kerb, median and refuge areas to accommodate wheelchairs and prams?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Is the slope from the path to the road safe, smooth and comfortable to use?	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Yes	Yes
Are waiting areas level with sufficient maneuvering space to accommodate wheel chairs and all users?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

	Route 1	Route 2a	Route 2b	Route 3	Route 4a	Route 4b	Route 5	Route 6	Route 7	Route 8	Route 9
Can vision impaired pedestrians identify the crossing via tactile surfaces provided?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No
Do pedestrian signals have audio-tactile devices for vision impaired pedestrians?	Yes	Yes	Yes	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Can children and people in wheelchairs reach the pushbuttons of signalised crossings?	Yes	Yes	Yes	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Street Furniture and signage

	Route 1	Route 2a	Route 2b	Route 3	Route 4a	Route 4b	Route 5	Route 6	Route 7	Route 8	Route 9
What type of street furniture is present along the route?	None	None	None	None	None	None	Benches; low walls to sit on; rubbish bins; public restrooms	Benches ; Rubish Bins	None	None	Low walls to sit on; Rubbish Bins
Is the street furniture in good condition?	N/A	N/A	N/A	N/A	N/A	N/A	Yes	Yes	N/A	N/A	Yes
Is shade provided by trees or structures?	No	No	Yes	No	No	No	Yes	Yes	Yes	Yes	Yes
Is shade provided at resting areas or where there is street furniture?	No	No	No	No	No	No	Yes	No	No	No	Yes
Is signage provided to guide and direct pedestrians to the key destinations in the area?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes
Are street names clearly visible to pedestrians?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Are pedestrian routes/crossings clearly visible to motorists via warning signs and pavement markings?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Are pedestrian routes/crossings clearly visible to pedestrians by markings and signs?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Route 1	Route 2a	Route 2b	Route 3	Route 4a	Route 4b	Route 5	Route 6	Route 7	Route 8	Route 9
Is the type of path clearly marked as a shared path, pedestrian only path etc?	No	Yes	Yes	No	No	No	No	Yes	No	No	No
Are signage and pavement markings in good condition?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Personal Safety

	Route 1	Route 2a	Route 2b	Route 3	Route 4a	Route 4b	Route 5	Route 6	Route 7	Route 8	Route 9
Do you feel safe walking on this route section during the day?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Is the path visible from adjacent land uses and activities during the day?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Are there enough people around to make you feel safe during the day?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Do you / would you feel safe walking on this route section during the night?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Is the path visible from adjacent land uses and activities during the night?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Are there / would there be enough people around to make you feel safe during the night?	No	No	No	No	No	No	No	No	No	No	No
Is there good lighting in the area during the night?	No	Yes	Yes	No	No	Yes	Yes	Yes	No	Yes	Yes

Adjacent Traffic

	Route 1	Route 2a	Route 2b	Route 3	Route 4a	Route 4b	Route 5	Route 6	Route 7	Route 8	Route 9
Is the motorised traffic speed or volume satisfactory for pedestrian safety and amenity?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Are there any traffic calming devices?	School zone;	School zone	School zone	School zone; speed humps	School zone	School zone	School zone; Chicanes ; Projecting kerbs	School zone	School zone	School zone; Roundabouts	School zone; Speed hump; Projecting Kerbs
Is separation provided between motorists and pedestrians?	No	Yes-Verge	Yes-Verge	No	No	No	Yes-Separation is only in some sections	Yes-Verge	No	Yes-Verge	Yes-Verge
Is the path used by other traffic?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Is the path well designed for this purpose with no resulting hazards and conflicts?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Are drivers aware of the presence of pedestrians?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Do drivers give way to pedestrians at e.g. zebras, driveways, loading docks and when turning left?	Don't Know	Don't Know	Don't Know	No	No	No	Don't Know	No	No	No	No
Is oncoming traffic clearly visible to pedestrians (no obstructions blocking sight lines) at crossings?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

	Route 1	Route 2a	Route 2b	Route 3	Route 4a	Route 4b	Route 5	Route 6	Route 7	Route 8	Route 9
Can children and people in wheelchairs clearly see approaching vehicles?	Don't Know	Don't Know	Don't Know	Don't Know	Don't Know	Don't Know	Don't Know	Don't Know	Don't Know	Don't Know	Don't Know
Is the driver's sight distance to the pedestrian crossing adequate with the drivers line of sight uninterrupted?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Are all types of pedestrians, including children and people in wheelchairs, visible to approaching vehicles?	Don't Know	Don't Know	Don't Know	Don't Know	Don't Know	Don't Know	Don't Know	Don't Know	Don't Know	Don't Know	Don't Know
Does the footpath continue uninterrupted through driveway crossovers?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No

Aesthetics and amenities

	Route 1	Route 2a	Route 2b	Route 3	Route 4a	Route 4b	Route 5	Route 6	Route 7	Route 8	Route 9
Is the route section: attractive and pleasant to walk around?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Is the route section: clear of litter, dumped rubbish, discarded items and graffiti?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Is the route section: clear of air pollution (e.g. diesel fumes and factory emissions)?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Is the route section: clear of noise pollution (e.g. construction, factories and traffic)?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Appendix C-3: Photo-collage content and thematic analysis

CONTENT ANALYSIS					THEMATIC ANALYSIS			
Codes: Objects and agents	TOTAL	HATE	LOVE	PERFECT	Code	N=	Theme	n=
Climbing a tree	3	0	1	2	Play	28	Playing in parks	20
Collecting	1	0	1	0	Having fun		Playing in the backyard	3
Crossing the road	8	2	3	3			Playing at school	3
Driving in a car	7	2	4	1			Playing in the street	1
Having fun	1	0	0	1			Independence	1
Journey to school	8	2	3	3				
Mapping	2	1	0	1	Sports	22	Sporting grounds- courts, ovals	15
Music	3	0	2	1	Practice sports		Sport's centre	3
Parking	4	3	1	0			Playing team sports	3
Physical activity	2	0	1	1			Backyard	1
Play	28	3	14	11			Sport is boring	1
Practice sports	3	0	1	2				
Resting / relaxing	4	0	4	0	Taking a photograph from the car	16	"I love shops"	6
Riding a bike	5	0	3	2	Driving in a car		"I hate traffic"	5
Riding a scooter	2	0	1	1			Neighbourhood/ place to walk	3
Shopping	8	0	4	4			Journey to school	2
Sitting	2	1	1	0				
Skating	7	1	1	5	Crossing the road	8	Better road crossings	8
Socialising	4	0	2	2			Crossing guards	5
Sports	25	4	14	7			Zebra crossing, lights or bridges	3
Swimming	6	0	3	3				
Taking photograph from a car	10	4	3	3	Walking	28	"I like places"	14
Walking	9	4	2	3	Riding a bike		Preference for appropriate infrastructure	7
Walking the dog	9	2	4	3	Journey to school		Being with friends and family	4
					Riding a scooter		"I hate places"	2
					Walking the dog		Fun, challenging routes	2
							Barriers to access	2

CONTENT ANALYSIS					THEMATIC ANALYSIS			
Codes: Objects and agents	TOTAL	HATE	LOVE	PERFECT	Code	N=	Theme	n=
BBQ	1	0	0	1	Car	26	Love of the car/ association with far	7
Bike	2	0	1	1	Traffic		Hate traffic	8
Bin	6	5	1	0	Traffic calming		Love safe roads to walk and play	8
Buildings	1	1	0	0	Traffic lights		Love traffic calming	2
Bully	1	1	0	0	Zebra crossing		Hate traffic calming	1
Car	16	8	5	3	Crossing guard			
Community	2	0	2	0	Footbridge			
Computer	1	0	1	0				
Crossing guard	5	1	3	1	Other children	25	Love being with friends- school	3
Dogs	7	2	3	2	Friends		Love being with friends- parks, play	4
Family	12	3	8	1			Love being with friends- sport	2
Flower	2	0	1	1			Love being with friends- streets, wa	3
Footbridge	2	1	1	0			Friends houses	2
Friends	14	0	12	2			Individual friends	8
Gaming and computers	2	0	0	2			Don't like older kids, bullies- street	3
Graffiti	2	1	0	1				
Hoons	1	1	0	0	Pets	15	My home and backyard	10
Letterbox	1	0	1	0	Dogs		Parks	4
Mobile phone/ Ipods	1	0	1	0			Streets	1
Neighbours	2	0	0	2			Farmers' markets	1
Netball ring	1	0	0	1				
Other children	15	4	6	5				
Other people	3	2	0	1				
Pets	9	0	5	4				
Powerlines and poles	2	2	0	0				
Rocks	2	0	1	1				
Rubbish	5	5	0	0				
Sculpture	1	0	0	1				
Seat	5	1	3	1				
Sign	5	2	1	2				
Sporting equipment	3	0	1	2				
Street light	1	0	0	1				
Swing	1	0	0	1				
Teacher	1	0	1	0				
Traffic	7	6	1	0				
Traffic calming	2	0	1	1				
Traffic lights	3	1	1	1				
Trampoline	3	0	1	2				
Trees	16	1	5	10				
Vegetation	7	1	1	5				
Wildlife	10	2	4	4				
Zebra crossing	1	0	0	1				

CONTENT ANALYSIS					THEMATIC ANALYSIS			
Codes: Place	TOTAL	HATE	LOVE	PERFECT	Code	N=	Theme	n=
Abstract place	1	1	0	0	Park or reserve	69	"I love parks"- specific park	27
Alley way	4	1	1	2	Specific Parks		"I love parks"- general	20
Backyard	13	0	6	7	Playgrounds		Preference for better parks, more facilities	8
Beach	1	0	0	1	Ponds and lakes		"I love parks"- nature, restoration	6
Bicton Bath	1	0	1	0	Bush area		Preference for clean parks	5
Bus stop	2	1	0	1			"I love parks"- space, things to do	5
Bush area	5	1	3	1			Hate people in the park	1
Car park	5	5	0	0	Road Crossing	12	Safe, designated crossings	12
Club	2	0	1	1	Backyard	14	A place to play and be physically active	9
Cul de sac	4	0	2	2	Frontyard		"I love my garden"	4
Drain	1	1	0	0			A place to keep pets	1
Farmers or carpark markets	4	0	3	1			A place to rest and relax	1
Fast food restaurant	3	1	0	2	"My street"	50	"I love my street"	14
Footpath	15	7	4	4	Streetscape		Preference for infrastructure	13
Friend's house	4	0	2	2	Footpath		Preference for safety- traffic	10
Frontyard	3	0	2	1	Alleyway		A place to play, be active, be mobile	8
Gaming centre	3	0	0	3	Cul-de-sac		Preference for comfort, shade etc	6
Gardens	7	0	4	3	School	28	"I hate school"	8
Home	30	5	15	10	School grounds		"I love school"	5
House	13	4	4	5			Being with friends	5
K Park	26	0	17	9			Activities at school- play, learning, sports	6
Lakes and ponds	7	2	1	4			Preference for active mobility to and from school	2
Landmarks	1	0	1	0	Shops	19	"I love shops"	14
Library	5	0	5	0	Shopping centre		"I hate shops"	3
Movies	1	0	1	0			The shops are too far away	1
"My street"	23	4	8	11	Sporting grounds	32	"I love places to play sports and be active"	27
Neighbourhood	5	1	2	2	Recreation centre		"I love sports"	5
Olding Park	4	0	3	1	Public swimming pool		"I hate sports"	1
Park or reserve	50	12	17	21	Friend's house	4	"I love my friend's house"	3
Petrol station	2	1	1	0			"I wish my friend's house was closer"	2
Playground	24	3	11	10				
Public swimming pools	4	0	3	1				
Recreation centre	10	0	6	4				
Restaurant	1	0	1	0				
River foreshore	5	0	4	1				
Road crossing	12	4	5	3				
Roundabouts	3	3	0	0				
School	24	10	11	3				
School grounds	12	1	9	2				
Service	2	1	0	1				
Shopping centre	3	1	0	2				
Shops	19	5	7	7				
Skate park	9	1	2	6				
Sporting grounds	29	4	15	10				
Streetscape	33	13	8	12				
Swimming pool	5	0	2	3				
The Duck Pond	6	0	0	6				
Town centre	1	0	0	1				
Tree	4	0	2	2				
Utilities	1	1	0	0				
Willagee	1	1	0	0				

CONTENT ANALYSIS					THEMATIC ANALYSIS			
Codes: Thoughts and Feelings	TOTAL	HATE	LOVE	PERFECT	Code	N=	Theme	n=
Abandoned	1	1	0	0	Proximity	17	Preference to be near parks, natural spaces and playgrounds	12
Aesthetics	5	1	2	2			Preference to be near school	3
Alone: "Not enough people"	1	1	0	1			Preference to be near friend's house	2
Awesome	4	0	3	1				
Boring	1	1	0	0	Safety	10	Values safe streets	7
Busy Roads	6	5	0	1			Values crossing the road safely	1
Clean	2	0	1	1			Values safe places	2
Creepy	2	2	0	0				
Difficult	2	2	0	0	No facilities	13	Preference for more accessible routes	9
Dirty	6	6	0	0	More facilities		Preference for better quality parks	4
"I don't hate anything!"	5	5	0	0				
Expansive Scale	7	3	0	4	Busy Roads	6	"I hate roundabouts"	2
Friendly	1	1	0	0			Dislike of traffic in general	3
Fun	6	0	4	2			Better traffic management	1
Inconvenience	2	2	0	0				
Independence	1	0	0	1	Expansive scale	7	Values big parks	5
More facilities	5	2	1	2			Dislike of urban infrastructure- housing, powerpoles	2
"Needs to be better"	5	4	0	1				
Nice	2	1	0	1	"Fun!"	6	Places to have fun- parks	3
No Change	1	0	0	1			Places to have fun- recreation centres	2
No facilities	8	7	0	1			Places to have fun- streets	1
Noisy	1	1	0	0				
Peaceful	4	0	3	1	Dirty	8	Dislike of dirty bins	3
Possibility	1	0	0	1	Clean		Dislike of dirty parks	5
Proximity	17	2	7	8				
Relaxing	1	0	1	0	Aesthetics	5	Values clean, natural spaces	4
Safety	10	3	4	3			Quirky furniture	1
Scared	3	3	0	0				
Spiritual	3	0	2	1				
Urban/rural	1	0	0	1				

Appendix C-4: Newspaper content and thematic analysis

Local Newspaper Analysis - Agent							
Content Analysis			Thematic Analysis				
			Theme	Code	N=	Sub-Themes (n)	n=
Agent							
Children	32		Children		32	Crossings	7
School	24					School zone	10
Local Government	18					Programs	10
Traffic	16					Children and criminal activ	2
Traffic warden	14					Children and parks	2
State Government Agency	14					Walking safety	1
Police	14						
Pedestrian	8		School		24	Crossing and traffic warden	8
Parents	7					Schools forming a coalition	2
Politician	6					Active travel programs	6
Principal	3					School zone	7
Heart Foundation	3						
School board member	2						
Main Roads	2						
Mayor	1						
Bins	1						

Local Newspaper Analysis - Activity						
Content Analysis			Thematic Analysis			
			Theme		Sub-Themes (n)	n=
Activity						
Walking	27		Walking		Walk to school programs	11
Crossing the road	15				Safety around schools	9
Cycling	10				Road crossings	6
Parking	6				Barriers along pathways	2
Play	2				Stranger danger	1
Public transport	2				Community building	1
			Crossing the road		Problem stemming from congestion	1
					Specific incident or place	7
					Dispute over management of traffic crossings	7

Local Newspaper Analysis - Place						
Content Analysis		Thematic Analysis				
Place		Code	N=	Sub-Themes (n)	n=	
Road Crossing	17	Road Crossing	17	Unsafe road crossing- specific	10	
School Zone	14			State Government reform of crossings	6	
Footpath	6			Fragmented governance of crossing	5	
Park	6			Call for volunteers	4	
Shared Use paths	3					
Neighbourhood related	2	School Zone	12	Traffic speed	10	
Playground	2			Congestion/ parking	4	
Shops	2			Police	4	
Pedestrian Accessway	1			Children as safety program managers	1	
		Footpath	6	Supply of infrastructure- new footpaths	3	
				Parked cars as barriers	1	
				Rubbish bins as barriers	1	
				Conflict- pedestrian and cyclists	1	
		Park	6	The opening of a new park	5	
				Children's activities at parks	3	
				Crime and parks- specific event	1	
				Community protest against a park clos	1	

Local Newspaper Analysis - Problem Framing						
Content Analysis		Thematic Analysis				
Problem Framing		Theme	Code	N=	Sub-Themes (n)	n=
Road Safety	29	Road safety	Road safety	29	Road crossings	17
Congestion	11				Speed Limits	12
Health Promotion	10				Congestion	8
Equity	6				Walk safely to school	5
Consolidation	5				Vehicle accidents	5
Independent Mobility	5				Cyclists	2
Access	4				Barriers alongs footpaths	2
stranger danger	4					
Crime	3	Children's wellbeing	Health	17	Walk to school safely	8
Funding/Resources	2		Access		Infrastructure- improve access	4
School Expansion	2		Independent mobility		State government program	3
Prevention	1				Education- children's mobility skills	3

Local Newspaper Analysis - Programs						
Content Analysis		Thematic Analysis				
Program		Theme	Code	Sub-Themes (n)	n=	
Speed Limit	12	Traffic	Speed limit	Campaign for lower speeds	4	
Traffic Lights	7		Traffic lights	Barriers to walking	1	
Walk Safely to School	7		Traffic count	Unsafe crossing	6	
Collaboration	3			Promotion of a program/initiative	2	
Travelsmart	3			Police targetting speeding in the school z	5	
Black Spot Funding	2					
Incentives	2	School p	Walk Safely to Sch	Program linked to wellbeing	11	
student to vehicle ratio	2		Travelsmart	Program linked to congestion relief	2	
Walking School Bus	2		Incentives			
Media campaign	1		Walking school bus			
Teacher resource	1		Media campaign			
Traffic Count	1		Teacher resource			

Appendix C-5: Categories for meta-analysis of audits

The meta-analysis focussed on a number of key categories.

- *Items*: Items reflect the built environment conceptual categories associated with walking or cycling. These categories provide an organising schema for various built environment variables. Common items associated with active mobility were discussed in Chapter Two and include: safety; aesthetics; path connectivity; and land-use diversity.
- *Evaluation*: Evaluation refers to the means of measuring the variable or items. Evaluation methods can include simple dichotomous responses (yes/no) that indicate the presence or absences of features; numerical scale ratings (a score from 0 to 5); or Likert scale measures that indicate degrees of quality of features.
- *Rating / output*: The rating or output of the audits refers to the final outcome of the audit process. This could be an overall rating, or score, of the walkability of the area or route. Alternatively, it could be a detailed report that, rather than reducing the quality of the area or route to a single value, highlights a range of relevant issues.
- *Unit of analysis*: The unit of analysis indicates the individual unit selected to be analysed; whether a defined area; a complete route; or a single segment of a route.
- *Supporting information*: This indicates whether any supplementary guidelines or additional information were provided in the audits to assist with the evaluation process.
- *Different groups included*: This makes note of any direct reference the audit makes to groups who have particular mobility characteristics, such as children, the elderly, or disabled; or alternatively, any evaluation of the built environment that accommodates different groups of users, such as the length of time provided at signalised crossings (for example, an assumption that people move at different speeds).
- *Intended use*: Included in this category is any information relating to the intended users identified by the audit.