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# Children's Neighbourhood Geographies: Examining Children's Perception and Use of Their Neighbourhood Environments for Healthy Activity

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Graduate Program in Geography  
A thesis submitted in partial fulfillment of the requirements for the degree in Doctor of Philosophy  
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CHILDREN'S NEIGHBOURHOOD GEOGRAPHIES:  
EXAMINING CHILDREN'S PERCEPTION AND USE OF THEIR  
NEIGHBOURHOOD ENVIRONMENTS FOR HEALTHY ACTIVITY

by

Janet Elizabeth Loebach

Graduate Program in Geography

A thesis submitted in partial fulfillment  
of the requirements for the degree of  
Doctor of Philosophy

The School of Graduate and Postdoctoral Studies  
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London, Ontario, Canada

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## Abstract

This dissertation examines children's everyday neighbourhood activities, and the role of the local environment in supporting or limiting their healthy behaviours. Research from the last two decades has documented a dramatic decline in the time children spend playing in their neighbourhood settings, and engaging in local active and independent travel. Traditionally, neighbourhood-based activities have fostered key developmental and health outcomes, including higher levels of physical fitness, the negotiation of new social relationships, and increased cognitive and environmental competence. The processes of carving out neighbourhood 'domains' for independent activity and establishing community relationships are also linked to the development of a healthy self-identity and attachment to place. The loss of neighbourhood experiences may therefore have adverse consequences for children's health and well-being.

This study identifies and investigates patterns in children's (aged 7 to 13 years) environmental perception, activity and mobility in various neighbourhoods within the mid-sized Canadian city of London, Ontario. Children's local activities are examined through three complementary case studies utilizing a broad range of experiential, visual and qualitative tools, coupled with objective activity monitoring via portable GPS. Patterns in perception and behaviour were evident, but findings reinforce that children's neighbourhood activities are highly individual and complex. Children were attuned to locally available activity opportunities, but neighbourhood engagements were generally limited and largely passive in nature. Recreational and commercial sites were identified as highly prized local destinations, but study neighbourhoods did not fully support the children's diverse preferences. Many of the criteria of 'child-friendly' environments were lacking in study neighbourhoods.

Findings also confirm that neighbourhood activity and mobility is influenced not only by individual characteristics such as a child's age, but by neighbourhood social and physical conditions, as well as parent perceptions of this environment. Permission from parents for active, independent travel strongly predicted neighbourhood activity, generally

expanding the size of a child's domain and the time spent in local settings. On the whole, however, children spent little of their free time in neighbourhood environments; pedestrian-based domains were generally very small, comprised primarily of the area immediately surrounding their home. This research provides additional evidence that the local domains of children are shrinking, and that the neighbourhood is no longer a primary setting for childhood activities. These findings suggest that the primary landscapes of play are changing in ways that may be detrimental to children's healthy development.

## Keywords

Children, neighbourhoods, domains, activity spaces, child-friendly environments, children's geographies, affordances, independent mobility, GPS, qualitative GIS, child-friendly methods

## Co-Authorship Statement

Each of the manuscripts contained within this dissertation have been published in or submitted for publication in peer-reviewed journals. Chapters 4 to 6 have all been written by Janet Loebach with Dr. Jason Gilliland as co-author. In each manuscript, Janet Loebach was the principal author and performed all research data collection and analysis. Dr. Jason Gilliland was involved in the development of the methodological and analytical protocols utilized in each of the three studies. Below is a list of the journal destinations for each of the manuscripts.

**Chapter 4:** Loebach, J. and Gilliland, J. (2010). “Child-Led Tours to Uncover Children’s Perceptions and Use of Neighbourhood Environments”. *Children, Youth and Environments* 20(1): 52-90.

**Chapter 5:** Loebach, J. and Gilliland, J. “Free range kids? Using GPS-derived domains to examine children’s independent neighbourhood mobility and activity”. Submitted to *Environment & Behavior*.

**Chapter 6:** Loebach, J. and Gilliland, J. “Linking play and place: An affordance-based approach using qualitative GIS to examine patterns in children’s neighbourhood activity preferences and use”. Prepared for *Children’s Geographies*.

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# Chapter 1

## 1 Introduction

### 1.1 Research context

Human geographers and environmental psychologists have been investigating the role of place and the built environment in the behaviour and well-being of children for over three decades, but recent concerns over children's health issues, particularly the childhood obesity epidemic, has pushed the built environment to the forefront of many academic, public and political agendas. Researchers from a number of fields, including epidemiology, public health, urban and transportation planning, have now joined the ranks of academics studying the reciprocal relationship between the environment and children's healthy activities, in an effort to understand, and hopefully reverse, increasing levels of obesity among children. This shift in research and policy focus has, in a very short span of time, produced a large body of work with particular focus on the role of the built environment in facilitating or limiting children's physical activity.

Although physical activity represents only one component of a child's healthy behaviour, the interest in exploring the link between the built environment and an active lifestyle has helped to mobilize research around children's healthy environments in general, and to ignite widespread interest in exploring this relationship. Specifically, increasing recognition that children's everyday environments play a role in their health and well-being has provided the impetus for delving deeper into the spatial context of children's activities, and for exploring more directly the lived experience of children in their local environments (Cummins et al. 2007; Gilliland et al. 2006; McMillan 2005; Srinivasan, O'Fallon, and Dearry 2003; Dannenberg et al. 2003; Morrow 2001; Sallis, Prochaska, and Taylor 2000; Spencer and Woolley 2000; Matthews, Limb, and Percy-Smith 1998).

Attention has recently been directed to neighbourhood settings in particular, and the impact of community conditions on children's health and behaviour (e.g., Beauvais and Jenson 2003; Carpiano 2009; Weden, Carpiano, and Robert 2008; Cummins et al. 2007;

Christensen and O'Brien 2003; Spilsbury, Korbin, and Coulton 2009; Wridt 2010; Leventhal and Brooks-Gunn 2000). A growing body of research suggests that there is a 'neighbourhood effect' influencing children's health and development over and above individual- or family-level characteristics (Leventhal & Brooks-Gunn, 2000, 2003). Aggregate neighbourhood conditions, such as socioeconomic status, social cohesion, residential stability, and quality of resources, are being linked to a range of child health and behaviour outcomes including obesity, asthma and academic outcomes (Jencks & Mayer, 1990; Juhn et al., 2005; Leventhal & Brooks-Gunn, 2000; McWayne, McDermott, Fantuzzo, & Culhane, 2007).

Environment-behaviour research has also highlighted the role of the neighbourhood as a critical childhood environment that helps foster the development of key skills and competencies (e.g., Hart 1979; Berg and Medrich 1980; Moore 1986; Chawla and UNESCO 2002; Clark and Uzzell 2002; Churchman 2003; Cosco and Moore 2002; Wohlwill and Heft 1987; Werner and Altman 1998; Rissotto and Giuliani 2006; Jack 2008; Holt et al. 2008; Rasmussen and Smidt 2003). Traditionally, the neighbourhood has served as the first setting beyond the home that children begin to independently explore, learning to negotiate the challenges of new physical environments as well as building social relationships beyond their family (Chawla, 2002a; Clark & Uzzell, 2002; Hart, 1979; Kytta, 2003; Matthews, 1987, 1992; Moore, 1986b; Rissotto & Giuliani, 2006). These neighbourhood interactions and the skills and learning they engender are considered key contributors to children's continued healthy development (Churchman, 2003; Gleave & Cole-Hamilton, 2012; Gray, 2011; Rissotto & Tonucci, 2002; Tranter & Pawson, 2001).

There is also evidence, however, to suggest that the relationship between Western children and their neighbourhood environments has fundamentally altered during the last several decades. Changes in the physical and socio-cultural environment of home neighbourhoods, coupled with dramatic reductions in the time and license children have to access local environments, may mean the neighbourhood no longer serves as the supportive setting for children's activities that it once did (Karsten, 2005; Mackett, Brown, Gong, Kitazawa, & Paskins, 2005; C. G. Pooley, Turnbull, & Adams, 2005;

Shaw et al., 2012; Spilsbury, 2005). Understanding the child-neighbourhood relationship, and the specific pathways through which neighbourhood characteristics affect children's health or behaviour, has been complicated by the highly intertwined nature of individual- and neighbourhood-level factors (Leventhal & Brooks-Gunn, 2000). We have yet to reach a critical mass in neighbourhood-based, environment-behaviour research that would help to untangle any causal relationships; work to date has generally been scarce, and largely cross-sectional in nature. As well, few methodological tools were available, until recently, which allowed for a closer and more objective look at children's environmental behaviour on a larger scale. A body of knowledge is slowly developing, but we still know very little about the contemporary nature of the relationship between the neighbourhood social and built environment and Western children's associated neighbourhood perceptions and behaviours (McMillan 2005; Clark and Uzzell 2002). Given the potential of the local neighbourhood for fostering interactions key to children's healthy development and well-being, it is imperative that we better understand the character of children's neighbourhood behaviour and geographies.

This dissertation opens a window into contemporary Canadian children's everyday experience of their neighbourhood environments, providing insights which help to recognize the role of space and place in children's healthy activity. Findings from this work also emphasize the need to establish a socio-political culture that prioritizes the health and rights of children.

## **1.2 Research objectives**

It is the general objective of this dissertation to examine children's everyday neighbourhood activities and experiences, and the role of the local environment in supporting or limiting these behaviours. This dissertation also identifies and investigates both individual and neighbourhood-level patterns in neighbourhood perception, activity and mobility. Additionally, this research examines the degree to which the study neighbourhoods are experienced by local children as 'child-friendly'.

This dissertation also aimed to make a methodological contribution by evaluating the efficacy of a range of tools for uncovering children's lived experience in their

neighbourhood environments. My focus will be on those tools and methodologies that more directly measure children's behaviour as well as those that effectively and ethically solicit the child's unique perspective. I have particular interest in evaluating methods that are child-guided, both for the way these approaches may help to counteract the typical imbalanced power relationship between an adult researcher and a child 'subject', as well as how they help to illustrate children's capacity to meaningfully contribute to environmental research and planning. Another goal was to investigate the value of simultaneously using multiple, diverse tools to elicit a 'truer', more nuanced picture of children's environmental experience and preferences.

Specifically, through several distinct studies, this dissertation aims to:

1. Clarify our understanding of the contemporary child-neighbourhood relationship, and the factors which influence children's neighbourhood perceptions, activities and mobility; and
2. Evaluate how well the methods and tools, both individually and collectively, help to uncover the nature of children's neighbourhood geographies, and the degree to which they are appropriate and effective for research with children

### **1.2.1 Dissertation format: Integrated manuscript**

This dissertation is a culmination of three independent but complementary studies. The research outlined in each study examines aspects of how children perceive and use their neighbourhood environments, and all contribute to our understanding of the contextual factors that can influence neighbourhood opportunities and behaviours. All three studies involve children in the stage of 'middle childhood' (aged 7 to 13 years) in neighbourhoods within the city of London, Ontario. However, each study aims to understand differing aspects of the child-neighbourhood relationship, and to test the efficacy of multiple data collection and analysis approaches for uncovering factors that underscore children's neighbourhood geographies. To this end, the studies involve different child participants and neighbourhood settings and are divided into three discrete studies (See Fig 1.1).

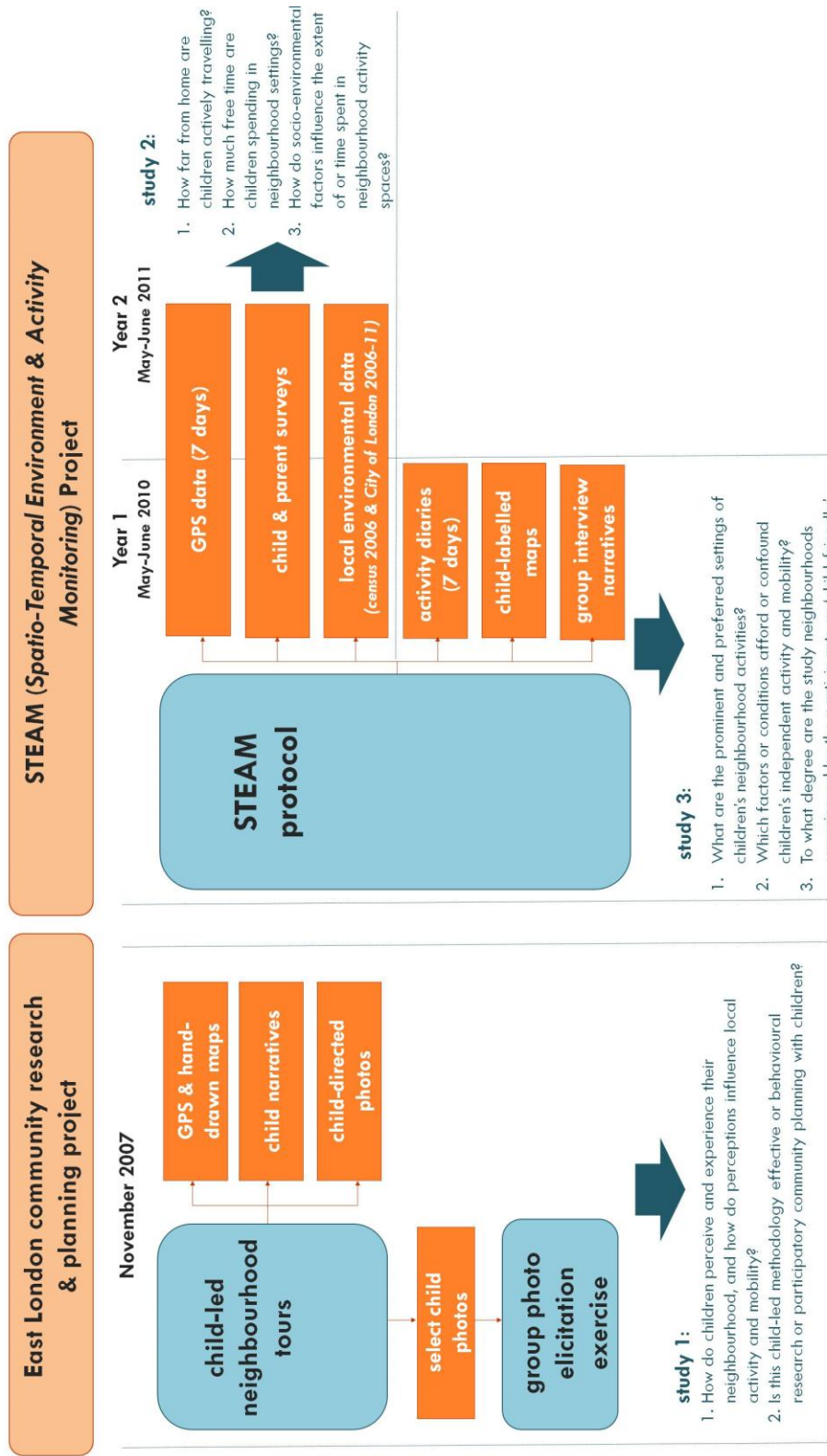


Figure 1.1: Dissertation study data and methodologies

The first manuscript (Chapter 4), published in *Children, Youth and Environments*, uses a unique child-led protocol to explore patterns in neighbourhood perception and use among a group of children (aged 7 to 9 years) within an urban core neighbourhood in the city of London, Ontario, Canada. Child-led neighbourhood walks, in combination with a group photo elicitation exercise, provide rich qualitative data on children's neighbourhood experiences that is analyzed both thematically and spatially within a geographic information system (GIS). This study reveals not only 'how' children use and move around their particular local environment, but also 'why' – that is, how their perception of and preferences for various resources and conditions in their neighbourhood impact what they do and where they do it. The study also examines the efficacy and feasibility of utilizing such experiential and visual exercises with children for both research and participatory urban planning. Specifically, this study was designed to address the following questions:

1. How do children perceive and experience their neighbourhood environments, and how do these perceptions influence their neighbourhood activity and mobility?
2. Is the child-led methodology an effective tool for behavioural research or for participatory community planning with children?

Integrated results from each method help to uncover both common and disparate experiences of children within this neighbourhood as well as the socio-environmental factors which may influence them. Reflection on the methodologies employed in Study 1 was also used to hone the protocol and study population selected for Studies 2 and 3.

Seeking to more intensively examine children's habitual neighbourhood behaviour, and the extent of their local mobility, studies 2 and 3 both utilize data gathered during the initial phases of a large multi-year study conducted in various school neighbourhoods across Southwestern Ontario. In the first two years of the STEAM (Spatio-Temporal Environment & Activity Monitoring) Project, a comprehensive, multi-tool protocol was carried out with children in seven neighbourhoods across London, Ontario to document

their neighbourhood activity and experiences. Building on the lessons learned in Study 1, the final two studies attempt to more directly document children's local activity, via monitoring devices such as portable global positioning system (GPS) units, and the impact of differing neighbourhood features and conditions on behaviour. Both STEAM-based studies utilize an older participant population (aged 9-13) than Study 1, to better reflect the age at which children are more likely to be given greater independent access to their neighbourhood environments (Matthews 1995; Tranter and Pawson 2001; Wridt 2010; Chawla and UNESCO 2002). The tools used for the STEAM study include portable GPS units, daily activity diaries, child and parent surveys, child-completed neighbourhood maps, as well as small group interviews with participating children. Study 2 uses participant data (n=143) from the first two years of the STEAM project, involving seven school neighbourhoods, while Study 3 undertakes a more in-depth analysis of neighbourhood activity for only those children attending the two schools (one urban, one suburban) who participated in the first year of the project (n=23). Although there is some overlap in the study population and dataset, Studies 2 and 3 each utilize data gathered through different suites of tools to examine distinctive components of the children's neighbourhood experience and use.

Study 2 (Chapter 5), submitted to *Environment and Behavior*, seeks to isolate and examine the size of children's neighbourhood activity spaces and the degree to which contemporary children spend their leisure time in this environment. Despite the wealth of developmental and health benefits considered to be associated with children's independent use of neighbourhood environments, both research and anecdotal evidence suggests that children's neighbourhood 'free ranges' or independent domains have been shrinking drastically in recent decades, in part due to parent concerns for child safety and decreases in children's unstructured leisure time (Christensen & O'Brien, 2003; Gaster, 1991; Karsten, 2005; Mikkelsen & Christensen, 2009; C. G. Pooley et al., 2005). The size and quality of the contemporary child's habitual neighbourhood range is therefore of significant interest; the larger and more resource-rich the domain, the greater the diversity in the social and environmental interactions the child is likely to experience, and the greater the benefits for their health and development (Bartlett, Hart, Satterthwaite, De La



Barra, & Missair, 1999; Churchman, 2003; Mikkelsen & Christensen, 2009; Rissotto & Giuliani, 2006; Tranter & Pawson, 2001; Wridt, 2010). It is also of key interest to understand the amount of time children habitually spend in their independent activity ranges as an indicator of the degree to which they are given free time and permission to explore the environment beyond their home.

As evident in the findings from Study 1, the time spent in neighbourhood domains may also relate to the type or quality of neighbourhood resources, which may be helping to draw children (or not) out of their indoor home environments. This study aims to identify the habitual environmental domains of children's activities within their neighbourhoods, and examine the factors, whether individual, perceptual or environmental, which may broaden or constrict these activity spaces. The study also seeks to document the degree to which the neighbourhood serves as a primary setting for contemporary children's activities. This study will utilize data from portable GPS units worn by child participants for 7 days, municipal built environment information, as well as neighbourhood perception data from both child and parent surveys to measure and analyze the pedestrian-based neighbourhood activity spaces of participating children across seven school neighbourhoods (See Fig 1.1). Spatial and temporal analysis reveals the size of these activity 'domains' as well as the degree to which participating children spend their time in neighbourhood zones and settings. Quantitative analyses also highlight the individual and environmental factors that may be influencing the size or use of neighbourhood activity spaces. Specifically, Study 2 addresses the following questions:

1. How far from home are children actively travelling within their neighbourhood environments?
2. How much of their free time are children spending in different neighbourhood zones around their homes?
3. How do individual, perceptual, and/or environmental factors influence the extent of or time spent in neighbourhood activity spaces?

Analysis from Study 2 reveals valuable characteristics of children's neighbourhood activity spaces, and the time participants spend in local settings, but this quantitative analysis does not expose why (or why not) children utilize specific local settings for their activities, nor reveal children's experience of their neighbourhood environment.

Building on themes revealed in Study 1 with a younger group of children (aged 7 to 9 years) Study 3 (Chapter 6), to be submitted to *Children's Geographies*, aims to delve deeper into the nature of children's neighbourhood activities, striving to understand not only where children's independent neighbourhood-based activities take place, but how and why they use them as they do. This third study involved children aged 9 to 13 years from two London, Ontario schools, one urban and one suburban. Small group digital mapping interviews with child participants were analyzed together with details from their activity diaries and neighbourhood activity maps in a qualitative GIS process to elicit a rich picture of neighbourhood activity and mobility within the two communities (See Fig 1.1). Focusing on the areas that children frequently and independently access in their neighbourhood, the data, combined in a GIS, outlines individual-, group- and neighbourhood-level patterns of child activity and preference, and highlights the environmental factors that support or hinder diverse play and movement within neighbourhood settings. This manuscript specifically aims to answer the following research questions:

1. What are the prominent and preferred settings of children's neighbourhood activities?
2. Which factors (individual, social or environmental) afford or confound children's independent activity and mobility?
3. To what degree are the study neighbourhoods experienced by the participants as 'child-friendly', providing safe, welcoming and diverse settings that support a wide range of healthy activities.

Study 3 helps to reveal the time and freedom participating children have to independently access neighbourhood environments, and their perception of the ways in which local settings support their activity needs and intentions. Detailed analysis of children's

neighbourhood perceptions and use exposes striking patterns in the social and environmental factors that can support or limit neighbourhood activities.

Collectively, these three studies provide critical insights into the contemporary child-neighbourhood relationship, and point to ways in which we can provide more supportive and stimulating neighbourhood environments for children that can help foster activity supportive of their health, development and well-being.

## **1.3 Conceptual framework**

Children's use and experience of their local environments plays a key role in their healthy development, however, researchers acknowledge that this relationship is complex and difficult to untangle. Exploring the relationship between children and their primary environments, and its impact on children's health, development and well-being, requires a conceptual framework that can accommodate the diverse and multi-faceted nature of both children and their environmental interactions.

### **1.3.1 The value of an ecological framework**

Recent years have seen the development and increased use of ecological frameworks in examinations of the influence of the built environment, particularly in an attempt to understand the complex factors that influence individual and population health. Ecological approaches were employed primarily in response to dissatisfaction with the narrow and reductionist nature of the biomedical model that has largely dominated health research and practice, and which holds that biological factors alone are responsible for the presence or absence of illness or disease (Engel, 1977; McKendrick, 2001). Engel was one of the first health scholars to challenge this dogmatic model and suggest that biological factors interact with social, psychological and experiential factors and conditions to determine an individual's vulnerability or resiliency to disease (1977). Engel, and several health scholars since, have proposed an alternative ecological systems framework which conceptualizes health as being more broadly determined by the complex interaction between individual characteristics (composition) and the conditions of both proximate and distal environments in which those individuals dwell (context)

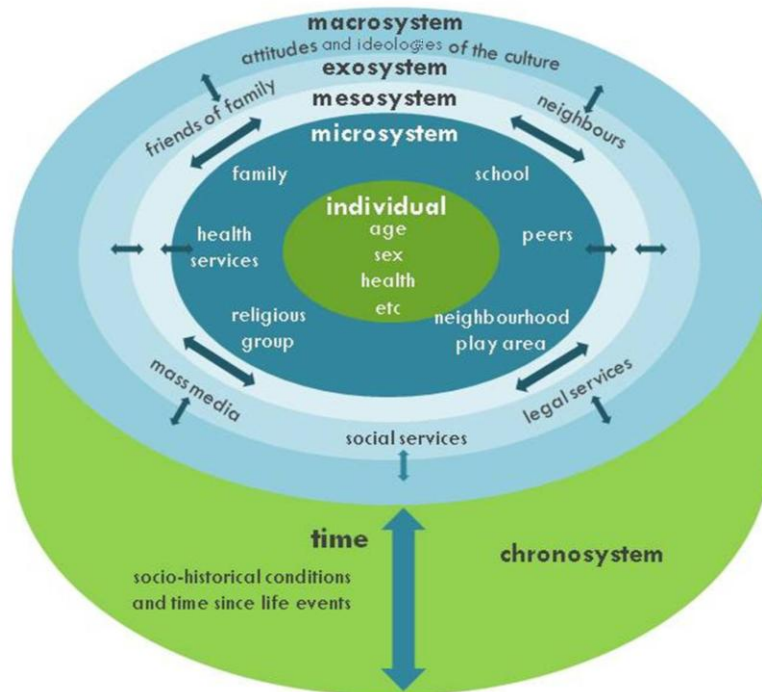
(Engel 1977; Holt et al. 2008; Macintyre, Ellaway, and Cummins 2002; Sallis et al. 2006).

An ecological approach reflects a necessary reorientation to the role of place in understanding the manifestation of health and well-being, seeing individuals as part of a dynamic and reciprocal relationship with their environmental contexts, and seeks to ground the study of health in the lived experiences of individuals and populations residing in a particular setting (Johnston, 2000; Kearns & Moon, 2002). Both this conceptual framework, and the employment of quantitative and qualitative methods, allows for the exploration of the role of various socio-spatial variables such as socioeconomic status, age, gender and impairment in promoting health, or alternatively, of the ways they underscore inequalities (Kearns and Moon 2002; Macintyre, Ellaway, and Cummins 2002; Sallis et al. 2006). This framework for conceptualizing and studying health has been widely adopted by contemporary health geographers (Kearns & Moon, 2002).

An ecological framework may be especially crucial for studying the complex child-environment relationship. An ecological approach, in fact, is not a new concept in research concerning children's health and behaviour. Emerging ecological models of health largely represent adaptations of Bronfenbrenner's ecological model of child development, proposed in the mid 1970s, which outlined a nested series of environmental domains which formed the interconnected system of contexts considered to influence children's behaviour and development (Bronfenbrenner 1979; Bronfenbrenner 2001; Holt et al. 2008) (See Fig. 1.2). Spheres of influence ranged from the microsystem of the home to the macrosystems which determine cultural beliefs and customs. Bronfenbrenner argued that children's development could not be considered independently from the multi-leveled social, material and cultural context in which the development took place (Bronfenbrenner 1979; Kytta 2003).

Bronfenbrenner's model, however, is defined primarily in socio-cultural terms, and he paid no particular attention to the potential role of the physical environment in either an environmental systems model or in child development (Kytta 2003). Robin Moore and

Hugh Matthews, considered key contributors to the field of Children's Geographies, have both worked to build on this early model and incorporate components of the physical environment into the child's environmental system (Matthews 1992; Moore 1986). Their



*Adapted from Bronfenbrenner (1979)*

**Figure 1.2: Bronfenbrenner's socio-ecological model of child development**

subsequent conceptual models have proven influential in the development of contemporary models of health, including the highly refined ecological systems model developed by Sallis and colleagues (Sallis et al., 2006); the Sallis model incorporates broad categories of intra- and interpersonal variables, including an individual's perception of environmental factors such as safety and convenience, along with objective characteristics of a behaviour setting and mechanisms related to relevant policy environments (Sallis et al., 2006). Such ecological models, while still in development, seem best equipped to conceptualize the dynamic relationship between children, their environments and their health-related behaviours. The ecological model alone

acknowledges the multiple socio-spatial contexts that influence, and are influenced by, the child in the course of their daily lives.

These frameworks reflect a significant step forward in advancing health and behavioural research, however, an ecological approach to studying health and behaviour is not without its challenges and shortcomings. Operationalizing such a complex model is inherently difficult, particularly as the relationship between contextual and compositional factors, and their combined and varying impacts on the health of individuals or populations, are far from clear (Cummins, Macintyre, Davidson, & Ellaway, 2005; Engel, 1977; Macintyre et al., 2002). Having addressed issues related to ‘ecological fallacy’ and ‘individual fallacy’ that undermined earlier efforts to operationalize person-environment models, defining and measuring both ‘composition’ and ‘context’ remain theoretical and methodological challenges for health environment researchers (Cummins et al. 2007; Cummins et al. 2005; Macintyre, Ellaway, and Cummins 2002; Macintyre and Ellaway 2000). Recent studies of relationships between neighbourhood characteristics and adult or child health outcomes have tended to rely on objective assessments of ‘neighbourhood’ composition derived from aggregated census measures, and identify the ‘context’ strictly according to common administratively-defined areas such as census tracts or postal code districts (Cummins et al., 2005; Weden et al., 2008). Use of these convenient measures may uncover some structural aspects which can influence health and behaviour, but they are unlikely to capture the particular, nuanced nature of neighbourhood context that can improve our understanding of the role and mechanisms of ‘place’ that matter for health and development (Cummins et al., 2007; Macintyre & Ellaway, 2000; Macintyre et al., 2002; D. Rainham, McDowell, Krewski, & Sawada, 2010). Objective assessments of environments also remain limited by the availability of both environmental and demographic data (Weden et al., 2008). Such measures also tend to obscure the active role of the individual in the manifestation of health or behaviour. The simplified definitions of the neighbourhood environments that result are not likely to reflect the subjective, lived experiences of the inhabitants of that community, a critical issue given recent findings which suggest that both objective and subjective constructs are associated with health (Macintyre et al., 2002; Weden et al., 2008). Researchers must

also go beyond arbitrary or generalized characterizations of ‘neighbourhood’ to understand the complex contextual factors that influence behaviours and health (Cummins et al., 2007; D. Rainham et al., 2010). The use of qualitative and mixed methods can help to refine or even contest definitions of neighbourhood environments developed strictly through large-scale quantitative approaches to better characterize local cultures, perceptions and environmental interactions.

### **1.3.2 The transactional nature of the child–environment relationship**

Researchers employing an ecological approach must also remember to drill down to the level of the individual to consider the experience of the neighbourhood environment unique to each inhabitant. In fact, the ‘relational’ nature of the person-environment system is a key construct which is currently marginalized or even absent from many existing ecological frameworks, threatening the appropriateness and efficacy of current models of health or behaviour. Ecological approaches explicitly recognize the role of both person and place, but in many cases the operationalization of person-place relationship fails to characterize the nature of the relation itself. Theory from environmental psychology can help to clarify this relationship in a way that is especially relevant to research with children. Rather than considering the person and their environment as distinct units which interact with one another, many environmental psychologists subscribe instead to a ‘transactional’ perspective; the person and their environments are not considered in dualist terms, but rather two inseparable parts of a dynamic, interactive system which mutually constitute each other (Aitken and Bjorklund 1988; Heft and Kyttä 2006; Kyttä 2003). That is, the perception and experience of a given environment cannot be separated from the particular needs, capabilities and, perhaps most importantly, intentions of that particular person (Heft, 1988; Moore, 1986a). Further, the meaning a person ascribes to a given environment is related to the congruency of ‘fit’ between the characteristics of a setting and his or her behavioural intentions (Heft, 1988; Heft & Kyttä, 2006; Kyttä, 2006). A transactional perspective also recognizes that that person and the environment are both influenced and modified by their interaction with one another (Heft, 1997; Kyttä, 2003).

A transactional framework is fully compatible with an ecological systems approach to health and behaviour, but it is clear that most emerging ecological models are missing two key 'transactional' constructs in the conceptualization of the person-environment dynamic -- meaning and intention. A study of the relationship between an environment and the behaviour of an inhabitant is superficial unless one considers the significance of the setting for that individual (Aitken and Bjorklund 1988; Heft and Kyttä 2006; Kyttä 2003). The significance which a person ascribes to or derives from their personal environments, and the degree to which these places support personal intentions and goals, are key elements of the meaningful engagements with place that underscore health and well-being (Chawla 1992; Kaplan, Kaplan, and Ryan 1998; Korpela, Kyttä, and Hartig 2002; Rasmussen 2004).

### **1.3.3 The transactional concept of *affordances***

Gibson's concept of affordances may offer a useful construct to help researchers understand and operationalize the transactional nature of the person-environment relationship within an ecological framework. A renowned perceptual psychologist, Gibson's revolutionary work with respect to environmental perception posited that the human-environment relationship is particularly driven by the notions of 'fit' and reciprocity. Gibson argued that humans perceive their environments in terms of the meaningful, functional possibilities that they afford for a particular person (Gibson, 1979; Heft, 1997). These perceived possibilities, or 'affordances', are functionally- and relationally-specified; that is, that are perceived precisely because the properties of environments are seen as being congruent with both the physical and psychological capabilities of the perceiver, as well as their specific goals or intentions (Gibson, 1979; Heft, 1997). For example, a horizontal surface could be seen to afford 'sitting on', or 'stepping up on', depending on the location of the surface relative to an individual's leg length and whether it is perceived as being capable of supporting the person's weight. However, the perception of the potential interaction is also dependent on a person's intention to 'sit' or 'climb up'. The perception of an affordance therefore depends on the fit between both the intentions and characteristics of the individual perceiver and the functional possibilities the specific environment offers.



Gibson further suggests that children fundamentally perceive the world from this functional perspective; they perceive the specific possibilities for interaction offered by a given set of environmental features and conditions (Gibson, 1979; Heft, 1997). Heft's detailed analysis of several ethnographic studies of children's place use (1988) provided additional support for this innate functional perspective, and suggested that Gibson's Theory of Affordances is particularly relevant for the study of children's environmental behaviours as it requires the use of a function-based language that is more in keeping with children's fundamental orientation to the world (Heft, 1988, 1997). For example, a number of recent studies have investigated the influence of particular environmental elements, such as neighbourhood trees, on children's local behaviours. Using the form-based term 'tree' does not reflect the unique child-tree interaction, nor reveal the range of potential affordances for activity that a tree might provide to a given child. Neither does it unveil the ways in which different trees, in different contexts, are perceived as affording very different interactions (Heft 1988; Kytta 2002). A function-based approach, which aims instead to capture meaningful environmental interactions, can reveal how one particular shady tree in the park is good for 'reading under' one day and as the 'home base for tag' on another, whereas the tall, stout tree in the backyard near the fence affords 'climbing' for one sibling and the experience of 'privacy' for another (Fjortoft, 2004; Heft, 1988). Alternatively, an affordance-based approach can also capture the different possibilities for interaction that the same tree provides to different children, who will sport different intentions and capabilities. An ecological model which utilizes the concept of affordances to consider child-environment interactions can reveal the myriad and meaningful ways in which children use their environments for the diverse range of behaviours essential for their health and well-being (Heft & Kytta, 2006; Korpela et al., 2002).

Ecological approaches with children must, however, be careful to avoid the misstep, perhaps we can call it the 'generational fallacy', of inferring that relationships or correlations which prove significant for adults will apply to the children in the same environment. Affordance Theory suggests that children fundamentally perceive and experience their environments differently than do adults; we must therefore work to

untangle the particular role of environment and place on children's health and behaviour rather than making inferences from adult-specific results. Children's environmental needs also shift dramatically with their development, and vary greatly from context to context. A transactional ecological approach to children's health must also acknowledge the dynamic and diverse nature of the child-environment relationship and its implication for variations in health and behaviour throughout the lifecourse.

### **1.3.4 The nature and role of child development**

Attending to the relational nature of the child-environment association therefore necessitates consideration of the ways in which children's relationships with their environments shift as they age and develop. Current ecological models of health do not sufficiently account for temporal factors in general; that is, they tend to consider health at a particular point in time, and do not adequately consider the impact of lifecourse experiences in determining present states of health (Evans, Barer, & Marmot, 1994; D. Rainham et al., 2010). For children's health specifically, most models ignore or marginalize the temporal shifts in environmental perception and use related to child development. Children's progression through the nested set of socio-spatial domains as they develop is a fundamental component of Bronfenbrenner's original model that seems to have been misinterpreted or ignored in the translation to recent models. Most contemporary ecological frameworks fail to incorporate the impact of changes in goal-driven behaviour as children mature and develop, instead, they tend to lump children of all ages into a single, homogenous category.

This generalization of children is at the heart of Piaget's theory of child development, the most prevalent developmental framework of the 19<sup>th</sup> and 20<sup>th</sup> centuries (Gleave & Cole-Hamilton, 2012; Valentine, 1997). Piaget's theory of development conceived of a single, uniform category of 'children', whose members naturally progressed through a series of rigid, universal stages, acquiring necessary skills and knowledge until they finally crossed the threshold of adulthood (Graue et al., 1998; Holloway & Valentine, 2000; McArdle, 2001; Prout & James, 1997). Piaget's framework has heavily influenced contemporary conceptions of children and childhood, as well as the development of

modern educational and care systems. Some social scientists recently began challenging both the ‘universal’ and ‘natural’ character of the category of children as well as Piaget’s stages of development which characterize children as ‘human becomings’ rather than ‘human beings’ (Holt and Holloway 2006; Prout and James 1997). These critics have largely succeeded in revealing the socially constructed nature of ‘childhood’, arguing that the experience of childhood is strongly tied to the specific socio-cultural and spatial contexts in which it is lived (Holloway & Valentine, 2000).

These critical shifts in our concepts of childhood and child development have significant implications for the study of children’s health and behaviour ‘in place’ as they highlight the variations in the place needs and experiences of children in different socio-cultural contexts, as well as of children at different points in their development. Children in general seem to be inherently motivated to engage in health- and development-promoting behaviours, such as active play (Burdette & Whitaker, 2005a), but research has also illustrated that children of varying age and development-related intentions will seek out and value very different environments than one another (Clark and Uzzell 2002; Heft 1988; Sebba 1991; Hart 1979). This shifting nature of place needs and preferences as children progress through the lifecourse must be more explicitly incorporated into emerging models of health and behaviour. Other issues related to temporality, such as children’s differing place preferences and use at different times of the day and year should also be explored within ecological health research.

Affordance theory in particular can help to integrate these temporal shifts in place use and meaning within ecological frameworks because its inherently relational nature automatically accommodates the particular capabilities and intentions of the individual, or groups, in question (Heft, 1988). Despite its challenges, a transactional ecological approach shows great potential for illuminating the *ways* in which children’s environmental contexts influence their health and healthy behaviours through the lifecourse. This dissertation, therefore, utilizes an ecological affordance-based framework to acknowledge and attempt to understand the idiosyncratic and shifting nature of children’s perceptions of and interaction with their neighbourhood places.

## **1.4 Methodological philosophy**

In addition to the theoretical framework employed, there are a number of issues related to the appropriate use of methods for conducting research with children that will guide and inform both the collection and analysis of data for this dissertation.

### **1.4.1 The child's lens and the child's voice**

One primary concern within the whole of this dissertation is the need to recognize children's unique experience of their environments, and the need to understand and represent their true voice to the best of my ability as an adult researcher. These two distinct but related issues have not always been acknowledged or made explicit in environment-behaviour research with children. It is my contention that both issues must be considered within any methodological framework in children-related research as they can significantly influence the collection, analysis and interpretation of data, and the treatment of the role of the researcher in the research process.

Early approaches involving the study of children, falsely presumed children lacked the capacity to articulate their own needs and experiences, and relied instead on observation or the narratives of adult proxies, such as parents and teachers, to reveal the perspective of the child (Chawla & Malone, 2003; Darbyshire, MacDougall, & Schiller, 2005; Hart, 1992; Malone, 2001; Sutton & Kemp, 2002). Fueled by a growing body of evidence, primarily from environmental psychology and human geography, social scientists in recent decades have begun to acknowledge that children, due to their differing skills and interests, will perceive, experience and value their environments in fundamentally different ways than adults (Burke 2005; Rasmussen 2004; Driskell 2002; Matthews and Limb 1999; Heft 1988). Arguing that researchers and proxies view the world through an intractable and selective 'adult' lens, these critics claim that the lifeworld or voice of a child cannot be uncovered to any degree by an adult without directly engaging with and listening to children (Darbyshire et al., 2005; Matthews and Tucker, 2000; Rasmussen, 2004).

### 1.4.2 'Child-friendly' methods

These recognitions have prompted many child researchers to shift almost exclusively to interpretive methodologies, endorsing a variety of task-based, experiential tools as more 'child-friendly' or 'child-centred', and arguing that such tools more successfully and equitably reveal children's own voices and their unique perception of their environments (Darbyshire et al., 2005; Driskell, 2002; Morrow, 2001; Sutton & Kemp, 2002). Visual and experiential methods, such as drawings, mental maps, photo elicitation, charrettes and child-led tours, have been particularly prominent as they are considered to sport fewer embedded assumptions and are less dependent on verbal and language skills than fixed format methodologies and traditional interview styles (see Burke 2005; Darbyshire, MacDougall, and Schiller 2005; Sutton and Kemp 2006; Dennis et al. 2008; Kofkin Rudkin and Davis 2007; Morrow 2001; Wang et al. 2004; Carpiano 2009).

Growing insights from these interpretive approaches led a number of social scientists to also begin challenging the notion of 'childhood' as 'universal', 'natural', and 'uniform', concepts that are dominant in both academic and public discourse (Holloway & Valentine, 2000; Prout & James, 1997). They have convincingly demonstrated that 'childhood' is a social construction which is both culturally and historically situated, and inextricably bound with other variables of social analysis such as 'class', 'gender' and 'ethnicity'. Children's environmental interactions and experiences are expressly shaped by their socio-spatial contexts, resulting in multiple and diverse experiences of childhoods (Holloway and Valentine 2000; Holt and Holloway 2006). Therefore there is no single, universal concept of 'childhood', nor category of 'children', that can be studied unproblematically within a contextual vacuum.

These critiques, now principal tenets of the emerging paradigm of the 'new social sciences of childhood', also draw attention to the 'crisis of representation' that threatens the scholarly and ethical legitimacy of contemporary studies of children (Aitken 2001; Matthews 2003; Matthews and Limb 1999). Failure to recognize the ways in which 'childhood' is often constructed in an hegemonic context which privileges the socio-spatial positions and practices of adults, and which positions children as 'less than' or

‘knowing less than’ adults, masks the inherent power imbalance which colours any research encounter with children (Aitken 2001; Holt and Holloway 2006; James, Jenks, and Prout 1998; Matthews, Limb, and Taylor 1998). Scholars conducting research with children are called on to critically reflect on and expose their adult(ist) frame of reference, as well as tacit assumptions or biases regarding both ‘childhood’ and ‘children’ which may be underpinning selection of methods, as well as their processes of interpretation (Holloway & Valentine, 2000).

In addition, Punch challenges that the labels ‘child-centred’ or ‘child-friendly’ have often been uncritically applied to methods that may still reflect both adultist components and interpretations (2002). For example, conducting interviews with children in schools, where children typically have little control and are expected to provide the ‘right’ answer, can influence the researcher-researched relationship and any subsequent narrative (Morrow, 2001; Punch, 2002). Holt and Holloway also suggest social scientists are still failing to fully unpack the ‘constructions’ and contexts that define contemporary childhoods, revealing remnants of traditional dualisms such as ‘local/global’ and ‘structure/agency’ that mask how children’s perceptions and actions influence and are influenced by wider “glocalized” processes (2006: 135). To this end, they suggest there needs to be greater sensitivity to structures in children’s research, requiring a re-engagement with large-scale datasets and quantitative analyses, in order to tease out the structural factors that contribute to the differentiations within childhood experiences (Holt & Holloway, 2006).

Social scientists are beginning to respond to these recent critiques, as evidenced by the growing inclusion of large, verbatim excerpts from child narratives (e.g., Foster-Fishman, Nowell, Deacon, Nievar, & McCann, 2005; Newman, Woodcock, & Dunham, 2006), concerted efforts to obtain feedback from participants on both the methods utilized (e.g., Foster-Fishman et al. 2005), and the positioning of children as co-researchers (e.g., Burke 2005; Strack, Magill, and McDonagh 2004; Travlou et al. 2008). Some researchers are also deliberately and reflexively employing tools such as auto-photography, activity diaries, and monitoring devices such as portable GPS units, precisely because they do not require the researcher to be present, attempting to minimize their, albeit unintentional,

influence on the child's products (e.g., Barker and Weller 2003a). Explorations of integrative methodologies, such as qualitative GIS, represent among the first attempts to consider children's relationships with place as a function of both local contexts and broader socio-cultural structures. Recent attempts by social scientists to marry qualitative outputs with digital information systems suggest that perceptions and experiences can be effectively translated into forms that are readily integrated into a geographic information system (GIS), allowing for sophisticated multi-level spatial analyses of perceptual and behavioural data (Berghlund & Nordin, 2007; Dennis Jr, 2006; Dennis Jr et al., 2008; Knigge & Cope, 2006; Kwan & Knigge, 2006). GIS, though not without its challenges, may therefore be an integrative tool capable of transcending the traditional quantitative-qualitative divide, allowing us to drill deeper into the influences and implications of place for health and behaviour.

Although the new 'social sciences of childhood' paradigm is being increasingly taken up by child scholars, only a few, such as those highlighted above, have responded to the call for critical refinements. Many child-related studies still reflect problematic and even worrisome frameworks. For example, a number of recent studies utilizing 'child-centred' visual methodologies to explore children's environmental perception still interpret visual products solely from the perspective of the adult researchers, in some cases without any corresponding narratives from children (e.g., Hume, Salmon, and Ball 2005). Such studies disregard the problematic ambiguity of visual products to an outside viewer (Barker & Weller, 2003; Dennis Jr, 2004; Orellana, 1999), as well as the biased and power-laden position of the (adult) researcher. Even fewer studies exhibit reflexive assessments of the role of the researcher in the knowledge production process, and participant feedback on both methods and interpretations remain rare. It can be argued that such approaches are both methodologically and ethically problematic, and that a 'crisis of representation' still plagues contemporary social science research with children. The methodological changes called for by both the 'new social sciences of childhood' and its recent critiques are critical steps toward advancing our understanding of children's lived experiences as well as effective and ethical research of, and with, children.

## 1.5 References

Aitken, S. C. (2001). Global crises of childhood: rights, justice and the unchildlike child. *Area*, 33(2), 119–127.

Aitken, S. C., & Bjorklund, E. M. (1988). Transactional and Transformational Theories in Behavioral Geography. *The Professional Geographer*, 40(1), 54–64.

Barker, J., & Weller, S. (2003). “Is it fun?” developing children centred research methods. *International Journal of Sociology and Social Policy*, 23, 33–58.

Bartlett, S., Hart, R., Satterthwaite, D., De La Barra, X., & Missair, A. (1999). *Cities for children: Children’s rights, poverty and urban management*. Earthscan.

Beauvais, C., & Jenson, J. (2003). *The well-being of children: Are there “neighbourhood effects”?* Canadian Policy Research Networks Inc.

Berg, M., & Medrich, E. A. (1980). Children in four neighborhoods: The physical environment and its effect on play and play patterns. *Environment and Behavior*, 12(3), 320–348.

Berglund, U., & Nordin, K. (2007). Using GIS to make young people’s voices heard in urban planning. *Built Environment: Special Issue on children, young people and built environments*, 33(4), 469–481.

Bronfenbrenner, U. (1979). *The Ecology of Human Development: Experiments by Nature and Design*. Cambridge, Massachusetts: Harvard University Press.

Bronfenbrenner, U. (2001). Human development, bioecological theory of. In N. J. S. & P. B. Baltes (Ed.), *International encyclopedia of the social and behavioral sciences* (pp. 6963–6970). Oxford, UK: Elsevier.

Burdette, H. L., & Whitaker, R. C. (2005). A National Study of Neighborhood Safety, Outdoor Play, Television Viewing, and Obesity in Preschool Children. *Pediatrics*, 116(3), 657–662.

Burke, C. (2005). “Play in focus”: Children researching their own spaces and places for play. *Children, Youth and Environments*, 15(1), 27–53.

Carpiano, R. M. (2009). Come take a walk with me: The “Go-Along” interview as a novel method for studying the implications of place for health and well-being. *Health & Place*, 15(1), 263–272.

Chawla, L. (1992). Childhood Place Attachments. In I. & L. Altman S.M. (Ed.), *Human behavior and environment: Advances in theory and research* (Vol. 12). New York: Plenum.

Chawla, L. (2002). Toward better cities for children and youth. In L. Chawla (Ed.), *Growing up in an urbanising world* (Vol. 13). Earthscan Publications Ltd.



- Chawla, L., & Malone, K. (2003). Neighborhood quality in children's eyes. In P Christensen & M. O'Brien (Eds.), *Children in the City: Home Neighbourhood and Community* (pp. 118–141). London and New York: Routledge/Falmer.
- Christensen, Pia, & O'Brien, M. (2003). Children in the city: Introducing new perspectives. *Children in the City: Home, Neighborhood, and Community* (pp. 1–12). London and New York: Routledge Falmer.
- Churchman, A. (2003). Is there a place for children in the city? *Journal of Urban Design*, 8(2), 99–111.
- Clark, C., & Uzzell, D. L. (2002). The affordances of the home, neighbourhood, school and town centre for adolescents. *Journal of Environmental Psychology*, 22(1-2), 95–108.
- Cosco, N., & Moore, R. (2002). Our neighborhood is like that. In L. Chawla (Ed.), *Growing up in an urbanizing world*. London: UNESCO and Earthscan.
- Cummins, S., Curtis, S., Diez-Roux, A. V., & Macintyre, S. (2007). Understanding and representing “place” in health research: a relational approach. *Social science & medicine* (1982), 65(9), 1825–38.
- Cummins, S., Macintyre, S., Davidson, S., & Ellaway, A. (2005). Measuring neighbourhood social and material context: Generation and interpretation of ecological data from routine and non-routine sources. *Health and Place*, 11(3), 249–260.
- Dannenberg, A. L., Jackson, R. J., Frumkin, H., Schieber, R. A., Pratt, M., Kochtitzky, C., & Tilson, H. H. (2003). The impact of community design and land-use choices on public health: A scientific research agenda. *American Journal of Public Health*, 93(9), 1500–1508.
- Darbyshire, P., MacDougall, C., & Schiller, W. (2005). Multiple methods in qualitative research with children: More insight or just more? *Qualitative Research*, 5(4), 417–436.
- Dennis Jr, S. F. (2004). Visual Seduction: The ambiguity of visual images in PPGIS. *Public Participation GIS conference*.
- Dennis Jr, S. F. (2006). Prospects for qualitative GIS at the intersection of youth development and participatory urban planning. *Environment and Planning A*, 38(11), 2039–2054.
- Dennis Jr, S. F., Gaulocher, S., Carpiano, R. M., & Brown, D. (2008). Participatory photo mapping (PPM): Exploring an integrated method for health and place research with young people. *Health & Place*, 15(2), 466–473.
- Driskell, D. (2002). *Creating better cities with children and youth: A manual for participation*. Earthscan.
- Engel, G. L. (1977). The need for a new medical model: A challenge for biomedicine. *Science*, 196(4286), 129–136.

- Evans, R. G., Barer, M. L., & Marmot, T. R. (1994). *Why are some people healthy and others not?: The determinants of health of populations*. New York: Aldine de Gruyter.
- Fjortoft, I. (2004). Landscape as playscape: The effects of natural environments on children's play and motor development. *Children, Youth and Environments*, 14(2), 21–44.
- Foster-Fishman, P., Nowell, B., Deacon, Z., Nievar, M. A., & McCann, P. (2005). Using methods that matter: The impact of reflection, dialogue, and voice. *American Journal of Community Psychology*, 36(3), 275–291.
- Gaster, S. (1991). Urban Children's Access to their Neighborhood. *Environment and Behavior*, 23(1), 70–85.
- Gibson, J. J. (1979). *The ecological approach to perception*. Boston: Houghton Mifflin.
- Gilliland, J., Holmes, M., Irwin, J. D., & Tucker, P. (2006). Environmental equity is child's play: mapping public provision of recreation opportunities in urban neighbourhoods. *Vulnerable Children and Youth Studies*, 1(3), 256–268.
- Gleave, J., & Cole-Hamilton, I. (2012). *A world without play : A literature review*. PlayEngland.
- Graue, M. E., Walsh, D. J., Ceglowski, D., Dyson, A. H., Fernie, D. E., Kantor, R., Leavitt, R. L., et al. (1998). *Studying children in context: Theories, methods, and ethics*. Sage Publications.
- Gray, P. (2011). The Decline of Play and the Rise of Psychopathology in Children and Adolescents s. *American Journal of Play*, 3(4), 443–463.
- Hart, R. (1979). *Children's experience of place*. Halsted Press.
- Hart, R. (1992). *Children's participation: From tokenism to citizenship*. UNICEF International Child Development Centre.
- Heft, H. (1988). Affordances of children's environments: a functional approach to environmental description. *Children's Environments Quarterly*, 5(3), 29–37.
- Heft, H. (1997). The relevance of Gibson's ecological approach to perception for environment-behavior studies. In G. T. Moore & R. W. Marans (Eds.), *Advances in environment, behavior, and design* (Vol. 4, pp. 71–108). New York: Plenum Press.
- Heft, H., & Kyttä, M. (2006). A psychologically meaningful description of environments requires a relational approach. *Housing, Theory and Society*, 23(4), 210–213.
- Holloway, S. L., & Valentine, G. (2000). Spatiality and the New Social Studies of Childhood. *Sociology*, 34(4), 763–783.
- Holt, L., & Holloway, S. L. (2006). Editorial: Theorising other childhoods in a globalised World. *Children's Geographies*, 4(2), 135–142.

- Holt, N. L., Spence, J. C., Sehn, Z. L., & Cutumisu, N. (2008). Neighborhood and developmental differences in children's perceptions of opportunities for play and physical activity. *Health & Place, 14*(1), 2–14.
- Hume, C., Salmon, J., & Ball, K. (2005). Children's perceptions of their home and neighbourhood environments, and their association with objectively measured physical activity: A qualitative and quantitative study. *Health Education Research, 20*(1), 1–13.
- Jack, G. (2008). Place Matters: The Significance of Place Attachments for Children's Well-Being. *British Journal of Social Work, 40*(3), bcn142.
- Jackson, L. E. (2003). The relationship of urban design to human health and condition. *Landscape and Urban Planning, 64*(4), 191–200.
- James, A., Jenks, C., & Prout, A. (1998). *Theorizing Childhood*. Williston, VT: Teachers College Press.
- Jencks, C., & Mayer, S. E. (1990). The social consequences of growing up in poor neighborhood. In L. E. Lynn & M. G. McGeary (Eds.), *Inner-City Poverty in the United States* (pp. 111–186). Washington D. C.: National Academy Press.
- Johnston, R. J. (2000). *The dictionary of human geography*. Blackwell Publishers.
- Juhn, Y. J., Sauver, J. S., Katusic, S., Vargas, D., Weaver, A., & Yunginger, J. (2005). The influence of neighborhood environment on the incidence of childhood asthma: a multilevel approach. *Social Science & Medicine, 60*(11), 2453–64.
- Kaplan, R., Kaplan, S., & Ryan, R. L. (1998). *With people in mind: Design and management of everyday nature*. Island Press.
- Karsten, L. (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, R., & Moon, G. (2002). From medical to health geography: Novelty, place and theory after a decade of change. *Progress in Human Geography, 26*(5), 605.
- Knigge, L., & Cope, M. (2006). Grounded visualization: Integrating the analysis of qualitative and quantitative data through grounded theory and visualization. *Environment and Planning A, 38*(11), 2021.
- Kofkin Rudkin, J., & Davis, A. (2007). Photography as a tool for understanding youth connections to their neighborhood. *Children, Youth and Environments, 17*(4), 107–123.
- Korpela, K., Kyttä, M., & Hartig, T. (2002). Restorative experience, self-regulation, and children's place preferences. *Journal of Environmental Psychology, 22*(4), 387–398.
- Kwan, M., & Knigge, L. (2006). Doing qualitative research using GIS: an oxymoronic endeavor? *Environment and Planning A, 38*(11), 1999.

- Kyttä, M. (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.
- Kyttä, M. (2003). *Children in outdoor contexts: Affordances and independent mobility in the assessment of environmental child friendliness*. Helsinki University of Technology.
- Kyttä, M. (2006). Environmental child-friendliness in the light of the Bullerby Model. In Christopher Spencer & M. Blades (Eds.), *Children and Their Environments: Learning, Using and Designing Spaces* (pp. 141–158). Cambridge University Press.
- Leventhal, T., & Brooks-Gunn, J. (2000). The neighborhoods they live in: The effects of neighborhood residence on child and adolescent outcomes. *Psychological Bulletin*, 126(2), 309–337.
- Leventhal, T., & Brooks-Gunn, J. (2003). Children and youth in neighborhood contexts. *Current Directions in Psychological Science*, 12(1), 27–31.
- Macintyre, S., & Ellaway, A. (2000). Ecological approaches: rediscovering the role of the physical and social environment. In L. F. & K. Berkma I. (Ed.), *Social Epidemiology* (pp. 332–348). New York: Oxford University Press.
- Macintyre, S., Ellaway, A., & Cummins, S. (2002). Place effects on health: How can we conceptualise, operationalise and measure them? *Social Science & Medicine*, 55(1), 125–139.
- Mackett, R., Brown, B., Gong, Y. I., Kitazawa, K. A. Y., & Paskins, J. (2005). Children's Independent Movement in the Local Environment, *Built Environment*, 33(4), 454-468.
- Malone, K. (2001). Children, Youth and Sustainable Cities. *Local Environment*, 6(1), 5–12.
- Matthews, H. (1987). Gender, home range and environmental cognition. *Transactions of the Institute of British Geographers*, 12(1), 43–56.
- Matthews, H. (1992). *Making sense of place: Children's understanding of large-scale environments*. Harvester Wheatsheaf Hemel Hempstead.
- Matthews, H. (1995). Living on the edge: Children as "Outsiders." *Tijdschrift Voor Economische En Sociale Geografie*, 86(5), 456–466.
- Matthews, H. (2003). Coming of Age for Children's Geographies. *Children's Geographies*, 1(1), 3–5.
- Matthews, H., & Limb, M. (1999). Defining an agenda for the geography of children: review and prospect. *Progress in Human Geography*, 23(1), 61–90.
- Matthews, H., Limb, M., & Percy-Smith, B. (1998). Changing Worlds: the Microgeographies of Young Teenagers. *Tijdschrift voor Economische en Sociale Geografie*, 89(2), 193–202.

- Matthews, H., Limb, M., & Taylor, M. (1998). The geography of children: some ethical and methodological considerations for project and dissertation work. *Journal of Geography in Higher Education*, 22(3), 311–324.
- Matthews, H., & Tucker, F. (2000). Consulting Children. *Journal of Geography in Higher Education*, 24(2), 299–310.
- McArdle, P. (2001). Children's play. *Child: Care, Health and Development*, 27(6), 509–514.
- McKendrick, J. H. (2001). Coming of age: Rethinking the role of children in population studies. *International Journal of Population Geography*, 7(6), 461–472.
- McMillan, T. E. (2005). Urban form and a child's trip to school: The current literature and a framework for future research. *Journal of Planning Literature*, 19(4), 440.
- McWayne, C. M., McDermott, P. a, Fantuzzo, J. W., & Culhane, D. P. (2007). Employing community data to investigate social and structural dimensions of urban neighborhoods: an early childhood education example. *American Journal of Community Psychology*, 39(1-2), 47–60.
- Mikkelsen, M. R., & Christensen, P. (2009). Is Children's Independent Mobility Really Independent? A Study of Children's Mobility Combining Ethnography and GPS/Mobile Phone Technologies1. *Mobilities*, 4(1), 37–58.
- Moore, R. (1986a). *Childhood's domain: Play and place in child development*. Croom Helm Ltd.
- Moore, R. (1986b). The power of nature orientations of girls and boys toward biotic and abiotic play settings on a reconstructed schoolyard. *Children's Environments Quarterly*, 3(3), 52–69.
- Morrow, V. (2001). Using qualitative methods to elicit young people's perspectives on their environments: Some ideas for community health initiatives. *Health Education Research*, 16(3), 255–268.
- Newman, M., Woodcock, A., & Dunham, P. (2006). "Playtime in the borderlands": Children's representations of school, gender and bullying through photographs and interviews. *Children's Geographies*, 4(3), 289–302.
- Orellana, M. F. (1999). Space and place in an urban landscape: Learning from children's views of their social worlds. *Visual Sociology*, 14(1), 73–89.
- Pooley, C. G., Turnbull, J., & Adams, M. (2005). The journey to school in Britain since the 1940s: continuity and change. *Area*, 37(1), 43–53.
- Prout, A., & James, A. (1997). A new paradigm for the sociology of childhood? Provenance, promise and problems. *Constructing and Reconstructing Childhood: Contemporary Issues in the Sociological Study of Childhood* (Vol. 2).

- Punch, S. (2002). Research with children: The same or different from research with adults? *Childhood*, 9(3), 321–341.
- Rainham, D., McDowell, I., Krewski, D., & Sawada, M. (2010). Conceptualizing the healthscape: contributions of time geography, location technologies and spatial ecology to place and health research. *Social science & medicine* (1982), 70(5), 668–76.
- Rasmussen, K. (2004). Places for children—children's places. *Childhood*, 11(2), 155.
- Rasmussen, K., & Smidt, S. (2003). Children in the neighbourhood. The neighborhood in the children. In PM Christensen & M. O'Brien (Eds.), *Children in the City: Home, Neighborhood, and Community*. London: Routledge Falmer.
- Rissotto, A., & Giuliani, M. V. (2006). Learning neighbourhood environments: the loss of experience in a modern world. In C. & B. Spencer M. (Ed.), *Children and Their Environments: Learning, Using and Designing Spaces*. Cambridge University Press.
- Rissotto, A., & Tonucci, F. (2002). Freedom of movement and environmental knowledge in elementary school children. *Journal of Environmental Psychology*, 22(1), 65–77.
- Sallis, J. F., Cervero, R. B., Ascher, W., Henderson, K. A., Kraft, M. K., & Kerr, J. (2006). An ecological approach to creating active living communities. *Annual Review of Public Health*, 27, 297.
- Sallis, J. F., Prochaska, J. J., & Taylor, W. C. (2000). A review of correlates of physical activity of children and adolescents. *Medicine & Science in Sports & Exercise*, 32(5), 963.
- Sebba, R. (1991). The landscapes of childhood: The reflection of childhood's environment in adult memories and in children's attitudes. *Environment and Behavior*, 23(4), 395–422.
- Shaw, B., Watson, B., Frauendienst, B., Redecker, A., Jones, T., & Hillman, M. (2012). *Children's independent mobility: A comparative study in England and Germany (1971-2010)*. London.
- Spencer, C., & Woolley, H. (2000). Children and the city: A summary of recent environmental psychology research. *Child: Care, Health & Development*, 26(3), 181.
- Spilsbury, J. (2005). "We Don't Really Get To Go Out in the Front Yard"—Children's Home Range and Neighborhood Violence. *Children's Geographies*, 3(1), 79–99.
- Spilsbury, J., Korbin, J., & Coulton, C. (2009). Mapping Children's Neighborhood Perceptions: Implications for Child Indicators. *Child Indicators Research*, 2(2), 111–131.
- Srinivasan, S., O'Fallon, L. R., & Deary, A. (2003). Creating healthy communities, healthy homes, healthy people: Initiating a research agenda on the built environment and public health. *Am J Public Health*, 93(9), 1446–1450.

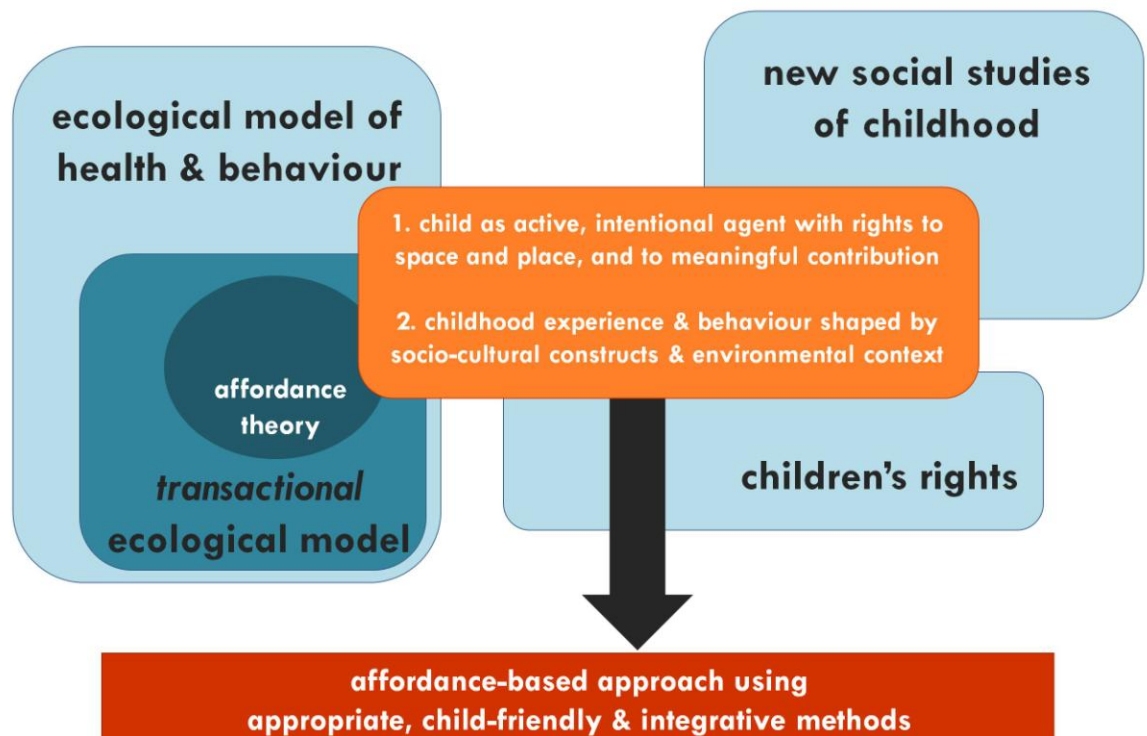
- Strack, R. W., Magill, C., & McDonagh, K. (2004). Engaging youth through photovoice. *Health promotion practice, 5*(1), 49–58.
- Sutton, S. E., & Kemp, S. P. (2002). Children as partners in neighborhood placemaking: Lessons from intergenerational design charrettes. *Journal of Environmental Psychology, 22*(1-2), 171–189.
- Sutton, S. E., & Kemp, S. P. (2006). Integrating social science and design inquiry through interdisciplinary design charrettes: an approach to participatory community problem solving. *American journal of community psychology, 38*(1-2), 125–39.
- Tranter, P., & Pawson, E. (2001). Children's access to local environments: A case-study of Christchurch, New Zealand. *Local Environment, 6*(1), 27–48.
- Travlou, P., Owens, P. E., Thompson, C. W., & Maxwell, L. (2008). Place mapping with teenagers: Locating their territories and documenting their experience of the public realm. *Children's Geographies, 6*(3), 309–326.
- Valentine, G. (1997). "Oh yes I can" "Oh no you can't": Children and parents' understandings of kids' competence to negotiate public space safely. *Antipode, 29*(1), 65–89.
- Wang, C. C., Morrel-Samuels, S., Hutchison, P. M., Bell, L., & Pestronk, R. M. (2004). Flint Photovoice: community building among youths, adults, and policymakers. *American journal of public health, 94*(6), 911–3.
- Weden, M. M., Carpiano, R. M., & Robert, S. A. (2008). Subjective and objective neighborhood characteristics and adult health. *Social Science & Medicine, 66*(6), 1256–1270.
- Werner, C. M., & Altman, I. (1998). A dialectical/transactional framework of social relations: Children in secondary territories. *International Studies on Childhood and Adolescence, 5*, 123–154.
- Wiehe, S. E., Hoch, S. C., Liu, G. C., Carroll, A. E., Wilson, J. S., & Fortenberry, J. D. (2008). Adolescent Travel Patterns: Pilot Data Indicating Distance from Home Varies by Time of Day and Day of Week. *Journal of Adolescent Health, 42*(4), 418–420.
- Wohlwill, J., & Heft, H. (1987). The physical environment and the development of the child. In D. Stokols & I. Altman (Eds.), *Handbook of Environmental Psychology I* (pp. 281–328). New York: Wiley.
- Wridt, P. (2010). A qualitative GIS approach to mapping urban neighborhoods with children to promote physical activity and child-friendly community planning. *Environment and Planning B: Planning and Design, 37*(1), 129–147.

## Chapter 2

### 2 Dissertation

#### 2.1 Theoretical and methodological framework

The methodology and analysis of the research documented in all three studies comprising this dissertation are therefore informed by a set of complementary conceptual frameworks (See Fig. 2.1). The work is carried out within a transactional ecological framework which recognizes that children's experiences and behaviour are influenced by conditions and structures at both micro and macro levels in the social and physical environment. It also incorporates the tenets of the new social studies of childhood which recognizes children as active, intentional agents of their own behaviour, but that their experience of childhood is also a social construction shaped by both local and global



**Figure 2.1: Theoretical frameworks**



constructs. Specifically, the research utilizes an affordance-based approach to examine children's perceptions and behaviour utilizing methods which recognize children's legitimate right to space and place, as well as their ability and right to meaningfully participate in community research and planning.

Throughout all three studies, I consciously and carefully employed this conceptual framework in the selection and application of methods, the interpretation of collected data, as well as my own personal conduct and disposition while working with the child participants. Specifically, I have attempted to utilize a range of methods and analyses that reflect the notion that children are unique, capable environmental actors who view and experience their environments in ways different not only from adults, but also from one another. This includes utilizing insights from both quantitative and qualitative methods, and a concerted effort to integrate these data with one another to better inform these understandings. I have intentionally utilized multiple tools simultaneously, many of which are interactive or child-led, in order to broaden the ways in which the children could convey their individual environmental experiences, and which gave them multiple vehicles for expressing their views.

Whenever possible, I have also tried to utilize approaches that position child participants as co-researchers, and minimize my own appearance as an authority figure. In all of my personal dealings with children, I was careful that my dress, my dialogue and even my body language reflected my position as a genuinely interested student researcher rather than an expert or authority figure. I worked to gain their trust and establish friendly, informal relationships. Particularly for those exercises that necessarily had to be conducted within a school environment, I was careful that my dress and demeanor distinguished me from the teachers and other authority figures at the school. Neutral, non-classroom spaces were chosen as the setting for these interactions whenever possible.

During analysis and interpretation stages I attempted to remain cognizant of each child's unique experience, and specifically sought to corroborate any interpretations through multiple sources of data to minimize the influence of my own experiences. Overall, through both the chosen methodologies and my own personal conduct, I actively tried to

create a balanced, safe and non-judgmental environment in which I could work in concert with the children to genuinely explore and document their distinctive lifeworlds.

## 2.2 Contributions

This dissertation contributes to the scarce body of literature pertaining to children's perception and use of their neighbourhood environments, and the socio-spatial factors that influence their everyday geographies within these local settings. Although there has been a recent surge in work investigating aspects of children's neighbourhood behaviour, the focus has been almost exclusively on the locations of or barriers to children's physical activity. This work represents a valuable contribution considering the disturbing increase in the incidence of overweight and obesity among children, but the narrow focus on active behaviours disregards the diverse array of neighbourhood interactions that can support children's overall health and development. Despite the adoption of an ecological approach in many recent child-environment studies, in theory recognizing the need for a holistic view of children's influential environments, a focus strictly on physically active behaviours fails to consider children's healthy behaviours in a holistic way as well. Physical activity is but a small component of the wide range of behaviours and experiences necessary to support children's health and well-being. Physically active behaviours are also not a discrete activity but rather a natural component of the many other occupations of children, especially the occupation of play (Burdette & Whitaker, 2005a). It is through play that children challenge themselves in order to develop skills and scaffold their own healthy development, including through physically active behaviours (Burke, 2005; Gleave & Cole-Hamilton, 2012; Valentine & McKendrick, 1997). Physical activity should not be divorced from the concept or study of play, even when we are trying to understand the environmental factors that might improve engagement in physically active behaviour. The three studies in this thesis therefore focus on the entire range of behaviours in which children engage in their local neighbourhood environments, and contribute to our broader understanding of their everyday neighbourhood geographies.

It is also critical to understand the motivations and perceptions that underscore children's environmental behaviours. Some research suggests that children are inherently motivated to engage in health- and development-promoting behaviours, such as active play (Burdette & Whitaker, 2005a) but children's geographers have also illustrated that children of varying age and development-related intentions will seek out and value very different environments than one another (Chawla 1992; Matthews and Limb 1999; McKendrick 2001; Moore 1986; Kyttä 2003; Spencer and Blades 2006). To understand the needs and preferences that drive these complex interactions, researchers must supplement larger quantitative studies with the employment of qualitative methods which more effectively capture children's unique voices and experiences. These more detailed and nuanced investigations are better positioned to pierce the veil shrouding the lifeworlds of children (Burke, 2007; Darbyshire et al., 2005; Wridt, 2010) and to 'ground truth' those factors that surface in larger studies as being influential for children's behaviour and health. The studies contained within this dissertation are therefore intended to contribute to the small but growing literature that explores the lived experiences of children in neighbourhoods within particular socio-cultural and environmental contexts so that we may more sensitively apply findings to local health and planning policies.

Although the cross-sectional nature of these studies may limit the development of the generalizable findings so many large scale studies are attempting to unearth, I do not believe that the relatively small set of participants or the case study nature of the investigations degrades the import or value of their findings. In fact, given my promotion of the tenet that there is no single, universal experience of childhood due to the moderating role of context (Holt and Holloway 2006; Holloway and Valentine 2000; James, Jenks, and Prout 1998), smaller case studies such as these make valuable contributions to our understanding of children's environmental behaviours as they manifest in specific contexts and cultures. For example, there is now a fairly large body of research related to the environmental influences on children's physical activity, including active travel, however, the consistently mixed results of these studies (see reviews by Davison and Lawson 2006; Panter, Jones, and van Sluijs 2008) demonstrate

that though there may be some overarching moderators of children's neighbourhood behaviour, such as child age and gender, it is also clear that the wide range of social and physical environmental factors specific to a given region or neighbourhood uniquely impact individual inhabitants to stimulate diverse environmental experiences, behaviour and even health outcomes. The distinctive interaction of contextual and compositional factors for a given individual should not be lost in our efforts to understand broader patterns. Therefore, in addition to studies using large scale datasets, we must supplement these studies with smaller, more focused studies of children in specific locations, such as those outlined in this dissertation, to examine how structural and contextual elements interact with the skills, freedoms, perceptions and intentions of even a single child. Then we may begin to grasp the myriad ways these factors influence children's health and development at individual and local levels.

Finally, one of the most innovative components of this dissertation is the promotion and use of participatory and mixed methods which not only provide many vehicles for capturing and understanding children's behaviour, but which also attempt to involve children as co-researchers as much as possible, privileging their perspectives and narratives. In addition to the contributions to academic scholarship, the participatory processes utilized in these studies provided an outlet for children to express their views about their communities and to advocate for their own needs and preferences. Providing such opportunities should be a primary goal of contemporary research with children.

## **2.3 Motivations**

Since the age of 12 years old, almost every role or job I have held has involved the care, education or study of children. In addition to countless years of babysitting, I spent my teens and 20s teaching children at a national music camp, running a university day care program, acting as a summer school teaching assistant and then directing a university science and engineering camp for youth. I have also worked with children to design and build playgrounds in both Canada and Peru, and redesigned the attractions at a popular children's fun park. An undergraduate degree in Civil Engineering fed my lifelong interest in architecture and building, but it wasn't until I discovered the field of

Environmental Design that I was able to combine my enthusiasm for environment-behaviour research with my interest in the play and place needs of children. When I undertook a Master's Degree in Environmental Design, focusing my research on children's environments was a natural choice. This work established my foundation in children's environments research, and instilled a commitment to supporting evidence-based design of environments for children and youth.

There is now a substantial body of work on children's environmental preferences and experiences, yet little of this knowledge is informing contemporary policy or practice related to providing supportive, healthy environments for children. There is a great need for continued and context-specific research evidence that can inform appropriate and sensitive environmental 'child-friendly' design. I also believe that it is imperative that we find more and better ways of integrating children into the planning and decision-making processes that affect their experience of their community environments. I have witnessed first-hand children's articulate, humorous and savvy evaluations of their community environments. I believe strongly in their right and ability to participate in the design and planning of their communities. My intention in pursuing a PhD related to children's neighbourhood geographies was to contribute to our understanding of the ways in which community environments influence the freedom and opportunity children have to engage in activities key to their healthy development, as well as to demonstrate children's extraordinary capacity for meaningful contribution to community assessment, research and planning.

## 2.4 References

Burdette, H. L., & Whitaker, R. C. (2005). A National Study of Neighborhood Safety, Outdoor Play, Television Viewing, and Obesity in Preschool Children. *Pediatrics*, *116*(3), 657–662.

Burke, C. (2005). "Play in focus": Children researching their own spaces and places for play. *Children, Youth and Environments*, *15*(1), 27–53.

Burke, C. (2007). The view of the child: Releasing "visual voices" in the design of learning environments. *Discourse: Studies in the Cultural Politics of Education*, *28*(3), 359–372.

- Chawla, L. (1992). Childhood Place Attachments. In I. & L. Altman S.M. (Ed.), *Human behavior and environment: Advances in theory and research* (Vol. 12). New York: Plenum.
- Darbyshire, P., MacDougall, C., & Schiller, W. (2005). Multiple methods in qualitative research with children: More insight or just more? *Qualitative Research*, 5(4), 417–436.
- Davison, K. K., & Lawson, C. T. (2006). Do attributes in the physical environment influence children's physical activity? A review of the literature. *International Journal of Behavioral Nutrition and Physical Activity*, 3(1), 19.
- Gleave, J., & Cole-Hamilton, I. (2012). *A world without play : A literature review*. PlayEngland.
- Holloway, S. L., & Valentine, G. (2000). Spatiality and the New Social Studies of Childhood. *Sociology*, 34(4), 763–783.
- Holt, L., & Holloway, S. L. (2006). Editorial: Theorising other childhoods in a globalised World. *Children's Geographies*, 4(2), 135–142.
- James, A., Jenks, C., & Prout, A. (1998). *Theorizing Childhood*. Williston, VT: Teachers College Press.
- Kyttä, M. (2003). *Children in outdoor contexts: Affordances and independent mobility in the assessment of environmental child friendliness*. Helsinki University of Technology.
- Matthews, H., & Limb, M. (1999). Defining an agenda for the geography of children: review and prospect. *Progress in Human Geography*, 23(1), 61–90.
- McKendrick, J. H. (2001). Coming of age: Rethinking the role of children in population studies. *International Journal of Population Geography*, 7(6), 461–472.
- Moore, R. (1986). *Childhood's domain: Play and place in child development*. Croom Helm Ltd.
- Panter, J. R., Jones, A. P., & van Sluijs, E. M. (2008). Environmental determinants of active travel in youth: a review and framework for future research. *The international journal of behavioral nutrition and physical activity*, 5, 34.
- Spencer, C., & Blades, M. (2006). *Children and their environments: Learning, using and designing spaces*. Cambridge University Press.
- Valentine, G., & McKendrick, J. (1997). Children's outdoor play: Exploring parental concerns about children's safety and the changing nature of childhood. *Geoforum*, 28(2), 219–235.
- Wridt, P. (2010). A qualitative GIS approach to mapping urban neighborhoods with children to promote physical activity and child-friendly community planning. *Environment and Planning B: Planning and Design*, 37(1), 129–147.

## Chapter 3

### 3 Literature review

#### 3.1 The nature and role of neighbourhood

In order to examine the role of neighbourhoods in children's healthy activities, it is necessary to examine the concept of 'neighbourhood' itself and ways in which it can be characterized and operationalized for environment-behaviour research. The ability to describe, measure and study complex, large-scale environments such as neighbourhoods have posed significant challenges for geographers as well as planners (Knox & Pinch, 2006; Kweon, Ellis, Lee, & Rogers, 2006; Weden et al., 2008). Knox & Pinch suggest that a key issue has been to unravel the tightly-knit social networks which can constitute a 'community', and the degree to which these are related to, or underscore the development of, a spatially defined 'neighbourhood' (2006). The term remains ambiguous in geography, alternately considered to be synonymous with 'community' and implying an associated social system, or as a generic term for a bounded setting in which inhabitants exhibit relatively similar socio-demographic characteristics, and which is unrelated to social networks or cultures which may be present (Johnston, 2000; Knox & Pinch, 2006). Geographers, as well as planners, will often demarcate neighbourhoods via artificial, but convenient, administrative boundaries, such as those defined by census tracts or postal codes, and often characterize them based on simple aggregates of the social characteristics of neighbourhood residents (Coulton, Korbin, Chan, & Su, 2001; Cummins et al., 2005; Weden et al., 2008). Public understanding and use of the term, however, often reflects the notion of a particular spirit of cohesiveness and mutuality, and can be related to affective bonds to the place itself as well as one's neighbours (Knox & Pinch, 2006; Talen, 1999). For many people their neighbourhood is a meaningful setting which contributes to the constitution of their personal identities (Cragg, 1998; Entrikin, 1991). These differences in measurement and perspective can mean that the neighbourhood, as defined by researchers, can be quite different than those of community planners, both of which may bear little resemblance to the socio-spatially defined

neighbourhood constructs perceived by its inhabitants (Coulton et al., 2001; Kweon et al., 2006; Weden et al., 2008).

These differences have methodological implications for the ways in which geographers or planners measure neighbourhood environments. Recognition of the discrepancies between the subjective perceptions of residents and the more objective views of planners and researchers derived via census proxies or spatial analyses have made characterizing or measuring the 'true' neighbourhood context problematic (Cummins et al., 2005). Recent work has begun to concentrate on refining both objective and subjective measures and analyses, to better capture the particular character of a given neighbourhood from both the 'outside' and the 'inside', and resolve discrepancies between various conceptions of local contexts (Coulton et al. 2001; Cummins et al. 2005; Holt et al. 2008). Rudkin & Davis suggest that the definition, operationalization and quantification of key concepts such as 'neighbourhood' and 'community' must be given more critical attention within the scholarly literature (2007; Weden, Carpiano, and Robert 2008).

The common notion that residents' experience their neighbourhood as 'community' is not uniform or static across all such settings. Many scholars and designers have suggested that contemporary suburban developments do not engender the development of this community spirit or cohesiveness; rather, the predominant form and culture of suburbia is seen by many to reflect the erosion of a sense of both place and community (Cragg, 1998; Knox & Pinch, 2006; Relph, 1976; Talen, 1999). The ubiquitous, homogeneous sprawling suburban developments, and the neighbourhood planning policies and practices which underscore them, have also recently come under intense fire from both scholars and designers who have implicated the modern suburban environment in a number of social ills. The homogeneous land use of the modern suburb, poorly connected by pedestrian pathways to destination both within and outside of the neighbourhood, are seen as hindering the ability of residents to engage in physical activities such as walking, and requiring increasing reliance on automobiles, both of which are considered to be contributing to poor health outcomes, including rising rates of obesity among both adults and children (Davison and Lawson 2006; Jackson 2003; Srinivasan, O'Fallon, and Dearth 2003; Frank and Engelke 2001).



The New Urbanism movement specifically attempts to combat the common response to suburban neighbourhood development, and suggests that healthy, cohesive communities can be created by way of designs which reflect a return to the smaller scale, more socially and spatially integrated settings which characterized neighbourhoods earlier in the twentieth century (Talen, 1999). The social doctrine of the New Urbanists claims that planning practices, such as the careful integration of public and private spaces, the delineation of neighbourhood boundaries and the development of a clearly defined community 'centre', will foster the social interactions necessary to develop communality and provide the environments to support health lifestyles (Talen, 1999). A review by Talen suggests that the vast majority of social science research does not support the claims of the New Urbanists, in part because the overly optimistic and somewhat deterministic expectations of the built environment (1999), as well as demonstration that residents in fact prefer the private and socially homogeneous nature of modern suburban life (Knox & Pinch, 2006; Talen, 1999). When considered in combination with the advances in transportation infrastructure and information technologies which foster the development of stronger ties with more geographically distant, and even global, social and cultural networks which are not place-bound nor reliant on personal contact, these findings suggest that we may be seeing significant changes in the nature of our relationships with neighbourhoods in general (Knox & Pinch, 2006; Talen, 1999).

The neighbourhood may, however, remain a significant setting in the lives of children, particularly given that they are generally more physically captive to their environments, and the opportunities they afford (Macintyre et al., 2002). This domain has traditionally been a critical arena where children learn about themselves and their environments by negotiating social, cultural, and physical worlds beyond their home. It serves as one of the first public platforms where children explore burgeoning interests and capabilities, experiment with new roles and realities, and begin to build relationships with and within their community (Christensen 2003; Churchman 2003; Clark and Uzzell 2002; Spencer and Woolley 2000). Community settings have tended to take on increasing importance as a child matures and gains the competencies to explore the settings beyond the immediate home environment; neighbourhoods provide a more complex environment which requires

more sophisticated skills and understandings (Churchman 2003; Sutton and Kemp 2002; Matthews 1992; Moore 1986). Independent exploration of their neighbourhood environment, and the carving out of meaningful places for activity and interaction within this setting, are also crucial steps in the development of children's self-identity and environmental competence (Rissotto and Giuliani 2006; Woolley 2006; Spencer 2005; Churchman 2003). The degree to which a neighbourhood is experienced by children as 'friendly' is related to its ability to support these critical activities and interactions of childhood.

### **3.2 Child-friendly neighbourhoods**

Riggio characterizes child-friendly cities as places "where children's right to a healthy, caring, protective, educative, stimulating, non-discriminating, inclusive, culturally rich environment are addressed" (2002, p. 45). Numerous studies of children's environmental use and preferences suggest that child-friendly cities exhibit a careful balance between the protection and freedom of children; indicators of 'friendliness' might then include access to attractive and safe settings that support a diverse range of activities and interactions, as well as independent movement through the neighbourhood (Chawla, 2002b; Francis & Lorenzo, 2002; Kytä, 2003; Moore, 1986a). Churchman also suggests that a neighbourhood is child- or youth-friendly to the extent that the predominant messages that it sends to resident children make them feel welcomed and that they are an equal and valued member of the community (2003). This message can be transmitted through the types of places the neighbourhood provides for children to play and gather safely and legitimately, as well as the attitudes and behaviours of the adult portion of the population regarding the degree to which children belong in various community settings (Churchman, 2003; Lynch, Banerjee, & UNESCO, 1977; Woolley, Dunn, Spencer, Short, & Rowley, 1999). Other studies with children and youth consistently confirm that the ability to freely gather with their friends in neighbourhood public places, and the freedom to act as they choose within these spaces, are key to engendering a sense of belonging, place attachment and legitimate dwelling (Chawla and UNESCO 2002; Cosco and Moore 2002; Kytä 2003; Woolley et al. 1999). While it is true that children and adults have different relationships with their neighbourhood environments, stemming from both

different capabilities and different interests or goals (Burke 2005; Chawla and Malone 2003; Jones 2001; Rasmussen and Smidt 2003) an ‘adult-friendly’ and ‘child-friendly’ neighbourhood are not inherently antithetical concepts in theory. These criteria could conceivably be considered those necessary for ‘people-friendly’ environments.

In practice, however, many contemporary neighbourhood environments could be described *only* as ‘adult-friendly’. While they may not consciously aim to be child-unfriendly, they implicitly reflect the misunderstanding that children’s place needs are no different than those of adults, and give no particular consideration to children (Frank et al. 2006; Knowles-Yanez 2005; Matthews 1995). Such environments fail to acknowledge that neighbourhoods are extremely relevant to the lives of children or that they are influential in different ways than they are for adults (Churchman 2003; Matthews 1995). The concept of a ‘child-friendly’ city or neighbourhood is also often mistakenly construed as an alternative place that caters first and foremost to the needs of children, considering the needs of adults a distant second (Matthews 1995). Rather, most proponents, including myself, would characterize them as shared settings which recognize that children, by virtue of their differing interests and capabilities, need and value different neighbourhood elements than adults, and attempts to effectively accommodate the needs of both (Chawla and Malone 2003; Kytä 2003). This means that the needs of children and youth are not just considered to have been met with the provision of token ‘places for children’ such as playgrounds or parks which meet only a narrow range of children’s place needs, and which serve to separate children from adults and ‘adult spaces’ (Aitken 2001; Churchman 2003; Matthews 1995; Rasmussen 2004; Travlou et al. 2008). A shared setting concept means that the neighbourhood as a whole, from its land uses, public facilities, and infrastructure, to the attitudes and policies of its politicians, planners and adult residents, collectively project that this environment is a safe, inclusive and welcoming ‘children’s place’ rather than one which primarily reflects adult values and usages (Hart 1992; Matthews 1995; Spencer and Woolley 2000; Woolley et al. 1999). Unfortunately, most neighbourhoods and cities remain child- and youth-unfriendly. Very little public or academic attention has been paid to children’s neighbourhood needs and perceptions (Hart, 1992; Matthews, 1995; Spencer & Woolley,

2000; Woolley et al., 1999). Planning processes and policies generally do not reflect consideration for, or even an interest in, children's place needs and preferences (Dennis 2006; Carr et al. 1993; Frank 2006; Knowles-Yanez 2005). Not surprisingly, a number of recent studies reveal that children and youth feel frustrated with their lack of access to public places and the intolerant reactions of many adults; they generally feel disconnected from and powerless in their local settings (Chawla and Malone 2003; Frank 2006; Matthews 1995; Valentine 1997).

### **3.3 Children's changing neighbourhood experience**

Traditionally, the neighbourhood has served as a crucial arena for children's exploration and play activities, particularly in the stage of middle childhood (Chawla, 1992; Christensen & O'Brien, 2003; Hart, 1979; Jack, 2008; Loukaitou-sideris, 2003; Matthews, 1992; Moore, 1986b; Sutton & Kemp, 2002). Research has traditionally suggested that around the age of 7 or 8 years, when children have mastered the challenges of the home environment, they become drawn to exploring the neighbourhood environment, and the new social and physical environments it holds (Chawla, 2002a; Hart, 1979; Hillman, Adams, & Whitelegg, 1990; Matthews, 1987, 1992; Spilsbury, 2005). Children's interactions in the outdoor, public settings of the neighbourhood, from about the age of 7 until the beginning of adolescence around 13 or 14 years of age, have been linked with key physical, social and cognitive developments. In the neighbourhood, children build social relationships beyond their families and strengthen their physical, psychological and cognitive abilities to negotiate new environmental conditions and challenges (Bartlett et al., 1999; Burdette & Whitaker, 2005a; Burke, 2005; Churchman, 2003; Gill, 2007; Prezza & Pacilli, 2007). As they develop both competence and confidence, children will push the boundaries of their domains, exploring settings further and further from home and in turn fostering further development (Chawla, 2002a; Hart, 1979; Hillman et al., 1990; Matthews, 1992; Rissotto & Tonucci, 2002; Spilsbury, 2005; Woolley, 2006).

Children's use and experience of their neighbourhoods, however, is rapidly changing as a result of number of worrying trends. A number of geographers have recently drawn

attention to the moral panic that has gripped the public and bred unprecedented concern for safety in public space, both *for children* and *from children* (Aitken 2001; Collins and Kearns 2001; Holloway and Valentine 2000). Increasingly pervasive, yet contradictory, perceptions alternately characterize children and youth as either innocent, vulnerable ‘angels’ in need of protection, or unruly and delinquent ‘devils’ from whom the public must be protected (Aitken 2001; Collins and Kearns 2001; Valentine 1996). Ironically, both characterizations have led to measures designed to remove children and youth from public space.

The perception of children as vulnerable ‘angels’ rests primarily with parents and caregivers, who consider their children to be at substantial risk in the public realm of the neighbourhood when unaccompanied by an adult. Parental fears centre primarily around the risk of abduction of their children by strangers, but also include more place-specific concerns such as the high potential for injury from local traffic, and harassment or harm at the hands of neighbourhood adults or bullies (Chawla and Malone 2003; Jack 2008; Mackett et al. 2007; Matthews and Limb 1999; Pooley, Turnbull, and Adams 2005; Valentine 1997). This protective standpoint of parents is also influenced by socio-cultural norms and values, including cultural practices (Bjorklid, 1982; Valentine, 1997) or pressure to conform to locally valued care-giving practices (Bartlett et al. 1999; Valentine 1997).

In response to these anxieties about safety, many parents (primarily in Western, developed countries) have begun severely limiting their children’s access to neighbourhood places, mobility within the confines of the community, and the types of activities in which they can engage in these settings (Burke 2005; Werner, Brown, and Altman 2002; Jack 2008; Mackett et al. 2007; Woolley 2006). As a result, we have seen a significant decrease in children’s independent activity and exploration within neighbourhood settings in recent years. A study by Hillman and colleagues (1990) in the UK revealed that the percentage of children aged 7-8 years who were allowed to travel alone to school dropped from 80% in 1971 to just 9% in 1990. Other more recent studies have corroborated the sharp decline (Pooley, Turnbull, and Adams 2005; Mackett et al. 2005; Mackett et al. 2007; Panter, Jones, and van Sluijs 2008; McMillan 2007;

Villanueva et al. 2012; O'Brien et al. 2000). A number of researchers cite the increased urbanization and higher volumes of motorized traffic as contributing to decreased independent travel among children (Karsten 2005; Mikkelsen and Christensen 2009; Valentine 1997). Jack also contends that the type and spatial range of outdoor activities that parents and caregivers feel are sufficiently safe or socially acceptable for their children is becoming increasingly small, with restrictions extending to much older ages than have traditionally been the case (2008). For example, a recent poll in the UK found that almost 50% of adults felt that children under the age of 14 should not be allowed outside without adult supervision, even when in the company of peers; another survey suggests that activities such as climbing trees, playing in local parks or on neighbourhood streets, or riding a bike to a neighbour's house, are often not condoned by parents unless an adult is present (Jack 2008; Kytta 2003).

Concerns about children's welfare in neighbourhood places have also been said to contribute to the increasing structuring and institutionalizing of children's daily lives and activities (Darbyshire et al., 2005; Graue et al., 1998; Matthews & Limb, 1999). Unstructured, 'free play' outdoors, considered critical to physical and psychological development, has given way to more structured and privatized forms of recreation (Burdette & Whitaker, 2005a; Darbyshire et al., 2005; Rasmussen, 2004). Between 1981 and 1997, the 'free play' time of children in the US saw a 25% drop (Burdette & Whitaker, 2005a). Many children are now more likely to spend their days sequencing through a series of 'protected', supervised environments, such as day care facilities, schools, and recreation facilities and spending a significant amount of their out-of-school time in structured activities such as private lessons or organized sports (Burdette & Whitaker, 2005a; Karsten, 2005; Shaw et al., 2012). Aitken suggests that this culture of fear has also spawned the development of commercial child care and play centres, where children engage in supervised play while their guardians are rest easy knowing their children are "safe from the perils of the streets" (2001, p. 124).

This is not to say that parental fears are not valid to some degree; children may in fact be vulnerable to some risk in their neighbourhoods from traffic, from adult strangers, and even from older children (Chawla and Malone 2003; Churchman 2003). However, the

actual risk to children is generally less than is perceived or reported; the response is not necessarily proportional to the risk (McMillan 2005; Valentine 1997; Woolley 2006). Valentine (1997) and Katz (1995) are among the scholars to suggest that the pervasive discourses regarding ‘stranger danger’ and other environmental risks, which are incessantly fueled by sensational media accounts (Aitken 2001; Jack 2008; Valentine 1997) amounts to “terror talk” (Katz, 1995, p. 3) which serves to unnecessarily limit the spatial autonomy and neighbourhood experiences of children. This common discourse also masks the fact that, for many children, the home is not the safe refuge it is assumed to be and that children are often more prone to danger in private spaces from domestic hazards or violence, and from adults known to them (Valentine 1997).

These anxieties reflect a dominant presumption on the part of parents that children themselves are not capable of either evaluating risk or taking appropriate measures to avoid or cope with potential dangers or hazards (Valentine, 1997; Woolley et al., 1999). Studies with children, however, not only demonstrate their capacity to deal with perilous situations, but that they generally want to be able to manage their own environmental experiences, including its attendant risks (Chawla and Malone 2003; Dennis et al. 2008; Woolley et al. 1999). Children even express preference for places that seem scary or dangerous to some degree for the excitement and challenge offered by the setting, and the opportunity to master both the environment and their own fears (Hart, 1979; Woolley et al., 1999). Adults generally tend to underestimate children’s ability to handle the complexities of their spaces and places (Spencer and Blades 2006), and so restrict their neighbourhood activities and autonomy in the name of protection (Jack 2008; Valentine 1997).

Parents’ perceptions, of both their children and the perceived safety of their local environments, weigh heavily in the environmental freedom afforded to children and youth, and subsequently the type and range of their neighbourhood activities and experiences, particularly for younger children (Jack, 2008; Matthews, 1995; Matthews & Limb, 1999). Younger children, who are more dependent on their parents due to their more limited capabilities, also internalize the fears of their parents which in turn impacts their level of comfort in the neighbourhood and their subsequent use of local settings

(Matthews and Limb 1999; Woolley et al. 1999). Despite the fact that these increased restrictions have been imposed by well-intentioned parents and guardians as a strategy to minimize risk from harm, the significant declines in independent use of and free play with neighbourhood places may be engendering its own detrimental effects on children's health and development (Jack, 2008; Mikkelsen & Christensen, 2009; Shaw et al., 2012; Spilsbury, 2005; Tranter & Pawson, 2001; Woolley, 2006).

The parallel, but contradictory, discourse which paints children instead as public 'devils' is also contributing to children's changing experience and use of neighbourhood and city spaces. Traditionally, children and youth have been the most frequent users of public spaces in urban neighbourhoods (Dennis Jr, 2006), but, increasingly, neighbourhood public spaces have been the source and setting of conflict between adults and children/youth, due to the growing perception of these younger users as delinquents - perpetrators of crimes and harassers of the 'legitimate' users of public space - adults (Aitken, 2001; Clark & Uzzell, 2002; Travlou et al., 2008; Valentine, 1996). Their 'non-conforming' uses or 'unchildlike' behaviours, are seen as inappropriate and disruptive (Aitken 2001; Collins and Kearns 2001; Dennis 2006); even the mere presence of youth is seen as threatening (Aitken 2001; Matthews and Limb 1999). As a result, the place use and mobility of youth are being subjected to intense scrutiny and control within the public settings of their neighbourhoods (Aitken 2001; Collins and Kearns 2001; Valentine 1996).

Various legal, spatial and design measures are being employed to reinforce or recast public space as 'adult space' and to discourage or even criminalize the use of these spaces by children, youth and other unwelcome 'others' (Collins and Kearns 2001; Mitchell 2003; Travlou et al. 2008; Valentine 1996). A number of cities have enacted blatantly discriminatory curfews to prevent the use of public spaces by youth in the evenings, or have installed video surveillance or security personnel to patrol public spaces and police youth behaviours (Collins & Kearns, 2001a; Jack, 2008; Valentine, 1996). In some cases, municipal authorities are taking additional steps to deliberately design children and youth 'out' of the public realm, by incorporating environmental features or barriers which discourage loitering, as well as common youth activities such



as skateboarding (Travlou et al., 2008). Even in the common planning practice to provide neatly contained playgrounds as the primary, and often the only, neighbourhood ‘places for children’ can we see the implicit assumption that the city and neighbourhood are, on the whole, adult spaces.

These “discourses of deviance” and associated socio-spatial measures have been denounced by numerous scholars and youth advocates, who consider them to be control mechanisms which serve to reinforce the spatial hegemony of adults; the space itself is being used to (re)produce and (re)enforce adult control, use and authority as legitimate (Aitken 2001; Collins and Kearns 2001, 401). Numerous explicit and implicit neighbourhood features, policies and attitudes send a clear message to children and youth that they are infringing on adult space; they are not welcome, they do not belong (Aitken 2001; Collins and Kearns 2001; Dennis 2006; Valentine 1996). And children, given little choice are listening; as a result, children are becoming largely invisible in public space (Collins and Kearns 2001; Francis and Lorenzo 2002; Valentine 1997). In these cases, ‘adult-friendly’ *is* antithetical to ‘child-friendly’.

The net sum of these diverse changes to the perception of both children and their local environments has led to the prevailing perception that children’s neighbourhood ‘domains’ are shrinking. Though only a few researchers to date have focused on the spatial dimensions of what are alternatively called children’s ‘home ranges’, ‘territories’, ‘activity spaces’ or ‘neighbourhood domains’, and the ways in which these ‘ranges’ may have transformed or contracted within recent decades (see Gaster, 1991; Hillman et al., 1990; Karsten, 2005; Spilsbury, 2005), the findings to date supports growing anecdotal evidence that children’s local, independent geographies are significantly smaller than those of previous generations (Gaster, 1991; Hillman et al., 1990; Karsten, 2005; C. G. Pooley et al., 2005). Generally, the time and freedom contemporary Western children are given to independently explore and range through their neighbourhoods has been drastically reduced in the past few decades (Gill, 2011; Hofferth & Sandberg, 2001; Shaw et al., 2012; Spilsbury, 2005; Veitch, Salmon, & Ball, 2008). Karsten suggests that the settings of children’s play have changed so much within a few decades that, unlike earlier generations for whom play was synonymous with ‘outdoor play’, there are now

large cohorts of children who spend the majority of their free time indoors or else in the backseat of cars being chauffeured to a range of activity locations; these children spend little to no time outdoors or in settings around their neighbourhood (Karsten, 2005). Given the wealth of health- and development-related skills that are buttressed through independent neighbourhood interactions, and the glaring mismatch between perceived and actual risks posed by these environments, supporting the expansion of children's 'neighbourhood domains', and debunking the discourses that threaten neighbourhood use by children, should be a priority of both research and policy agendas within the fields of public health and urban planning.

### **3.4 The child's right to neighbourhood space and place**

It is ironic that the social and legal controls aimed at restricting or removing children and youth from public spaces are being enacted at the same time as the movement to install legal and policy measures that recognize children's rights to 'place' and places is gaining momentum. In 1989, the United Nations passed the *Convention on the Rights of Children*, which acknowledged that children were both full human beings and full citizens, and, though they were not accorded the full range of rights extended to adults, such as the right to vote, they were granted the greater range of freedoms associated with basic human rights (Bartlett et al. 1999; Chawla 2002; Hart 1992). These broader rights include the right to associate and gather freely with others, in both public and private spaces, as well as the right to have a say in all matters that impact their lives. This includes the right to participate, and have their voice heard and taken seriously, in planning processes or policy development related to the design and use of their private and public environments (Bartlett et al., 1999; Chawla, 2002b; Riggio, 2002). The Convention also publically acknowledged that children are not equally positioned in their ability to influence the decisions and policies which affect them; they are at a distinct disadvantage within the landscapes of power that govern policy- and decision-making (Bartlett et al. 1999; Hart 1992; Matthews and Limb 1999). The rights afforded by the Convention have since been reinforced through additional international policies and initiatives, and have been officially incorporated into many national, regional and municipal policy frameworks. These maneuvers represent in part an attempt to

destabilize the spatial hegemony of adults and rebalance the power structures related to the planning and use of public places (Frank 2006; Hart 1992). Though some community planners are attempting to include children and youth in participatory planning processes, many of these initiatives still only involve children in a tokenistic manner or result in only limited changes to preconceived plans, in part because these efforts are not supported by the broader planning and policy structures (Francis and Lorenzo 2002; Frank 2006).

Despite efforts towards acknowledging children's human and spatial rights and to integrate them within community participatory processes, the dominant discourses perpetuating the contemporary culture of fear regarding children are strongly informing socio-spatial practices which have in effect 'shrunk' the world of childhood (Jack, 2008; Woolley, 2006). These changes in the experience and use of neighbourhood spaces by children and youth are extremely worrisome given the role of independent, unstructured, community-based activities in fostering their healthy development, in addition to concerns regarding the infringements to the rights of children and youth. Significant changes to environmental and policy infrastructures may be required to (re)instate the neighbourhood as a supportive and legitimate place for children. These changes must also be paralleled by efforts to understand the actual risks to children in neighbourhood environments and increased acknowledgement on the part of adults of children's human rights and their value as community citizens.

It is clear that we require a deeper understanding of children's neighbourhood place use and experience, and the role that social and built environments, at micro- and macro-levels, influence children's ability to safely, legitimately and meaningfully engage with their neighbourhood environments. To do so, we need to employ better and more direct methods for examining children's neighbourhood behaviour and for soliciting their unique experience of these settings. Children's researcher and advocate Roger Hart long ago called for the need for the close observation of children in their natural settings in order to document and understand their place use (1979, 1984). Until recently, the ability to directly capture children's environmental behaviour has been difficult without engaging in involved ethnographic studies. The recent advent of highly portable

monitoring devices such as GPS loggers now allow for the direct and spatially-situated recording of children's place use in real time. The ability to integrate directly measured behaviour data such as GPS tracks with the powerful environmental analysis tools within Geographic Information Systems (GIS) is opening up new avenues for exploring children's everyday geographies. Combining this new type of situated activity data with engaging qualitative tools can help to open up a larger window into children's perceptions and behaviours and provide new and more nuanced understandings of their lifeworlds. These powerful new research and analysis tools can also help to provide more evidence to better inform both policy and practices that would establish legitimately child-friendly cities and neighbourhoods.

### 3.5 References

- Aitken, S. C. (2001). Global crises of childhood: rights, justice and the unchildlike child. *Area*, 33(2), 119–127.
- Bartlett, S., Hart, R., Satterthwaite, D., De La Barra, X., & Missair, A. (1999). *Cities for children: Children's rights, poverty and urban management*. Earthscan.
- Bjorklid, P. (1982). *Children's outdoor environment: A study of children's outdoor activities on two housing estates from the perspective of environmental and developmental psychology*. CWk Glerup.
- Burdette, H. L., & Whitaker, R. C. (2005). A National Study of Neighborhood Safety, Outdoor Play, Television Viewing, and Obesity in Preschool Children. *Pediatrics*, 116(3), 657–662.
- Burke, C. (2005). "Play in focus": Children researching their own spaces and places for play. *Children, Youth and Environments*, 15(1), 27–53.
- Carr, S., Francis, M., Rivlin, L., & Stone, A. (1993). *Public Space*. Cambridge University Press.
- Chawla, L. (1992). Childhood Place Attachments. In I. & L. Altman S.M. (Ed.), *Human behavior and environment: Advances in theory and research* (Vol. 12). New York: Plenum.
- Chawla, L. (2002a). "Insight, creativity and thoughts on the environment": integrating children and youth into human settlement development. *Environment and Urbanization*, 14(2), 11–22.
- Chawla, L. (2002b). Toward better cities for children and youth. In L. Chawla (Ed.), *Growing up in an urbanising world* (Vol. 13). Earthscan Publications Ltd.

- Chawla, L., & Malone, K. (2003). Neighborhood quality in children's eyes. In P Christensen & M. O'Brien (Eds.), *Children in the City: Home Neighbourhood and Community* (pp. 118–141). London and New York: Routledge/Falmer.
- Christensen, Pia. (2003). Place, space and knowledge: Children in the village and the city. In P Christensen & M. O'Brien (Eds.), *Children in the City*. London: Routledge/Falmer.
- Christensen, Pia, & O'Brien, M. (2003). Children in the city: Introducing new perspectives. *Children in the City: Home, Neighborhood, and Community* (pp. 1–12). London and New York: Routledge Falmer.
- Churchman, A. (2003). Is there a place for children in the city? *Journal of Urban Design*, 8(2), 99–111.
- Clark, C., & Uzzell, D. L. (2002). The affordances of the home, neighbourhood, school and town centre for adolescents. *Journal of Environmental Psychology*, 22(1-2), 95–108.
- Collins, D. C. A., & Kearns, R. A. (2001). The safe journeys of an enterprising school: negotiating landscapes of opportunity and risk. *Health and Place*, 7(4), 293–306.
- Cosco, N., & Moore, R. (2002). Our neighborhood is like that. In L. Chawla (Ed.), *Growing up in an urbanizing world*. London: UNESCO and Earthscan.
- Coulton, C. J., Korbin, J., Chan, T., & Su, M. (2001). Mapping residents' perceptions of neighborhood boundaries: A methodological note. *American Journal of Community Psychology*, 29(2), 371–383.
- Crang, M. (1998). Place or Space. *Cultural geography* (2nd ed.). London: Routledge.
- Cummins, S., Macintyre, S., Davidson, S., & Ellaway, A. (2005). Measuring neighbourhood social and material context: Generation and interpretation of ecological data from routine and non-routine sources. *Health and Place*, 11(3), 249–260.
- Darbyshire, P., MacDougall, C., & Schiller, W. (2005). Multiple methods in qualitative research with children: More insight or just more? *Qualitative Research*, 5(4), 417–436.
- Davison, K. K., & Lawson, C. T. (2006). Do attributes in the physical environment influence children's physical activity? A review of the literature. *International Journal of Behavioral Nutrition and Physical Activity*, 3(1), 19.
- Dennis Jr, S. F. (2006). Prospects for qualitative GIS at the intersection of youth development and participatory urban planning. *Environment and Planning A*, 38(11), 2039–2054.
- Dennis Jr, S. F., Gaulocher, S., Carpiano, R. M., & Brown, D. (2008). Participatory photo mapping (PPM): Exploring an integrated method for health and place research with young people. *Health & Place*, 15(2), 466–473.

- Entrikin, J. N. (1991). *The betweenness of place: Towards a geography of modernity*. Baltimore: Johns Hopkins University Press.
- Francis, M., & Lorenzo, R. A. Y. (2002). Seven realms of children's participation. *Journal of Environmental Psychology*, 22(1-2), 157–169.
- Frank, K. I. (2006). The potential of youth participation in planning. *Journal of Planning Literature*, 20(4), 351–371.
- Frank, L. D., & Engelke, P. O. (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.
- Frank, L. D., Sallis, J. F., Conway, T. L., Chapman, J. E., Saelens, B. E., & Bachman, W. (2006). Many pathways from land use to Hhealth: Associations between neighborhood walkability and active transportation, body mass index, and air quality. *Journal of the American Planning Association*, 72(1), 75–87.
- Gaster, S. (1991). Urban Children's Access to their Neighborhood. *Environment and Behavior*, 23(1), 70–85.
- Gill, T. (2007). *No Fear: Growing Up in a Risk Averse Society*. London, England: Calouste Gulbenkian Foundation.
- Gill, T. (2011). *Free range kids : Why children need simple pleasures and everyday freedom , and what we can do about it*.
- Graue, M. E., Walsh, D. J., Ceglowski, D., Dyson, A. H., Fernie, D. E., Kantor, R., Leavitt, R. L., et al. (1998). *Studying children in context: Theories, methods, and ethics*. Sage Publications Ltd.
- Hart, R. (1979). *Children's experience of place*. Halsted Press.
- Hart, R. (1984). The geography of children and children's geographies. In T. F. Saarinen, D. Seamon, & J. L. Sell (Eds.), *Environmental Perceptions and Behaviour: An inventory and prospect*. Research Paper No. 209. Chicago, IL: Department of Geography, University of Chicago.
- Hart, R. (1992). *Children's participation: From tokenism to citizenship*. UNICEF International Child Development Centre.
- Hillman, M., Adams, J., & Whitelegg, J. (1990). *One false move*. Policy Studies Institute London.
- Hofferth, S. L., & Sandberg, J. F. (2001). Changes in American Children's Time, 1981-1997. *Children at the millenium: Where have we come from, where are we going?* (Vol. 6, pp. 193–229). Elsevier Science Ltd.
- Holloway, S. L., & Valentine, G. (2000). Spatiality and the New Social Studies of Childhood. *Sociology*, 34(4), 763–783.

- Holt, N. L., Spence, J. C., Sehn, Z. L., & Cutumisu, N. (2008). Neighborhood and developmental differences in children's perceptions of opportunities for play and physical activity. *Health & Place, 14*(1), 2–14.
- Jack, G. (2008). Place Matters: The Significance of Place Attachments for Children's Well-Being. *British Journal of Social Work, 40*(3), bcn142.
- Jackson, L. E. (2003). The relationship of urban design to human health and condition. *Landscape and Urban Planning, 64*(4), 191–200.
- Johnston, R. J. (2000). *The dictionary of human geography*. Blackwell Publishers.
- Jones, O. (2001). "Before the Dark of Reason": Some Ethical and Epistemological Considerations on the Otherness of Children. *Ethics, Place & Environment, 4*(2), 173–178.
- Karsten, L. (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.
- Katz, L. G. (1995). *Talks with Teachers of Young Children: A Collection*. Ablex Publishing Corporation.
- Knowles-Yanez, K. (2005). Children's participation in planning processes. *Journal of Planning Literature, 20*(1), 3.
- Knox, P., & Pinch, S. (2006). Neighbourhood, community and the social construction of place. In P. Knox & S. Pinch (Eds.), *Urban and Social Geography*. Prentice Hall.
- Kweon, B. S., Ellis, C. D., Lee, S. W., & Rogers, G. O. (2006). Large-Scale Environmental Knowledge: Investigating the Relationship Between Self-Reported and Objectively Measured Physical Environments. *Environment and Behavior, 38*(1), 72.
- Kyttä, M. (2003). *Children in outdoor contexts: Affordances and independent mobility in the assessment of environmental child friendliness*. Helsinki University of Technology.
- Loukaitou-sideris, A. (2003). Children's Common Grounds: A Study of Intergroup Relations Among Children in Public Settings. *Journal of the American Planning Association, 69*(2), 130–143.
- Lynch, K., Banerjee, T., & UNESCO. (1977). *Growing up in cities: studies of the spatial environment of adolescence in Cracow, Melbourne, Mexico City, Salta, Toluca, and Warszawa*. MIT Press.
- Macintyre, S., Ellaway, A., & Cummins, S. (2002). Place effects on health: How can we conceptualise, operationalise and measure them? *Social Science & Medicine, 55*(1), 125–139.
- Mackett, R., Brown, B., Gong, Y., Kitazawa, K., & Paskins, J. (2007). Children's Independent Movement in the Local Environment. *Built Environment, 33*(4), 454–468.

- Mackett, R., Lucas, L., Paskins, J., & Turbin, J. (2005). The therapeutic value of children's everyday travel. *Transportation Research Part A: Policy and Practice*, 39(2-3), 205–219.
- Matthews, H. (1987). Gender, home range and environmental cognition. *Transactions of the Institute of British Geographers*, 12(1), 43–56.
- Matthews, H. (1992). *Making sense of place: Children's understanding of large-scale environments*. Harvester Wheatsheaf Hemel Hempstead.
- Matthews, H. (1995). Living on the edge: Children as "Outsiders." *Tijdschrift Voor Economische En Sociale Geografie*, 86(5), 456–466.
- Matthews, H., & Limb, M. (1999). Defining an agenda for the geography of children: review and prospect. *Progress in Human Geography*, 23(1), 61–90.
- McMillan, T. E. (2005). Urban form and a child's trip to school: The current literature and a framework for future research. *Journal of Planning Literature*, 19(4), 440.
- McMillan, T. E. (2007). The relative influence of urban form on a child's travel mode to school. *Transportation Research Part A: Policy and Practice*, 41(1), 69–79.
- Mikkelsen, M. R., & Christensen, P. (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.
- Mitchell, D. (2003). *The right to the city—Social justice and the fight for public space*. New York: The Guilford Press.
- Moore, R. (1986a). *Childhood's domain: Play and place in child development*. Croom Helm Ltd.
- Moore, R. (1986b). The power of nature orientations of girls and boys toward biotic and abiotic play settings on a reconstructed schoolyard. *Children's Environments Quarterly*, 3(3), 52–69.
- O'Brien, M., Jones, D., Sloan, D., & Rustin, M. (2000). Children's Independent Spatial Mobility in the Urban Public Realm. *Childhood*, 7(3), 257–277.
- Panter, J. R., Jones, A. P., & van Sluijs, E. M. (2008). Environmental determinants of active travel in youth: a review and framework for future research. *The international journal of behavioral nutrition and physical activity*, 5, 34.
- Pooley, C. G., Turnbull, J., & Adams, M. (2005). The journey to school in Britain since the 1940s: continuity and change. *Area*, 37(1), 43–53.
- Prezza, M., & Pacilli, M. G. (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.



- Rasmussen, K. (2004). Places for children-children's places. *Childhood, 11*(2), 155.
- Rasmussen, K., & Smidt, S. (2003). Children in the neighbourhood. The neighborhood in the children. In PM Christensen & M. O'Brien (Eds.), *Children in the City: Home, Neighborhood, and Community* (pp. 82–100). London: Routledge Falmer.
- Relph, E. (1976). *Place and placelessness*. London: Pion.
- Riggio, E. (2002). Child friendly cities: good governance in the best interests of the child. *Environment and Urbanization, 14*(2), 45.
- Rissotto, A., & Giuliani, M. V. (2006). Learning neighbourhood environments: the loss of experience in a modern world. In C. & B. Spencer M. (Ed.), *Children and Their Environments: Learning, Using and Designing Spaces*. Cambridge University Press.
- Rissotto, A., & Tonucci, F. (2002). Freedom of movement and environmental knowledge in elementary school children. *Journal of Environmental Psychology, 22*(1), 65–77.
- Shaw, B., Watson, B., Frauendienst, B., Redecker, A., Jones, T., & Hillman, M. (2012). *Children's independent mobility: A comparative study in England and Germany (1971-2010)*. London.
- Spencer, C. (2005). Place attachment, place identity and the development of the child's self-identity: Searching the literature to develop an hypothesis. *International Research in Geographical and Environmental Education, 14*(4), 305–309.
- Spencer, C., & Blades, M. (2006). *Children and their environments: Learning, using and designing spaces*. Cambridge University Press.
- Spencer, C., & Woolley, H. (2000). Children and the city: A summary of recent environmental psychology research. *Child: Care, Health & Development, 26*(3), 181.
- Spilsbury, J. (2005). "We Don't Really Get To Go Out in the Front Yard"—Children's Home Range and Neighborhood Violence. *Children's Geographies, 3*(1), 79–99.
- Srinivasan, S., O'Fallon, L. R., & Deary, A. (2003). Creating healthy communities, healthy homes, healthy people: Initiating a research agenda on the built environment and public health. *Am J Public Health, 93*(9), 1446–1450.
- Sutton, S. E., & Kemp, S. P. (2002). Children as partners in neighborhood placemaking: Lessons from intergenerational design charrettes. *Journal of Environmental Psychology, 22*(1-2), 171–189.
- Talen, E. (1999). Sense of community and neighbourhood Form: An assessment of the social doctrine of new urbanism. *Urban Studies, 36*(8), 1361–1379.
- Tranter, P., & Pawson, E. (2001). Children's access to local environments: A case-study of Christchurch, New Zealand. *Local Environment, 6*(1), 27–48.

Travlou, P., Owens, P. E., Thompson, C. W., & Maxwell, L. (2008). Place mapping with teenagers: Locating their territories and documenting their experience of the public realm. *Children's Geographies*, 6(3), 309–326.

Valentine, G. (1996). Angels and devils: moral landscapes of childhood. *Environment and Planning D*, 14, 581–600.

Valentine, G. (1997). “Oh yes I can” “Oh no you can’t”: Children and parents’ understandings of kids' competence to negotiate public space safely. *Antipode*, 29(1), 65–89.

Veitch, J., Salmon, J., & Ball, K. (2008). Children’s active free play in local neighborhoods: a behavioral mapping study. *Health education research*, 23(5), 870–9.

Villanueva, K., Giles-Corti, B., Bulsara, M., McCormack, G. R., Timperio, A., Middleton, N., Beesley, B., et al. (2012). How far do children travel from their homes? Exploring children’s activity spaces in their neighborhood. *Health & Place*, 18(2), 263–273.

Weden, M. M., Carpiano, R. M., & Robert, S. A. (2008). Subjective and objective neighborhood characteristics and adult health. *Social Science & Medicine*, 66(6), 1256–1270.

Werner, C. M., Brown, B. B., & Altman, I. (2002). Transactionally oriented research: Examples and strategies. In R. & C. Bechtel A. (Ed.), *Handbook of environmental psychology* (pp. 203–221). New York: John Wiley & Sons.

Woolley, H. (2006). Freedom of the city: Contemporary issues and policy influences on children and young people’s use of public open space in England. *Children's Geographies*, 4(1), 45–59.

Woolley, H., Dunn, J., Spencer, C., Short, T., & Rowley, G. (1999). Children describe their experiences of the city centre: A qualitative study of the fears and concerns which may limit their full participation. *Landscape Research*, 24(3), 287–301.

## Chapter 4

### 4 Child-led tours to uncover children's perceptions and use of neighbourhood environments

#### 4.1 Abstract

This pilot study tested a child-guided protocol integrating qualitative field techniques with spatial analysis tools to explore children's neighbourhood perceptions and use. Sixteen children aged 7-9 in London, Canada led researchers and city planners on guided walks of their school neighbourhood to document and discuss places of significance to them. Children were equipped with digital cameras and maps to record neighbourhood features, while adult facilitators recorded the ongoing dialogue and tracked the routes taken with GPS units. Children's photographs from the walks supported a group photo-elicitation exercise that further probed and clarified the children's community perspectives. Location data from the GPS and narratives allowed for the analysis of children's comments and photographs within a geographic information system (GIS). Thematic and spatial analysis of narratives and photographs revealed significant but complex patterns of neighbourhood perception and use, suggesting that this child-led protocol is an effective tool for engaging children in community assessment and for revealing their local lived experience.

#### 4.2 Introduction

Increasing recognition that children's everyday environments play a role in their activities, health, and well-being has provided the impetus for delving deeper into the spatial context of children's activities, and for exploring more directly the lived experience of children in their local environments (Cummins et al., 2007; Dannenberg et al., 2003; Gilliland et al., 2006; Jackson, 2003; Matthews, 2003; McMillan, 2005; Spencer & Woolley, 2000; Srinivasan et al., 2003). Greater attention has been focused in

recent years on neighbourhood settings in particular, and the impact of their physical and social conditions on children's health and behaviour (Carpiano 2009; Weden, Carpiano and Robert 2008; Cummins et al. 2007; Christensen and O'Brien 2003; Beauvais and Jenson 2003). This paper presents results from a pilot study designed to test a child-guided protocol that pairs qualitative field techniques with digital and spatial analysis tools to better explore children's neighbourhood perceptions and use. Our objectives for this pilot study were threefold. First, to field test the effectiveness of our selected tools for capturing children's neighbourhood perspectives and experiences, and their suitability for both behavioural research and community participatory planning. Secondly, we aimed to identify patterns in resident children's environmental perceptions and behaviour within the study neighbourhood. Our third objective was to actively involve local children in an evaluation of their community environment, and provide the opportunity to convey their perceptions and priorities directly to local planners, who served as field facilitators. Following a review of key literature and the justification for this study, this paper outlines the combination of methods and tools utilized, and reflects on key findings from thematic and spatial analyses. We conclude by considering the effectiveness of the methodologies for uncovering children's neighbourhood perceptions and use, as well as their suitability as tools for participatory community assessment and design.

#### **4.2.1 The neighbourhood environment in the life of the child**

The neighbourhood has traditionally been a critical arena where children learn about themselves and their environments by negotiating social, cultural, and physical worlds beyond their home. It serves as one of the first public platforms where children explore burgeoning interests and capabilities, experiment with new roles and realities, and begin to build relationships with and within their community (Loukaitou-Sideris 2003; Churchman 2003; Christensen and O'Brien 2003; Sutton and Kemp 2002; Clark and Uzzell 2002; Spencer and Woolley 2000; Matthews and Tucker 2000). Independent exploration of their neighbourhood environment, and the carving out of meaningful places for activity and interaction within this setting, are also crucial steps in the development of children's self-identity and environmental competence (Woolley 2006; Weller 2006; Rissotto and Guiliani 2006; Churchman 2003; Hart 1979). Recent research

exploring neighbourhood-level effects on health and behaviour suggests that although individual-level factors remain most influential, children are also impacted by the collective characteristics of their community, such as its socioeconomic circumstances, the availability and quality of its resources, the nature of its built form, and the perceived level of neighbourhood safety (Cummins et al. 2005; Ross, Tremblay and Graham 2004; Chawla and Malone 2003; Beauvais and Jenson 2003; Leventhal and Brooks-Gunn 2000; Jencks and Mayer 1990). These conditions can either cultivate or impede children's activity and mobility, as well as their overall physical and psychological health (Tucker et al. 2009; Frank et al. 2005; Chawla and Malone 2003; Spencer and Woolley 2000; Sallis, Prochaska and Taylor 2000). A neighbourhood with the social and physical resources to support rich interactions can scaffold children's skill and confidence development, and encourage healthy behaviours and attitudes that can carry through to adulthood (Darbyshire, MacDougall and Schiller 2005; Chawla and Malone 2003; Churchman 2003).

The nature and scope of children's activities within their neighbourhood environments have changed over the last several decades in ways that may be detrimental to their health and development (McMillan 2005; Darbyshire, MacDougall and Schiller 2005; Burke 2005; Valentine 1997b). Unstructured outdoor play, considered critical to physical and psychological development, has given way to more structured and privatized forms of recreation (Darbyshire, MacDougall and Schiller 2005; Rasmussen 2004; Buckingham 2000). Children's independent exploration of their neighbourhoods has also sharply declined, primarily undermined by increasing parental restrictions due to a perception of danger or risk inherent in unsupervised activity (Rissotto and Guiliani 2006; Dennis 2006; Burke 2005; Sutton and Kemp 2002; Valentine 1997a; 1997b; Moore 1986). Outdoor neighbourhood activities must also increasingly compete with the appeal of sedentary indoor pursuits such as television, video games and computers, which now comprise 20 hours per week within the recreational life of the typical Canadian child (Shields 2005). However, when children and youth are outside and utilizing public spaces, they are now more likely to be considered "out of place" by adult residents, who often oppose the presence of youth, assuming they are engaging in disruptive or

delinquent behaviour (Weller 2006; Darbyshire, MacDougall and Schiller 2005; Morrow 2001; Matthews, Limb & Percy Smith, 1998). As a result, use of public places by children has become increasingly monitored and controlled, further restricting opportunities for interaction and learning in community spaces (Frank 2006; Weller 2006; Woolley 2006; Collins and Kearns 2001; Matthews and Limb 1999).

#### **4.2.2 Integrating children's voices into community research and planning**

Despite increasing recognition of its influence on the health and development of children, we still know very little about the precise nature of the relationship between the characteristics of the neighbourhood environment and children's associated perceptions and behaviours (McMillan 2005; Clark and Uzzell 2002). This gap in knowledge is due in part to the historical exclusion of children's voices from both research and planning processes (Frank 2006; Knowles-Yanez 2005; Churchman 2003; Francis and Lorenzo 2002). Positioning children as "less than" adults, lacking the capacity to articulate their needs and experiences, or the maturity to effectively contribute to research, planning or policy development (Chawla and Malone 2003; Matthews 2003; Sutton and Kemp 2002; McKendrick 2002; Holloway and Valentine 2000; Prout and James 1997; Hart et al. 1997), researchers and planners often relied instead on observation or the use of adult proxies, such as parents, teachers or professionals, to speak to the child's perspective (Rasmussen 2004; Darbyshire, MacDougall and Schiller 2005; Matthews and Limb 1999; Heft 1988). These approaches failed to acknowledge that children, by virtue of their differing skills and interests, view, experience and value their environments in fundamentally different ways than do adults, and consequently require different environmental conditions to support their primary activities (Burke 2005; Rasmussen 2004; Jones 2001; Matthews and Limb 1999; Heft 1988; Hill and Michelson 1981). Adults, therefore, cannot presume to understand children's needs or preferences simply because they were once children themselves (Darbyshire, MacDougall and Schiller 2005; Churchman 2003; Chawla 2002b; Bartlett et al. 1999; Talen and Coffindaffer 1999; Matthews, Limb & Taylor 1998). Earlier research "on" children has also been criticized for its lack of critical consideration of the power-laden and interpretative role of the adult

researcher in data collection and analysis (Matthews 2003; Jones 2001; Holloway and Valentine 2000; Aitken 2001). Children alone can speak to the experience of the child, and their understanding of the world cannot be accurately filtered through an adult lens. These acknowledgements highlight the necessity of utilizing participatory frameworks that directly solicit children's voices, and that facilitate greater integration of children as partners in research and community planning.

The path to this improved integration has been paved in part by the work of researchers like Hart, Chawla, and Lynch who have demonstrated that children possess the cognitive, spatial, and communication skills to make participation both feasible and valuable (Hart 1979; 1992; Hart et al. 1997; Chawla 2002a; 2002b; Lynch 1979). When given the opportunity, children have shown themselves capable of delivering perceptive and ardent appraisals of their environments (Rasmussen 2004; O'Brien 2003; Sutton and Kemp 2002; Driskell 2002; Spencer and Woolley 2000; Lynch 1979). The experience of participation itself further fosters the development of children's participatory skills and can set them along a path of lifelong community engagement (Knowles-Yanez 2005; Checkoway and Richards-Schuster 2004; Chawla and Malone 2003; Sutton and Kemp 2002; Sanoff 2000; Mullahey, Susskind and Checkoway 1999; Hart 1997). Youth participation in community evaluation and research still presents a number of challenges, but these are outweighed by the substantial benefits for both the child and community (Knowles-Yanez 2005; Checkoway and Richards-Shuster 2004; Hart 1992).

The challenge then lies in employing methodologies that can tap into the child's experience of the world and position them as empowered agents, and that are better tailored to their strengths and interests than traditional tools. The use of techniques such as drawings, maps, diaries, story-telling, and auto-photography in several key environment-behaviour studies in the 1970s and 1980s demonstrated that such expressive tools may be more in keeping with how children naturally conceptualize and interact with their environments and better able to extract a slice of their lived experience (Hart 1979; Lynch 1979; Moore 1986). Contemporary investigators attempting to engage children as co-researchers are increasingly turning to such visual and experiential methods, which

sport fewer embedded assumptions than fixed format methodologies and are less dependent on verbal and language skills, allowing the child's distinctive reality to surface more readily (Dennis et al. 2009; Burke 2005; 2007; Kofkin Rudkin and Davis 2007; Darbyshire, MacDougall and Schiller 2005; Chawla and Malone 2003; O'Brien 2003; Driskell 2002; Morrow 2001; Mullahey, Susskind and Checkoway 1999). A number of child and youth researchers have also begun to capitalize on advancements in digital tools, such as GPS units and digital cameras, to underscore such methods (Walker et al. 2009; Dennis et al. 2009; Travlou et al. 2008; Kofkin Rudkin and Davis 2007; Mackett et al. 2007; Burke 2005; Strack, Magill and McDonagh 2004). The increase in prevalence and decrease in cost of such tools has helped researchers put them in the hands of children, while benefitting from the increased ease of data collection, analysis and synthesis when more of the data is available within a digital medium. Hands-on, child-directed methods and tools also tend to generate more enthusiasm and skill development among children, and serve as instruments of empowerment by shifting full or partial control into their hands (Darbyshire, MacDougall and Schiller 2005; London, Zimmerman and Erbsstein 2003; Chawla 2002b; Matthews and Tucker 2000).

### **4.3 The 'Child Guides' methodology**

This paper presents experiences from a pilot study undertaken in London, Ontario, Canada to test a particular combination of methods and tools for understanding children's perceptions and use of their neighbourhood environments. Inspired by the methods of participatory action research initiatives such as UNESCO's *Growing Up in Cities* (Chawla and Malone 2003; Cosco and Moore 2002) and the highly experiential nature of the approach, we adopted child-led neighbourhood walks as the foundation for this pilot study. Though highlighted in the literature as one of the most effective methods for exploring children's environmental perception and use (Chawla 2002a; Driskell 2002; Sutton and Kemp 2002; Bryant 1985), child-guided walks are still seldom employed in research or participatory planning processes.

Local planners had expressed an interest in collaborating with researchers on World Town Planning Day (WTPD) activities in local elementary schools to explore issues



related to neighbourhood use and planning, and eight planners from the City of London and the County of Middlesex volunteered their time to participate in the two days of exercises proposed by the research team. Involving city planners directly in field exercises also provided them with an opportunity to become acquainted with new participatory planning tools, and to witness first-hand the children's ability to provide competent and insightful appraisals of their environments.<sup>1</sup>

On World Town Planning Day 2007, 16 Grade 3 children (aged 7 to 9) from a local elementary school led researchers and city planners on guided walks of their neighbourhood to document places of significance to them. We also incorporated an auto-photography element into the guided walks as such visual methods often elicit different insights from children than verbal means (Darbyshire, MacDougall and Schiller 2005; Foster-Fishman et al. 2005; Morrow 2001; Matthews, Limb and Taylor 1998), and thus has an enhanced ability to capture a child's perspective of a particular environment. Auto-photography, often referred to as "photovoice," has become increasingly common in behavioural and health research as an effective means for documenting and communicating an individual's unique experience of place (Wilson et al. 2007; Kofkin Rudkin and Davis 2007; Dennis 2006; Darbyshire, MacDougall and Schiller 2005; Wang et al. 2004; Strack, Magill and McDonagh 2004; Rasmussen and Smidt 2003; Morrow 2001; Matthews, Limb and Taylor 1998). We also anticipated that both the visual and narrative outputs from these tools would serve as powerful and informative means for conveying the children's perspectives and priorities directly to the participating planners (Dennis 2006; Knowles-Yanez 2005; Halseth and Doddridge 2000).

The participating school was located in East London, a historic urban neighbourhood within London's inner city well-defined by distinct morphological, political and psychological boundaries. Bordered by a rail line to the north and east, and busy

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<sup>1</sup> *Approvals for this study were obtained from University of Western Ontario's Non-medical Research Ethics Board.*

<sup>2</sup> *The child's daily activity and travel diary was used to identify mode of travel to school during each day of the study, and verified against travel speeds recorded daily by the GPS loggers. When a discrepancy*

commercial corridors to the west and south, the community contains a diverse mix of residential, commercial and industrial land uses upon a traditional gridiron street pattern from the late-nineteenth century. Considered one of the most socio-economically distressed areas in London, the East London neighbourhood has median household incomes well below the city average (Table 4.1). Furthermore, the neighbourhood is centered on a commercial corridor that, despite ongoing revitalization efforts and a burgeoning artistic community, suffers from the presence of prostitution, drug dealers, and empty storefronts. Compared to other London neighbourhoods, this area has few publicly designated outdoor play areas: one small park and the school playground (Table 4.1). On the other hand, given its nineteenth-century origins, the area has a strong neighbourhood character, with a well-connected street and sidewalk network, a high density of old-growth trees, and a large repertoire of well-maintained historical structures, which all contribute to its high level of “walkability” (Larsen, Gilliland and Hess 2009) and strong sense of place among its residents.

	East London Census Tract	Average London Census Tract
Total population	4,107	4,377
Youth population (5-14 yrs old)	8.9 %	12.1 %
Median annual household income	\$37,732	\$56,051
Proportion of lone parent households	22 %	18 %
Unemployment rate	9.5 %	6.3 %
Proportion of multi-family dwellings	52 %	46 %
Area of park space per youth	348 ft <sup>2</sup>	5014.7 ft <sup>2</sup>
Residential break & enters (5 yr period)	482	166
<i>* data from 2006 Census and City of London</i>		

**Table 4.1: Profile of East London census tract versus average city census tract**

Child participants were all from the same Grade 3 class in the only elementary school located within the study neighbourhood, and all of the students in the class who were

present on the day of the exercises participated (16 out of 20 total students). Fourteen out of the 16 children who participated lived within the boundaries of the study area and regularly walked or bicycled to school. The remaining two children lived just at the borders of the study area, and though they were typically driven to school, still identified East London as their neighbourhood. We therefore assumed that the study included the majority of the neighbourhood children of this age, and that most of the child participants were well acquainted with the neighbourhood environment around the school. The 16 participating children were paired by the teacher, based on existing friendship ties, into eight groups; pairs of children tended to be of the same gender.

	Protocol Phases	Tools / Resources
WEEK 1	<b>Classroom Visit</b>	
	<ul style="list-style-type: none"> <li>Introduced project task, tools and roles</li> <li>Began orienting children to aerial photo map of neighborhood</li> </ul>	<ul style="list-style-type: none"> <li>Large print aerial photo map of neighborhood</li> </ul>
WEEK 2	<b>Child Guided Neighborhood Walks</b>	
	<ul style="list-style-type: none"> <li>Pairs of children self-selected route on which to guide 2 adult observers (1 research, 1 planner) to highlight and record favorite and least favorite neighborhood places</li> </ul>	<ul style="list-style-type: none"> <li>digital cameras</li> <li>aerial photo map/clipboard</li> <li>portable GPS units</li> <li>Narrative recording sheets (<i>audio recording devices also recommended</i>)</li> <li>List of probing questions for observers</li> </ul>
WEEK 3	<b>Group Photo Elicitation Exercise</b>	
	<ul style="list-style-type: none"> <li>Selection of children's photographs (chosen after preliminary thematic analysis) projected before the group to facilitate further discussion</li> </ul>	<ul style="list-style-type: none"> <li>laptop and digital projector</li> <li>children's photos / collages</li> <li>flip charts</li> </ul>
WEEK 4	<b>Thematic and Spatial Analysis</b>	
	<ul style="list-style-type: none"> <li>Analyzed content and locations of verbal and photo narratives for themes and/or spatial patterns</li> </ul>	<ul style="list-style-type: none"> <li>Narratives and photos from guided walks and elicitation exercise</li> <li>Geographic Information System (e.g. Arc GIS from ESRI)</li> <li><i>Coding software such as NVivo recommended for larger data sets</i></li> </ul>

**Table 4.2: The Child Guides protocol**

On the first day of exercises, the student pairs led two trained adult observers, one city planner and one university researcher, on self-selected walks around their neighbourhood to highlight the students' "favorite" and "least favorite" community places and features

(Table 4.2). Each group of children was outfitted with a digital camera to document these settings, as well as an aerial photograph of the neighbourhood on which they marked their overall routes and locations of their photographs. Both child and adult participants were advised that the children were in charge of all decisions, including routes to be taken, places to visit, and the content and composition of all photographs. The children were also encouraged to follow the routes that they would normally take through the neighbourhood, including shortcuts and informal paths.

In each group, one adult observer hand-recorded the running narratives and observations of the child guides, verbatim when possible. They also documented the routes and locations of photographs via their own copy of the neighbourhood aerial photograph. The research team also used the opportunity to test the use of handheld GPS units for recording the routes taken during the exercise as a future supplement to, or substitute for, the aerial photo maps. Adult observers in each group therefore carried a GPS unit that passively recorded the route taken; recorded routes were later compared to the children's hand-drawn routes to test GPS accuracy and reliability for logging the spatial movement of each group. Observers in some of the groups also chose to use the GPS unit to actively mark the locations at which the children took photographs. These were subsequently compared to the locations marked on the photo maps by the child guides, and used to clarify photo locations when necessary.

The second adult observer was charged with engaging the children in detailed discussions of their neighbourhood activities and perceptions, particularly in relation to the environments they chose to highlight on the walk. Adult observers were advised that their primary role was to document the observations expressed by the children rather than soliciting responses to prescribed or leading questions. However, they were also given a list of potential probing questions that they could use to clarify or gain additional information related to the children's comments or photographs, such as: "What is it about this place that you like?," "What is it that you like to do here?" or "Can you tell me what you were taking a photo of?" Our approach gave children the lead in opening a dialogue and in choosing what to discuss or document, but we took the opportunity while in the

field to explore the children's perceptions of the specific environments they chose to highlight. This folded the act of photographing a place of significance and the follow-up discussion into a single *in-situ* process, unlike typical "photovoice" approaches that solicit captions or narratives at a time and place removed from the field context (Wilson et al. 2007; Wang et al. 2004).

One week after the child-led tours, during Geography Awareness Week, the research team returned to the school to conduct a photo elicitation exercise with the aim of clarifying information gathered during the guided walks and eliciting new details related to the children's use and impressions of their neighbourhood (see Table 2 above). In the intervening week, the two authors independently reviewed all of the children's recorded narratives and photographs and developed a list of possible emerging themes and patterns. Sixteen photographs were then selected that the researchers felt might confirm the validity of these detected themes, or clarify the meaning of images for which there was little corresponding narrative. We projected the photographs one by one, or in small collages, before the entire group and asked the children to comment on whether the photograph depicted something that they liked or disliked about their neighbourhood, or whether it was associated with a "favorite" place or a "least favorite" place. We assured the children that they could hold opposing views to those of their classmates, and that the same child could refer to both positive and negative aspects represented in a single image. We recorded all of the comments on large flip charts set up at the front of the room. The exercise was also videotaped and later transcribed.

After the photo elicitation exercise, we revisited the initial themes derived from the guided walks based on clarifications and revelations uncovered by this follow-up activity. All of the narrative comments, along with their associated photographs, were then coded by the authors according to the revised themes. Where appropriate, we coded a single comment or photograph for more than one theme. To minimize undue interpretation on the part of the researchers, only photographs that had an associated narrative were considered in the derivation or analysis of themes. By combining the annotated aerial maps of both the children and observers with the narrative records and GPS readings, a

high proportion of the children's photographs and comments could be pinpointed to specific locations in the neighbourhood. Chosen routes and places of interest could therefore be geocoded and mapped within a geographic information system (GIS), allowing us to analyze the spatial relationships between children's perceptions, activities and mobility within this environment.

Following a review of the children's narratives from the guided walks and photo elicitation exercise, the researchers identified ten prominent themes associated with neighbourhood perception and use. We subsequently coded all narrative comments and associated photographs by one or more of these ten themes, for a total of 194 coded mentions (Table 4.3). Of these comments, 169 (87 percent) could be tied to a specific neighbourhood location and integrated into a GIS. The ensuing thematic and spatial analysis of the narratives and photographs reveal a number of insights regarding children's environmental behaviours and perceptions within this neighbourhood. Four of the themes were considered especially revealing and will be discussed here in some

Narrative Themes	% of coded mentions per group								Coded mentions by theme		
	A	B	C	D	E	F	G	H	Total Number	% of Total	Median %
Sense of Ownership / Belonging / Pride	12	10	33	0	44	0	16	35	34	18	14
Sites of Recreational Activity	27	5	40	8	6	25	16	15	32	16	16
Proximity / Orientation	20	13	7	0	17	17	5	15	24	12	14
Good Community Design / Aesthetics	5	18	0	33	0	33	0	4	22	11	4
Sense of Fear / Danger / Annoyance	12	21	0	21	6	8	5	4	22	11	7
Sites of Commercial Services	12	3	13	0	22	0	32	8	20	10	10
Accessibility / Mobility	7	18	0	4	0	8	26	8	19	10	8
Poor Community Design / Aesthetics	5	10	7	21	6	0	0	4	14	7	5
Nature or Natural Elements	0	3	0	13	0	8	0	0	5	3	0
Environmental or Community Advocacy	0	0	0	0	0	0	0	8	2	1	0

**Table 4.3: Group narrative comments coded by theme**

detail, followed by a short review of the remaining six themes. Our attention will then turn to the additional perspective gained from the spatial analysis of the children's neighbourhood activities and perceptions.

## 4.4 Results of thematic and spatial analysis

### 4.4.1 Prominent narrative themes

#### *Sense of ownership, belonging or neighbourhood pride*

The theme that emerged as the most prominent, garnering the most mentions within the children's narratives, was that related to the sense of ownership, belonging or pride experienced by the child residents of this neighbourhood. The tour narratives suggest that the children are well attuned to potentially "dangerous" areas or elements in their neighbourhood, whether related to "creepy" people, "scary" places such as abandoned houses, or to heavy traffic on local streets. However, comments that revealed a perception of fear or danger were always related to specific places or areas, and did not seem to permeate their overall impressions of the neighbourhood. In fact, an overwhelming feeling of pride in their neighbourhood emerged from the children's narratives, and a sense that they identified strongly as being part of this particular community. This was reflected in the high degree of proprietary language in the narratives; children spoke of "our neighbourhood," "our variety store," and "my park." The walks also revealed extensive social and familial networks within the community. Over half of the children made it a point to visit their individual homes, and most highlighted the homes of extended family and friends. Several children revealed ties to the neighbourhood that extended back generations; one child enthusiastically pointed out a local rooming house because "my grandmother used to sleep there." A number also pointed out their parents' places of work that were also located within the area, further demonstrating that the children's own lives and those of their family and friends were deeply embedded in the neighbourhood. These deep, long-term connections seemed to instill in the children a strong sense that they belonged to, and were a part of this community.

The photo elicitation exercise revealed an additional facet of this neighbourhood pride and belonging that was not entirely clear from the guided walks. Comments with respect to several photographs made it apparent children were often fond of certain places or features particularly because they were located close to the child's home, regardless of whether it had other redeeming characteristics. For example, the photographs of a graffiti



**Figure 4.1: Graffiti on local building**

wall and an unkempt yard, for which there were no other positive comments, yielded many remarks similar to: “I like it because it’s close to my house” (Figures 4.1 and 4.2).

The same reasons were given for liking a particular “really old” dilapidated building, and a “weird” ornamental lawn sculpture. These elements held some intrinsic value for children simply because they perceived them as being a part of their immediate and familiar world, their neighbourhood. Despite an acknowledgement of dangerous or offensive places or characteristics, the children’s pride in and identification with their community remained fiercely intact.





**Figure 4.2: Overgrown front yard**

*Sites of recreational activities*

A large proportion of children’s comments were play- or activity-focused, comprising almost a fifth of all mentions in the guided walk narratives (see Table 4.3). The one small park located within the neighbourhood, Boyle Park, was high on the list of most of the children, and garnered the greatest number of mentions of all the activity sites highlighted during the walks. Four of the eight groups led their observers directly to this park when the walks commenced. Though there were many general, favorable comments about the park in the walk narratives, many children considered it a favorite place because of specific features that supported play activities, such as: “the big fun tree” or “the baby swings... I like hanging upside down in them.” For one child, it was the basketball court that made the park a favorite place despite the bare bones nature of this facility, and she was eager to photograph it (Figure 4.3). Further discussion revealed that



**Figure 4.3: Nearby basketball court as favourite place**

this place was special to her because, as it was close to her house, she was allowed to go to play at the courts on her own. The school playground, the local library, and a skatepark located beyond the railroad tracks on the northern edge of the neighbourhood comprised the remainder of the key year-round sites of activity highlighted by the children.

Since the local park figured so prominently in the tour narratives, we chose to revisit it during the photo elicitation exercise, utilizing a collage of photographs taken by children during the walks to solicit additional details on their activities (Figure 4.4). Many of the comments reiterated that children liked the park because it possessed specific amenities that supported their play: “I like it because you can go down the slide”; “I like to go there because [the other] park doesn’t have swings and this one does”; and “[the open space] is

a good place to play tag.” However, the elicitation exercise also yielded negative perceptions related to the park that were not evident in any of the guided walk narratives. One young girl admitted, “I don’t like the park because there are too many creepy people there.” Another child disliked the fact that “there’s [often] broken glass” and other dangerous debris. Though many children considered the park to be one of their favorite



**Figure 4.4: Park collage used in photo elicitation**

neighbourhood places, the group discussion revealed that a number in fact avoided the park as a result of their concerns. This supplemental information helped to paint a fuller, more accurate and nuanced picture of the children’s perceptions of the park and disposed of the notion that it was uniformly favored within the neighbourhood.

On the whole, the range of sites for recreation highlighted by the children appeared to be quite narrow. Most activities were confined to a few formal play facilities, such as the local park and the school playground, confirming our initial contention that there were

few publicly provided amenities in the neighbourhood that supported children's play. Despite the bare and run-down nature of some of these facilities, most neighbourhood children still gravitated to these places for the few play opportunities provided; however, few choices seemed to be left for the children too afraid to play in these spaces.

### *Sites of commercial services*

Another pattern that surfaced in the narratives was children's connections with commercial service sites. Categorized as a specialized type of activity site, local services such as restaurants and retail stores were highlighted as meaningful neighbourhood places by all but one group. Convenience stores were by far the most prominent of this type in both the narratives and photographs, and seemed to elicit the strongest and most positive responses. Many groups pointed out several convenience stores around their neighbourhood, but marked one as their "favorite store" (Figure 4.5). Children also demonstrated proprietary feelings towards certain stores, proclaiming, for example, "this is *our* variety store," and often were well acquainted with the owners. It was clear that



**Figure 4.5:** A "favourite" convenience store

children regularly frequented these places, often without a parent present, on the way to or from school or a favorite activity site. The stores were particularly valued for their proximity to these locations and for the opportunity to buy food or treats: “I like Mini Mart for food, [video] games and toys”; “I like that if you’re going to the skateboard park and you’re coming back and if you’re really hungry you can get food.” Several children also revealed that they are often sent to these convenience stores on errands for their parents, such as: “[to buy] smokes for my dad” or “bread and salamis.” They especially liked that they were allowed to go to these stores on their own. The presence of a responsible, often well-known, adult may have contributed to their sense of comfort and safety in these community places. Convenience stores seemed to serve as important neighbourhood nodes for many children, and facilitated opportunities to explore and build relationships in the neighbourhood beyond their home environment.

Retail stores in general attracted many fervent responses from children, both positive and negative. One child enthusiastically led observers to a particular bicycle store in order to take several pictures of both the bike on display that she liked and the proprietor’s dog in the window. Conversely, another child took a photograph of a particular clothing store to document his passionate dislike for the place because it didn’t sell either food or toys (Figure 4.6). However, some of the highlighted establishments seemed to hold little personal meaning: “the Palace Theatre... has shows”; “we just passed the police station”; and “Tim Horton’s [coffee shop] is right there.” Though aware of the nature of the service provided, these were not places that they utilized; children seemed to point them out more as a way of orienting the observers to the neighbourhood, and demonstrating their knowledge of the area. In general, the sites of commercial services that proved meaningful to the children were those that catered to their interests, providing treats, toys and games, or that facilitated their development of a sense of neighbourhood competence and independence.



**Figure 4.6: Clothing store "detested" because it does not sell toys or food**

*Sense of fear, danger, or annoyance*

Sites of activity and services generated mostly positive comments from the children, but neighbourhood places that elicited a sense of fear or danger were also prevalent in the narratives. Children in many of the groups identified specific houses of which they were scared, sometimes for qualities such as the “creepy back yard,” or due to past experiences with the inhabitants: “the people are mean there” and “the people just have parties and they shoo me away with paintball guns... I don’t even know what [the inhabitants] look like.” In several cases the fear was related to the presence of dogs: “the house with the scary dog... sometimes I’m scared to pass it,” or the house with the “big, mean pit bull.” However, some fear-related comments reminded us that these children contend with more dangerous conditions and events as well; one young boy was scared of a particular house because “my sister’s friend got killed there... don’t know how... some guy killed her.”

Places that generated feelings of annoyance were grouped together with those that elicited a sense of fear as the two appeared highly intertwined. Most sources of annoyance related to noise or heavy traffic, each of which was also associated with places the children considered dangerous or scary. For example, many children intensely disliked the railroad tracks because the trains were “so noisy!,” but were also nervous



**Figure 4.7: "It feels unsafe with all the ... trucks"**

about the general area around the tracks, noting that they felt unsafe around the trains and that there were “a lot of bad people around here.” They also expressed frustration with a number of specific streets around the neighbourhood, finding them “too noisy.” The same streets also felt treacherous because of the heavy traffic and “fast cars,” and many avoided activities in these areas: “it feels unsafe with all the business and trucks” (Figure 4.7). Many of these frightening and frustrating places had also been designated as “off limits” by their parents: “I’m not allowed to play here [by the tracks]” and “my mum

doesn't like me walking down here [on Dundas Street]." On the whole, many of the places children considered scary also brought up feelings of annoyance and frustration, perhaps in part because their fears, and those of their parents, created barriers to neighbourhood activities and mobility.

We chose several photographs for the photo elicitation exercise to further gauge perceptions of dangerous, scary or annoying places in their neighbourhood (see Figures 4.1, 4.8, and 4.9). Graffiti was of particular interest as it figured prominently in the collection of children's images, but had no accompanying comments from the guided walks. The elicitation exercise revealed that, rather than being viewed as "cool" urban artwork, many children agreed the graffiti was "kind of tacky," and that it spoiled the community's efforts to create a clean and pleasant neighbourhood. One child concluded:



**Figure 4.8: Busy neighbourhood streetscape**





**Figure 4.9: Neighbourhood rail yard**

“I don’t like it because lots of people worked hard on [the building] and then someone just goes out there and sprays on it.” Some children related the prevalent neighbourhood graffiti to crime and danger: “I don’t like it because... usually gangsters make those signs and it makes me feel unsafe.” The elicitation exercise confirmed that the graffiti was considered a blemish on their local landscape that undermined both their sense of neighbourhood pride and of safety. Overall, the elicitation exercise echoed and clarified comments related to fear and annoyance the children mentioned during the walks. Scary and annoying places or conditions within their neighbourhood frustrated not only the children’s activities and movement through the community, but also their determination to maintain a sense of pride in their neighbourhood.

#### **4.4.2 Other narrative themes**

##### ***Proximity / Orientation***

Proximity to the child’s home was revealed as playing a part in the child’s sense of neighbourhood belonging or pride, but the importance of proximity to home also surfaced

in other ways in the narratives. Distance stood out as a significant factor not only in adding value to nearby places or features, but in influencing which places were considered favorite or meaningful. For example, one girl commented that Boyle Park was a particular favorite place because it was close to her house and therefore she was allowed to go to it on her own. In several cases, proximity was tied to the ability to play or explore independently, which could turn a neighbourhood site into a favorite place.

Proximity to home or common routes and landmarks also played a role in the degree to which the children were oriented within particular areas. Most children were generally very familiar with the neighbourhood at large and navigated well along its streets and paths, however they also tended to lead the observers along the routes they used regularly: “my babysitter walks me this way to school,” and exhibited a higher level of orientation and comfort with these paths. Their strong overall orientation and spatial cognition skills were likely facilitated by the well-defined neighbourhood edges and grid street pattern, and also by the intimate knowledge of this environment most would gain during their regular wanderings through the neighbourhood, including their daily walk or bike to school (Rissotto and Guiliani 2006). Regular, intimate exposure to places, particularly those proximate to home, seemed to increase the child’s sense of orientation, competence, and ease in those settings.

### ***Accessibility / Mobility***

Despite the children’s apparent ease of movement in and around in certain neighbourhood settings close to home and along common routes, access to further flung places or services, as well as the children’s mobility within the neighbourhood as a whole, was often frustrated by a series of barriers. Both the tour narratives and the group discussion revealed that, in addition to “scary” places, there were other impediments to safe and easy travel through the neighbourhood such as heavy traffic: “you can’t ride bikes on [Queens Avenue] because there’s too much traffic... and fast cars.” The railroad tracks, and the long slow trains that traverse them, also made it difficult and frustrating to reach amenities located beyond. One child vehemently exclaimed: “I hate train tracks! I have to go around them [to get to the skatepark]. I wish they were in the

air!” Another child confirmed: “I don’t like [the trains] because you have to wait like an hour for it to be done.” For these children, the environment presented a number of physical obstacles that hindered their neighbourhood activities and movement.

As noted earlier, the exercises also provided evidence that neighbourhood use by children of this age is also heavily influenced by parental restrictions, particularly with respect to independent mobility, motivated mostly by parents’ fears of injury or abduction. One child confirmed he is not allowed to walk to school on his own “so [he] doesn’t get stolen.” The influence of these restrictions, and their associated fears, were evident when children were visiting places normally deemed off-limits. Many reacted nervously in response to either the inherent “dangers” or to the notion that they were disobeying their parents’ wishes. Though not a physical barrier to mobility, parental perceptions of danger and their associated restrictions effectively limited children’s choices with respect to activity and exploration within the neighbourhood.

### *Community design and aesthetics*

A surprisingly high proportion of the children’s narratives spoke to the aesthetics of neighbourhood spaces and features, or provided critiques of local community and architectural design (see Table 4.3). The children expressed strong preferences for specific houses, building styles, ornamentation types, and even building materials. One girl led her observers to her “favorite house” in the neighbourhood, chosen for both its “pretty” style and its flowering front garden (Figure 4.10). Another child declared a particular dwelling to be “a nice house,” discussing and taking several photos of its well-kept front yard and some decorative elements placed in the trees and gardens of the home.

However, the narratives also revealed that children were both aware and critical of signs of decay, vandalism and lack of care in their neighbourhood. Many specifically drew attention to buildings that were abandoned, or in a state of disrepair, expressing primarily distaste, rather than fear, in relation to signs of decay such as peeling paint, broken windows, and untidy front yards: “I don’t like this house ... [it] looks ugly” and



**Figure 4.10: A favourite, "pretty" house**

“we don’t like this place... it has cracked windows and no one lives there.” This common view was strongly reinforced during the elicitation exercise, where over a third of all comments spoke to the children’s dislike of what they considered to be poor aesthetics or conditions. For example, photographs of wild, overgrown spaces, rather than suggesting a place to explore or play, were uniformly perceived as neighbourhood blight. They condemned such places for having “too much litter,” “too many plants and weeds,” and for being “all dirty” (see Figure 4.2). The children’s consistent aversion to ugly, broken down or unkempt places came across as a challenge to their sense of neighbourhood pride; they recognized the value of clean, pleasing, well-kept places in making their neighbourhood an appealing place to live and demonstrated consistent preference for these conditions.

### *Nature / Natural elements*

Pictures of nature and natural elements were prevalent in the overall collection of images. Many children took photographs of animals in the neighbourhood, as well as natural elements such as trees, flowers, bushes, and rocks. However, the accompanying narratives did little to clarify the significance of these elements for the children's neighbourhood perceptions or use; a strong preference for "clean" yards, as well as streets with trees, bushes, and grass, seemed solely related to their effect on the general aesthetic appeal of the area. The significance of these features came across much more strongly during the photo elicitation exercise. A tree-lined streetscape yielded strong preferences for routes with natural elements present including "colorful leaves" and "many trees that shade" (Figure 4.11). A manicured front garden was highly valued by the children (Figure 4.12), whereas their reaction was uniformly negative to an image of a



**Figure 4.11: A valued tree-lined streetscape**



**Figure 4.12: A prized, "colourful" front yard**

large front yard that had been allowed to grow wild: “I don’t like it because there [are] too many plants and weeds” and “I don’t like it because it’s all dirty” (Figure 4.2). The elicitation exercise helped to clarify that children’s preference was not just for nature in general, but rather for tidy, colorful, well-kept landscapes. The value of a particular place or route in turn increased when these natural elements were present.

***Community or environmental concern / Advocacy***

The children’s strong sense of pride in the neighbourhood translated in some cases to a display of community and environmental advocacy. A number of the groups marked the local library branch as an important site of recreational activity, but one group in particular used the exercise to document their concern for the reduction in hours faced by the library due to funding cuts. One of the children proclaimed: “I’m taking a picture [of the library] because I don’t want it to close” (Figure 4.13). The other child agreed it was

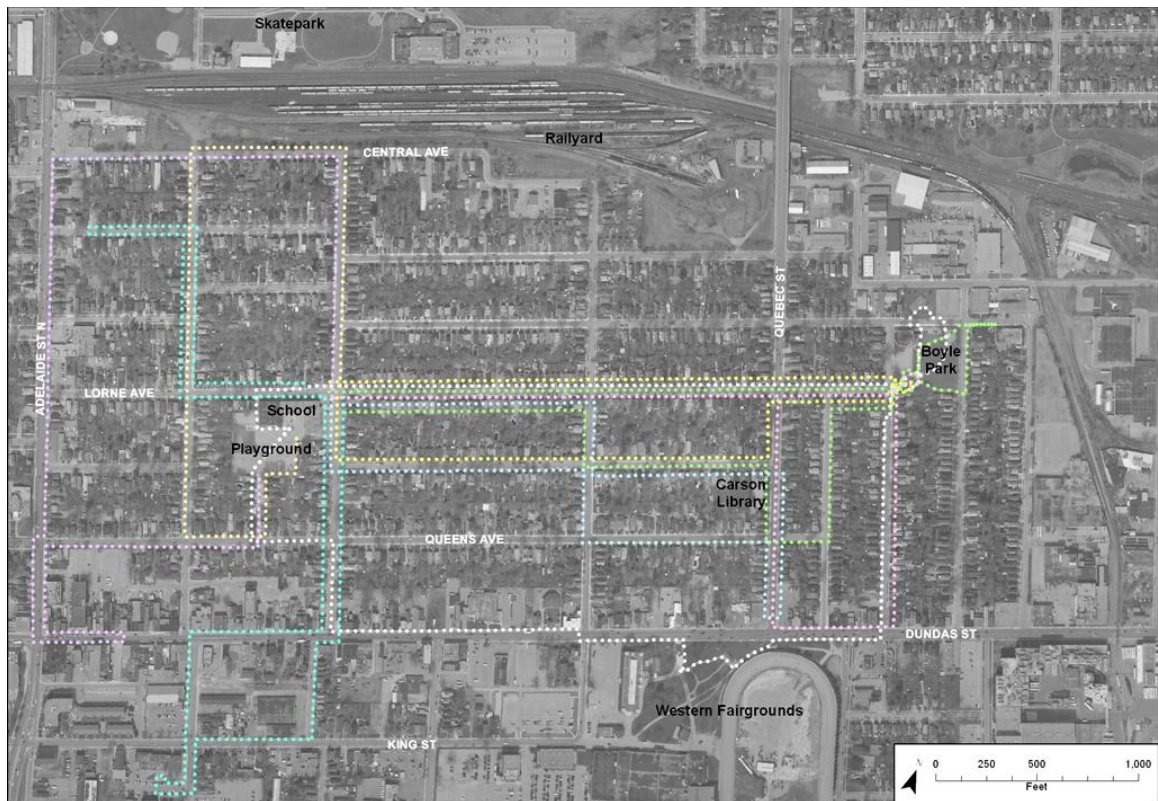
important to document and added that they should “take, like, three pictures of Carson [library] because they are shutting it down.” The same group also discussed the wisdom of photographing cars on the street. One child suggested that: “we shouldn’t take pictures of cars... they are polluting our area.” Her partner replied: “we *want* to take pictures of cars because they are polluting.” Such comments and actions divulge an awareness of threats to the health of both their community and environment, though it was difficult to determine if this awareness was widespread. Perhaps even more important than what they revealed about their neighbourhood needs and perceptions, these dialogues demonstrated that the exercise itself was viewed as an opportunity to document their concerns, and seemed to instill a sense of empowerment and a means of advocating on behalf of their community.



**Figure 4.13: An endangered local library**

## 4.5 Mapping and spatial analysis of perceptions and use

In addition to the preceding thematic analysis, the data from the neighbourhood walks and elicitation exercise also lent themselves well to a spatial analysis of neighbourhood perception and use. The children's photo maps, supplemented by specific place references in the narratives and the GPS unit logs, allowed a high proportion of the children's narrative comments, over 87 percent, to be tied to specific locations in the community, and could therefore be overlaid on the aerial photograph of the neighbourhood in a GIS. As a result, we were able to consider spatial patterns with respect to individual group walks and narratives, as well as neighbourhood-level patterns in perceptions, activity, and mobility. The narrative data could also be isolated and compared in the GIS by theme, allowing spatial relationships within and among the themes to surface that would not have been clear from the thematic analysis alone. This GIS-based qualitative analysis yielded another valuable layer of insight regarding children's neighbourhood perceptions and use.



**Figure 4.14: Map of guided neighbourhood walk routes**

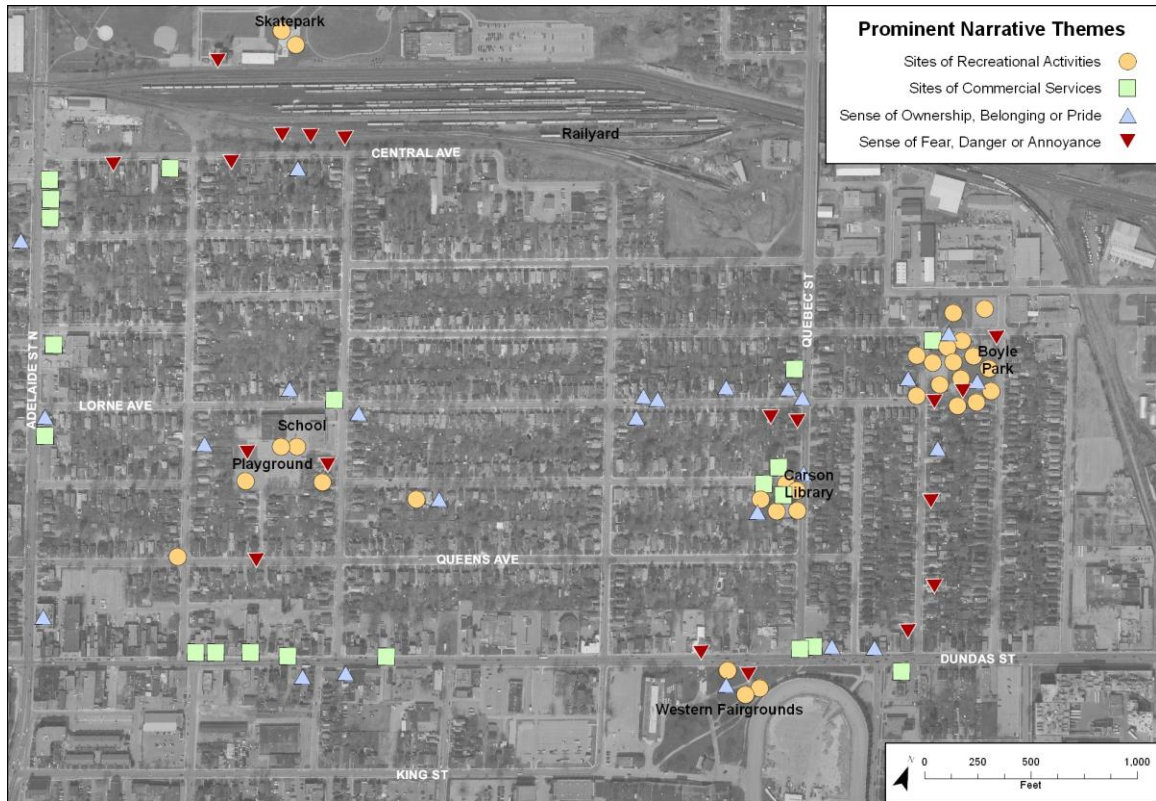


The first pattern evident from mapping all the children's guided walks was the degree to which their selected routes were dispersed throughout the neighbourhood. Though there was some overlap with respect to streets and destinations, and some of the group's routes were more limited than others, the children generally chose varied locations and routes through the neighbourhood and collectively covered most of the area (Figure 4.14). The master route map also illustrates that despite the widespread coverage of the neighbourhood within its major boundaries, few children, despite permission to do so, ventured beyond these edges. When considered in conjunction with the narratives, this map supports the notion that these implicit boundaries, whether due to parental restrictions or the children's own fears or lack of comfort, act as systemic barriers to the mobility and activity of these children beyond the borders of this neighbourhood.

A closer look at the route map of each individual group of children clearly reveals that the favored places the children chose to highlight were primarily clustered in the immediate area surrounding their own homes. (The maps showing the location of the children's homes cannot be shown here in order to preserve their anonymity). This revelation was aided by the fact that, quite coincidentally, the children paired together in most groups were found to live quite close to one another, and so had a shared "close to home" environment in which a high proportion of their favorite places for play and social activity were located. As the children were paired together by the teacher based on existing friendships, we might infer that these friendships are in part a result of, or are reinforced by, the close proximity of the homes of the children in each pair, and help to define the activity or social range of individual children. Together, the route maps suggest that, for children of this age, the neighbourhood environment in which they typically range is still fairly limited and is generally centered on their homes.

Collectively mapping the four most prominent themes yielded a number of spatial relationships both within and between the themes (Figure 4.15). The location of "sites of recreational activities" reinforced that outdoor recreational pursuits were, in fact, clustered in the local park and the school playground, and supported our earlier assessment that there were few publicly-provided places for recreation in the

neighbourhood. It was often the favored “sites of commercial services” that seemed to provide the greatest number of informal activity opportunities beyond the home environment and represented the majority of the attractions that enticed children



**Figure 4.15: Collective map of prominent narrative themes**

furthest from their homes. Many of the highlighted commercial sites tended to be located toward the borders of the neighbourhood, acting perhaps as bases for exploration, particularly when the presence of a familiar, responsible adult might provide an element of security or comfort at these community edges. However, when we consider the location of these activity sites against neighbourhood places that elicit a sense of fear or danger, we see a competing force that perhaps quells exploration beyond community boundaries. Places that children feared or considered dangerous also tended to be grouped along the peripheries of the neighbourhood, forming “borders” that coincided with the train tracks, industrial areas and the busiest commercial streets. Though only a few children explicitly mentioned these elements as deterrents to their activity or

mobility, the map revealed that very few children frequented activity sites beyond these “dangerous” borders. The narratives clearly revealed that fears and restrictions were influencing children’s activity and movement, but the spatial analysis was critical in pinpointing “scary” places on the community edges as most problematic, collectively acting to confine activities to places or amenities contained within these boundaries.

Despite the presence of these frightening places and signs of urban distress within the surrounding community, neither the narratives nor the photo elicitation comments suggested a pervasive or universal sense among the children that they lived in a dangerous or unpleasant neighbourhood. The spatial analysis helped to reinforce this notion, illustrating that places that instilled a sense of pride or belonging were extremely prevalent and dispersed fairly evenly through the neighbourhood, not just coinciding with favored sites of activity or services (see Figure 4.15). For example, the street that elicited the most negative comments in the narratives, Dundas Street, had almost as many pride-related comments as Lorne Avenue, on which both the popular park and the school playground were located, and which was traversed by six of the eight groups on their walks. In fact, the analysis of both the children’s individual and collective maps revealed that positive and negative neighbourhood elements were often intertwined along their preferred routes and even within places highlighted as favorites, such as Boyle Park.

## **4.6 Discussion**

### **4.6.1 Reflections from thematic and spatial analyses**

The child-guided walks and succeeding photo elicitation exercise, combined with our thematic and spatial analyses, uncovered a number of patterns in the participant children’s perceptions and use of this neighbourhood. The narrative themes and spatial maps exhibit a high level of agreement across the group of children, suggesting that we can draw some tentative conclusions despite the small number of children participating as they represent the majority of children of this age in the East London community. These children are well-oriented and enmeshed within their community, facilitated in part by their extensive social and familial networks. A number of common neighbourhood

places were identified that were meaningful for recreational and social activities for most children. Though few publicly provided recreation places are available, the children used the local park and school playground, as well as commercial establishments such as convenience stores, as important nodes of community activity and interaction. The participating children also demonstrated a clear preference for clean, well-kept, and natural places in their local environment, which also tended to be perceived as “safe” and which served as sources of collective community pride. However, the exercises also uncovered evidence that the children do not always feel welcome or safe in the neighbourhood, even in their favorite places or along preferred routes. Perceived dangers, on the part of either the child or their parent, impacted their exploration and use of the neighbourhood and its facilities, as well as the scope of their ranging beyond their home. On the whole, both the thematic and spatial analysis suggest that these children have a complex relationship with their local neighbourhood that cannot be easily separated into “good” and “bad” areas, characteristics or experiences. Despite conditions or events that may have challenged their sense of safety, belonging or respect, the children exhibited a resilient sense of pride and ownership with respect to this local environment. It was clear that for many child participants this neighbourhood is a distinct and fundamental part of their individual and community identity.

The results of this pilot project are highly congruent with findings from other studies of children and their neighbourhood environments. Children have consistently highlighted heavy traffic, noise, violence, evidence of decay and neglect such as graffiti and abandoned buildings or lots, and a shortage of safe and attractive places to gather or play as the biggest challenges to their activities, their security, and their sense of pride in their community (Dennis 2006; Knowles-Yanez 2005; Chawla and Malone 2003; Chawla 2002a; Spencer and Woolley 2000; Woolley et al. 1999; Horelli 1998; Moore 1986). Similarly, features or characteristics that children typically highlight as valuable include clean, quiet, safe places to play and hang out with friends, as well as nearby stores, parks and community centers that facilitate social interaction and play activity (Chawla and Malone 2003; Loukaitou-Sideris 2003; Woolley et al. 1999; Talen and Coffindaffer 1999; Matthews and Limb 1999). Parental fears, perhaps grounded in real concerns about

neighbourhood safety but magnified by community design and the media, have also been shown in other studies to restrict the location and range of these neighbourhood activities (McMillan 2005; Valentine 1997b; Moore 1986). Previous studies with children have also found they have a strong affective sense of their environment and are very appreciative of its aesthetic and sensual aspects (Matthews and Limb 1999), including a clear preference for places and routes featuring beautiful plants, shading trees, flowers and well maintained green spaces (Larsen, Gilliland and Hess 2009; Chawla and Malone 2003; Rasmussen and Smidt 2003; Woolley et al. 1999; Matthews and Limb 1999). Neglected, overgrown or abandoned places on the other hand have been regularly disparaged and rejected by children (Dennis 2006; Chawla and Malone 2003). The degree to which the results from this pilot are compatible with previous studies suggest that the child guides protocol can effectively solicit rich and relevant information on children's neighbourhood perceptions and experiences.

#### **4.6.2 Lessons from the Child Guides methodology**

A primary goal of this study was to pilot the effectiveness and complementarity of our chosen methodologies for uncovering children's perceptions and use of their neighbourhood. The two methods, both on their own and in combination, effectively engaged the children and elicited rich and enlightening narratives that provided a window into their lived experience in the neighbourhood. This pilot study, however, also revealed that the tools are not without their challenges and pointed towards ways to improve their individual and collective efficacy.

##### ***Child-guided neighbourhood walks***

On their own, the neighbourhood walks presented both benefits and challenges. As predicted by the literature (Frank 2006; Driskell 2002) the children responded enthusiastically to the exercise, particularly its child-led nature. Despite initial skepticism among the children that the decisions, and the use of the camera, would be under their jurisdiction with little to no interference from the adult observers, they quickly and enthusiastically adjusted to being in charge. Many of the adult observers, on the other hand, noted that they struggled against a tendency to steer the children's actions.

Pairing children up for the guided walks was necessary to ensure that no child was sent out alone with an adult, but we also recognized that this might make it more difficult to hear individual voices. However, the partnering also produced a dialogue among the children that generated richer and more detailed information than may have surfaced during an adult-child exchange. The contradictions were especially enlightening, and served to reinforce that children of similar age and background can have differing and even conflicting experiences of the same environment.

Conducting the neighbourhood walks simultaneously with a large group of adult facilitators made for some variation in the degree and consistency with which children's narratives were probed and recorded. As a result, there was significant variation in the level of detail included in the transcripts and direct quotations could not always be attributed verbatim to the children. Hand-recording of the narratives is essential to match narratives to specific actions and photographs, but a supplementary audio recording could help to provide a more complete transcript and reduce discrepancies among note-takers.

Handheld GPS units were included in the protocol to test their effectiveness for recording the routes chosen by the children, and in some cases, locations at which photographs were taken, in order to consider them as a supplement to or substitute for the hand-notated aerial photo maps in future work with this protocol. The GPS units, however, showed a high degree of inconsistency among the various units; some recorded the true routes of the children quite well, while others exhibited quite poor records of the routes, indicating in some cases a path that was several streets away from the true route. These erroneous records could be a result of faulty units or due to clouds, tree canopies or buildings causing satellite interference that prevents the units from logging precise locations. Advancements in technology, however, are increasing the consistency and reliability of portable GPS receivers, and GPS could be a valuable supplemental tool in such an exercise for locating routes and points of interest. Though carried by the adult observers during this pilot study and primarily used to passively log the spatial movement of the walking groups, these units in future studies could be operated by the child guides

themselves, and more actively integrated into the methodology. The hard copy aerial photo maps remain necessary, in our opinion, as they served as a tangible and invaluable tool around which group discussion and orientation centered.

### ***Group photo elicitation***

The group photo elicitation exercise also proved valuable for uncovering children's neighbourhood perceptions, particularly as a supplement to the guided walks. The children really enjoyed seeing their photographs projected back to them, and both the photos and the group setting prompted animated discussion with and among the children. This exercise particularly helped to clarify when perceptions differed among children in the overall group, which was more difficult to derive strictly from the narratives. This proved especially true with respect to places children associated with negative experiences or perceptions. Since children were not pressed to visit their "least favorite" places in the neighbourhood, they might have avoided these uncomfortable places on their walks and their negative impressions might not have surfaced. In this way, the group elicitation exercise yielded a number of new, and often contradictory, perspectives from those common in the narratives. These revelations particularly speak to the value of combining these methods in order to generate a fuller picture of patterns of perceptions than each might reveal operating on their own.

One potential drawback to the group discussion is that children were not necessarily given the opportunity to discuss the personal significance of their individual photographs. Though this limitation was offset to some degree by the in-depth field discussions of photographs, it may be beneficial, given additional time and resources, to supplement these exercises with individual post-walk interviews.

### ***Suitability and complementarity of methods***

Both the child-guided walks and the group photo elicitation utilized for this pilot study demonstrate the value of more participatory, expressive methods for observing and understanding children's behaviours. Though each yielded valuable perceptual and behavioural patterns, combining the two methods was essential for gaining a fuller, more

accurate picture of children's neighbourhood perceptions and use. The new and contrasting comments from the group session prompted the researchers to revisit the themes and patterns detected in the walk narratives, which in turn became more representative of the broad range of experiences of the child participants. The facilitated group session also balanced the looser nature of the guided walks and allowed for more structured probing of the patterns arising from the walk narratives. The mix of both small and large group discussions provided the children with a range of opportunities for participation, and the presence of peers proved especially valuable for promoting an ongoing dialogue and for engaging more introverted children. These experiences are similar to those of other researchers utilizing photographs and group sessions to investigate children's perspectives (Dennis et al. 2009; Burke 2005; Rasmussen 2004).

The incorporation of auto-photography directly into the methodology proved to be one of the most successful innovations, providing an alternative way for children to capture and convey their perspective. Though children were more limited in the places they could visit and document on the groups' walks than in traditional solo auto-photography exercises, this protocol has the advantage of using the act of taking a photograph as a springboard for broader, *in-situ* discussions of children's neighbourhood perceptions and experiences.

Despite the complementarity of the methods and the rich information garnered, there may still be aspects of children's neighbourhood experiences that were not uncovered by this methodology. For example, the researchers were surprised by the lack of reference during the exercises to informal activity spaces, a possible indication that the tools do not lend themselves to unearthing these special or unstructured sites of play. Having more than one child per walking group meant that compromises might have been struck in the selection of places to visit, and groups may have missed some of those places meaningful to only one of the two children. Adding a component whereby individual children can write or draw about their neighbourhood experiences could also help to ensure that individual voices are heard, especially those of children less comfortable speaking up in the presence of other children or the adult observers. The presence of adults or another



child may have also deterred children from showcasing their more private, special places for play or retreat. An increase in familiarity between the children and the adult observers, through more prolonged contact, could result in further divulging of these other, more private spaces and activities. The addition of a traditional auto-photography exercise or an activity diary may also be beneficial in this regard, to give children a chance to document these spaces on their own, in their own way, to better flush out the network of small spaces they use in their daily neighbourhood interactions.

The exercises were effective in demonstrating to both the researchers and the urban planners that children are capable of shrewd and sophisticated evaluations of their neighbourhoods, in addition to providing an evocative profile of their neighbourhood perspectives and priorities. Both methods were well-received by the planners, but the intimate nature of their dialogue with the children during the guided walks made a particularly favorable impression for the rich picture of experience that they evoked. The exchanges with the children also highlighted for the planners the more localized nature of the children's activities than those of adults, and the more personal and intimate relationships they have with their neighbourhood spaces and places than is likely true for adult residents. Though these experiential, child-guided exercises demonstrated to the planners the value of utilizing more direct, participatory methods to better understand children's environmental experiences and needs, integrating children as key informants into planning processes still holds a number of challenges. The planners felt that the community planning processes currently utilized within the local municipality, which typically involve presenting proposed plans at public meetings and fielding questions from community members, would not be suitable for engaging children, yet the time and human-resource intensive nature of the exercises and subsequent analysis were cited as obstacles to their widespread adoption in future community planning initiatives. The lack of political influence that non-voting children can currently wield means that few challenge these existing approaches, making for a planning environment, as is the case in many other cities across North America and Europe, that does not specifically support the allotment of time and resources to listen to children and actively involve them in community planning. The City of London, however, has recently adopted a Children's

Agenda and has established a Child and Youth Network to identify the most pressing needs of children and youth in the local community and address them through policy and environmental changes. This new concerted focus on children may help to change the political climate as it pertains to acknowledging children's rights and needs, and direct more attention and resources to involving children more substantially in City and County infrastructures and initiatives, including community planning.

Condensed versions of this protocol may also help to alleviate the time and resource investment required of planners. Guided walks could be conducted with larger groups of children in order to include more in the process, in a shorter amount of time. Photo elicitation exercises could also be carried out within the existing infrastructure of public meetings, if an effort was made to solicit and support the attendance of children and families rather than just adult residents. Photographs taken prior to the meetings by community children could then serve as valuable foci for needs assessment and discussion among all residents of a neighbourhood.

Such abridged variations, however, risk the loss of children's individual voices and the elicitation of rich narratives unless groups are skillfully facilitated. Children's views could be lost altogether if they are merely folded into public meetings that include adults. Coordinating such neighbourhood research and engagement efforts to coincide with community and educational events such as World Town Planning Day, as well as tying research activities to curricular goals, can be an effective way to garner the support of teachers or local planners, and allow for sharing of workload and resources. A city or community, however, that is dedicated to participatory planning must recognize that such processes are likely to take more time and resources than traditional approaches, and weigh this investment against the benefit of being better positioned to meet the needs of all of the community's members, and to promote more engaged and informed communities, including their resident children.

## 4.7 Conclusion

Neighbourhood environments are influential settings that play a critical role in the physical and psychological development of children, but research has only scratched the surface in terms of understanding the child-neighbourhood relationship and children's environmental needs and preferences. Fortunately, a growing body of research is working to employ children as co-researchers, consequently demonstrating that children are highly capable of participating in community evaluation and design, and that both the community and the children benefit significantly from the experience. The challenge lies in finding tools and methodologies that tap into children's view and experience of their neighbourhood and that can effectively communicate their needs and priorities directly to researchers, urban planners and policy makers.

This pilot study set out to field test a combination of research and analysis tools for uncovering children's neighbourhood perceptions, and for detecting discernible patterns in their use of the local environment. The engaging and expressive nature of the child-led walks, coupled with the photo elicitation exercise, yielded evocative narratives that spoke to the broad range of perceptions and spatial behaviours of children within a single neighbourhood, and within this community in particular. Subsequent thematic analysis revealed significant yet complex patterns of neighbourhood perception and use by these child residents, which echo those found by other recent studies. However, the GIS-based spatial analysis of the children's routes and places of significance proved critical to providing a spatial narrative to complement those derived from the neighbourhood walks and group photo elicitation, uncovering additional patterns in the children's activities and perceptions.

The enthusiastic participation of the children and the rich profile of experience elicited confirmed that the tools are highly suited to children of this age. The participating children also revealed their distinctive perspective, as well as their interest in and capacity for community evaluation. As anticipated, the narrative and visual outputs proved especially powerful for conveying perspectives to participating planners and demonstrated the value of such expressive, participatory tools for community planning

processes involving children. The principal obstacles cited by the planners, lack of time and human resources, could be overcome by partnering with community or research institutions to share resources and workload.

Further testing will be conducted to address potential gaps in the experiences that surfaced, as well as to address the effectiveness of these tools for uncovering variations in the behaviours among children of different age groups within the same setting. The methodology will also be integrated into a larger study to compare the behaviour and perceptions of children in neighbourhoods with different environmental characteristics, and to investigate the influence of socioeconomic and other neighbourhood-level factors.

Children have a legitimate role in shaping the environments in which they live, and are an essential source of information about their unique community experiences and needs. Our initial experience with this child-guided methodology suggests that the protocol is extremely valuable for engaging children in community assessment, opening a window into their lived experiences, and for flushing out trends and themes in their neighbourhood activities and perceptions. It is expected that the voices of children that will surface from this protocol will provide an insightful and compelling snapshot of their neighbourhood experiences, and serve as a valuable springboard for both behavioural research with children and community design and decision-making.

## **4.8 Acknowledgements**

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## 4.9 Bridge to Chapter 5

Study 1 provided a number of insights into children's neighbourhood perception and use and illustrated that the collective tools effectively solicited children's environmental views. Children living in East London were very familiar with their neighbourhood environment and felt relatively safe and comfortable travelling to locations within the community. Resident children seemed to spend some of their leisure time in their neighbourhood, but the overall number and diversity of resources they utilized was quite low, and generally the children did not appear to travel far from home. These findings sparked an interest in focusing more closely on the size of children's neighbourhood domains and an examination of their activities within these settings. However, we also wanted to be able to more directly measure the spatial locations of activities as well as the size of neighbourhood domains, which would require additional measurement tools. The use of more accurate, objective measures of children's activity and mobility is considered key to overcoming inconsistencies from self-report methodologies and untangling the relationships between the built environment and children's healthy behaviour (Badland, Duncan, Oliver, Duncan, & Mavoa, 2010; Oliver, Badland, Mavoa, Duncan, & Duncan, 2010; Shaw et al., 2012). It was also clear from the findings that local social and environmental conditions impacted the children's neighbourhood perceptions and activity, and the nature of this influence also warranted further study. Findings from this study therefore directly prompted the investigations documented in both Studies 2 and 3.

Our experience with the tools chosen for this study also helped to guide the selection of both the methodological protocol and tools for the STEAM project, on which studies 2 and 3 are based. Conducting the neighbourhood tours and group discussions with participating children was intense and time consuming but, in addition to the rich narrative data collected, were also found to provide invaluable lessons regarding the methodological tools utilized. First, the walks demonstrated that children oriented very well to aerial photo maps of their neighbourhood, and had little trouble utilizing the technology of the camera or the GPS unit. The neighbourhood tours also highlighted the value of utilizing portable GPS units to directly capture activity and travel; the inconsistent nature of the data, however, led us to conduct extensive field tests with a

number of GPS devices to select more reliable equipment for the STEAM study. The walks also demonstrated the value of not only being able to discuss neighbourhood children's perspectives while directly viewing the environment on the street but also the significant advantage of being able to immediately pin child narratives to specific geographic locations. Another insight from the walks was the noted increase in dialogue and data that resulted from conducting the tours with two or three children together rather than individually; the children more enthusiastically and comfortably spoke with one another than with the adult facilitators and their conversations highlighted both similarities and differences in their neighbourhood experiences, allowing for a richer and more complete data set. As a direct result, we developed a group interview protocol for the STEAM project using Google Earth which provided a dynamic, virtual tour of the children's neighbourhood environments in order to discuss their activities and experience; Google Earth was also selected as an interview tool because it allowed narratives to be immediately tied to spatial coordinates. Interviews were conducted in groups of two or three children to encourage peer to peer dialogue.

The additional, and sometimes contradictory, narratives that emerged from the different methods in study 1 reinforced the value of utilizing multiple methods to capture and clarify neighbourhood perceptions. This insight directly informed the suite of methodological tools selected for both studies 2 and 3, ensuring that at least two complementary methods were used in the analysis and interpretation of data for each set of research questions. The analysis in Study 1 also illustrated the value of the ability to analyze perceptions and use spatially when data was integrated within a geographic information system (GIS). The STEAM protocol was specifically devised to support the eventual amalgamation of all data within a GIS.

The study documented in this first manuscript served as a valuable exercise not only for helping to understand the neighbourhood experiences of children in East London but for helping to guide the objectives and methodologies for Studies 2 and 3.

An overall synthesis of findings across all three studies is included in the final chapter (Chapter 7).

## 4.10 References

- Aitken, S.C. (2001). "Global Crises of Childhood: Rights, Justice and the Unchildlike Child." *Area* 33(2): 119-127.
- Bartlett, S., R. Hart, D. Satterthwaite, X. de la Barra, A. Missair (1999). *Cities for Children: Children's Rights, Poverty and Urban Management*. London: Earthscan for UNICEF.
- Beauvais, C. and J. Jenson (2003). "The Well-Being of Children: Are There 'Neighbourhood Effects.'" *Canadian Policy Research Networks Discussion Paper F31*.
- Bryant, B.K. (1985). "The Neighborhood Walk: Sources of Support in Middle Childhood." *Monographs for the Society for Research in Child Development* 50(3): 1-122.
- Buckingham, D. (2000). *After the Death of Childhood: Growing up in the Age of Electronic Media*. Cambridge, UK: Polity Press.
- Burke, C. (2005). "Play in Focus: Children Researching Their Own Spaces and Places for Play." *Children, Youth and Environments* 15(1): 27-53.
- (2007). "The View of the Child: Releasing 'Visual Voices' in the Design of Learning Environments." *Discourse: Studies in the Cultural Politics of Education* 28(3): 359-372.
- Carpiano, R.M. (2009). "Come Take a Walk with Me: The 'Go-Along' Interview as a Novel Method for Studying the Implications of Place for Health and Well-Being." *Health and Place* 15(1): 263-272.
- Chawla, L. (2002a). *Growing Up in an Urbanising World*. London: UNESCO/ Earthscan Publications Ltd.
- Chawla, L. (2002b). "Insight, Creativity and Thoughts on the Environment: Integrating Children and Youth into Human Settlement Development." *Environment and Urbanization* 14(2): 11.
- Chawla, L. and K. Malone (2003). "Neighbourhood Quality in Children's Eyes." In Christensen, P. and M. O'Brien, eds. *Children in the City: Home, Neighbourhood and Community*. London: Routledge-Falmer, 118-141.
- Checkoway, B. and K. Richards-Schuster (2004). "Youth Participation in Evaluation and Research as a Way of Lifting New Voices." *Children, Youth and Environments* 14(2): 84-98.
- Christensen, P. and M. O'Brien (2003). "Children in the City: Introducing New Perspectives." In Christensen, P. and M. O'Brien, eds. *Children in the City: Home Neighbourhood and Community*. London: Routledge-Falmer, 1-12.

Churchman, A. (2003). "Is There a Place for Children in the City?" *Journal of Urban Design* 8(2): 99-111.

Clark, C. and D.L. Uzzell (2002). "The Affordances of the Home, Neighbourhood, School and Town Centre for Adolescents." *Journal of Environmental Psychology* 22(1-2): 95-108.

Collins, D. and R. Kearns (2001). "Under Curfew and Under Siege? Legal Geographies of Young People." *Geoforum* 32: 389-403.

Cosco, N. and R. Moore (2002). "Our Neighbourhood Is Like That! Cultural Richness and Childhood Identity in Boca-Baraccas, Buenos Aires." In Chawla, L., ed. *Growing Up in an Urbanising World*. London: UNESCO/Earthscan Publications Ltd.

Cummins, S., S. Curtis, A. Diez-Roux, S. Macintyre (2007). "Understanding and Representing 'Place' in Health Research: A Relational Approach." *Social Science and Medicine* 65(9): 1825-1838.

Cummins, S., M. Stafford, S. McIntyre, M. Marmot, and A. Ellaway (2005). "Neighbourhood Environment and Its Association with Self-Rated Health: Evidence from Scotland and England." *Journal of Epidemiology and Community Health* 59: 207-213.

Dannenberg, A.L., R.J. Jackson, H. Frumkin, R.A. Schieber, M. Pratt, C. Kochtitzky, and H.H. Tilson (2003). "The Impact of Community Design and Land-Use Choices on Public Health: A Scientific Research Agenda." *American Journal of Public Health* 93: 1500-1508.

Darbyshire, P., C. MacDougall, and W. Schiller (2005). "Multiple Methods in Qualitative Research with Children: More Insight or Just More?" *Qualitative Research* 5(4): 417.

Dennis, S.F. (2006). "Prospects for Qualitative GIS at the Intersection of Youth Development and Participatory Urban Planning." *Environment and Planning A* 38: 2039-2054.

Dennis, S.F., S. Gaulocher, R.M. Carpiano, and D. Brown (2009). "Participatory Photo Mapping (PPM): Exploring an Integrated Method for Health and Place Research with Young People." *Health and Place* 15(2): 466-473.

Driskell, D. (2002). *Creating Better Cities with Children and Youth*. London: Earthscan Publications/UNESCO.

Foster-Fishman, P., B. Nowell, Z. Deacon, M.A. Nievar, and P. McCann (2005). "Using Methods That Matter: The Impact of Reflection, Dialogue, and Voice." *American Journal of Community Psychology* 36(3-4): 275-291.

Francis, M. and R. Lorenzo (2002). "Seven Realms of Children's Participation." *Journal of Environmental Psychology* 22: 157-169.



- Frank, K. (2006). "The Potential of Youth Participation in Planning." *Journal of Planning Literature* 20(4): 351.
- Frank, L.D., T.L. Schmid, J. Sallis, J. Chapman, and B. Saelens (2005). "Linking Objectively Measured Physical Activity with Objectively Measured Urban Form Findings from SMARTRAQ." *American Journal of Preventive Medicine* 28(2S2): 117-125.
- Gilliland, J., M. Holmes, J. Irwin, and P. Tucker (2006). "Environmental Equity Is Child's Play: Mapping Public Provision of Recreation Opportunities in Urban Neighbourhoods." *Vulnerable Children and Youth Studies* 1(3): 256-268.
- Halseth, G. and J. Doddridge (2000). "Children's Cognitive Mapping: A Potential Tool for Neighborhood Planning." *Environment and Planning B: Planning and Design* 27(4): 565-82.
- Hart, R. (1979). *Children's Experience of Place*. New York: Irvington Publishers.
- (1992). "Children's Participation: From Tokenism to Citizenship." *Innocenti Essay inness* 92/6, UNICEF Innocenti Research Centre.
- Hart, R., C. Daiute, S. Iltus, D. Kritt, M. Rome, and K. Sabo (1997). "Developmental Theory and Children." *Social Justice* 24(3): 33-63.
- Heft, H. (1988). "Affordances of Children's Environments: A Functional Approach to Environmental Description." *Children's Environments Quarterly* 5(3): 29-37.
- Hill, F. and W. Michelson (1981). "Towards a Geography of Urban Children and Youth." In Herbert, D.T. and R.J. Jonston, eds. *Geography and the Urban Environment: Progress in Research and Applications, Vol. 4*. Chichester: John Wiley, 193-228.
- Holloway, S.L., and G. Valentine (2000). "Children's Geographies and the New Social Studies of Childhood." In Spencer, C. and M. Blades, eds. *Children's Geographies: Playing, Living, Learning*. New York: Routledge, 1-26.
- Horelli, L. (1998). "Creating Child-Friendly Environments: Case Studies on Children's Participation in Three European Countries." *Childhood* 5(2): 225.
- Jackson, L.E. (2003). "The Relationship of Urban Design to Human Health and Condition." *Landscape and Urban Planning* 64(4): 191-200.
- Jencks, C. and S.E. Mayer (1990). "The Social Consequences of Growing Up in a Poor Neighborhood." In Lynn, L. and M. McGeary, eds. *Inner-City Poverty in the United States*. Washington, D.C.: National Academy Press, 111-186.
- Jones, O. (2001). "'Before the Dark of Reason': Some Ethical and Epistemological Considerations on the Otherness of Children." *Ethics, Place and Environment* 4(2): 173-178.

- Kofkin Rudkin, J. and A. Davis (2007). "Photography as a Tool for Understanding Youth Connections to Their Neighborhood." *Children, Youth and Environments* 17(4): 107-123.
- Knowles-Yanez, K.L. (2005). "Children's Participation in Planning Processes." *Journal of Planning Literature* 20(1): 3-14.
- Larsen, K., J. Gilliland, and P. Hess (2009). "Identifying Influences of Physical Environments and Socio-Demographic Characteristics on a Child's Mode of Travel to and from School." *American Journal of Public Health*. In Press.
- Leventhal, T. and J. Brooks-Gunn (2000). "The Neighborhoods They Live In: The Effects of Neighborhood Residence on Child and Adolescent Outcomes." *Psychological Bulletin* 126(2): 309-337.
- London, J.K., K. Zimmerman, and N. Erbstein (2003). "Youth-Led Research and Evaluation: Tools for Youth, Organizational, and Community Development." *New Directions for Evaluation* 98: 33-45.
- Loukaitou-Sideris, A. (2003). "Children's Common Grounds: A Study of Intergroup Relations among Children in Public Settings." *Journal of the American Planning Association* 69(2): 130-144.
- Lynch, K. (1979). "The Spatial World of the Child." In Michelson, W., S.V. Levine, and E. Michelson, eds. *The Child in the City: Today and Tomorrow*. Toronto, Canada: University of Toronto Press, 102-127.
- Mackett, R., B. Brown, Y. Gong, K. Kitazawa, and J. Paskins (2007). "Children's Independent Movement in the Local Environment." *Built Environment* 33(4): 454-468.
- Matthews, H., M. Limb, and M. Taylor (1998). "The Geography of Children: Some Ethical and Methodological Considerations for Project and Dissertation Work." *Journal of Geography in Higher Education* 22(3): 311-324.
- (2003). "Coming of Age for Children's Geographies." *Children's Geographies* 1: 3-5.
- Matthews, H. and M. Limb (1999). "Defining an Agenda for the Geography of Children: Review and Prospect." *Progress in Human Geography* 23(1): 61.
- Matthews, H., M. Limb, and B. Percy Smith (1998). "Changing Worlds: The Microgeographies of Young Teenagers." *Tijdschrift voor Economische en Sociale Geografie* 89(2): 193-202.
- Matthews, H. and F. Tucker (2000). "Consulting Children." *Journal of Geography in Higher Education* 24(2): 299-310.
- McKendrick, J. (2002). "Coming of Age: Rethinking the Role of Children in Population Studies." *International Journal of Population Geography* 7(6): 461-472.

- McMillan, T. (2005). "Urban Form and a Child's Trip to School: The Current Literature and a Framework for Future Research." *Journal of Planning Literature* 19: 440-456.
- Moore, R.C. (1986). *Childhood's Domain: Play and Place in Child Development*. London: Croom Helm Ltd.
- Morrow, V. (2001). "Using Qualitative Methods to Elicit Young People's Perspectives on Their Environments: Some Ideas for Community Health Initiatives." *Health Education Research* 16(3): 255-268.
- Mullahey, R., Y. Susskind, and B. Checkoway (1999). *Youth Participation in Community Planning*. Chicago: American Planning Association.
- O'Brien, M. (2003). "Regenerating Children's Neighborhoods: What Do Children Want." In Christensen, P. and M. O'Brien, eds. *Children in the City: Home Neighborhood and Community*. London: Routledge-Falmer, 142-161.
- Prout, A., and A. James (1997). "A New Paradigm for the Sociology of Childhood? Provenance, Promise and Problems." *Constructing and Reconstructing Childhood: Contemporary Issues in the Sociological Study of Childhood*. London: Routledge-Falmer, 7-33.
- Rasmussen, K. (2004). "Places for Children—Children's Places." *Childhood* 11(2): 155-173.
- Rasmussen, K. and S. Smidt (2003). "Children in the Neighbourhood—The Neighborhood in the Children." In Christensen, P. and M. O'Brien, eds. *Children in the City: Home, Neighbourhood and Community*. London: Routledge-Falmer, 82–100.
- Rissotto, A. and M.V. Giuliani (2006). "Learning Neighbourhood Environments: The Loss of Experience in a Modern World." In Spencer, C. and M. Blades, eds. *Children and Their Environments: Learning, Using and Designing Spaces*. Cambridge, UK: University Press, 75-90.
- Ross, N.A., S. Tremblay, and K. Graham (2004). "Neighborhood Influences on Health in Montréal, Canada." *Social Science and Medicine* 59(7): 1485-1494.
- Sallis, J.F., J.J. Prochaska, and W.T. Taylor (2000). "A Review of Correlates of Physical Activity of Children and Adolescents." *Medicine and Science in Sports and Exercise* 32(5): 963.
- Sanoff, H. (2000). *Community Participation Methods in Design and Planning*. New York: John Wiley & Sons.
- Shields, M. (2005). *Measured Obesity: Overweight Canadian Children and Adolescents*. Ottawa: Statistics Canada: 82-620.
- Spencer, C. and H. Woolley (2000). "Children and the City: A Summary of Recent Environmental Psychology Research." *Child: Care, Health and Development* 26(3): 181-198.

- Srinivasan, S., L.R. O'Fallon, and A. Dearry (2003). "Creating Healthy Communities, Healthy Homes, Healthy People: Initiating a Research Agenda on the Built Environment and Public Health." *American Journal of Public Health* 93: 1446-1450.
- Strack, R.W., C. Magill, and K. McDonagh (2004). "Engaging Youth through Photovoice." *Health Promotion Practice* 5(1): 49.
- Sutton, S.E. and S.P. Kemp (2002). "Children as Partners in Neighborhood Placemaking: Lessons from Intergenerational Design Charrettes." *Journal of Environmental Psychology* 22(1-2): 171-189.
- Talen, E. and M. Coffindaffer (1999). "The Utopianism of Children: An Empirical Study of Children's Neighborhood Design Preferences." *Journal of Planning Education and Research* 18(4): 321.
- Travlou, P., P.E. Owens, C.W. Thompson, and L. Maxwell (2008). "Place Mapping with Teenagers: Locating Their Territories and Documenting Their Experience of the Public Realm." *Children's Geographies* 6(3): 309-326.
- Tucker, P., J. Irwin, J. Gilliland, M. He, K. Larsen, and P. Hess (2009). "Environmental Influences on Physical Activity Levels in Youth." *Health and Place* 15(1): 357-363.
- Valentine, G. (1997a). "'My son's a bit dizzy.' 'My wife's a bit soft': Gender, Children and Cultures of Parenting." *Gender, Place and Culture* 4: 37-62.
- (1997b). 'Oh yes I can.' 'Oh no you can't': Children and Parents' Understandings of Kids' Competence to Negotiate Public Space Safely." *Antipode* 29(1): 65-89.
- Walker, M., J.D. Whyatt, C.G. Pooley, G. Davies, P. Coulton, and W. Bamford (2009). "Talk, Technologies and Teenagers: Understanding the School Journey Using a Mixed-Methods Approach." *Children's Geographies* 7(2): 107-122.
- Wang, C.C., S. Morrel-Samuels, P.M. Hutchison, L. Bell, and R.M. Pestronk (2004). "Flint Photovoice: Community Building among Youths, Adults, and Policymakers." *American Journal of Public Health* 94: 911-913.
- Weden, M.M., R.M. Carpiano, and S.A. Robert (2008). "Subjective and Objective Neighborhood Characteristics and Adult Health." *Social Science and Medicine* 66(6): 1256-1270.
- Weller, S. (2006). "Situating (Young) Teenagers in Geographies of Children and Youth." *Children's Geographies* 4(1): 97-108.
- Wilson, N., S. Dasho, A.C. Martin, N. Wallerstein, C. Wang, and M. Minkler (2007). "Engaging Young Adolescents in Social Action through Photovoice: The Youth Empowerment Strategies (YES!) Project." *The Journal of Early Adolescence* 27(2): 241-261.

Woolley, H. (2006). "Freedom of the City: Contemporary Issues and Policy Influences on Children and Young People's Use of Public Open Space in England." *Children's Geographies* 4(1): 45-59.

Woolley, H., J. Dunn, C. Spencer, T. Short, and G. Rowley (1999). "Children Describe Their Experiences of the City Centre: A Qualitative Study of the Fears and Concerns which May Limit Their Full Participation." *Landscape Research* 24(3): 287-301.

## Chapter 5

### 5 Free range kids? Using GPS-derived domains to examine children's independent neighbourhood mobility and activity

#### 5.1 Abstract

This study examined the neighbourhood activity spaces (NAS) of 9 to 13 year old children (n=143) from 7 elementary school neighbourhoods (4 urban, 3 suburban) in London, Canada. Data from portable GPS loggers worn by participants for 7 days were used to isolate all non-vehicular trips originating from home, including active travel to school. Both spatial and spatio-temporal metrics were developed to assess the maximum active distance children travelled from home and the relative time spent in neighbourhood settings. Descriptive and linear regression analyses examined the influence of individual, perceptual and environmental factors on children's neighbourhood use and travel. Participants spent a large portion of their out-of-school time (75%) in their NAS. While children travelled relatively far from home at least once during the study, 980m on average, they spent little of their overall leisure time in neighbourhood settings. The majority of children's time (average 94.5%) was spent within 400m of home. Almost 90% of children's time in their NAS was spent within the 150m that defined their 'home zone'. Analyses revealed school travel mode the level of independent mobility awarded by parents were two of the strongest predictors of both distance travelled and time spent close to home; active travellers and those with high levels of independent mobility travelled further than their counterparts, and spent more time in neighbourhood settings and in settings further from home. Results suggest that while individual-level factors were most influential, parent perceptions of neighbourhood safety, neighbourhood type, and nearby land uses also influenced children's neighbourhood use. This study supports the suggestion that children's habitual neighbourhood domains are shrinking and that the

neighbourhood may no longer be serving as a primary environment for children's leisure activities.

## **5.2 Introduction**

The freedom and opportunity to independently explore local neighbourhood environments has been linked with a wealth of developmental and health benefits for children. Yet, both the time and license to play in neighbourhood settings, particularly without the supervision of adults, has declined drastically for many children in recent decades (Fyhri, Hjorthol, Mackett, Fotel, & Kyttä, 2011; Hillman et al., 1990; Kyttä, 2004; Mackett et al., 2007; Shaw et al., 2012). Evidence is accruing that contemporary children are spending little of their free time in neighbourhood environments, and generally not venturing very far from home on their own (Fagerholm & Broberg, 2011; Veitch et al., 2008; Villanueva, Giles-Corti, Bulsara, McCormack, et al., 2012; Villanueva, Giles-Corti, Bulsara, Timperio, et al., 2012; Wridt, 2010). The potential adverse health effects of the loss of neighbourhood activity and mobility necessitates more work to examine children's independent neighbourhood geographies and factors which may broaden or limit local play and travel. This study aims to isolate children's everyday neighbourhood activity spaces and investigate the degree to which contemporary children are spending their free time in local neighbourhood settings. Specifically, this study will address the following questions: 1) How far from home are children actively travelling within their neighbourhood environments? 2) How much of their free time are children spending in neighbourhood zones around their homes? and 3) How do individual, perceptual, or environmental factors influence the extent of or time spent in neighbourhood activity spaces?

### **5.2.1 Neighbourhood activity as a developmental stimulator**

A child's home neighbourhood has traditionally been considered a key arena during middle childhood, when a child begins to acquire the skills for, and interest in, exploring the world beyond their home and family as part of their continuing development (Chawla, 1992; Hart, 1979; Jack, 2008; Matthews, 1992; Moore, 1986a; Sutton & Kemp, 2002; Tranter & Pawson, 2001). Starting around the age of 7 or 8 years, as children gain greater

confidence and skill in tackling environmental challenges, they begin to crave more freedom to move around their communities, unaccompanied by an adult; if allowed, children slowly start to venture further and further from home, carving out a spatial domain for independent neighbourhood activity (Chawla, 1992; Hillman et al., 1990; Matthews, 1992, 1995; Spilsbury, 2005; Tranter & Pawson, 2001).

It is as much the process of continually expanding these neighbourhood domains as the interactions that take place within them that have proved beneficial for healthy child development (Churchman, 2003; Gleave & Cole-Hamilton, 2012; Gray, 2011; Hart, 1979; Mikkelsen & Christensen, 2009; Moore, 1986a; Tranter & Pawson, 2001; Veitch, Salmon, & Ball, 2007; Wridt, 2010). Stimulating play and explorative experiences in the new environments of the neighbourhood allow children to test their burgeoning bodies and minds, scaffolding the development of more refined physical capabilities and cognitive skills (Bartlett et al., 1999; Burdette & Whitaker, 2005b; Burke, 2005; Churchman, 2003; Gill, 2007; Moore, 1986a; Rissotto & Tonucci, 2002). Exposed to a wider range of social and environmental encounters in the neighbourhood setting, children also begin to build a network of social contacts beyond their home, and to explore their own social identity outside of their family (Prezza & Pacilli, 2007; Spilsbury, 2005; Sutton & Kemp, 2002). Independently conquering the complexities of the neighbourhood environment breeds a sense of autonomy and competence in children, in turn giving them the confidence to continue pushing the boundaries of their neighbourhood domains (Bartlett et al., 1999; Bjorklid, 1982; Churchman, 2003; Fjortoft, 2004; Gill, 2007; Spencer & Woolley, 2000). This intense and evolving engagement with their local environments can also foster early attachments to place, a bonding experience which can be critical to the development of a healthy self-identity (Cosco & Moore, 2002; Engwicht, 1992; Jack, 2008; Ross, 2007; Tranter & Pawson, 2001; Tuan, 1978). Children are intrinsically drawn to such environmental interactions; when given the opportunity, they are naturally motivated to playfully explore and engage with their neighbourhood environments in countless ways that are advantageous for their healthy development and well-being (Bartlett et al., 1999; Cosco & Moore, 2002). Such active



and independent exploration of their community settings may, in fact, be necessary for children to thrive (Shaw et al., 2012).

Children's ability to freely engage in neighbourhood activity and capitalize on its benefits, however, may be highly dependent on their level of independent neighbourhood mobility, that is, the freedom they have to travel within their communities unaccompanied by an adult. Children whose neighbourhood mobility is less restricted have been shown to venture outside more often, engage in longer periods of outdoor play and exhibit higher levels of social interaction in the community (Mackett & Paskins, 2008; Page, Cooper, Griew, & Jago, 2010; Prezza et al., 2001; Prezza & Pacilli, 2007; Shaw et al., 2012). Children with fewer mobility restrictions also tend to have larger and more diverse neighbourhood domains for outdoor activity (Joshi, Maclean, & Carter, 1999; Matthews, 1987; Rissotto & Tonucci, 2002; Villanueva, Giles-Corti, Bulsara, McCormack, et al., 2012).

### **5.2.2 Declining levels of neighbourhood activity and mobility**

Recognition of the potential benefits for health and development has led to greater attention in the last decade on children's neighbourhood activity and independent travel patterns. Much of the research to date focuses particularly on children's journey to school (Schoeppe, Duncan, Badland, Oliver, & Curtis, 2012; Shaw et al., 2012), but school travel mode can serve as a partial indicator of children's ability to travel independently to other neighbourhood destinations. Trends revealed in school travel studies are alarming; recent meta-reviews highlight consistent and dramatic downward trends in both independent travel to school and children's overall license to play or travel around their communities without adult supervision (McDonald, Brown, Marchetti, & Pedroso, 2011; Schoeppe et al., 2012; Shaw et al., 2012). One of the earliest longitudinal studies, conducted in the UK between 1971 and 1990, reported that unaccompanied travel to school had dropped from 72% to 7% among 7 year olds, and from 94% to 54% among 10-11 year olds during this period (Hillman et al., 1990). Multiple governmental and academic studies since have supported these findings, reporting steep declines in independent travel to school travel or mobility in the UK in the last 50 years (Fyhri et al.,

2011; Mackett, Lucas, et al., 2005; C. G. Pooley et al., 2005; Shaw et al., 2012). Evidence of similar declines is now surfacing in other developed countries, including Australia and New Zealand (Salmon, Salmon, Crawford, Hume, & Timperio, 2007; Trapp et al., 2012; Veitch et al., 2008; Villanueva, Giles-Corti, Bulsara, McCormack, et al., 2012; Witten, Kearns, Carroll, Asiasiga, & Tava'e, 2013); one recent study reported that one third of the 8-12 year old participants did not travel more than 100m from home without an adult (Veitch et al., 2008). Studies in the US and Canada also describe dramatic decreases in independent and active travel to school; the percentage of active travellers have been reported in some cases to be as low as 5% (Buliung, Mitra, & Faulkner, 2009; McDonald, 2007a; McDonald et al., 2011; McMillan, 2007; Sirard, Riner, McIver, & Pate, 2005). Even in Northern European and Scandinavian countries, where children generally enjoy higher levels of independent mobility, substantial reductions in the number of children travelling independently to school are being reported, along with considerable increases in the use of cars to escort children (Fyhri & Hjorthol, 2009; Fyhri et al., 2011; Kyttä, 2004; Schoeppe et al., 2012; Shaw et al., 2012).

### **5.2.3 The changing landscapes of childhood**

With declining levels of independent mobility and active travel to school, children are subsequently spending less time in neighbourhood environments than previous generations, and their neighbourhood domains for unsupervised free play have been steadily shrinking, significantly altering the primary settings of childhood. After examining intergenerational changes in children's activity in an Amsterdam neighbourhood, Karsten suggests that contemporary landscapes of childhood have changed so dramatically from previous generations as to necessitate new classifications of childhood play experience (2005). Play among earlier generations was often synonymous with 'outdoor play', the majority of children's activities taking place in the public outdoor environments of the neighbourhood (Karsten, 2005). While some contemporary children still demonstrated this type of 'outdoor' childhood, the experience of many others, spending vast amounts of their time in indoor play or care settings, or else in vehicles being chauffeured to various activity settings, would be better classified as 'indoor' or 'backseat' childhoods (Karsten, 2005).

The changing nature of childhood play settings in contemporary Amsterdam is not exceptional; Karsten's work aptly captures the transformations in childhood experience now being documented in many developed countries. A number of cultural changes have helped to precipitate these changes in children's activities and settings.

Developments in technology, which have increased the availability of home-based entertainment such as television, computers, and video games (Burke, 2005; Clements, 2004; Copperman & Bhat, 2009; Karsten, 2005; Kytta, 2003; Mikkelsen & Christensen, 2009; Postman, 1985; Tandy, 1999; Witten et al., 2013), coupled with parents' heightened interest in providing 'safer', supervised activities (Clements, 2004; Gaster, 1991; Gray, 2011; Hillman et al., 1990; Irwin, Johnson, Henderson, Dahinten, & Hertzman, 2007), have made indoor activities more appealing to both children and their parents. A number of studies reveal that many contemporary parents no longer view the neighbourhood as a safe play space for children, or know or trust enough in their neighbours to look after their children while playing outside (Irwin et al., 2007; Shaw et al., 2012; Witten et al., 2013). Fears of stranger abduction or of dangers due to traffic and bullies, anxieties often in turn adopted by the children themselves, can lead parents to either accompany their children on excursions within the community, or else keep them indoors all together (Clements, 2004; Gill, 2011; Irwin et al., 2007; Karsten, 2002; Mikkelsen & Christensen, 2009; O'Brien et al., 2000; C. G. Pooley et al., 2005; Shaw et al., 2012). Family schedules and rhythms have also changed to accommodate parental activity or commuting patterns, as well as children's increased involvement in structured out-of-school activities (Copperman & Bhat, 2009; Gray, 2011; Karsten, 2002; Mackett, Lucas, et al., 2005; Witten et al., 2013). The net result is an increase in the time children spend indoors in private settings, or in vehicles being driven to a range of organized activities, often outside of their immediate neighbourhood (Christensen & O'Brien, 2003; Karsten, 2002, 2005; Mackett, Brown, et al., 2005; Mikkelsen & Christensen, 2009; C. G. Pooley et al., 2005; Wridt, 2010; Zenk et al., 2011). The public, outdoor settings of the 'street' and neighbourhood, with the developmentally-supportive opportunities they offer, have become inaccessible or infrequent domains for many children (Gray, 2011; Karsten, 2005; Mikkelsen & Christensen, 2009; Prezza & Pacilli, 2007; Spilsbury, 2005).

### **5.2.4 The adverse effects of restricted activity and mobility**

Restricting children's unsupervised neighbourhood activity and mobility typically sprouts from a caregiver's desire to protect children from risk; there is little awareness, however, of the potential negative impact these protective strategies may have on children's health and development. Inhibiting children's ability to freely interact with their local environments, and in turn, limiting the diversity of environments and encounters to which they are exposed, can adversely affect children's spatial and orientation skills, as well their creative thinking capabilities (Hillman et al., 1990; Rissotto & Tonucci, 2002; Tranter & Pawson, 2001). Reduced independent local activity and mobility has also been associated with increased time spent in sedentary pursuits, such as watching television, and reduced engagement in healthy physical activity (Ekelund et al., 2004; Karsten, 2005; Page et al., 2005; Schoeppe et al., 2012). The development of a child's personal and social skills can also be obstructed when their exposure to the broader social environment of the neighbourhood is limited or eliminated, reducing their ability to develop healthy community relationships and effectively interact with the social and physical life of the neighbourhood (Christensen & O'Brien, 2003; Matthews, 2003; Mikkelsen & Christensen, 2009; Prezza & Pacilli, 2007). This reduced engagement with and attachment to local places can weaken a children's comfort in public settings, as well their confidence in their own environmental competence, and ultimately their sense of self (Hart, 1979; Prezza & Pacilli, 2007; Rissotto & Tonucci, 2002; Spilsbury, 2005). Rather than a neutral or negligible impact, reduced independent travel and neighbourhood activity may be having significant adverse effects on children's healthy development.

## **5.3 Children's neighbourhood activity spaces**

### **5.3.1 Conceptualizing children's neighbourhood activity spaces**

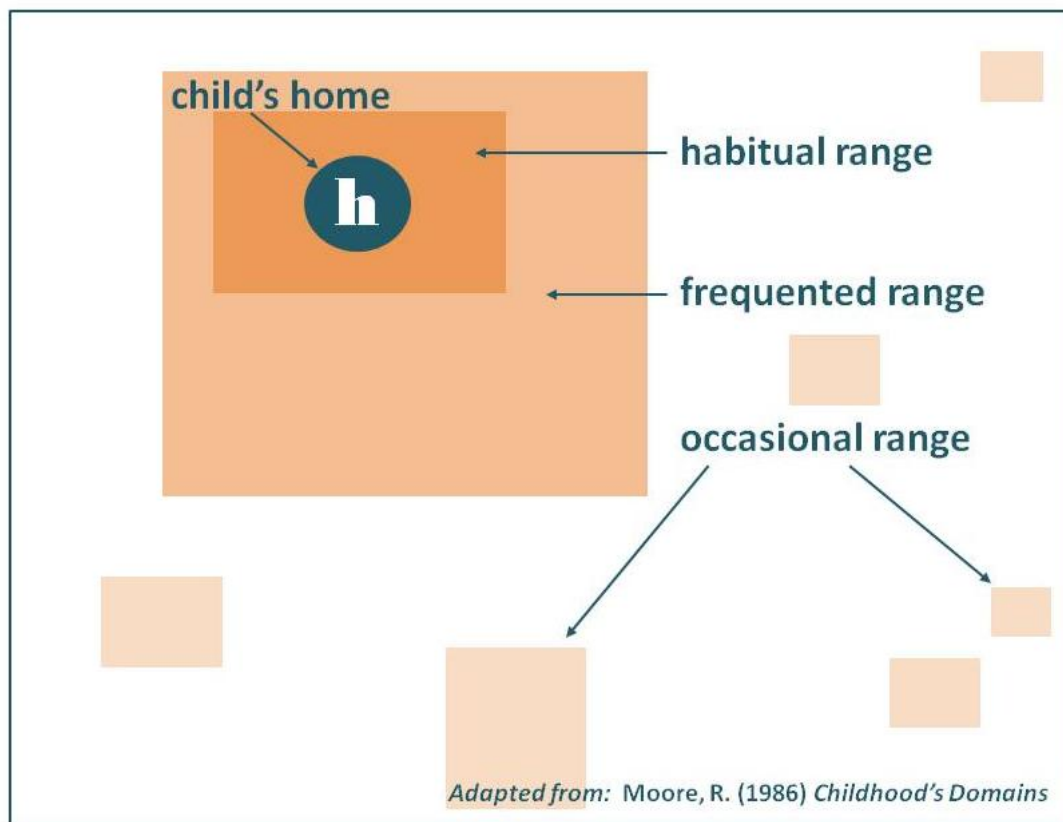
Although generally receiving little research attention in the last few decades, there has been a small but consistent thread of work to capture and describe the neighbourhood territories that children use in the course of their everyday lives, most notably by Hart (1979), Bjorklid (1982), Moore (1986), Matthews (1987; 1992), Hillman et al (1990;

2006), Gaster (1991), Karsten (2002; 2005), Spilsbury (2005; 2009) and Villanueva et al (2012a, 2012b). These studies, however, have used a range of terminologies to refer to children's neighbourhood spaces including home range, territorial range, neighbourhood domain, activity range, and action or activity space. The term that seems to be most acceptable across disciplines is '*activity space*' and will be used for the purposes of this study to refer to the full spatial territory that children utilize in the course of their everyday activities.

Children's neighbourhood activity spaces (NAS) have also not been conceptualized in the same way in research to date, particularly with respect to whether '*activity space*' includes territory that the child utilizes while accompanied by an adult. Most work attempting to measure or characterize domains also describe them primarily in spatial terms, using metrics such as distance or area; few to date have included a temporal component that addresses when children use these domains, or for how long. Spatial metrics alone, however, do not adequately summarize children's habitual use of their neighbourhood activity spaces.

Robin Moore's classic study (1986) of British children's use of and movement through their neighbourhood environments may still provide one of the most useful conceptual frameworks for envisioning children's neighbourhood activity spaces. Moore recognized that children do not spend their time equally within all areas of their home range; some areas close to home saw almost daily use while destinations further away, although accessible, may only be visited occasionally. Moore therefore developed a conceptual model of nested domains to characterize the spatial and temporal differences in children's use of their local environments; three types of '*ranges*' (activity spaces) were identified that together comprise the overall territorial domain of a child at a given point in time (See Fig. 5.1). The first domain, termed the child's *habitual range*, is comprised of the spaces centred around the home that a child can easily access, and which they utilize on an almost daily basis. The size of a child's habitual range can be influenced by a number of factors, including, for example, a child's age (Moore, 1986). A child's *frequented range*, broader than their habitual range, includes those neighbourhood spaces that the child accesses periodically when granted both the time and freedom to do so. Moore

suggests that this *frequented range* is usually bounded by both parental restrictions and physical constraints such as busy roads (1986). The third and final range, a child's *occasional range*, represents the absolute edges of a child's independent territory at any given time and includes those places that a child accesses only very occasionally or as part of a special outing. It also includes those places that a child may access via public transportation, and therefore no longer represents a strictly pedestrian territory. As a child matures, and is awarded higher degrees of independence, the size and nature of each of these domains usually expands to encompass more and more territory (Matthews, 1992; Moore, 1986a). The size of these activity spaces, however, is likely to be highly variable across children, depending on factors such as age, gender, and a parent's confidence in their child's ability to successfully negotiate territories beyond their homes (Matthews, 1992; Moore, 1986a; Spilsbury, 2005; Villanueva, Giles-Corti, Bulsara, McCormack, et al., 2012).



**Figure 5.1: Moore's model of nested childhood domains**

As conceptualized by Moore, the majority of children's daily activities would therefore take place within the nested domains of the 'habitual' and 'frequented ranges', and this combination represents the activity space commonly used by children independently, and on foot or bicycle, in the course of their daily and weekly activity routines. The outer periphery of this pair of domains therefore aligns with the boundaries of the 'neighbourhood activity space' sought out in this study. Having adopted the term *activity space* for purposes of this study, these two nested domains will hereafter be referred to as a child's *habitual activity space* and *frequented activity space*.

### **5.3.2 Capturing and measuring neighbourhood activity spaces**

Accurately capturing children's neighbourhood activity spaces is a difficult endeavor, particularly as these territories present moving targets with shifting boundaries. Previous studies have utilized a range of strategies and metrics to describe or measure these fluid domains, including the use of child- or parent-drawn maps of places children can visit independently, or maps of their perceptions of neighbourhood boundaries (MacDougall, Schiller, & Darbyshire, 2009; Matthews, 1987; Rissotto & Tonucci, 2002; Spilsbury et al., 2009; Veitch et al., 2008; Veitch, Salmon, & Ball, 2010; Villanueva, Giles-Corti, Bulsara, McCormack, et al., 2012; Villanueva, Giles-Corti, Bulsara, Timperio, et al., 2012; Wridt, 2010); other studies have employed qualitative means such as interviews, focus groups or neighbourhood walking tours (Loebach & Gilliland, 2010; Matthews, 1987; Spilsbury, 2005; Tranter & Pawson, 2001).

Until recently, researchers have had little opportunity to directly measure children's neighbourhood behaviour and mobility. The advent of reliable portable GPS monitoring equipment (e.g., GPS loggers or GPS-enabled cell phones) has begun to allow researchers to more objectively record children's spatial activity range and mobility patterns as they are lived within a given environmental context, and over an extended period of time. Although much of the work to date has focussed on locating settings of children's physical activity (see Mackett & Paskins, 2008; Maddison et al., 2010; Quigg, Gray, Reeder, Holt, & Waters, 2010; Rainham et al., 2012; Rodriguez et al., 2012; Zenk et al., 2011), a few have attempted to utilize GPS data to define the geographical

boundaries of children's frequented activity spaces and examine the degree of their independent mobility (see Fagerholm & Broberg, 2011; Mackett et al., 2007; Mikkelsen & Christensen, 2009; C. Pooley et al., 2010; Wiehe et al., 2008). Combined with local census and built environment data, as well as data derived from other quantitative and qualitative measures, this tracking information is helping to provide a more comprehensive and nuanced picture of children's neighbourhood behaviour as well as the social or environmental factors that may support or hinder their local activities. Direct measures of children's local movements can also help us to better define what constitutes a 'neighbourhood' for contemporary children, as well as provide more accurate measures of their actual exposure to local social and built environments.

### **5.3.3 Factors influencing children's neighbourhood activity spaces**

Most children are subject to some extrinsic restrictions on their neighbourhood play and mobility throughout childhood. The degree of independence granted and the time available to children for outdoor play is highly variable, and can be influenced by a range of socio-environmental factors. The factors identified in the literature to date can be generally grouped into three categories: (1) individual-level characteristics, such as age or gender, (2) perceptions of the neighbourhood environment, either on the part of the child or their parent, and (3) built environment characteristics, such as neighbourhood conditions, road characteristics and traffic levels.

#### ***Individual-level factors***

Children's age has consistently surfaced as a factor in the degree of independent mobility awarded, and a key variable explaining much of the variance in levels of active travel to school or other destinations around the neighbourhood. Within the age range of 7 to 13 years, when children are most likely to be carving out an independent domain (Chawla, 1992; Matthews, 1995), those at the older end of the age spectrum consistently exhibit larger neighbourhood activity spaces, and are typically allowed to access more local destinations on their own than their younger peers (Fyhri & Hjorthol, 2009; Hart, 1979; Sener & Bhat, 2007; Spilsbury, 2005; Tranter & Pawson, 2001; Veitch et al., 2008; van Vliet, 1983). In general, children are granted more freedom of movement around their



neighbourhood as they mature. This trend may be related to parents increased level of comfort with independent travel among their older children (Johansson, 2006). It should be emphasized, however, that the age at which most contemporary children are granted a substantial degree of independent neighbourhood mobility is much older than that typical of earlier generations (Gaster, 1991; Karsten, 2002, 2005; Mikkelsen & Christensen, 2009).

The story with respect to gender differences in independent neighbourhood activity is not as clear. The bulk of the studies in the last few decades report that boys are generally granted more freedoms than girls of the same age, and subsequently have been able to enjoy larger independent activity spaces in their neighbourhoods (Brown, Mackett, Gong, Kitazawa, & Paskins, 2008; Fyhri & Hjorthol, 2009; Hart, 1979; Mackett et al., 2007; Matthews, 1987; O'Brien et al., 2000; Page, Cooper, Griew, Davis, & Hillsdon, 2009; Prezza et al., 2001; Spilsbury, 2005; Tranter & Pawson, 2001; Wridt, 2010). However, there have also been a few recent studies that have found no significant or systemic differences in mobility restrictions or allowances by gender, or the size of boys' versus girls' neighbourhood activity spaces (Johansson, 2006; McDonald, 2007b; Spilsbury, 2005; Trapp et al., 2012; Villanueva, Giles-Corti, Bulsara, Timperio, et al., 2012). Traditionally the imbalance has been credited to parent's perception that girls may be more at risk to neighbourhood dangers than boys, and are therefore restricted to areas closer to home (Hart, 1984; Matthews, 1992; Spilsbury, 2005; Valentine, 1997). It is possible that parent perceptions are changing in this regard, and that gender is not figuring as heavily in their perception of the safety of their children in neighbourhood, or in their child's ability to handle the challenges posed by environments beyond the home. A recent study by Veitch and colleagues (2008) found, in fact, that participating girls were able to go more places in the neighbourhood without an adult than boys of the same age. It may be, however, that the overall mobility of boys is being more restricted than in the past, to the point that their ranges are now on par with those of their female counterparts, rather than that girls are being granted greater freedom to roam their neighbourhoods. Regardless, the gender of the child is no longer a consistent factor related to neighbourhood independence and activity, and warrants further study.

### *Perceptual and environmental factors*

Environmental attributes and conditions of the neighbourhood have been shown to considerably influence both parent and child perceptions of their local places, and the way and degree to which these settings are used by children for outdoor activity (Kerr et al., 2006; Panter et al., 2008; Shaw et al., 2012; Timperio, Crawford, Telford, & Salmon, 2004; Tranter & Pawson, 2001; Weir, Etelson, & Brand, 2006; Wridt, 2010). As neighbourhood perceptions can be tied to the actual conditions of the local built environment, these factors will be explored simultaneously.

The size of children's independent neighbourhood territories, and the time children are given to spend in them, is often the product of negotiation between parent and child, and relies heavily on the degree to which parents perceive risks in local environments as well as their confidence in their child's ability to successfully cope with any challenges they might encounter (Berg & Medrich, 1980; Hart, 1979, 1984; Moore, 1986a; Spilsbury, 2005; Tranter & Pawson, 2001; Valentine, 1997; Villanueva, Giles-Corti, Bulsara, McCormack, et al., 2012). Concerns regarding children's safety in the neighbourhood, especially from dangers posed by traffic and strangers, consistently rank among the strongest parental reasons for restricting children's unsupervised neighbourhood activity (Berg & Medrich, 1980; Carver, Timperio, & Crawford, 2008; Hillman, 2006; Kytä, 2004; C. G. Pooley et al., 2005; Valentine, 1997; Valentine & McKendrick, 1997; Veitch, Bagley, Ball, & Salmon, 2006; Witten et al., 2013). These concerns also seem to have increased in the last few decades, leading to more restricted neighbourhood geographies for children and an increase in escorting of children by car, further contributing to traffic volume on local roads (Johansson, 2006; Mackett, Gong, & Kitazawa, 2006; Spilsbury, 2005; Tranter & Pawson, 2001; Valentine, 1997).

At the neighbourhood level, there have been some noticeable differences between the neighbourhood ranges of children who live in urban versus suburban environments. The majority of the earliest studies, on children's home ranges, conducted in the 1970s and 1980s, reported that suburban children enjoyed a larger independent neighbourhood domain than their urban peers (Hart, 1979; Lynch et al., 1977; Moore & Young, 1978;

van Vliet, 1983). Moore and Young hypothesized at the time that this was likely because parents considered suburban environments to be safer and so were more comfortable granting their children broader license to explore (1978).

The research evidence accumulated since, however, has not painted as consistent a picture. Sener & Bhat found that urban children are more likely to be given license to participate, unaccompanied by a parent, in leisure activities outside of the home than those from suburban neighbourhoods, suggesting a higher level of comfort with neighbourhood mobility among urban parents (Sener & Bhat, 2007). Several other studies suggest that environmental attributes of urban settings may be more conducive to mobility and facilitate greater access to a broad range of amenities. The presence of a more diverse mix of land uses within a denser community structure, and increased ease of movement due to higher density of intersections and more connected street patterns, have all been consistently associated with children's active travel to school and to other neighbourhood destinations (Badland & Schofield, 2005; Fagerholm & Broberg, 2011; Clare Hume, Jorna, et al., 2009; Kerr, Frank, Sallis, & Chapman, 2007; Larsen et al., 2009; Timperio et al., 2004). Yet, other contemporary studies have reported that urban children have mapped much smaller domains of neighbourhood activity than suburban participants (MacDougall et al., 2009), and urban parents have expressed more concern with neighbourhood safety (Weir et al., 2006). Higher levels of traffic or having to cross busy roads to reach local destinations, conditions common to urban environments, have also been negatively associated with walking or cycling around the neighbourhood (Min & Lee, 2006; Timperio et al., 2004; Tranter & Pawson, 2001; Villanueva, Giles-Corti, Bulsara, McCormack, et al., 2012; Weir et al., 2006). It may be that independence, measured solely as distance travelled from home, does not accurately highlight differences in mobility between urban and suburban children as those living in urban environments have much smaller distances to travel to reach local destinations (Evenson et al., 2006; Kerr et al., 2007; Mackett et al., 2007).

Urban environments also tend to exhibit higher overall population densities, as well as higher proportions of children and youth, both of which have been associated with increased levels of active travel and neighbourhood mobility among children (Berg &

Medrich, 1980; Kerr et al., 2007; Panter et al., 2008). This may be related in part to the contention that children's neighbourhood activity is primarily social in nature (Mikkelsen & Christensen, 2009), and that visiting nearby friends represents a large part of children's neighbourhood activity and movement (Fagerholm & Broberg, 2011). Both parents and children have also demonstrated preference for neighbourhood play and travel that is accompanied by young friends or siblings (Clark & Uzzell, 2002; Mikkelsen & Christensen, 2009). Several studies have shown that active travel in the neighbourhood has increased when children had positive perceptions of the social environment in the neighbourhood, and felt they had many peers nearby with whom to socialize (Clare Hume, Timperio, et al., 2009; Panter et al., 2008). Greater access to other children may also extend neighbourhood domains; Spilsbury found that the size of children's independent activity spaces increased when they travelled in the company of other youth (2005). The lack of nearby playmates, more common in lower-density suburban environments, has been cited by parents as a barrier to neighbourhood play, and an incentive for arranging supervised 'playdates' with other children (Karsten, 2005). Contrary to these findings, O'Brien et al (2000) found that children's independent mobility was greatest in areas with the lowest population density. The evidence to date regarding the influence of neighbourhood type, and associated attributes, on children's neighbourhood play and social activity therefore remains mixed.

In fact, what is clear is that the exact nature of the influence of neighbourhood type, or other environmental conditions, on children's neighbourhood activity and mobility remains blurry (Page et al., 2009; Prezza et al., 2001; Veitch et al., 2008; Zenk et al., 2011). Numerous reviews to date have attempted to conclusively summarize the correlates of the neighbourhood built environment that impact the use of local settings for active play and travel, but the results remain mixed with respect to most factors (Badland & Schofield, 2005; Davison & Lawson, 2006; L. D. Frank & Engelke, 2001; Heath et al., 2006; Owen, Humpel, Leslie, Bauman, & Sallis, 2004; Sallis et al., 2000; Schoeppe et al., 2012; Shaw et al., 2012).

One of the few environmental variables that has consistently surfaced as an overarching moderator of children's neighbourhood travel and activity is distance to destination

(Fyhri & Hjorthol, 2009; Panter et al., 2008). The shorter the distance to school, or the closer the proximity to home of recreation facilities such as parks, the greater the likelihood of active travel to these destinations, and independent neighbourhood mobility in general (Fyhri & Hjorthol, 2009; Larsen et al., 2009; Mackett et al., 2007; Page et al., 2009, 2010; Panter et al., 2008; Prezza et al., 2001; Rodriguez et al., 2012). Due to both the denser and more diverse land use in urban neighbourhoods and typically well-connected road systems, travel distances to local amenities tend to be shorter, in effect supporting higher levels of access to neighbourhood resources (Badland & Schofield, 2005; Fyhri & Hjorthol, 2009; Page et al., 2010; Timperio et al., 2004; Zwerts, Allaert, Janssens, Wets, & Witlox, 2010; van Vliet, 1983). Ironically, parents who chose to raise children in the ostensibly safer environments of the suburbs have consequently increased the travel distance to local destinations, which may have resulted in more restricted neighbourhood mobility for their children (Badland & Schofield, 2005). Yet, even in well-connected urban or more 'walkable' environments, the influence of distance to destination can also be mediated by other factors such as the age the child, local perceptions of safety, and volume of traffic immediately around the home (McDonald, 2007b; Shaw et al., 2012; Spilsbury, 2005; Tranter & Pawson, 2001; Villanueva, Giles-Corti, Bulsara, McCormack, et al., 2012).

The degree of freedom a child may be granted to play and travel independently around their neighbourhood is the result of a complex combination of individual, perceptual and environmental factors, that can manifest differently among differing groups of children and within varied environmental contexts in ways that can be difficult to untangle (Olds et al., 2009; Shaw et al., 2012). Addressing the effects of these influences is made even more difficult by the constantly shifting nature of the physical, social and cultural landscape of the neighbourhood and childhood itself.

## **5.4 Methods**

### **5.4.1 Participant recruitment and engagement**

This study utilizes data gathered during the first two years of a multi-year research study entitled the STEAM (Spatio-Temporal Environment and Activity Monitoring) project, designed to examine the potential causal effects of the built environment on children's health-related behaviours in the Southwestern Ontario region of Canada. Before launching the study, approvals were obtained from the Non-medical Research Ethics Board of the University of Western Ontario; approval was also obtained from regional school boards to approach schools for participation. Seven elementary schools in the city of London, four urban and three suburban, participated during the first two years of the study. Children in grades 5 to 8 (approximately 9 to 13 years of age) in each school were considered eligible to participate. All children who received permission to participate from a parent or guardian, and who signed their own Child Assent Form, were allowed to participate in the study.

### **5.4.2 Data collection and preparation**

During the study period, participants at the seven elementary schools completed a 7-day multi-tool protocol to document their neighbourhood activities, movements and experiences. Participating children (n=220) wore portable GPS monitors (VGPS-900 by Visiontac) during all waking hours for up to 7 days during the spring-summer season (April to June); GPS units marked a spatial coordinate for each second the unit was in use. Participants also completed detailed daily activity and travel diaries, and both children and parents completed comprehensive surveys on children's neighbourhood activities, environmental perceptions and mobility behaviours.

The GPS tracks of the participating children constitute the primary data for the measurement of children's habitual and frequented neighbourhood activity spaces in this study. Although children may be driven to locations within their neighbourhood as part of their daily routines, we are specifically interested in the neighbourhood settings children travel to or access independently (i.e., without the company of an adult). By

virtue of their age, this implies primarily those settings which they access through pedestrian or ‘active’ means (e.g., on foot, bicycle, skateboard). Therefore, the neighbourhood activity space (NAS) will be represented by all of the child’s out-of-school GPS tracks which originated from home and to which they travelled without a vehicle.

A number of steps were taken to isolate children’s NAS tracks, including removing all GPS points falling within the child’s in-school schedule, all points from a journey to or from school where a vehicular mode (e.g., car, school bus) was indicated <sup>2</sup> as well as GPS points with a recorded speed greater than 22 km/h <sup>3</sup>.

### 5.4.3 Minimum data requirements

There was a high level of compliance with the study protocol from participating children, but there were still some inconsistencies in some children’s data recording across the full week. In order to argue that a child’s GPS dataset represented a valid snapshot of their NAS, it was determined that only those children whose isolated dataset included at least 3 hours of out-of-school wear on at least two weekdays, as well as at least 4 hours of wear on at least one weekend day, would be included in the analysis. Although there is no common standard yet for GPS wear time, validity criteria here were guided by the highest common standard for accelerometer wear time, namely 10 hours of recording per day (Colley, Gorber, & Tremblay, 2010; Penpraze et al., 2006). Since in-school time, typically about 7 hours per day, was removed from the dataset, a minimum of 3 hours of out-of-school data was required for a weekday to be considered valid. Likewise, the

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<sup>2</sup> *The child’s daily activity and travel diary was used to identify mode of travel to school during each day of the study, and verified against travel speeds recorded daily by the GPS loggers. When a discrepancy occurred, the mode of travel assigned to the given school trip was based on the mode indicated by the GPS devices.*

<sup>3</sup> *The speed of 22 km/h was taken as a suitable value for representing the maximum biking speed for a child based on previous studies (Meyer & Dumbaugh, 2005; Thompson, Rebolledo, Thompson, Kaufman, & Rivara, 1997).*

majority of accelerometer-based studies require a minimum of 3 valid days of monitoring per participant (Cliff, Reilly, & Okely, 2009; Colley et al., 2010); this standard also guided inclusion criteria for this study.

#### **5.4.4 Independent variables: Factors influencing neighbourhood activity and mobility**

This work is carried out within a socio-ecological framework that recognizes the multiple spheres of influence on children's behaviours and health outcomes (N. L. Holt et al., 2008; Kearns & Moon, 2002; Macintyre & Ellaway, 2000; Sallis et al., 2006). A number of compositional and contextual factors may be contributing to children's restricted time and activity in neighbourhood environments, or keeping them more home-centred. In order to better understand children's neighbourhood activity and mobility, we need to consider the individual, perceptual and environmental influences that may underscore children's development of an independent activity space beyond their home.

##### ***Individual-level factors***

This study examines several of the individual-level factors which have shown to be influential in other studies of neighbourhood play and mobility, including: age group (9-11 years / 12-13 years), gender (females / males), neighbourhood type (urban / suburban), travel mode to school (active traveler / non-active traveler), distance from home to school (less than 1600m / greater than 1600m), and parent-reported independent mobility (high IM / low IM).

Travel mode to school was derived from children's survey responses regarding the number of school days per week they use each type of transportation mode. All vehicle modes (e.g., car, school bus, city bus) were considered 'non-active modes'; walking, bicycling, skateboarding, or rollerblading were considered 'active' modes. Children travelling by 'active' means one or more days per week were labelled as 'active travellers'. Child survey responses were verified by comparisons to parent responses and mode of travel suggested by GPS data.



Parent-reported independent mobility (IM) was derived from parent responses to the whether there was a household rule that their child is not allowed to be out in the neighbourhood without a parent; children whose parent's responded 'yes' or 'sometimes' were considered to have 'low IM', those whose parent's responded 'no' were considered to have 'high IM'.

### *Perceptual and environmental factors*

Previous research has demonstrated that perceptions of the barriers or risks inherent in the local environment, whether they are based on evidence or not, can influence children's activities. We must therefore consider both objective measures of the built environment, as well as the way the neighbourhood is viewed by both parents and children. In this study, children and parent perceptions of the local built environment were collected using questionnaires, while objective environmental measures were derived individually for each child participant within a GIS, using data obtained from the City of London as well as from national census data (2006). Child and parent perceptions of neighbourhood risk and distance to recreational amenities were selected as the primary neighbourhood perception variables for this analysis.

Perception of neighbourhood risk was determined from a set of five survey questions asked of each child and parent; all answers were given in a 4 point Likert scale format ranging from Strongly Disagree to Strongly Agree. Principal component analysis (PCA) was performed with the data from the five safety-related questions to reduce the number of variables for analyses. Checks were performed to ensure that PCA was appropriate for use with these datasets, including checking inter-variable correlations, the KMO Measure of Sampling Adequacy and Bartlett's Test of Sphericity (Pallant, 2011); the child and parent datasets both met the requirements for PCA, and analyses were carried out separately for each dataset. The number of resulting components were determined based on Eigenvalues  $>1$  and by examining individual scree plots (Pallant, 2011). The child and parent neighbourhood risk datasets were each reduced to a single

‘Neighbourhood Risk’ component<sup>4</sup>, with all variables loading on with values of 0.5 or greater. Cronbach’s alpha scores were calculated to test internal reliability; both datasets met reliability requirements with scores of 0.726 (child perceptions) and 0.839 (parent perceptions) respectively (Pallant, 2011). For child and parent datasets, all five individual variables were therefore summed to determine a component value, which was then collapsed into a binary variable indicating either a high or low perception of neighbourhood risk.

The perception that distance to local destinations represented a barrier to neighbourhood activity was assessed from a single question which asked a child or their parent whether they agreed that it is difficult or unpleasant to play at recreational facilities within the neighbourhood ‘because it is too far from our house or takes too long to get there’. Responses from a 4-point Likert scale ranging from ‘strongly disagree’ to ‘strongly agree’ were collapsed into a binary variable indicating ‘disagree’ or ‘agree’ that recreational facilities are ‘too far from home’.

This study also examines a number of objective environmental measures that have previously been found in the literature to have an impact on children’s neighbourhood activity and mobility, namely: population density (population per km<sup>2</sup>), youth population (age 5-14 years) density (youth population per km<sup>2</sup>), residential density (residential units per km<sup>2</sup>), proportions of primary land uses (percentage of overall commercial, residential, institutional, industrial, and agricultural land area within buffer), maximum traffic

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<sup>4</sup> *Survey items for determining child’s perception of neighbourhood risk: (i) most drivers go too fast in my neighbourhood; (ii) there is a lot of crime in my neighbourhood; (iii) it feels unsafe to walk by myself around my neighbourhood during the day; (iv) I am worried about being or walking alone in my neighbourhood because I am afraid of being taken or hurt by a stranger; (v) My parents are afraid that I will be taken or hurt by a stranger if I am out walking alone in my neighbourhood.*

*Survey items for determining parent’s perception of neighbourhood risk: (i) most drivers go too fast in our neighbourhood; (ii) there is a lot of crime in our neighbourhood; (iii) it feels unsafe to let my child walk alone around the neighbourhood during the day; (iv) I am worried about my child being or walking with friends or siblings in our neighbourhood during the day; (v) I am worried about my child being or walking alone in our neighbourhood because I am afraid of them being taken or hurt by a stranger.*

volume (maximum count per hour on any street segment with buffer), intersection density (intersection count per km<sup>2</sup>), public recreational opportunity density (count per km<sup>2</sup>).

It is unclear at which distance from home any of these factors may exert an influence over children's neighbourhood activity, therefore, a value was calculated for each variable at varying distances from the child's home. *ArcGIS* (v.10.0) was used to calculate values for each environmental variable within circular buffers centred on the child's home location at each of the following distances: within 400m, 800m, 1200m and 1600m. Though arbitrary buffer distances, the use of 400m, 800m and 1600m are common demarcations within studies attempting to define a child's home neighbourhood or to examine neighbourhood mobility (Almanza, Jerrett, Dunton, Seto, & Ann Pentz, 2012; Harten & Olds, 2004; McDonald & Aalborg, 2009; Thornton, Pearce, & Kavanagh, 2011; Timperio et al., 2004; Villanueva, Giles-Corti, Bulsara, Timperio, et al., 2012; Villanueva, Giles-Corti, Bulsara, McCormack, et al., 2012). Buffers of 400m or 500m are also often used as a neighbourhood proxy as they represent the environment within an easy 5-10 minute walk for a child. A distance of 1600m has been used in previous studies to define a child's 'walkable' neighbourhood environment (Thornton et al., 2011; Villanueva, Giles-Corti, Bulsara, McCormack, et al., 2012), as in certain regions of Canada and the US, 1600m (or 1 mile) is the distance administrators use to establish the boundary for bussing students to school (Larsen et al., 2009).

#### **5.4.5 Measures of neighbourhood activity spaces**

Studies to date have focused almost exclusively on spatial metrics to define children's neighbourhood activity spaces (NAS), such as distance travelled from home or an area-based measure of the territorial domain. Yet to better understand the spatial extents of children's local activity spaces, as well as the amount of time spent within various neighbourhood settings, examinations of behaviour patterns also need to include a temporal component. Although a child may be given license to travel on their own to school, or another distant destination such as a park, these may be isolated and infrequent trips. This study therefore examines two dimensions of children's neighbourhood

activity spaces: 1) the spatial extent of their NAS, and 2) the relative amount of time spent in various settings within their NAS.

#### **5.4.5.1 Spatial metrics of NAS**

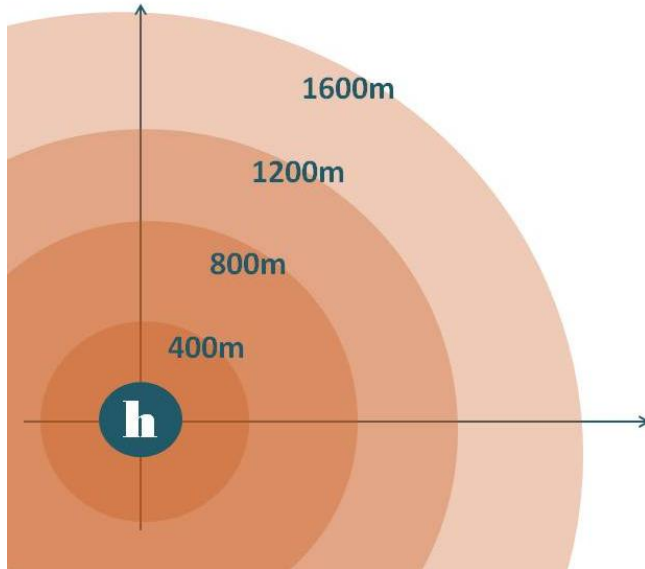
The ‘maximum distance travelled from home’ was selected as the primary spatial metric for this study. A *Maximum Path Distance* (MPD) measure was created for each participant by first converting all GPS points within their NAS to a raster set (based on a 20m cell), then using the Cost Distance tool within ArcGIS (v. 10.0) to calculate the longest distance from the child’s home along all possible continuous paths (i.e., along any path created by a series of adjacent raster cells containing any GPS points). As the cost distance is calculated to the centroid of the furthest 20m raster cell along the longest path, this process could produce a margin of error of +/- 10m in the MPD value. This path distance more accurately reflects the (ground) distance travelled than a traditional crow-fly (Euclidean) distance measure while still taking into consideration the short-cuts through alleys or across parks that children tend to utilize, and which are not captured within a network distance measure that only utilizes the formal street network.

#### **5.4.5.2 Spatio-temporal metrics of NAS**

To examine the relative time each child spent in their NAS overall, as well as various environmental settings within that space, two sets of ‘locational’ filters were applied to all GPS points. The first filter categorized time spent at varying fixed distances from the child’s home by assigning all points to a set of concentric circular buffers around each home, set at 400m increments, up to 1600m (1 mile), after which all further points were classified as ‘greater than 1600m’ (See Fig. 5.2). As each GPS point represents one second of time, totalling all the GPS points within each buffer gives us a relative measure of time spent at that relative distance from home.

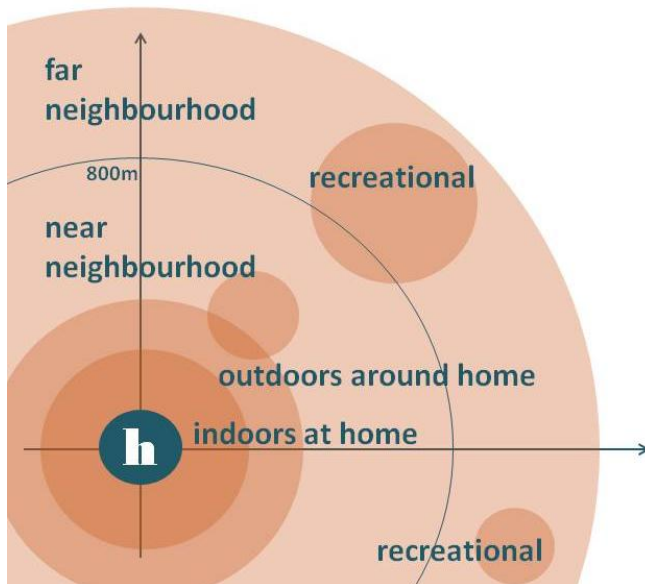
The second locational filter classified each GPS point into a small set of 5 environmental zones: (i) *Indoors at Home*, (ii) *Outdoors around Home*, (iii) *Recreational Facilities*, (iv) *Near Neighbourhood*, and (v) *Far Neighbourhood* (See Fig. 5.3). All GPS points were first classified according to the degree of precision each point exhibited and

therefore our ‘confidence’ in the accuracy of the spatial coordinates recorded by the GPS logger.



**Figure 5.2: Locational filter by fixed distance from home**

Confidence values were based on a combination of satellite ‘fix’ status and ‘horizontal dilution of precision’ values (HDOP). Points assigned a ‘high’ confidence rating had a



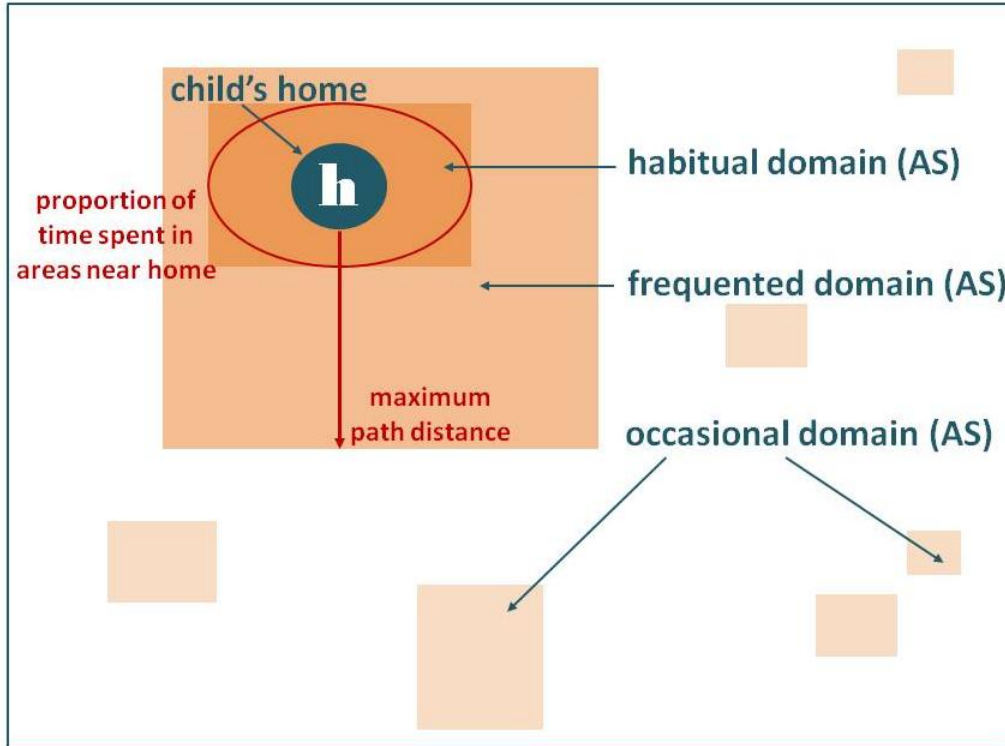
**Figure 5.3: Locational filter by select environmental zones**

3D satellite fix and an HDOP less than or equal to 1.2m; data points were only considered ‘good’ if they maintained a 3D satellite fix but exhibited an HDOP between 1.2 and 2 metres. ‘Poor’ confidence was assigned to points with only a 2D satellite fix and an HDOP greater than 2m; these points with low levels of accuracy were more likely to have been recorded while a participant was indoors.

Each point was then assigned to one of the five environmental zones. All points located within 10m of the centre of the child’s home regardless of confidence value, or any point within 150m of the child’s home with a ‘poor’ confidence value was assigned to ‘indoors at home’. Any other points beyond 10m of home but within a 150m radius, and exhibiting a confidence value of ‘good’ or ‘high’ were considered to be ‘outdoors around home’. Points were considered to be at a ‘recreational facility’ if they were located within the boundaries of any municipal parcel with a recreational designation, including both indoor and outdoor facilities. All school grounds were also included as recreational facilities, to capture any out-of-school recreational use of local schools or their playgrounds. Any points not falling under these 3 categories, but located within an 800m circular buffer of the child’s home were designated as ‘near neighbourhood’. All remaining points within the child’s NAS but located more than 800m from their home were categorized as ‘far neighbourhood’. Again, as each GPS point in a participant’s dataset represents one second of time, the relative amount of time spent within any given environmental zone over the study period can be calculated.

#### **5.4.6 Measures of childhood domains**

Employing these three metrics also helps us to obtain measures that correspond to the different types of domains that make up the child’s NAS as per Moore’s original model. Given that the Maximum Path Distance value represents the distance to the extreme edge of the child’s pedestrian-based NAS, it is reasonable to use this variable to represent a measure of the size of the child’s *frequented activity space*, that is, the space they can access but which they don’t necessarily utilize on a daily basis (See Fig. 5.4).



**Figure 5.4: Childhood domains (activity spaces) and study metrics**

The two spatio-temporal measures are best utilized as measures of the child's *habitual activity space*, indicating, by virtue of the amount of time spent in various environmental zones, the size of the neighbourhood space which they inhabit on a more habitual or daily basis. A hypothetical set of pedestrian-based GPS tracks illustrates how the three metrics would each provide measures of children's neighbourhood activity domains (See Figs. 5.5, 5.6, 5.7 and 5.8).

## 5.5 Analysis

### 5.5.1 Descriptive analysis

Once NAS values were calculated for each child, the data were first examined through various descriptive analyses. The means and standard deviations for each set of metrics were calculated for the full dataset as well as by each major demographic category;

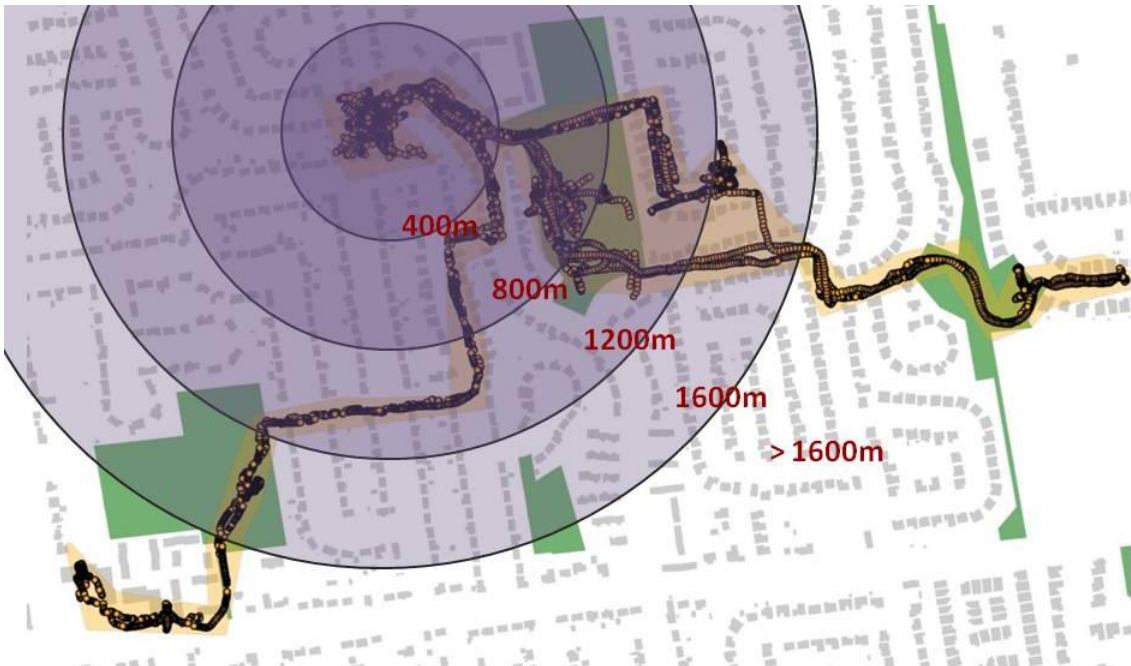


**Figure 5.5: Hypothetical GPS tracks of child's neighbourhood activity space**

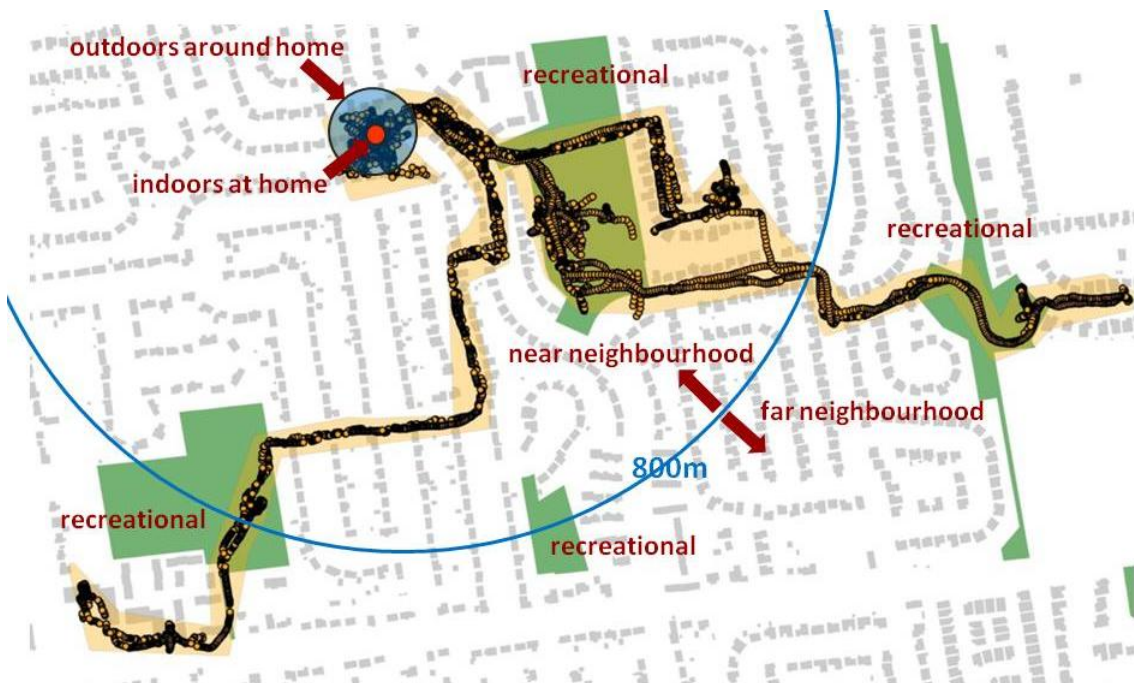


**Figure 5.6: Hypothetical illustration of raster-based measure of maximum path distance**





**Figure 5.7: Hypothetical illustration of GPS point assignment to fixed distance buffers around home**



**Figure 5.8: Hypothetical illustration of GPS point assignment to select environmental zones**

independent samples t-tests were conducted to compare differences in means within each of the dichotomous demographic categories. Correlation matrices were also used to examine relationships between individual outcome variables and any of the selected individual, perceptual or environmental variables, as well relationships among all independent variables.

### **5.5.2 Regression analysis**

In addition to examining general patterns in NAS measures, multiple linear regression analyses were conducted in SPSS v.17 to examine the association between select socio-environmental variables and children's use of and time within neighbourhood settings. Three primary outcome variables were initially selected for analyses: 'Maximum Path Distance' travelled, 'Proportion of Time spent within 400m of Home' and 'Proportion of Time spent beyond 800m of Home'. Preliminary analyses revealed that the latter two variables were highly correlated; therefore 'proportion of time spent beyond 800m of home' was not included in the final regression analyses. Regression models were performed separately for each of the final two outcome variables.

For each outcome variable, individual regression models were first run to separately examine the effects of the individual-level, perceptual, and environmental factors. For built environment variables, four separate models examined the effects of the local environment at each of the buffer distances around each child's home on each dependent variable. Subsequent models combined factors from multiple variable sets. Both initial correlation matrices and results from early regression models were utilized to refine those variables included in final models.

## **5.6 Results**

### **5.6.1 Preliminary and descriptive analyses**

Response rates for both children and parents across all target schools were extremely high. An average of 49% of the eligible children agreed to participate. Parental surveys were available for 75.6% of the final participant sample. Of the 220 original child participants, 144 children met the minimum GPS data requirements (66%). This

participant rate is on par with, or higher than, previous studies using GPS monitoring with children (see Mackett, Brown, Gong, Kitazawa, & Paskins, 2004; Maddison et al., 2010; Rodriguez et al., 2012; Wiehe et al., 2008). Although only 10 hours of out-of-school data over the 7 day monitoring period were required for inclusion, most participants far exceeded minimums; the median recorded volume of out-of-school GPS data over a week was 42.1 hours, and the minimum was over 18 hours. The mean number of valid weekdays was 4.0 and valid weekend days was 2.0 days.

Preliminary data analysis identified a single outlier and this case was subsequently removed from the sample (Pallant, 2011). Of the final participant sample of 143 children, the median age was 11.0 years, 65.7% were female, and 55.2% were from urban

<b>final participant sample characteristics</b>	<b># of participants</b>	<b>% of participants</b>
<b><i>all participants</i></b>	<b>143</b>	
<b>females</b>	94	65.7%
<b>males</b>	49	34.3%
<b>9-11 year olds</b>	87	60.8%
<b>12--13 year olds</b>	56	39.2%
<b>urban neighbourhood</b>	79	55.2%
<b>suburban neighbourhood</b>	64	44.8%
<b>active traveller to school</b>	72	50.3%
<b>non-active traveller to school</b>	71	49.7%
<b>school &lt; 1600m from home</b>	83	58.0%
<b>school &gt; 1600m from home</b>	60	42.0%
<b><i>parent reported:</i></b>		
<b>low IM</b>	89	81.7%
<b>high IM</b>	19	17.4%

**Table 5.1: Participant sample characteristics**

neighbourhoods. In addition to categorizing participants by age group, gender, and neighbourhood type, children were also grouped by their mode of travel to school, the distance between home and school, as well as parent-reported level of independent mobility (See Table 5.1).

Of the final participants, 50.3% reported travelling to or from school by active means at least one day a week. A slightly higher percentage of males (57.1%) travelled actively (at least one day per week) than females (46.8%). Many more children in the 12 to 13 year age group reported active travel (58.9%) versus the 9 to 11 year old group (44.8%), in line with previous research that suggests active travel generally increases with age up until about 13 or 14 years (Olds et al., 2009; Shaw et al., 2012). A slightly higher proportion of the suburban children (53.1%) travelled actively at least one day versus urban children (48.1%). There were no significant differences, however, in the neighbourhood type of active travellers when isolated by age group; approximately 50% of active travellers in each age group came from urban neighbourhoods.

Based on other work in the literature it was hypothesized that the distance between a child's home and school may influence not only the decision to actively travel (Larsen et al., 2009; Larsen, Gilliland, & Hess, 2012; McDonald, 2007b), but also the amount of time a child spends playing or travelling in the neighbourhood (Fyhri & Hjorthol, 2009). The mean network distance from home to school among participants was large (mean = 1877m, median = 1465m), but over half of the children (58.0%) live within 1600m (1 mile) of their school. The mean distance to school was comparable among children by both gender and age group, but showed significant differences among other demographic groups. The mean distance for suburban children (2288m) was almost twice that for children living in urban neighbourhoods (1544m). Non-active travellers lived an average of 2446m from school, as opposed to active travellers who lived, on average, much closer (1135m). Children whose parents report that they have a higher level of independent neighbourhood mobility live on average much closer to their school (1697m), versus children with lower reported mobility (1950m).

For parent-reported IM, 81.7% of the 109 parent respondents reported low levels of independent mobility for their children; only 17.4% of children were not subject to any mobility restrictions. A similar proportion of urban (60%) and suburban (65%) children had low IM, but a higher percentage of girls (67.0%) were subject to mobility restrictions than boys (53.1%), and a greater proportion of children in the younger age group (67.8%) had low parent-reported IM than those in the older group (53.6%). A higher proportion of children who live more than 1600m from their school (68.3%) than those living within 1600m (57.8%) had low levels of independent mobility.

#### **5.6.1.1 Time spent in NAS proportional to all out-of-school time**

Participants spent, on average, over 75% of their total out-of-school time in their pedestrian-based NAS. This average did not vary significantly when stratified by any of the individual-level categories: age group, gender, neighbourhood type, travel mode to school, distance to school or parent-reported IM. One quarter of their day, outside of school time, is therefore spent in environments that they reach, by choice or by necessity, via vehicle. Over half (52%) of the participants spent at least 80% of their out-of school time within their NAS. This represents a very high proportion of their overall out-of-school time and suggests that most children spent the vast majority of this free time within their neighbourhood activity space, either at home or in settings they travelled to by non-motorized means.

#### **5.6.1.2 Maximum Path Distance Travelled**

##### *Individual- level differences*

The average distance from the home to the outer boundary of the child's NAS was relatively long (980m) and illustrates that many children are walking or biking a far distance from their home at least once a week (See Table 5.2). Maximum path distances (MPD), however, varied greatly among participants and there were many children at both extremes of the distance spectrum; 17% travelled at least 1600m from home, yet there were an almost equal number (18%) who travelled only 200m or less from home.

The average MPD for active travellers was almost 700m more than their peers who were driven to school, and students living within 1600m of their school travelled 375m more on average than those who live further away (See Table 5.2). Of those children that live within 1600m of their school, 80.0% had their school encompassed within their NAS, indicating active travel to school at least once during the study week. Conversely, only 11.6% of children living beyond 1600m of their school had the school location included within their NAS. For all children whose school location fell within their NAS, the GPS

<b>means and bi-variate correlations</b>		
<b>demographic category</b>	<b>maximum path distance travelled (m)</b>	
	<b>Mean (SD)</b>	<b>p</b>
<b><i>all participants</i></b>	<b>980 (726)</b>	
<b>females</b>	927 (677)	0.148
<b>males</b>	1080 (810)	
<b>9-11 year olds</b>	904 (617)	0.234
<b>12--13 year olds</b>	1097 (862)	
<b>urban neighbourhood</b>	1071 (747)	0.095
<b>suburban neighbourhood</b>	867 (688)	
<b>active traveller to school</b>	1313 (740)	0.000 **
<b>non-active traveller to school</b>	642 (533)	
<b>school &lt; 1600m from home</b>	1137 (738)	0.002 **
<b>school &gt; 1600m from home</b>	762 (654)	
<b><i>parent reported:</i></b>		
<b>low IM</b>	837 (600)	0.002 **
<b>high IM</b>	1626 (921)	
<b>* <math>p &lt; 0.05</math> ** <math>p &lt; 0.01</math></b>		

**Table 5.2: Differences in maximum path distance travelled**

datasets for one third (32.9%) revealed the school as the furthest destination to which they travelled during the study period; the remaining two-thirds travelled to further destinations. Finally, the average MPD travelled for those whose parents reported

placing few restrictions on their neighbourhood mobility was almost double the average for those with higher parent-imposed restrictions.

The MPD was approximately 150m to 200m longer on average for males, older children, and urban residents than each of their counterparts, but the differences in means were not statistically significant.

### *Perceptual-level differences*

There were no significant differences in average MPD travelled based on either a child's or their parent's perception of neighbourhood access to recreational opportunities (See Table 5.3). Both child and parent perceptions of neighbourhood risk, however, appeared to exert some influence over the maximum distance the child travelled. Children who perceived lower levels of neighbourhood risk travelled further on average than those who perceived more risk in their neighbourhood ( $p=0.025$ ); a similar, but slightly less significant relationship was demonstrated when the child's parent perceived lower levels of risk ( $p=0.063$ ).

t-tests for perception components	maximum path distance travelled (m)	% time within 400m of home	% time beyond 800m of home	% time within home-zones	% time within non-home zones
	p	p	p	p	p
<i>child neighbourhood perception components</i>					
distance to recreational opportunities	0.176	0.009 **	0.246	0.161	0.531
neighbourhood safety	0.025 *	0.027 *	0.063	0.112	0.128
<i>parent neighbourhood perception components</i>					
distance to recreational opportunities	0.486	0.234	0.517	0.112	0.073
neighbourhood safety	0.063	0.931	0.505	0.509	0.924
* $p < 0.05$ ** $p < 0.01$					

**Table 5.3: Significant mean differences by neighbourhood perceptions**

### *Environmental-level differences*

Of the built environment variables within 400m and 800m of the child's home, only the proportion of agricultural land within 800m was correlated ( $r = -0.166$ ,  $p = 0.046$ ) with the maximum distance travelled (See Table 5.4). Built environment variables within 1200m and 1600m, however, exhibited slightly stronger relationships; the proportion of

commercial (+), residential (+) and agricultural (-) land all correlated to distance travelled, the strongest of which was with the proportion of commercial land within 1200m of home ( $r=0.236$ ,  $p=0.004$ ). Intersection density (at both 1200m ( $r=0.216$ ,  $p=0.009$ ) and 1600m ( $r=0.198$ ,  $p=0.017$ )) was the only other variable to demonstrate a relationship with MPD; a greater number of intersections per square kilometre within the broader neighbourhood related to longer maximum distances travelled.

### **5.6.1.3 Proportion of time spent within fixed distances from home**

#### *Individual- level differences*

For each child participant, we calculated the proportion of all NAS points within each 400m distance buffer around their home. Results revealed that child participants carried out the vast majority of their pedestrian-based activity close to home; on average, 94.5% of all time spent within their NAS was within 400m of home, and 97.7% was within 800m of home (See Table 5.5). Close to one third (29.4%) of participants spent all of their time in their NAS within 400m of home, and almost two-thirds (60.8%) spent 100% of their NAS time within 800m. The proportion of time spent within 400m and 800m of home was higher for females than males but the difference was not statistically significant. Children in the younger age group (9-11 years) spent a significantly greater proportion of their time within both 400m and 800m of home than older children, as did non-active travellers, children who live more than 1600m from school, and those with low parent-reported IM. Time spent within this distance of home was virtually identical for urban and suburban children.

From these findings we can easily surmise that the children spent little to no part of their pedestrian-based out-of-school time in the neighbourhood beyond 800m of their home. In fact, the average proportion of NAS time spent beyond this distance was only 2.3% (45 minutes per week on average), which drops further to 0.4% (about 10 minutes per week) for time spent beyond 1600m. Similar to the smaller buffer differences, a much higher percentage of the older age group spent time beyond 800m, as did active travellers and those with higher levels of independent mobility. When we consider time child participants spent beyond 1600m of home, only age group demonstrates significant mean



differences in time spent, with older children again spending more time at these more extreme distances.

### ***Perceptual- & Environmental-level differences***

The time children spent within 400m of home, was not significantly associated with parents' perceptions of relative safety or distance to local destinations (See Table 5.3). On the other hand, children who perceived local recreational facilities as 'too far from home' and those who perceived more risk in the neighbourhood environment, spent significantly more of their time on average in environments closer to home.

The proportion of time children spent within 400m of home did not appear to be significantly related to any of the selected built environment features within 400m of home (See Table 5.4). Of the environmental factors within 800m of home, only residential density (-) and proportion of agricultural land (+) correlated with the proportion of time spent within 400m.

Relationships with time children spent close to home were stronger and more numerous for environmental conditions within both 1200m and 1600m buffers of home. The proportion of time spent within 400m was negatively correlated with residential density at 1200m ( $r = -0.213, p = 0.011$ ) and at 1600m ( $r = -0.198, p = 0.017$ ); that is, the lower the density of homes within the broader neighbourhood, the greater the likelihood of finding the child within 400m of their home. Commercial (-) and agricultural (+) land use within 1200m and 1600m buffers were both moderately correlated with time spent within 400m of home; the lower the proportion of commercial land and the higher percentage of agricultural land within the broader community environment, the greater the proportion of time the child spent closer to home. Density of intersections within 1200m ( $r = -0.194, p = 0.02$ ) or 1600m ( $r = -0.247, p = 0.003$ ) was the only other variable to relate to time spent within 400m of home; the greater the density of intersections within the larger community, the more likely it is to find the child spending time at locations further from home.

bi-variate correlations (Pearson's r)	maximum path distance travelled (m)	proportion of time spent			
		within 400m of home	beyond 800m of home	within home zones	within non-home zones
<b>built environment within 400m</b>					
population density	-	-	-	-	-
youth population density	-	-	-	-	-
residential density	-	-	-	-	-
% commerical	-	-	-	-	-
% industrial	-	-	-	-	-
% institutional	-	-	-	- 0.190 *	+ 0.198 *
% recreation	-	-	-	-	-
% residential	-	-	-	-	-
% agricultural	-	-	-	-	- 0.174 *
maximum traffic count	-	-	-	-	-
intersection density	-	-	-	-	-
recreation fac density	-	-	-	-	-
<b>built environment within 800m</b>					
population density	-	-	-	-	-
youth population density	-	-	-	-	-
residential density	-	- 0.199 *	+ 0.220 **	- 0.189 *	+ 0.199 *
% commerical	-	-	+ 0.168 *	- 0.179 *	+ 0.187 *
% industrial	-	-	-	-	-
% institutional	-	-	-	- 0.177 *	+ 0.185 *
% recreation	-	-	-	-	-
% residential	-	-	-	-	-
% agricultural	- 0.166 *	+ 0.174 *	-	+ 0.219 **	- 0.230 **
maximum traffic count	-	-	-	- 0.186 *	+ 0.198 *
intersection density	-	-	-	-	-
recreation fac density	-	-	-	-	-
<b>built environment within 1200m</b>					
population density	-	-	-	-	-
youth population density	-	-	-	-	-
residential density	-	- 0.213 *	+ 0.232 **	- 0.200 *	+ 0.211 *
% commerical	+ 0.236 **	- 0.229 **	+ 0.222 **	- 0.231 **	+ 0.235 **
% industrial	-	-	-	-	-
% institutional	-	-	-	- 0.205 *	+ 0.213 *
% recreation	-	-	-	-	-
% residential	+ 0.195 *	-	-	-	-
% agricultural	- 0.190 *	+ 0.179 *	-	+ 0.237 **	- 0.247 **
maximum traffic count	-	-	-	-	-
intersection density	+ 0.216 **	- 0.194 *	-	- 0.225 **	+ 0.237 **
recreation fac density	-	-	-	-	-
<b>built environment within 1600m</b>					
population density	-	-	-	-	-
youth population density	-	-	-	-	-
residential density	-	- 0.198 *	+ 0.213 *	- 0.203 *	+ 0.218 **
% commerical	+ 0.198 *	- 0.236 **	+ 0.267 **	- 0.225 **	+ 0.229 **
% industrial	-	-	-	-	-
% institutional	-	-	-	- 0.256 **	+ 0.267 **
% recreation	-	-	-	-	-
% residential	+ 0.195 *	-	-	-	-
% agricultural	- 0.190 *	+ 0.192 *	-	+ 0.257 **	- 0.226 **
maximum traffic count	-	-	-	-	+ 0.169 *
intersection density	+ 0.198 *	- 0.247 **	+ 0.196 *	- 0.266 **	+ 0.276 **
recreation fac density	-	-	-	-	-
* $p < 0.05$ ** $p < 0.01$					

**Table 5.4: Correlations with built environment variables at varying buffer distances**

demographic category	proportion of time spent							
	total within 400m of home (%)		total within 800m of home (%)		total beyond 800m of home (%)		total beyond 1600m of home (%)	
	Mean (SD)	p	Mean (SD)	p	Mean (SD)	p	Mean (SD)	p
<b>all participants</b>	<b>94.5 (4.1)</b>		<b>97.7 (0.2)</b>		<b>2.3 (5.5)</b>		<b>0.4 (2.3)</b>	
<b>females</b>	95.0 (7.6)	0.175	98.0 (5.1)	0.381	2.0 (5.1)	0.187	0.3 (2.0)	0.390
<b>males</b>	93.6 (8.9)		97.1 (6.1)		2.9 (6.1)		0.6 (2.7)	
<b>9-11 year olds</b>	96.5 (5.1)	0.002 **	98.8 (3.3)	0.008 **	1.2 (3.3)	0.013 *	0.0 (3.3)	0.020 *
<b>12-13 year olds</b>	91.5 (10.6)		96.0 (7.4)		4.0 (7.4)		1.1 (3.5)	
<b>urban neighbourhood</b>	94.5 (7.2)	0.551	97.7 (5.2)	0.992	2.3 (5.2)	0.518	0.6 (2.9)	0.116
<b>suburban neighbourhood</b>	94.6 (9.1)		97.7 (5.8)		2.3 (5.8)		0.1 (0.9)	
<b>active traveller to school</b>	91.3 (9.5)	0.000 **	96.0 (6.9)	0.000 **	4.0 (6.9)	0.001 **	0.6 (2.6)	0.248
<b>non-active traveller to school</b>	97.8 (4.4)		99.4 (2.3)		0.6 (2.3)		0.2 (1.9)	
<b>school &lt; 1600m from home</b>	92.6 (9.3)	0.041 *	96.9 (6.6)	0.022 *	3.1 (6.6)	0.588	0.5 (2.4)	0.969
<b>school &gt; 1600m from home</b>	97.2 (4.9)		98.8 (3.1)		1.2 (3.1)		0.3 (2.1)	
<b>parent reported:</b>								
<b>low IM</b>	95.5 (6.4)	0.004 **	98.5 (4.1)	0.015 *	1.4 (4.0)	0.015 *	0.2 (1.9)	0.106
<b>high IM</b>	87.3 (10.6)		93.6 (7.9)		6.4 (8.0)		1.9 (4.4)	
<b>* p &lt; 0.05 ** p &lt; 0.01</b>								

**Table 5.5: Differences in time spent within at varying distances from home**

Select elements of the built environment also influenced the proportion of time children spent in the far neighbourhood, in environments beyond a distance of 800m from home. Residential density ( $r=0.220$ ,  $p=0.008$ ) and the percentage of commercial land ( $r=0.168$ ,  $p=0.044$ ) within an 800m buffer were both positively and moderately associated with time spent in the far neighbourhood; these relationships were even stronger within 1200m and 1600m buffers (See Table 4). Density of intersections ( $r=0.196$ ,  $p=0.019$ ) within 1600m of home was the only other significant environmental variable, suggesting that the higher the intersection density within the broader community, the more likely the child is to spend time in the far neighbourhood, at distances greater than 800m from home.

### 5.6.1.4 Proportion of time spent within select neighbourhood environmental zones

#### *Individual-level differences*

The high proportion of time the participants spent within 400m of home suggests that they may be spending a large amount of their discretionary time inside the home, or outdoors within close proximity of home. To test this hypothesis we summarized the children's time spent within five different environmental zones (see Table 5.6 and 5.7). Overall, the child participants spent an average of 89.5% of their time within their NAS within their *Home Zones* (i.e., total of time spent *Indoors at Home* and *Outdoors Around Home*, which represent a maximum distance from home of 150m). Over 50% of their

demographic category	proportion of time spent									
	indoors at home (%)		outdoors around home (%)		recreational facilities (%)		near neighbourhood (%) (< 800m from)		far neighbourhood (%) (> 800m)	
	Mean (SD)	p	Mean (SD)	p	Mean (SD)	p	Mean (SD)	p	Mean (SD)	p
<i>all participants</i>	50.7 (25.0)		38.9 (24.4)		3.9 (4.8)		5.2 (6.6)		1.3 (4.1)	
females	49.7 (26.2)	0.509	40.2 (26.0)	0.373	3.6 (4.5)	0.422	5.4 (7.4)	0.685	1.0 (3.5)	0.349
males	52.6 (22.6)		36.3 (21.2)		4.4 (5.5)		4.9 (4.7)		1.7 (5.1)	
9-11 year olds	53.3 (24.4)	0.119	38.8 (24.2)	0.955	3.2 (4.3)	0.059	4.2 (5.0)	0.032 *	0.4 (1.2)	0.008 **
12--13 year olds	46.6 (25.5)		39.0 (24.9)		4.9 (5.5)		6.9 (8.2)		2.6 (6.2)	
urban neighbourhood	46.5 (25.2)	0.027 *	42.2 (25.7)	0.065	4.0 (4.2)	0.614	5.8 (6.7)	0.285	1.4 (4.5)	0.695
suburban neighbourhood	55.8 (23.9)		34.7 (22.3)		3.7 (5.6)		4.6 (6.4)		1.1 (3.5)	
active traveller to school	46.5 (24.5)	0.046 *	38.3 (23.9)	0.770	6.2 (5.4)	0.000 **	6.9 (7.7)	0.002 **	2.1 (5.2)	0.017 *
non-active traveller to school	54.9 (25.0)		39.5 (25.1)		1.5 (2.5)		3.5 (4.6)		0.5 (2.2)	
school < 1600m from home	50.1 (24.2)	0.749	36.1 (23.1)	0.117	5.6 (5.4)	0.000 **	6.3 (7.5)	0.012 *	1.7 (4.9)	0.155
school > 1600m from home	51.4 (26.2)		42.7 (25.8)		1.4 (2.2)		3.7 (4.6)		0.7 (2.6)	
<i>parent reported:</i>										
low IM	51.5 (25.1)	0.028 *	39.3 (25.0)	0.538	3.4 (5.0)	0.023 *	5.0 (6.7)	0.040 *	0.6 (2.2)	0.000 **
high IM	37.3 (25.2)		43.3 (26.6)		6.3 (4.9)		8.6 (7.5)		4.2 (6.8)	
* $p < 0.05$ ** $p < 0.01$										

**Table 5.6: Differences in time spent within select environmental zones**

overall time in their NAS was estimated to be *Indoors at Home*, while an average of 38.9% of their NAS time appeared to be spent *Outdoors around Home*, such as on the streets in front of or near to their homes.

Very little of their out-of-school leisure time was spent at neighbourhood *Recreational Facilities* (mean 3.9%), representing an average of 1.3 hours per week. About 5% of their time (an average of 1.7 hrs per week) was spent within the *Near Neighbourhood* zone (less than 800m) at non-recreational sites; however, as indicated above, many children did not spend any of their NAS time in the *Near Neighbourhood* beyond the immediate vicinity of home. Even fewer children ventured beyond to the *Far*

demographic category	proportion of time spent			
	total in home zones (%)		total in non-home zones (%)	
	Mean (SD)	p	Mean (SD)	p
<i>all participants</i>	<b>89.5 (10.9)</b>		<b>10.4 (10.9)</b>	
<b>females</b>	89.8 (11.1)	0.665	10.0 (11.0)	0.607
<b>males</b>	89.0 (10.6)		11.0 (10.6)	
<b>9-11 year olds</b>	92.1 (7.8)	0.002 **	7.8 (7.6)	0.001 **
<b>12--13 year olds</b>	85.6 (13.7)		14.4 (13.7)	
<b>urban neighbourhood</b>	88.8 (10.2)	0.366	11.2 (10.2)	0.304
<b>suburban neighbourhood</b>	90.5 (11.8)		9.3 (11.7)	
<b>active traveller to school</b>	84.8 (12.0)	0.000 **	15.2 (12.0)	0.000 **
<b>non-active traveller to school</b>	94.3 (7.1)		5.5 (6.7)	
<b>school &lt; 1600m</b>	86.2 (12.2)	0.000 **	13.6 (12.1)	0.000 **
<b>school &gt; 1600m</b>	94.1 (6.8)		5.9 (6.8)	
<b>parent reported:</b>				
<b>low IM</b>	90.8 (10.1)	0.000 **	9.1 (10.0)	0.000 **
<b>high IM</b>	80.6 (12.9)		19.4 (12.9)	
<b>* p &lt; 0.05 ** p &lt; 0.01</b>				

**Table 5.7: Differences in time spent within home and non-home zones**

*Neighbourhood* zone (non-recreational sites greater than 800m), and spent on average only 1.3% of their time (25 minutes per week on average) in this distant zone. Earlier results suggest that this ‘far neighbourhood’ time may mostly reflect travelling to schools located more than 800m from home. As opposed to *Home Zones*, only 10.4% of their time on average was spent in Non-Home Zones (total of time in *Recreational Facilities*, *Near Neighbourhood* and *Far Neighbourhood* zones), with some children spending none of their NAS time within these zones away from home.

When amalgamated into the proportion of time spent in *Home Zones* and *Non-Home Zones* then examined across demographic groups, we find that there is little difference in average time spent in *Home Zones* between males and females, or between those living in either urban or suburban neighbourhoods (See Table 5.6). However, on average, more children in the younger age group ( $p=0.002$ ), the non-active travellers ( $p=0.000$ ), those living more than 1600m from school ( $p=0.000$ ), and children with low IM ( $p=0.000$ ) spent a significantly larger proportion of their NAS time within *Home Zones*. Older children, the active travellers, those living closer to their schools, and children with higher levels of IM were in turn more likely to spend a larger proportion of their pedestrian-based NAS time within *Non-Home Zones*.

### ***Perceptual & Environmental level differences***

Unlike maximum distance travelled and the proportion of time spent close to home, no relationship was found between time spent in *Home Zones* or *Non-Home Zones* and any of the child or parent environmental perception variables (see Table 5.3).

For environmental-level variables, since similar strength relationships (though in opposite directions) were reported for all variables with respect to *Home Zones* and *Non-Home Zones*, only relationships with time children spent in *Non-Home Zones* (all environmental zones beyond 150m of home) will be discussed here.

For environmental variables measured within a 400m buffer around the child's home, only the proportion of institutional and agricultural land use related to time children spent within *Non-Home Zones*. The higher the percentage of institutional land ( $r=0.198$ ,  $p=0.018$ ) and the lower the proportion of agricultural land ( $r= - 0.174$ ,  $p=0.037$ ), the more likely the child is to be found in environmental zones beyond home (See Table 5.4).

These relationships are also significant within an 800m zone around home. As well, the proportion of commercial land ( $r=0.187$ ,  $p=0.025$ ), residential density ( $r=0.199$ ,  $p=0.017$ ) and intersection density ( $r=0.198$ ,  $p=0.017$ ) within 800m of home all exhibit significant positive, moderate relationships with time children spent in *Non-Home Zones*.

Each of these relationships not only remains significant within both 1200m and 1600m buffers, but become stronger as the buffer expands. Within 1600m of home, residential density ( $r=0.218$ ,  $p=0.009$ ), proportion of commercial ( $r=0.226$ ,  $p=0.006$ ) and institutional ( $r=0.267$ ,  $p=0.001$ ) land, and intersection density ( $r=0.237$ ,  $p=0.001$ ) all demonstrated highly significant, positive relationships with time children spent within *Non-Home Zones*. The greater the value of any of these variables, the more likely the child will spend time within neighbourhood zones away from home. Only the proportion of agricultural land within 1200m ( $r= - 0.247$ ,  $p=0.003$ ) or 1600m ( $r= - 0.226$ ,  $p=0.001$ ) exhibited a significant negative correlation; the lower the proportion of agricultural land within the broader neighbourhood around their homes, the greater the likelihood children spent time in *Non-home Zones*. No other selected environmental variables exhibited a relationship with children spent in *Non-Home Zones* at any buffer distance.

### 5.6.2 Regression analyses

To better understand the factors which are most likely to predict children's neighbourhood activity and mobility, exploratory multivariate linear regression analyses were performed separately for one spatial and one spatio-temporal outcome variable: (1) maximum path distance (MPD) travelled and (2) the proportion of time spent within 400m of Home.

Preliminary analyses above revealed that there were no significant relationships between any dependent (outcome) variable and any of the built environment measures within 400m of the child's home (see Table 5.4). Early analyses also highlighted that the direction and strength of relationships between outcome variables and environmental variables were similar for both 1200m and 1600m buffers. It was therefore decided to only perform regression analyses with the built environment conditions measured within 800m and 1600m buffers of the child's home.

A series of linear regression models were performed for each of the outcome variables, exploring the influence of individual, perceptual and built environment factors individually and in combination (Pallant, 2011). Independent variables were added into models simultaneously and then in various hierarchical combinations. The hierarchical

process did not affect the values produced by the models, therefore all relevant variables were added into final models simultaneously (Pallant, 2011). The models which were able to explain the highest degree of variance within each dependent variable are presented below.

### 5.6.2.1 Dependent variable: Maximum path distance travelled

On their own, neither of the individual-level variables, the neighbourhood perception factors, nor any of the built environment variables were able to predict a significant degree of variance among the distances travelled. Individual-level factors, however, explained more of the variance than either of the other variable sets. Travel mode to school was by far the strongest predictor of MPD travelled, but parent-reported level of IM and parent perception of neighbourhood safety also surfaced as clear predictor variables. Neighbourhood type was also significant, but on a less consistent basis. A small selection of built environment measures from within an 800m buffer around the child's home provided a modest but significant addition to the strongest models, resulting in a final model (adjusted  $r^2 = 0.314$ ) that included variables from all three variable sets (see Table 5.8).

dependent variable: maximum path distance travelled					
adjusted $r^2 = 0.314$					
independent variables		unstandardized coefficients (beta)	standardized coefficients (beta)	95% confidence interval	
				lower	upper
neighbourhood type	(urban / suburban)	- 251.42	- 0.173 *	-503.09	0.245
travel mode to/from school	(active / non-active)	- 658.94	- 0.456 ***	-896.2	-421.69
parent-reported IM level	(low IM / high IM)	343.68	0.185 *	34.09	653.27
parent perception: safety	(safe / risky)	- 350.12	- 0.226 **	-609.17	-91.08
% commercial land within 800m		16.50	0.094	-13.86	46.86
* $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$					

**Table 5.8: Regression model results for Maximum Path Distance travelled (DV)**

The strongest predictor variable in the model, travel mode to school (beta = - 0.456) favoured active travel to school, suggesting those travelling further from home on average are more likely to be active travellers. Neighbourhood type (beta = - 0.173) and parent-reported level of independent mobility (beta = 0.185) were also significant



predictors, suggesting that living in urban environments and with fewer parent-imposed restrictions on mobility, may facilitate the ability to journey further from home. Parent's perception of the risk inherent in their neighbourhood environment, while not exhibiting a strong direct correlation with MPD, surfaced as a significant predictor (beta = - 0.226) of the distance a child will travel, suggesting that children of parents who perceived lower levels of risk generally travelled further distances from home.

The only built environment variable to contribute to the final linear regression model was the proportion of commercial land measured within an 800m buffer of the child's home (beta = 0.094). Although making only a modest contribution to the ability of the model to predict distance travelled, the results indicate that the higher a percentage of commercial land within the near neighbourhood is associated with increased likelihood of a child travelling further from home.

***Dependent variable: Proportion of Time Spent within 400m of Home***

As with the model for distance travelled, the strongest regression model for predicting the proportion of time a child will spend within 400m (adjusted  $r^2 = 0.254$ ) of their home includes variables from more than one variable set. Again, none of the variable sets produced strong prediction models on their own, but the set of individual-level variables explained the largest degree of variance of the three. Not surprisingly, several individual level variables surfaced as the strongest and most consistently significant predictors, specifically: travel mode to school, the child's age group, as well as parent-reported IM (see Table 5.9). Travel mode to school (beta = 0.366) was again the strongest predictor of time spent within 400m of home, this time favouring the non-active travellers; children who do not regularly travel on foot or bicycle to school were more likely to be found in their neighbourhood activity space within 400m of home. The age group (beta = -0.180) to which the child belongs was also found to be a significant predictor, with younger children (9-11 years old) more likely to spend a greater proportion of their time close to home. As with distance travelled, parent-imposed restrictions on mobility (beta = - 0.212) also plays a role in predicting where they will spend their time; children who had

dependent variable: proportion time spent within 400m of home					
adjusted r2 = 0.254					
independent variables		unstandardized coefficients (beta)	standardized coefficients (beta)	95% confidence interval	
				lower	upper
age group	(9-11 yrs / 12-13 yrs)	- 0.030	- 0.180 ^	- 0.060	0.001
travel mode to/from school	(active / non-active)	0.059	0.366 ***	0.03	0.088
parent-reported IM level	(low IM / high IM)	- 0.044	- 0.212 *	-0.081	-0.006
% industrial land within 800m		0.002	0.222 ^	0.000	0.005
% residential land within 800m		0.002	0.332 *	0.000	0.004
% agricultural land within 800m		0.001	0.304 *	0.000	0.003
^ p < 0.06 * p < 0.05 ** p < 0.01 *** p < 0.001					

**Table 5.9: Regression model results for Proportion of Time Spent within 400m of home (DV)**

lower levels of IM were more likely to spend their time within 400m of home. Unlike the MPD model, however, none of the child or parent neighbourhood perception variables strongly predicted proportion of time near to home.

Three built environment variables (measured within an 800m buffer around a child's home) appear to be significant predictors of time spent within 400m of home. The proportion of industrial (beta = 0.222), residential (beta = 0.332) and agricultural (beta = 0.304) land within 800m were all positive predictors of time spent nearest to home; that is, the higher the proportion of each of these land uses, the greater the chance finding the child more often within just a short distance of their home.

## 5.7 Discussion

### 5.7.1 How far from home are children travelling?

An examination of the spatial extents of children's activity spaces revealed that many children are travelling significant distances from their homes, close to 1 kilometre on average. Approximately 57% of children were found to have travelled more than 800m from their homes at least once during the study period, with almost 20% walking or biking more than 1600m from their homes on at least one occasion. These numbers represent significant pedestrian-based journeys that would expose travellers to at least a

portion of their neighbourhood environment. These substantial distances are also encouraging when compared to several recent studies that indicate many children are not travelling more than a few hundred metres from their homes (Shaw et al., 2012; Veitch et al., 2008).

The child's MPD is conceptualized as the outer boundary of their frequented activity space. While many children travelled a relatively far distance from home at least on occasion, and therefore exhibited a reasonably large frequented activity space, it should be highlighted that almost one quarter of the children did not actively travel (e.g., by foot or bicycle) more than 400m from home, and more than 15% did not venture more than 200m from their home during the entire study period. These very short distances suggest that a significant portion of the participants have very small frequented domains, limited to the area immediately around their homes.

For many children, the journey to school may be contributing in large part to their overall neighbourhood journeys and activities, or to facilitating higher degrees of overall independent mobility. Both descriptive and regression analyses confirm a very strong relationship between regular mode of travel to school, and the distance children travel from home. Consistent with other studies of children's mobility (e.g., Page et al., 2010; Villanueva, Giles-Corti, Bulsara, McCormack, et al., 2012), travelling actively to or from school was by far the strongest predictor of maximum distance travelled, and active travellers were shown to travel almost twice the average distance of peers who are regularly driven or bussed to school. Given the high proportion of students who travel actively to school at least once a week (over 50%), and the much greater distances traversed by active travellers, we can surmise that the journey to school represents a significant portion of their away-from-home activity. Moreover, the license to travel actively to school may also represent a higher comfort level on the part of some parents to let their children travel independently elsewhere in the neighbourhood. Active travellers spent, on average, 3 times as much of their NAS time in Non-Home Zone environments (including recreational facilities), than did non-active travellers. Although part of this time can be attributed to the active journey to school, it does not account for all of the difference, particularly as two-thirds of the active travellers journeyed to

destinations beyond the distance to their school. Active travel to school, in itself an important source of exposure to the neighbourhood environment, may also act as a springboard for activity detours on the journey home or for being granted license to travel to other local destinations during their out-of-school leisure time.

Active travel to school, however, appears to depend highly on the distance between a child's home and their school. Distance to school has been previously identified as one of the most significant factors dictating children's level of independent mobility (Fyhri & Hjorthol, 2009), as it tends to promote active travel. In this study as well, children living within 1600m of their school travelled much further distances on average, almost 400m more, than those living further away. Not surprisingly, the proportion of active travellers among those children living within 1600m of school (80.7%) was eight times higher than those living beyond 1600m from school (9.8%), and the active journey to and from school is likely contributing significantly to these longer travelled distances. Those living within 1600m of school also spent twice as much time in non-home zones overall, including significantly more time in recreational and near neighbourhood zones. Shorter distances between home and school may make active travel to school more palatable for parents; seeing children handle the challenges of this active commute may in turn lead them to relax restrictions around other neighbourhood journeys and activities. Smaller home to school distances seem to facilitate both active travel to school as well as more frequent and distant neighbourhood travel, thereby expanding the size of the child's frequented activity space.

This license to travel to school or to other destinations in the neighbourhood also serves to predict whether children actually travelled significant distances during the study period. Preliminary analyses showed parent-reported IM to be highly correlated ( $p=0.002$ ) with distance travelled. In fact, children with the highest levels of parent-reported IM demonstrated the highest average maximum distance travelled of any demographic group. Parent-reported IM ( $\beta = 0.185$ ) was also a significant predictor of distance travelled in regression models, relating longer distances travelled to higher levels of parent-awarded mobility. Previous studies have suggested that children's IM license is often decided through an ongoing process of negotiation between parent and

child, and hinges partly on a parent's confidence in their child's ability to tackle the challenges they would likely encounter in their neighbourhood (Villanueva, Giles-Corti, Bulsara, McCormack, et al., 2012; Wridt, 2010). This confidence is reflected in the correlation with age group; as in other studies, the older children generally experienced fewer restrictions on their mobility than their younger peers, presumably because parents are more comfortable granting increased freedom to their children as they mature (Johansson, 2006; Olds et al., 2009; Shaw et al., 2012; Spilsbury, 2005; Timperio et al., 2004). Parent perceptions of neighbourhood safety may also be influencing children's mobility; the regression model of distance travelled suggested a child whose parent perceived a lower level of neighbourhood risk would be more likely to travel further distances from home.

Both preliminary and regression analyses confirm that, unlike previous studies, neither the child's age nor gender contributed in any significant or systematic way to the distance from home the child travels or is given license to travel. Although age itself was not a predictor of distance travelled, parent-reported IM and parent perception of neighbourhood safety, both highly correlated with age, were strong predictors; parents of younger children tended to impose more restrictions on unsupervised activity and were more likely to perceive risks associated with the neighbourhood both of which were associated with shorter distances travelled. The findings with respect to gender are contrary to the majority of studies to date that found that boys tend to be granted greater freedom to travel independently and enjoy larger neighbourhood domains, but consistent with a few more recent studies that have not found systematic gender differences. The lack of gender-related differences may be a reflection of a diminishing gap between males and females with respect to neighbourhood independence and activity. Unfortunately, this may also reflect a decrease in mobility for all children, rather than an increase in the neighbourhood freedom awarded to girls.

Children's perceptions of neighbourhood risk, though correlating with MPD travelled, did not prove a significant predictor in the final regression model. This may be due in part to the high correlation between child and parent perceptions of neighbourhood safety. As suggested by previous work (Loebach & Gilliland, 2010; H. Mitchell, Kearns,

& Collins, 2007), children often take on their parent's anxieties about neighbourhood dangers and these concerns may also serve to deter children from pushing their own environmental boundaries in the neighbourhood, even when granted the freedom to do so.

Interestingly, neither parent restrictions on mobility nor their perception of neighbourhood safety were significantly related to any of the measures of the built environment, such as localized traffic levels, that one would expect to be related to perceptions of safety. As well, safety-related measures of the built environment did not surface as predictors in regression models. As has been noted in previous studies, this discrepancy highlights a common gap between objective measures of the built environment, and a child or parent's subjective perception of the same setting, particularly with respect to the imagined versus realistic threats posed by the local environment (Gill, 2007; MacDougall et al., 2009; Rissotto & Tonucci, 2002). It is also possible, however, that this mismatch is partly related to the built environment measures utilized in the study; the variables chosen for analysis, though shown to be influential in other studies, may not adequately represent the built environment conditions that would, for example, cause parents to be anxious for their child's safety.

The objective built environment, however, appears to be playing a role in the distances children are travelling and the subsequent size of their frequented activity spaces. Although there were no statistically significant differences in the average maximum distance travelled by urban versus suburban children, the child's home neighbourhood type did surface as significant predictor ( $\beta = -0.173$ ) in regression analyses. These findings are consistent with a recent review of correlates with children's mobility, and correlations identified earlier in this study, which suggest attributes typically associated with urban environments, such as diverse land uses and more highly connected street networks, seem to facilitate local travel among children (Badland & Schofield, 2005; Larsen et al., 2009; Shaw et al., 2012). The concomitant higher levels of traffic, however, did not seem to deter movement as it has in some earlier studies (Larsen et al., 2012; Villanueva, Giles-Corti, Bulsara, McCormack, et al., 2012).

The proportion of commercial land within 800m of home surfaced as a predictor of distance travelled. Most of the study participants with the highest proportion of nearby commercial land were found to reside in dense, older urban neighbourhoods within close proximity to commercial corridors or clusters. A few of the children meeting this criterion, however, live in less dense suburban environments, but on the edges close to major roads and clusters of commercial properties; their neighbourhoods exhibit many hallmarks of a typical suburban setting but their location still provides them convenient and fairly direct access to commercial amenities similar to some of their urban peers. The proportion of nearby commercial land may also serve as a proxy for a more mixed-use environment in general, which can offer greater opportunities for and diversity of neighbourhood activities. Proximity to and diversity of such neighbourhood resources has been noted by other researchers as a factor affecting children's neighbourhood use and IM (Evenson et al., 2006; Gordon-Larsen, Nelson, Page, & Popkin, 2006; Kerr et al., 2007; Larsen et al., 2009; Panter et al., 2008; Timperio et al., 2004; Wridt, 2010). When neighbourhood resources and amenities are available within a reasonable distance from home, they may succeed at drawing children further and more frequently into the neighbourhood. In this study, the commercial destinations within 800m, and the other environmental conditions that this may imply, seemed to encourage children's neighbourhood travel and enlarge their frequented activity spaces.

These findings are, however, somewhat opposed to those of a recent study by Villanueva et al (2012) that revealed more utilitarian destinations within 800m of a child's home resulted in smaller neighbourhood activity spaces, and suggested that the shorter distance to amenities may negate the need to travel further from home. Though proximity to destinations no doubt plays some role in children's neighbourhood activities, reasonable distance to destinations, as highlighted earlier, may be a necessary but not a sufficient component of increased local mobility. The influence of nearby destinations to home on children's travel, as with other conditions of the local built environment, can be mediated by myriad other factors, including children's own interests and personal freedom to access nearby amenities. Generally, this study aligns with those recent studies that suggest that many of the conditions typical of urban environments, though available in

some suburban locations, are supportive of increased mobility and neighbourhood use among children.

The relationships with other built environment variables that surfaced in descriptive and regression analyses reminds us, however, that a general typology alone is not sufficient to characterize the influence of the local built environment on children's activity and movement. The strong correlations between distance travelled and the proportion of both commercial and agricultural land within the larger vicinity (1200m or 1600m) of a child's home suggests that those 'suburban' neighbourhoods located closer to the suburban-rural fringe, with fewer nearby commercial properties and higher proportions of nearby agricultural land, may need to be considered differently than those 'suburban' settings with nearby commercial centres and the greater number of resources they provide. In this study, participants with the highest proportion of agricultural land nearby all lived on a suburban-rural border, with all nearby residences and amenities clustered in only two or three directions, in effect reducing the number of social or recreational opportunities available within walking distance of their home. In general, results of this study suggest that we need to utilize better and more comprehensive descriptors of the micro-neighbourhood around children's homes to understand the influence of nearby environmental conditions on children's neighbourhood behaviour.

### **5.7.2 How much time do children spend in their neighbourhood environments, and in which primary settings?**

Understanding the degree to which children regularly utilize their neighbourhood environments for play and other activities requires that we consider not only how far they travel, but where they spend the bulk of their out-of-school time. Although many children exhibited fairly long pedestrian journeys at least once during the study, analysis of time spent in various neighbourhood zones confirms that the participant's spent the vast majority of their NAS time within very close proximity to their home, and little relative time within the broader neighbourhood environment. That is, although the size of children's frequented activity spaces may be fairly large, their habitual activity spaces



remain very small, for many the equivalent of just a few houses down the street from their home.

As with maximum distance travelled, travel mode to school and IM level demonstrated the strongest relationships with the proportion of time children spent close to home; regression models confirmed these two variables to be two of the strongest predictors of time spent within 400m of home (beta = 0.366 and - 0.212 respectively), suggesting that non-active travellers and those with more mobility restrictions were more likely to spend their time at or close to home. Active travel to school also seems to support additional neighbourhood activity beyond the school journey itself; active travellers spent substantially larger proportions of time in all non-home zones, including neighbourhood recreational facilities and the 'far neighbourhood' settings beyond 800m from home. As noted earlier, permission to travel alone to school likely reflects both a parent and child's confidence in their ability to travel independently to other neighbourhood destinations. Similarly, children awarded higher degrees of IM by their parents were much more likely to travel to and spend time in environments substantially far from home. Findings suggest that, given the time and freedom, children will take advantage of opportunities to explore and push the boundaries of their habitual domains

Also similar to distance travelled, gender did not demonstrate any relationship with the proportion of time children spent near or far from home. Nearly identical proportions of girls and boys spent time in each of the distance buffers and environmental zones, confirming no systemic differences in the general locations of activity based on gender alone. Gender also failed to serve as a predictor of activity location in any of the regression models. On the whole both male and female participants spent the vast majority of their out-of-school NAS time within just a short distance of home, and exhibited very small habitual activity spaces.

Alternatively, a child's age was strongly related to each of the spatio-temporal measures, and surfaced as a strong predictor of time spent closer to home. Although older children didn't necessarily travel further distances on average, they were significantly more likely to be found spending time within non-home zones, and within settings beyond 800m of

home. The overall proportion of time older children spent in further located zones was not substantial relative to all time within their NAS, there was still a noticeable presence, whereas very few of the younger participants spent a prolonged period of time in more distant settings. These findings are in keeping with trends that see greater license being granted to older children, but also perhaps emphasize the natural interest in exploring environments further from home as children age and gain more environmental competence.

It was expected that parent perceptions of the neighbourhood, particularly of its potential risk to a child, would serve as a predictor of whether a child spends their time closer to home; the lack of association is therefore somewhat surprising, especially given the influence of parents' perceptions on the distances children travelled and the role of parent-imposed IM. Parents' perceptions of safety were, however, highly correlated with age, as were parent-imposed restrictions on mobility, suggesting that perceptions of safety, and the IM restrictions they may generate, may be more influential with respect to the independence granted to younger children. Parents may be less concerned about the older child's ability to cope with any dangers posed by the neighbourhood. Children's perceptions of neighbourhood access and safety both correlated with time spent close to home but did not surface as significant predictors suggesting that parent perceptions, and their imposed restrictions on mobility, are stronger overall predictors of neighbourhood activity. An anxious child may not push the boundaries of their neighbourhood domain even when granted permission to do so, but many children may not have this choice if their neighbourhood mobility has already been limited by parent-imposed restrictions. A child's age, and age-related perceptions of neighbourhood risk, account for more variance in time spent close to home than either child or parent perceptions alone.

Analyses also suggest that the built environment contributes in slightly different ways to the proportion of time children spent in various neighbourhood settings than to the maximum distances they travelled. Neighbourhood type no longer serves as a strong environmental predictor, and was unrelated to time spent within any distance buffer or environmental zone. Of considerable interest, however, was the emergence of several land use variables as significant predictors; a higher proportion of industrial, residential

and agricultural land within 800m of home were each associated with the likelihood the child would spend a larger proportion of their time within 400m of their residence. At first glance, the positive direction of each of these relationships seems to be at odds with one another; however, clearer patterns emerge when we take a closer look at the children with high proportions of each of these land uses in their near neighbourhood.

In the case of residential land within 800m we would expect lower proportions of nearby residential land to predict higher proportions of time spent close to home, especially as this outcome variable was negatively correlated with residential density (See Table 4). The opposite relationship is somewhat confusing until we examine the built environment around the children's homes; although children from both 'urban' and 'suburban' neighbourhoods fell into this category, their near neighbourhoods were characterized by similar environmental conditions. Each of these children appeared to live in 'residential islands', surrounded primarily by other homes, and located far from any commercial clusters or corridors. Each home, however, had a significant amount of nearby park land or other recreational facilities; GPS tracks confirmed that these children largely confined their pedestrian activities to their residential neighbourhood and nearby parks. One of two phenomena is likely at work here. First, as suggested by Villanueva (2012), the proximity of many homes and potential playmates, as well as the substantial recreational lands nearby, may satisfy many of the child's play interests and reduce the need to travel further afield. Alternatively, or in addition to this explanation, the locations of commercial properties that might normally be of interest are considered to be too far for comfortable and convenient access. In these cases, although the urban and suburban locations generally exhibited opposite degrees of residential density, the influence of density was moderated by other local attributes. In either case, the behaviour patterns of these children reinforce the influence of the specific environmental conditions and morphologies of the near neighbourhood on children's local travel and activity.

The relationship with the proportion of nearby industrial and agricultural land represents another environmental phenomenon which limits children's activity in settings further from home. The home environments of children registering high proportions of either of these land uses nearby were all found to be bordered by a wide swath of either

agricultural or industrial land on one or more sides, creating a barrier to local mobility. These agricultural and industrial properties in most cases were also bounded by major morphological elements, such as railroad lines or major arterial roads, reinforcing the mobility barrier presented by these land uses. These environmental conditions serve to not only limit children's movement to just a few directions from home, but also effectively reduce the number of recreational and social opportunities within the immediate vicinity.

Industrial lands acting as a deterrent to activity and travel within the neighbourhood is easy to understand; perhaps less so is the barrier presented by nearby agricultural lands. The substantial body of work documenting children's preference for natural and wild outdoor places for play (Fjortoft, 2004; Hart, 1979; Jack, 2008; Moore, 1986a; Tranter & Pawson, 2001), would suggest that the close proximity of natural, unstructured agricultural lands present appealing play opportunities that would also draw children from their homes. An in-depth look at the GPS tracks of children living in areas bordered by agricultural lands, however, reveals that not a single child in these neighbourhoods crossed over into these areas at any time, even when the designated land was a natural wooded area or was not active agricultural land. It is hard to decipher whether this complete lack of use is due to parent- or owner-imposed restrictions on utilizing these lands, its lack of appeal as a play space, or else physical barriers such as roads or fences that deterred use; understanding this behaviour would require speaking directly to children discern motives or restrictions. Regardless, these agricultural lands, and the roads or other property dividers that separated them from residential areas, appeared to limit children's movement and play within their neighbourhoods.

Overall analysis illustrates that participant children spent the majority of their pedestrian-based out-of-school time at or within very close proximity of home. The bulk of their time was spent not just in the small area contained within a 400m distance buffer of home, but in the even smaller *Home Zone* domain, which defines an area less than 150m from home. It is likely that the majority of this NAS time is located indoors at home, and most children's habitual out-of-school domain extends only occasionally into neighbourhood domains, if at all. For the small amount of time that is spent in

neighbourhood environments, individual-level factors and built environment conditions appear to particularly influence the time children spend in their local neighbourhood environments.

## 5.8 Limitations and next steps

While this study makes significant advances in measuring children's neighbourhood activity spaces, and examining the time children spend in local environments, the greatest limitation is the inability to definitively conclude that children's pedestrian-based neighbourhood activity was, in fact, independent and carried out without adult supervision. It is likely that some portion of the time captured was supervised, but that a significant amount of their NAS time was still spent alone or with peers, particularly as results aligned with parent-reported levels of independent mobility. As well, besides not knowing 'with whom' they are conducting their activities, GPS data alone does not reveal exactly 'what' children are doing, or 'why'. Therefore, a necessary next step to understanding children's neighbourhood behaviour is to explore more deeply the nature of children's activities, and the motivations or interests that underscore them.

Participants included in this study demonstrated high levels of compliance with the protocol and recorded high levels of GPS data during the study period. There were, of course, some gaps in the GPS data due to equipment glitches or child forgetfulness. Activity diaries and narratives helped to clarify gaps related to location, but are less able to compensate for the time these lost GPS points represent. The measures of out-of-school time spent in various environmental zones are therefore a relative measure, and do not necessarily include all out-of-school time for all participants. Recorded GPS data, however, was sufficiently high for all participants to suggest that the children's patterns of neighbourhood activity for the study period were represented.

The seven-day study also only provides a snapshot of children's local behaviour and may not represent their habitual weekly geographies, or their activity and travel at different points of the year. Longitudinal studies, or repeating of the protocol at different times of year, would help to confirm habitual patterns of children's behaviour in neighbourhood environments.

The variable results from this study, and the moderate level of variance explained by regression models, emphasise the extremely complex nature of children's behaviour and the numerous factors that influence them. It is also possible that there are other social and cultural factors, such as neighbourhood social capital, household income, parental norms, or children's activity preferences, that may be playing a role but which are unaccounted for here. Household income in particular may be influencing individual and family level patterns as economic resources can influence whether children are involved in fee-based recreation or other structured activities. There was insufficient data for household socio-economic status available for this study, however, to include it as an independent variable in this analysis. Larger studies that can effectively include income in analysis and modelling could isolate the degree to which household or even neighbourhood SES impacts neighbourhood perceptions and behaviour. The results overall underscore the need for a socio-ecological approach to examining children's behaviour and health which recognize multiple spheres of influence, as well as the need to carefully characterize the environmental settings and conditions of children's local settings.

Even with the availability of more advanced research tools, attempts to definitively untangle the nature and drivers of children's neighbourhood geographies will always be difficult due to the large, fluctuating set factors that influence behaviour patterns at any given time in a child's life. As well, while similarities among common demographic groups, or within a given cultural context, may emerge, the impact of compositional and contextual factors in the manifestation of behaviour is so individualized that generalizable patterns may never materialize, or be applicable to children from one culture or context to the next. Continued work with larger participant samples, and a broader and more nuanced set of variables, however, will shed additional light on the relationship between children's behaviour and their environments as well as the mediating effects individual, perceptual and environmental factors may have on neighbourhood use and each other. A necessary supplement to this work is a more in-depth look at children's daily activities to highlight the forces or motivations that

underscore their activities, and reveal the specific role environmental conditions play in promoting children's neighbourhood activity.

## 5.9 Conclusion

The 1990 study *One False Move* by Hillman and colleagues documenting changes in children's independent mobility in Britain highlighted the dramatic change in home range within 3 generations of one family, all of whom grew up in the same UK city. The independent activity space of an 8 year old child shrank from the 10 kilometer wide range enjoyed by the great-grandfather in 1919, to the scant 300 meter domain of his great-grandson, only 70 years later (Hillman et al., 1990). This current study of the neighbourhood domains of contemporary children in London, Canada demonstrates similar reductions in habitual home ranges, and generally low levels of independent mobility. Though child participants exhibited some ability to travel to relatively distant destinations within their neighbourhood, they spent little time overall venturing into or playing in community settings beyond just a short distance of home. This is not entirely surprising given that the vast majority of children were subject to household rules that restricted unsupervised neighbourhood play and travel, and may have effectively limited their activity to a very shallow geography within the immediate vicinity of home. The powerful influence of these parent-imposed restrictions was clearly evident, as children with fewer mobility restrictions tended to travel further, have larger neighbourhood activity spaces, and spent more time in more distant environments than their lower mobility peers.

The participants also spent over half of their NAS time indoors at home. Considering this does not include the 25% of their out-of-school time that was spent in environments accessed by vehicle, or activity indoors elsewhere in the neighbourhood, the overall proportion of time the children spent indoors is likely much higher. The result is that the habitual activity spaces of participating children were generally very small and concentrated indoors, with many actively travelling only a few hundred metres beyond their home during their out-of-school free time.

Though behaviour patterns across participants were highly variable, findings clearly illustrated the strong influence of individual-level factors, particularly with respect to age and travel mode to school, which is highly consistent with previous work. Gender alone contrasted with most historical results, finding no systemic gap in behaviour between girls and boys; this leveling out has, however, been echoed by a number of more recent studies suggesting that gender-related differences in neighbourhood freedom and activity may be shifting.

Neighbourhood design and built environment conditions within the broader community, while not generally as influential as compositional factors, still played a significant role in broadening or constricting children's local mobility. Some variance could be explained by environment differences that broadly typify urban and suburban environments. Several patterns, however, were not made clear until neighbourhood environments were examined on a micro-scale. The environmental conditions surrounding the homes of a number of participants contrasted with those typically found within neighbourhoods of their assigned type of 'urban' or 'suburban'; activity and mobility patterns of these children often did not align with peers within the same neighbourhood category, highlighting the greater influence of nearby environmental conditions on opportunities and behaviour. The morphological attributes of the nearby neighbourhood also proved influential, as bands of agricultural or industrial land, or wide ravines and major roads, effectively directed and limited opportunities for local activity and travel. Future studies of children's neighbourhood behaviour and mobility should direct more attention to the specific features and layout of the child's near neighbourhood, rather than relying on simplified neighbourhood typologies or a small set of environmental variables.

Time and freedom to play outdoors and explore the diverse, stimulating settings of the neighbourhood are critical for children's healthy development and well-being. The evidence from the literature to date clearly demonstrates that not only is this independent neighbourhood play responsible for supporting a raft of critical childhood developments, but the lack of opportunity or freedom to engage in unsupervised community activity can handicap children's ability to develop skills and insights that will promote their



continued health. The impact of reduced independent activity also seems to progress in a negative feedback loop; the more we restrict children's IM and neighbourhood play, the less children learn how to cope with new situations and people, and the less confident in and attached they will be to their local environments. In turn, parent's confidence in children's ability to successfully navigate the neighbourhood unsupervised remains low, and they may resist the children's efforts to expand their local independent domains.

Discussions with parents reveal that restrictions are imposed primarily in the name of safety, to protect children from the dangers posed by the social and physical environment of the neighbourhood (Gill, 2007; MacDougall et al., 2009; Valentine, 1997; Witten et al., 2013). Contrary to popular perception, however, the relative level of risk in most neighbourhoods is small (Gill, 2007; Holloway & Valentine, 2000). As well, it is precisely through exposure to some environmental challenges that children develop new skills and knowledge. The more children learn to negotiate new settings and situations, the more knowledge they gain of place, including its inherent hazards, and the better adapted they become to deal with these challenges (Gill, 2007; Gray, 2011; MacDougall et al., 2009). The key is to balance feelings of safety and challenge; a child who is given license to play freely and independently in their local environments learns how to choose their own challenges and to manage their own risk (Gill, 2007; Gray, 2011; Rissotto & Giuliani, 2006). The contemporary conception of appropriate play, however, has become sanitized from which most, if not all, risk has been removed (Gill, 2007). This includes severely limiting unsupervised and neighbourhood play, and increasing levels of structured and indoor activity. Use of these protective strategies isn't new; evidence of their implementation dates back several decades (Gaster, 1991; Hillman et al., 1990; Shaw et al., 2012). What may be changing is the degree to which these restrictions or strategies are being employed in children's daily lives; contemporary children appear to be losing more and more opportunity to play freely, unsupervised and unstructured, in the diverse environs of their neighbourhood.

Highlighting the substantial health and development benefits of independent neighbourhood activity may be an effective strategy to counter the culture of protection and accompaniment that characterizes daily activity for many contemporary children.

Discussions with parents and caregivers could also work to dispel common myths around neighbourhood risk, and raise awareness around the value of exposure to some challenge for children's development and well-being. Given the highly influential role of an active mode to school in increasing the size of children's activity domains, and the time spent in more distant neighbourhood settings, policy and advocacy efforts should be directed toward increasing parent's comfort level with children's independent travel to school; planning initiatives can work to ensure a supportive, 'walkable' infrastructure.

The last few decades have been witness to substantial changes in the overall structure and rhythms of children's daily lives as well as their primary environmental settings, yet little attention has been paid to date to the health impacts of these changes, particularly with respect to the decline of independent neighbourhood activity. The alarming consequences for children's healthy development and well-being require not only that we continue research efforts to understand the factors influencing children's local behaviour, but that we also step up both practice and policy efforts to promote a better understanding of the role of independent, local play for children's health, and to provide them with their rightful access to safe, rich and high-quality neighbourhood environments.

## **5.10 Acknowledgements**

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## **5.11 Reflection on methods and metrics**

For this analysis of children's neighbourhood use and travel, we chose three metrics, one spatial and two spatio-temporal, to define characteristics of children's neighbourhood activity spaces. Several other GIS-based methods have recently been utilized to help delineate activity spaces, such as the use of standard deviational ellipses or minimum convex polygons (See Fagerholm & Broberg, 2011; Rainham et al., 2010; Villanueva,

Giles-Corti, Bulsara, Timperio, et al., 2012). Though such techniques can provide an area-based measure of the potential size of a child's activity space, it was decided that areal measures would not especially help to our objectives; these measures are better to provide an outline of environments of opportunity rather than the actual routes children travel or the frequency with which they access neighbourhood destinations.

The maximum path distance measured, derived from a raster-based calculation using a child's GPS dataset, was a highly useful measure of distance travelled from home; its route-based distance was a more accurate measure of distance travelled than a Euclidean distance measure nor was it reliant on a road network that would not likely align with children's meandering routes or shortcuts.

The use of two spatio-temporal measures provided a necessary complement to the distance measure, providing an alternative view of children's neighbourhood use. As results highlighted, a distance measure alone could over- or underestimate the time a child spends in their neighbourhood environment. For example, some participants were granted license to walk almost 1 km to and from their school, recording fairly high path distances, but this license did not translate to high levels of neighbourhood use; most of their out-of-school leisure time was spent within a very short distance of their homes. The use of the two types of measures helped to highlight some of these contradictions and provide a more accurate overall picture of neighbourhood travel and use. The spatio-temporal measures were particularly revealing and could serve as effective activity space measures in other studies. The measures of time spent in various buffer distances or environmental zones, however, remains relative as there were occasional gaps in GPS data, and because there are likely some errors in the assignment of GPS points to environmental settings given the current level of accuracy of portable GPS data loggers. However, these measures could be employed with even more confidence in future studies as the accuracy of GPS units and data cleaning methods improve.

Similar to this analysis, other recent studies attempting to quantify children's activity spaces have also highlighted the enormous variability in children's neighbourhood domains, as well as their lack of alignment with traditional neighbourhood boundaries

(Wiehe, Carroll, et al., 2008; Zenk et al., 2011). Neither administrative boundaries nor arbitrary buffer zones have served overly well as proxies for children's everyday activity spaces or the environments to which they are regularly exposed (Wiehe, Carroll, et al., 2008). Similarly, this study revealed that the neighbourhood domains children carve out for themselves and the resulting neighbourhood environment to which they are exposed, are highly individual and do not easily coincide with any designated neighbourhood boundaries or arbitrarily-defined distance buffers. They particularly highlight the role of morphological elements such as roads, ravines and railroads as significant barriers to activity and mobility, but which are rarely considered in the development of neighbourhood metrics.

Utilizing objective and individual tracking data from GPS-enabled devices is the best option for providing a better snapshot of children's utilized environments, but the time consuming nature of manually isolating children's pedestrian-based neighbourhood domains from enormous GPS datasets still makes the generation of individualized domains for a large sample set of children a difficult and time-consuming task.

Advanced GIS tools and models are helping to address this issue (D. Rainham et al., 2010), but for now many studies may still need to employ arbitrary buffers to represent the child's neighbourhood and the local environment of opportunity. In this regard, analyses suggested that children's activity patterns demonstrated little association with the environment within the immediate vicinity of home (within 400m) but rather strong relationships with the broader community environment, in this case from 800m up to 1600m from home. Even when children did not regularly travel to more distance destinations, the conditions and opportunities of the built environment within these larger regions does seem to influence activity patterns. Buffers that include the environment up to 1600m around the child's home will likely be relevant and useful in future analyses for defining the environment of influence. Regression analyses, however, suggested that the built environment within an 800m region around the child's house may be even more likely to help predict activity and mobility patterns among children. Continuing efforts to utilize GPS-enabled devices to capture activity and travel behaviour, and more refined

processes for cleaning and isolating data, however, will be highly valuable in the ongoing endeavour to understand children's everyday geographies.

When we are able to couple more refined tools that objectively measure children's activity with more qualitative approaches that can speak to children's subjective environmental experience, we will be better positioned to capture a more holistic picture of children's environmental behaviour.

## **5.12 Bridge to Chapter 6**

The study outlined in this second manuscript reveals the extent to which children travel and spend time in their neighbourhood environments. Generally, the results highlight that children may occasionally travel fairly far from home, but on the whole they spent very little time in their neighbourhood beyond their immediate home environment. Analysis of individual, perceptual and environmental variables points to the general influence of each these types of factors in encouraging or limiting children's neighbourhood use. We do not know, however, how these compositional and contextual factors are specifically combining to impact the neighbourhood perceptions or activity of the individual child. Insights from Study 1 suggest that children's behaviour can be highly dependent on parental perceptions of the neighbourhood environment, but that the specific conditions of the neighbourhood built environment may also restrict the mobility of some children. This research was, however, carried out with a younger age group (7 to 9 years versus the 9 to 13 year cohort targeted in the STEAM project) who may be more sensitive to these barriers. The work of Study 2 suggests that while age may be a factor, this older cohort also exhibits very low levels of neighbourhood use.

Analysis of the GPS data from this larger participant group was able to reveal higher-level patterns in children's neighbourhood travel and use, but the broad range of tools included within the STEAM protocol also provided the opportunity for a deeper, more detailed examination of the patterns of neighbourhood activity within a given environmental setting. Data from activity diaries, child-directed neighbourhood maps and interview narratives allowed for an investigation of activity locations and of the specific affordances for activity perceived and utilized (or not) by neighbourhood

children. The themes which emerged from Study 1 provided an effective foundation for initial thematic analysis in Study 3, and allowed similarities and differences in experience between various study neighbourhoods to surface. Integration of all data within a GIS also allowed for the spatial analysis of activity and narrative data, tying children's neighbourhood experiences to specific built environments.

Study 3 provides the necessary child narratives to complement Study 2, and allow us to better understand the general patterns of activity and mobility which emerged, as well as how socio-environmental factors may manifest differently for individual children.

### 5.13 References

- Almanza, E., Jerrett, M., Dunton, G., Seto, E., & Ann Pentz, M. (2012). A study of community design, greenness, and physical activity in children using satellite, GPS and accelerometer data. *Health & Place, 18*(1), 46–54.
- Badland, H. M., & Schofield, G. (2005). Transport, urban design, and physical activity: an evidence-based update. *Transportation Research Part D: Transport and Environment, 10*(3), 177–196.
- Bartlett, S., Hart, R., Satterthwaite, D., De La Barra, X., & Missair, A. (1999). *Cities for children: Children's rights, poverty and urban management*. Earthscan.
- Berg, M., & Medrich, E. A. (1980). Children in four neighborhoods: The physical environment and its effect on play and play patterns. *Environment and Behavior, 12*(3), 320–348.
- Bjorklid, P. (1982). *Children's outdoor environment: A study of children's outdoor activities on two housing estates from the perspective of environmental and developmental psychology*. CWk Gleerup.
- Brown, B., Mackett, R., Gong, Y., Kitazawa, K., & Paskins, J. (2008). Gender differences in children's pathways to independent mobility. *Children's Geographies, 6*(4), 385–401.
- Buliung, R. N., Mitra, R., & Faulkner, G. (2009). Active school transportation in the Greater Toronto Area, Canada: an exploration of trends in space and time (1986-2006). *Preventive medicine, 48*(6), 507–12.
- Burdette, H. L., & Whitaker, R. C. (2005). Resurrecting Free Play in Young Children Looking Beyond Fitness and Fatness to Attention, Affiliation, and Affect. *Archives of Pediatrics and Adolescent Medicine, 159*(1), 46–50.

- Burke, C. (2005). "Play in focus": Children researching their own spaces and places for play. *Children, Youth and Environments*, 15(1), 27–53.
- Carver, A., Timperio, A., & Crawford, D. (2008). Playing it safe: The influence of neighbourhood safety on children's physical activity - A review. *Health & Place*, 14(2), 217–227.
- Chawla, L. (1992). Childhood Place Attachments. In I. & L. Altman S.M. (Ed.), *Human behavior and environment: Advances in theory and research* (Vol. 12). New York: Plenum.
- Christensen, P., & O'Brien, M. (2003). Children in the city: Introducing new perspectives. *Children in the City: Home, Neighborhood, and Community* (pp. 1–12). London and New York: Routledge Falmer.
- Churchman, A. (2003). Is there a place for children in the city? *Journal of Urban Design*, 8(2), 99–111.
- Clark, C., & Uzzell, D. L. (2002). The affordances of the home, neighbourhood, school and town centre for adolescents. *Journal of Environmental Psychology*, 22(1-2), 95–108.
- Clements, R. (2004). An Investigation of the Status of Outdoor Play. *Contemporary Issues in Early Childhood*, 5(1), 68–80.
- Cliff, D. P., Reilly, J. J., & Okely, A. D. (2009). Methodological considerations in using accelerometers to assess habitual physical activity in children aged 0-5 years. *Journal of science and medicine in sport / Sports Medicine Australia*, 12(5), 557–67.
- Colley, R., Gorber, S. C., & Tremblay, M. S. (2010). Quality control and data reduction procedures for accelerometry-derived measures of physical activity. *Health Reports*, 21(1), 63–69.
- Copperman, R. B., & Bhat, C. (2009). *Children's activity-travel patterns and implications for activity-based travel demand modeling*. Transportation Research Board 88<sup>th</sup> Annual Meeting. No. 09-0844.
- Cosco, N., & Moore, R. (2002). Our neighborhood is like that. In L. Chawla (Ed.), *Growing up in an urbanizing world*. London: UNESCO and Earthscan.
- Davison, K. K., & Lawson, C. T. (2006). Do attributes in the physical environment influence children's physical activity? A review of the literature. *International Journal of Behavioral Nutrition and Physical Activity*, 3(1), 19.
- Ekelund, U., Sardinha, L. B., Anderssen, S. a, Harro, M., Franks, P. W., Brage, S., Cooper, A. R., et al. (2004). Associations between objectively assessed physical activity and indicators of body fatness in 9- to 10-y-old European children: a population-based study from 4 distinct regions in Europe (the European Youth Heart Study). *The American Journal of Clinical Nutrition*, 80(3), 584–90.
- Engwicht, D. (1992). *Towards an Eco-city: Calming the traffic*. Sydney: Envirobook.

- Evenson, K. R., Birnbaum, A. S., Bedimo-rung, A. L., Sallis, J. F., Voorhees, C. C., Ring, K., & Elder, J. P. (2006). Girls' perception of physical environmental factors and transportation : reliability and association with physical activity and active transport to school. *International Journal of Behavioral Nutrition and Physical Activity*, *16*, 1–16.
- Fagerholm, N., & Broberg, A. (2011). Mapping and characterising children's daily mobility in urban residential areas in Turku, Finland. *Fennia International Journal of Geography*, *189*(2), 31–46.
- Fjortoft, I. (2004). Landscape as playscape: The effects of natural environments on children's play and motor development. *Children, Youth and Environments*, *14*(2), 21–44.
- Frank, L. D., & Engelke, P. O. (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.
- Fyhri, A., & Hjorthol, R. (2009). Children's independent mobility to school, friends and leisure activities. *Journal of Transport Geography*, *17*(5), 377–384.
- Fyhri, A., Hjorthol, R., Mackett, R., Fotel, T. N., & Kyttä, M. (2011). Children's active travel and independent mobility in four countries: Development, social contributing trends and measures. *Transport Policy*, *18*(5), 703–710.
- Gaster, S. (1991). Urban Children's Access to their Neighborhood. *Environment and Behavior*, *23*(1), 70–85.
- Gill, T. (2007). *No Fear: Growing Up in a Risk Averse Society*. London, England: Calouste Gulbenkian Foundation.
- Gill, T. (2011). *Free range kids : Why children need simple pleasures and everyday freedom , and what we can do about it*. Dairylea Foundation
- Gleave, J., & Cole-Hamilton, I. (2012). *A world without play : A literature review*. PlayEngland.
- Gordon-Larsen, P., Nelson, M. C., Page, P., & Popkin, B. M. (2006). Inequality in the built environment underlies key health disparities in physical activity and obesity. *Pediatrics*, *117*(2), 417–424.
- Gray, P. (2011). The Decline of Play and the Rise of Psychopathology in Children and Adolescents s. *American Journal of Play*, *3*(4), 443–463.
- Hart, R. (1979). *Children's experience of place*. Halsted Press.
- Hart, R. (1984). The geography of children and children's geographies. In T. F. Saarinen, D. Seamon, & J. L. Sell (Eds.), *Environmental Perceptions and Behaviour: An inventory and prospect*. Research Paper No. 209. Chicago, IL: Department of Geography, University of Chicago.



- Harten, N., & Olds, T. (2004). Patterns of active transport in 11-12 year old Australian children. *Australian and New Zealand journal of public health*, 28(2), 167–72.
- Heath, G., Brownson, R. ., Kruger, J., Miles, R., Powell, K., Ramsey, T., & Services, T. F. on C. P. (2006). The Effectiveness of Urban Design and Land Use and Transportation Policies and Practices to Increase Physical Activity: A Systematic Review. *Journal of Physical Activity and Health*, 3(Suppl 1), S55–S76.
- Hillman, M. (2006). Children's rights and adults' wrongs. *Children's Geographies*, 4(1), 61–67.
- Hillman, M., Adams, J., & Whitelegg, J. (1990). *One false move*. Policy Studies Institute London.
- Holloway, S. L., & Valentine, G. (2000). Spatiality and the New Social Studies of Childhood. *Sociology*, 34(4), 763–783.
- Holt, N. L., Spence, J. C., Sehn, Z. L., & Cutumisu, N. (2008). Neighborhood and developmental differences in children's perceptions of opportunities for play and physical activity. *Health & Place*, 14(1), 2–14.
- Hume, C., Jorna, M., Arundell, L., Saunders, J., Crawford, D., & Salmon, J. (2009). Are children's perceptions of neighbourhood social environments associated with their walking and physical activity? *Journal of science and medicine in sport / Sports Medicine Australia*, 12(6), 637–41.
- Hume, C., Timperio, A., Salmon, J., Carver, A., Giles-Corti, B., & Crawford, D. (2009). Walking and cycling to school: predictors of increases among children and adolescents. *American journal of preventive medicine*, 36(3), 195–200.
- Irwin, L. G., Johnson, J. L., Henderson, a, Dahinten, V. S., & Hertzman, C. (2007). Examining how contexts shape young children's perspectives of health. *Child: care, health and development*, 33(4), 353–9.
- Jack, G. (2008). Place Matters: The Significance of Place Attachments for Children's Well-Being. *British Journal of Social Work*, 40(3), bcn142.
- Johansson, M. (2006). Environment and parental factors as determinants of mode for children's leisure travel. *Journal of Environmental Psychology*, 26(2), 156–169.
- Joshi, M. S., Maclean, M., & Carter, W. (1999). Children's journey to school: Spatial skills, knowledge and perceptions of the environment. *British Journal of Developmental Psychology*, 17(1), 125–139.
- Karsten, L. (2002). Mapping childhood in Amsterdam: The spatial and social construction of children's domains in the city. *Tijdschrift voor Economische en Sociale Geografie/Journal of Economic & Social Geography*, 93(3), 231–241.
- Karsten, L. (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, R., & Moon, G. (2002). From medical to health geography: Novelty, place and theory after a decade of change. *Progress in Human Geography*, 26(5), 605.
- Kerr, J., Frank, L. D., Sallis, J. F., & Chapman, J. (2007). Urban form correlates of pedestrian travel in youth: Differences by gender, race-ethnicity and household attributes. *Transportation Research Part D: Transport and Environment*, 12(3), 177–182.
- Kerr, J., Rosenberg, D., Sallis, J. F., Saelens, B. E., Frank, L. D., & Conway, T. L. (2006). Active commuting to school: Associations with environment and parental concerns. *Medicine and Science in Sports and Exercise*, 38(4), 787–94.
- Kyttä, M. (2003). *Children in outdoor contexts: Affordances and independent mobility in the assessment of environmental child friendliness*. Helsinki University of Technology.
- Kyttä, M. (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(2), 179–198.
- Larsen, K., Gilliland, J., & Hess, P. M. (2012). Route-Based Analysis to Capture the Environmental Influences on a Child's Mode of Travel between Home and School, 102, 1348–1365.
- Larsen, K., Gilliland, J., Hess, P., Tucker, P., Irwin, J., & He, M. (2009). The influence of the physical environment and sociodemographic characteristics on children's mode of travel to and from school. *Am J Public Health*, 99(3), 520–526.
- Loebach, J., & Gilliland, J. (2010). Child-Led Tours to Uncover Children's Perceptions and Use of Neighborhood Environments, 20(1), 52–90.
- Lynch, K., Banerjee, T., & UNESCO. (1977). *Growing up in cities: studies of the spatial environment of adolescence in Cracow, Melbourne, Mexico City, Salta, Toluca, and Warszawa*. MIT Press.
- MacDougall, C., Schiller, W., & Darbyshire, P. (2009). What are our boundaries and where can we play? Perspectives from eight to ten year old Australian metropolitan and rural children. *Early Child Development and Care*, 179(2), 189–204.
- Macintyre, S., & Ellaway, A. (2000). Ecological approaches: rediscovering the role of the physical and social environment. In L. F. & K. Berkma I. (Ed.), *Social Epidemiology* (pp. 332–348). New York: Oxford University Press.
- Mackett, R., Brown, B., Gong, Y., Kitazawa, K., & Paskins, J. (2004). Measuring the outcomes from active transport interventions for children. *Creating Lively Neighbourhoods: Children and Active Transport Symposim*. Melbourne, Australia.
- Mackett, R., Brown, B., Gong, Y., Kitazawa, K., & Paskins, J. (2007). Children's Independent Movement in the Local Environment. *Built Environment*, 33(4), 454–468.

- Mackett, R., Gong, Y., & Kitazawa, K. (2006). Where do children walk (and what do they do when they get there)? *Tagungsbeitrag, WALK21-VII* (pp. 1–14). Melbourne, Australia.
- Mackett, R., Lucas, L., Paskins, J., & Turbin, J. (2005). The therapeutic value of children's everyday travel. *Transportation Research Part A: Policy and Practice*, 39(2-3), 205–219.
- Mackett, R., & Paskins, J. (2008). Children's physical activity: The contribution of playing and walking. *Children & Society*, 22(5), 345–357.
- Maddison, R., Jiang, Y., Vander Hoorn, S., Exeter, D., Mhurchu, C. N., & Dorey, E. (2010). Describing patterns of physical activity in adolescents using global positioning systems and accelerometry. *Pediatric exercise science*, 22(3), 392–407.
- Matthews, H. (1987). Gender, home range and environmental cognition. *Transactions of the Institute of British Geographers*, 12(1), 43–56.
- Matthews, H. (1992). *Making sense of place: Children's understanding of large-scale environments*. Harvester Wheatsheaf Hemel Hempstead.
- Matthews, H. (1995). Living on the edge: Children as "Outsiders." *Tijdschrift Voor Economische En Sociale Geografie*, 86(5), 456–466.
- Matthews, H. (2003). Coming of Age for Children's Geographies. *Children's Geographies*, 1(1), 3–5.
- McDonald, N. C. (2007a). Travel and the social environment: Evidence from Alameda County, California. *Transportation Research Part D: Transport and Environment*, 12(1), 53–63.
- McDonald, N. C. (2007b). Children's mode choice for the school trip: The role of distance and school location in walking to school. *Transportation*, 35(1), 23–35.
- McDonald, N. C., & Aalborg, A. E. (2009). Why parents drive children to school: Implications for safe routes to school programs. *Journal of the American Planning Association*, 75(3), 331–342.
- McDonald, N. C., Brown, A. L., Marchetti, L. M., & Pedroso, M. S. (2011). U.S. school travel, 2009 an assessment of trends. *American journal of preventive medicine*, 41(2), 146–51.
- McMillan, T. E. (2007). The relative influence of urban form on a child's travel mode to school. *Transportation Research Part A: Policy and Practice*, 41(1), 69–79.
- Meyer, M., & Dumbaugh, E. (2005). *Institutional and regulatory factors related to nonmotorized travel and walkable communities*.

- Mikkelsen, M. R., & Christensen, P. (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.
- Min, B., & Lee, J. (2006). Children's neighborhood place as a psychological and behavioral domain. *Journal of Environmental Psychology*, 26(1), 51–71.
- Mitchell, H., Kearns, R. A., & Collins, D. C. A. (2007). Nuances of neighbourhood: Children's perceptions of the space between home and school in Auckland, New Zealand. *Geoforum*, 38(4), 614–627.
- Moore, R. (1986). *Childhood's domain: Play and place in child development*. Croom Helm Ltd.
- Moore, R., & Young, D. (1978). Childhood outdoors: Toward a social ecology of the landscape. In I. Altman & J. Wohlwill (Eds.), *Children and the Environment* (Vol. 3, pp. 83–130). Plenum Publishing Corporation.
- Olds, T., Wake, M., Patton, G., Ridley, K., Waters, E., Williams, J., & Hesketh, K. (2009). How do school-day activity patterns differ with age and gender across adolescence? *The Journal of adolescent health : official publication of the Society for Adolescent Medicine*, 44(1), 64–72.
- Owen, N., Humpel, N., Leslie, E., Bauman, A., & Sallis, J. F. (2004). Understanding environmental influences on walking: Review and research agenda. *American journal of preventive medicine*, 27(1), 67–76.
- O'Brien, M., Jones, D., Sloan, D., & Rustin, M. (2000). Children's Independent Spatial Mobility in the Urban Public Realm. *Childhood*, 7(3), 257–277.
- Page, A. S., Cooper, A. R., Griew, P., Davis, L., & Hillsdon, M. (2009). Independent mobility in relation to weekday and weekend physical activity in children aged 10–11 years: The PEACH Project. *The international journal of behavioral nutrition and physical activity*, 6, 2.
- Page, A. S., Cooper, A. R., Griew, P., & Jago, R. (2010). Independent mobility, perceptions of the built environment and children's participation in play, active travel and structured exercise and sport: the PEACH Project. *The international journal of behavioral nutrition and physical activity*, 7, 17.
- Page, A. S., Cooper, A. R., Stamatakis, E., Foster, L. J., Crowne, E. C., Sabin, M., & Shield, J. P. H. (2005). Physical activity patterns in nonobese and obese children assessed using minute-by-minute accelerometry. *International Journal of Obesity (2005)*, 29(9), 1070–6.
- Pallant, J. (2011). *SPSS Survival Manual: A step by step guide to data analysis using SPSS* (4th editio.). Open University Press.

Panther, J. R., Jones, A. P., & van Sluijs, E. M. (2008). Environmental determinants of active travel in youth: a review and framework for future research. *The international journal of behavioral nutrition and physical activity*, 5, 34.

Penpraze, V., Reilly, J. J., MacLean, C., Montgomery, C., Kelly, L., & Paton, J. Y. (2006). Monitoring of physical activity in young children: How much is enough? *Pediatric Exercise Science*, 18, 483–491.

Pooley, C. G., Turnbull, J., & Adams, M. (2005). The journey to school in Britain since the 1940s: continuity and change. *Area*, 37(1), 43–53.

Pooley, C., Whyatt, D., Walker, M., Davies, G., Coulton, P., & Bamford, W. (2010). Understanding the school journey: integrating data on travel and environment. *Environment and Planning A*, 42(4), 948–965.

Postman, N. (1985). The disappearance of childhood. *Childhood Education*, 61(4), 286–293.

Prezza, M., & Pacilli, M. G. (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, M., Piloni, S., Morabito, C., Sersante, C., Alparone, F. R., & Giuliani, M. V. (2001). The influence of psychosocial and environmental factors on children's independent mobility and relationship to peer frequentation. *Journal of Community & Applied Social Psychology*, 11(6), 435–450.

Quigg, R., Gray, A., Reeder, A. I., Holt, A., & Waters, D. L. (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.

Rainham, D. G., Bates, C. J., Blanchard, C. M., Dummer, T. J., Kirk, S. F., & Shearer, C. L. (2012). Spatial classification of youth physical activity patterns. *American journal of preventive medicine*, 42(5), e87–96.

Rainham, D., McDowell, I., Krewski, D., & Sawada, M. (2010). Conceptualizing the healthscape: contributions of time geography, location technologies and spatial ecology to place and health research. *Social science & medicine (1982)*, 70(5), 668–76.

Rissotto, A., & Giuliani, M. V. (2006). Learning neighbourhood environments: the loss of experience in a modern world. In C. & B. Spencer M. (Ed.), *Children and Their Environments: Learning, Using and Designing Spaces*. Cambridge University Press.

Rissotto, A., & Tonucci, F. (2002). Freedom of movement and environmental knowledge in elementary school children. *Journal of Environmental Psychology*, 22(1), 65–77.

- Rodriguez, D. a, Cho, G.-H., Elder, J. P., Conway, T. L., Evenson, K. R., Ghosh-Dastidar, B., Shay, E., et al. (2012). Identifying walking trips from GPS and accelerometer data in adolescent females. *Journal of physical activity & health*, 9(3), 421–31.
- Ross, N. J. (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.
- Sallis, J. F., Cervero, R. B., Ascher, W., Henderson, K. A., Kraft, M. K., & Kerr, J. (2006). An ecological approach to creating active living communities. *Annual Review of Public Health*, 27, 297.
- Sallis, J. F., Prochaska, J. J., & Taylor, W. C. (2000). A review of correlates of physical activity of children and adolescents. *Medicine & Science in Sports & Exercise*, 32(5), 963.
- Salmon, J., Salmon, L., Crawford, D., Hume, C., & Timperio, A. (2007). Associations among individual, social and environmental barriers and children’s walking or cycling to school. *American Journal of Health Promotion*, 22(2), 107–113.
- Schoeppe, S., Duncan, M. J., Badland, H. M., Oliver, M., & Curtis, C. (2012). Associations of children’s independent mobility and active travel with physical activity, sedentary behaviour and weight status: A systematic review. *Journal of science and medicine in sport / Sports Medicine Australia*.
- Sener, I. N., & Bhat, C. R. (2007). An analysis of the social context of children’s weekend discretionary activity participation. *Transportation*, 34(6), 697–721.
- Shaw, B., Watson, B., Frauendienst, B., Redecker, A., Jones, T., & Hillman, M. (2012). *Children’s independent mobility: A comparative study in England and Germany (1971-2010)*. London.
- Sirard, J. R., Riner, W. F., McIver, K. L., & Pate, R. R. (2005). Physical Activity and Active Commuting to Elementary School. *Medicine & Science in Sports & Exercise*, 37(12), 2062–2069.
- Spencer, C., & Woolley, H. (2000). Children and the city: A summary of recent environmental psychology research. *Child: Care, Health & Development*, 26(3), 181.
- Spilsbury, J. (2005). “We Don”T Really Get To Go Out in the Front Yard’—Children’s Home Range and Neighborhood Violence. *Children’s Geographies*, 3(1), 79–99.
- Spilsbury, J., Korbin, J., & Coulton, C. (2009). Mapping Children’s Neighborhood Perceptions: Implications for Child Indicators. *Child Indicators Research*, 2(2), 111–131.
- Sutton, S. E., & Kemp, S. P. (2002). Children as partners in neighborhood placemaking: Lessons from intergenerational design charrettes. *Journal of Environmental Psychology*, 22(1-2), 171–189.

- 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.
- Thompson, D. C., Rebolledo, V., Thompson, R., Kaufman, A., & Rivara, F. (1997). Bike speed measurements in a recreational population: Validity of self reported speed. *Injury Prevention*, 3, 43–45.
- Thornton, L. E., Pearce, J. R., & Kavanagh, A. M. (2011). Using Geographic Information Systems (GIS) to assess the role of the built environment in influencing obesity: a glossary. *The international journal of behavioral nutrition and physical activity*, 8(1), 71.
- Timperio, A., Crawford, D., Telford, A., & Salmon, J. (2004). Perceptions about the local neighborhood and walking and cycling among children. *Preventive Medicine*, 38(1), 39–47.
- Tranter, P., & Pawson, E. (2001). Children's access to local environments: A case-study of Christchurch, New Zealand. *Local Environment*, 6(1), 27–48.
- Trapp, G., Giles-Corti, B., Christian, H., Bulsara, M., Timperio, A., McCormack, G. R., & Villanueva, K. (2012). Increasing children's physical activity: individual, social and environmental factors associated with walking to and from school. *Health Education & Behavior*, 39(2), 172–182.
- Tuan, Y. F. (1978). Children and the natural environment. *Children and the Environment*, 1–32.
- Valentine, G. (1997). "Oh yes I can" "Oh no you can't": Children and parents' understandings of kids' competence to negotiate public space safely. *Antipode*, 29(1), 65–89.
- Valentine, G., & McKendrick, J. (1997). Children's outdoor play: Exploring parental concerns about children's safety and the changing nature of childhood. *Geoforum*, 28(2), 219–235.
- Veitch, J., Bagley, S., Ball, K., & Salmon, J. (2006). Where do children usually play? A qualitative study of parents' perceptions of influences on children's active free-play. *Health & place*, 12(4), 383–93.
- Veitch, J., Salmon, J., & Ball, K. (2007). Children's Perceptions of the Use of Public Open Spaces for Active Free-play. *Children's Geographies*, 5(4), 409–422.
- Veitch, J., Salmon, J., & Ball, K. (2008). Children's active free play in local neighborhoods: a behavioral mapping study. *Health education research*, 23(5), 870–9.
- Veitch, J., Salmon, J., & Ball, K. (2010). Individual, social and physical environmental correlates of children's active free-play: a cross-sectional study. *The international journal of behavioral nutrition and physical activity*, 7, 11.

- Villanueva, K., Giles-Corti, B., Bulsara, M., McCormack, G. R., Timperio, A., Middleton, N., Beesley, B., et al. (2012). How far do children travel from their homes? Exploring children's activity spaces in their neighborhood. *Health & Place, 18*(2), 263–273.
- Villanueva, K., Giles-Corti, B., Bulsara, M., Timperio, A., McCormack, G. R., Beesley, B., Trapp, G., et al. (2012). Where do children travel to and what local opportunities are available? The relationship between neighborhood destinations and children's independent mobility. *Environment and Behavior, 45*(6), 679–705.
- Weir, L. A., Etelson, D., & Brand, D. A. (2006). Parents' perceptions of neighborhood safety and children's physical activity. *Preventive Medicine, 43*(3), 212–217.
- Wiehe, S. E., Carroll, A. E., Liu, G. C., Haberkorn, K. L., Hoch, S. C., Wilson, J. S., & Fortenberry, J. D. (2008). Using GPS-enabled cell phones to track the travel patterns of adolescents. *International Journal of Health Geographics, 7*(1), 22.
- Witten, K., Kearns, R. A., Carroll, P., Asiasiga, L., & Tava'e, N. (2013). New Zealand parents' understandings of the intergenerational decline in children's independent outdoor play and active travel. *Children's Geographies, 11*(2), 215–229.
- Wridt, P. (2010). A qualitative GIS approach to mapping urban neighborhoods with children to promote physical activity and child-friendly community planning. *Environment and Planning B: Planning and Design, 37*(1), 129–147.
- Zenk, S. N., Schulz, A. J., Matthews, S. a, Odoms-Young, A., Wilbur, J., Wegrzyn, L., Gibbs, K., et al. (2011). Activity space environment and dietary and physical activity behaviors: a pilot study. *Health & Place, 17*(5), 1150–61.
- Zwerts, E., Allaert, G., Janssens, D., Wets, G., & Witlox, F. (2010). How children view their travel behaviour: a case study from Flanders (Belgium). *Journal of Transport Geography, 18*(6), 702–710.
- van Vliet, W. (1983). Children's Travel Behavior. *Ekistics, 50*(298).



## Chapter 6

### 6 Linking play and place: An affordance-based approach using qualitative GIS to examine patterns in children's neighbourhood activity preferences and use

#### 6.1 Abstract

Children's time and freedom for independent neighbourhood activity is severely declining. This change in childhood experience may be adversely impacting children's health and development. Data from GPS monitors, daily activity diaries, child surveys, hand-drawn neighbourhood maps as well as digital-mapping interviews from 23 children (aged 9 to 13 years) from London, Ontario were integrated to comprehensively examine patterns in their habitual neighbourhood activities. The contextual factors that support or limit children's regular and independent use of neighbourhood affordances are also investigated. Child participants on the whole spent little of their free time playing in neighbourhood environments, and most activities took place at or very close to home. Children's local independent activity appeared to be heavily influenced by both social and environmental factors in their near neighbourhoods, as well as their perception of local opportunities for activity and their license to travel independently. Children didn't explicitly experience their neighbourhoods as *non-child-friendly*, but all study communities could do more to support the preferred activities of youth. An affordance-based approach was found to be a useful framework for assessing children's perception and use of their neighbourhood environments.

#### 6.2 Introduction

More than 20 years ago, a study in the UK drew attention to the shrinking domains of childhood by highlighting the dramatic loss in a child's independent home range within

just three family generations; a young boy in Sheffield in 1919 had permission to walk alone almost 10 km to a favourite fishing spot, compared with his great-grandson, who is only allowed to travel independently the 300m to the end of his own street (Hillman et al., 1990). Though few studies since have quantitatively confirmed the systematic decline in independent home range, research has now documented severe losses in children's independent activity and mobility within their local environments. Studies from several developed countries confirm dramatic decreases in children's license for local independent travel, including severe declines in the number of children travelling to school without adult supervision. In addition to Hillman's (1990) longitudinal UK study, which documented a 40% decrease in unaccompanied travel to school among 10-11 year olds between 1971 and 1990, similar findings have been recorded in Australia and New Zealand (Salmon et al., 2007; Villanueva, Giles-Corti, Bulsara, McCormack, et al., 2012; Witten et al., 2013), northern Europe (Fyhri et al., 2011; Schoeppe et al., 2012; Zwerts et al., 2010), Canada and the US (Buliung et al., 2009; McDonald et al., 2011; McMillan, 2007), and elsewhere in the UK (Fyhri et al., 2011; Mackett, Brown, et al., 2005; Shaw et al., 2012). Together these studies document declines in active, independent travel among children in many developed countries from rates between 70 and 90% in the 1970s down to contemporary levels between 10% and 25% of children. Concomitantly, there is some evidence that the size of children's independent activity domains also appear to be shrinking; one recent study reported that one-third of the 8-12 year old participants did not venture more than 100m from their home on their own (Veitch et al., 2008).

Given the enormous health threats facing contemporary children, including rising rates of obesity, asthma and injury (Akinbami, 2006; Anandan, Nurmatov, van Schayck, & Sheikh, 2010; Fraga, Fraga, Stanley, Costantini, & Coimbra, 2010; Ogden, Carroll, Kit, & Flegal, 2012; Pan et al., 2006; Tremblay et al., 2010), one might ask why the loss of independent mobility, or reductions in free play in neighbourhood environments, should provoke much concern. The predominant discourse of protectionism would suggest we insulate children from these contemporary health threats by protecting them from risk at all costs, including limiting their unsupervised activity and travel (Gill, 2007; Karsten,

2002; MacDougall et al., 2009; O'Brien et al., 2000). Unfortunately, there is little awareness of the detrimental corollary of such protective actions (Mikkelsen & Christensen, 2009; Spilsbury, 2005; Woolley, 2006). Rather than a neutral or negligible impact, reduced independent travel and neighbourhood play may be having significant adverse effects on children's healthy development, and should garner as much attention as other threats to children's well-being.

Understanding children's perception and use of their primary environments, such as the neighbourhood, is key to untangling the influence of the social and built environment on children's health and development (Talen & Coffindaffer, 1999). Unfortunately, we still know very little about children's use of neighbourhood environments, and the factors which may be restricting or hampering local independent activities. More research has recently begun to examine children's independent travel, particularly the journey to school (Schoeppe et al., 2012; Shaw et al., 2012), but very little work to date has focused on children's independent journeys to other neighbourhood destinations, or the specific environmental settings of child and youth activities (Fyhri & Hjorthol, 2009; D. G. Rainham et al., 2012; Veitch et al., 2008; Villanueva, Giles-Corti, Bulsara, Timperio, et al., 2012; Wiehe, Carroll, et al., 2008). A recent systematic review highlights related gaps in children's environments research, stressing the need to focus on the geographical context of children's activities, as well as the factors underscoring the diversity of their activity and travel patterns (Shaw et al., 2012). Several scholars have also called for more work to investigate the environmental features and destinations that would appeal most to children, and encourage higher levels of neighbourhood use (Mikkelsen & Christensen, 2009; Shaw et al., 2012; Villanueva, Giles-Corti, Bulsara, Timperio, et al., 2012). The rhythms and settings of children's neighbourhood activities have changed dramatically in recent decades, posing new challenges for healthy child development. It is imperative we examine the nature of the contemporary child-neighbourhood relationship, and the contextual factors that support children's neighbourhood interactions.

This study attempts to fill some of these research gaps by engaging in a deep examination of patterns in children's habitual neighbourhood activity and the community

environments they perceive as appealing and supportive of their activities, as well as the contextual factors that support or limit regular and independent use of neighbourhood settings. Specifically, this study aims to (1) establish the prominent and preferred settings of children's neighbourhood activities, (2) identify and examine the factors or conditions (individual, social or environmental) that afford or confound children's independent activity and mobility, and (3) evaluate whether participating children experience their neighbourhoods as 'child-friendly', where they are provided with safe, welcoming and diverse settings that support a wide range of their preferred activities. With this analysis we hope to better understand the contemporary relationship between children and their neighbourhoods, and recognize ways to provide more supportive and stimulating community environments that can foster child health and well-being.

The analysis for this study is carried out in three complementary parts. The first part utilizes GPS, interviews and activity diary data to establish children's local independent destinations and the extent of their neighbourhood activity domains. The second part involves thematic analysis of group interview narratives to confirm patterns in neighbourhood perception and use, and environmental factors which may influence the size or use of these neighbourhood domains. The third and final section integrates data collected from a broad suite of tools within a qualitative GIS to engage in a deep examination of individual- and neighbourhood-level patterns in children's habitual activity settings, their level of independent mobility and their perception and use of neighbourhood opportunities for activity.

While GPS is being increasingly employed in research to directly monitor children's activity, this study is among the first to blend objective GPS tracking of children's activity with subjective data from a range of qualitative tools, including activity diaries, maps and child interviews, to comprehensively examine the form and context of children's neighbourhood activity as well as their overall neighbourhood experience. In addition to the contributions to the literature gained from this neighbourhood behavioural analysis, this work also tests and advances methodological approaches for environment-behaviour research with children, including an affordance-based approach to environmental assessment, and enhanced-mapping techniques that allow for the

simultaneous analysis of objective and qualitative data within a specific social and environmental context.

## **6.3 Background**

### **6.3.1 Neighbourhood exploration as developmental stimulator**

Once the home environment has been mastered by young children, it has traditionally been subsequent exposure to the new social and environmental settings of the neighbourhood that has helped foster continued social, physical, cognitive and emotional development during middle childhood and adolescence (Chawla, 1992; Hart, 1979; Jack, 2008; Matthews, 1992; Mikkelsen & Christensen, 2009; Moore, 1986a; Sutton & Kemp, 2002). Starting around 7 or 8 years of age, children begin to seek out interactions with social and environmental settings beyond the home; if allowed, children will begin to actively explore and inhabit spaces in their local environments, slowly carving out a domain for their independent neighbourhood activities (Chawla, 1992; Hillman et al., 1990; Matthews, 1992; Spilsbury, 2005; Tranter & Pawson, 2001). It is as much the process of continually expanding these neighbourhood domains as the interactions that take place within them that have proved beneficial for healthy child development (Mikkelsen and Christensen 2009; Churchman 2003; Moore 1986; Hart 1979).

Learning to negotiate the challenges served up by the diverse environments of the neighbourhood has been linked to a number of key developmental advancements in children (Churchman, 2003; Gleave & Cole-Hamilton, 2012; Gray, 2011; Hart, 1979; Mikkelsen & Christensen, 2009; Moore, 1986a; Veitch et al., 2010). In the neighbourhood, children encounter new social contacts and situations, learning to build relationships with adults and other children, as well as trying on new social roles themselves (Prezza & Pacilli, 2007; Spilsbury, 2005; Sutton & Kemp, 2002). Children's burgeoning social engagement within their neighbourhood has also been credited by some as a catalyst for the establishment of closer social ties within the community at large and the fostering of social capital (Karsten, 2005; Prezza & Pacilli, 2007; Shaw et al., 2012; Tranter & Pawson, 2001; Weller & Bruegel, 2009). Through neighbourhood

exploration, children also begin to understand their relationship with the larger physical world, testing new ways of using their bodies to understand and manipulate their environments, simultaneously improving motor skills and other physical capabilities (Bartlett et al., 1999; Burdette & Whitaker, 2005b; Churchman, 2003; Moore, 1986a). This may explain why increased degrees of neighbourhood mobility have been consistently associated with higher levels of physical activity among children, and reduced time spent in sedentary pursuits (Clements, 2004; Karsten, 2005; Mackett et al., 2007; Page et al., 2009; Wen, Kite, Merom, & Rissel, 2009). Navigating the varied challenges offered by the neighbourhood also stimulates the development of cognitive skills, including heightened spatial and orientation capabilities, and greater awareness and knowledge of place (Burke, 2005; Gill, 2007; Matthews, 1987; Rissotto & Tonucci, 2002). Independently facing these complex environments breeds a sense of autonomy and competence; children then have the confidence to continue pushing the boundaries of their independent domains (Bartlett et al., 1999; Bjorklid, 1982; Churchman, 2003; Fjortoft, 2004; Gill, 2007; Spencer & Woolley, 2000). Active and regular engagement with their neighbourhoods can also foster a special attachment to their local ‘place’, which in turn supports the development of a healthy self-identity (Cosco & Moore, 2002; Engwicht, 1992; Jack, 2008; Ross, 2007; Tranter & Pawson, 2001). Children’s ability, therefore, to spend time exploring and building relationships with the social and physical environment of their neighbourhood is fundamental to their healthy development and psychological well-being.

### **6.3.2 Declining levels of outdoor neighbourhood play**

Play is the primary vehicle through which children acquire their knowledge and mastery of the physical and social environments of the neighbourhood (Tranter & Pawson, 2001; Valentine & McKendrick, 1997). Outdoor play is a particularly strong catalyst for skill and knowledge development, especially when the activity is independent and unstructured (Burdette & Whitaker, 2005a; Churchman, 2003). The more complex nature of outdoor environments offers children more diverse and enriched opportunities for play (Burdette & Whitaker, 2005a; Fjortoft, 2004). Unsupervised outdoor activity also tends to be more exploratory, experimental and innovative in nature than indoor

play (Bartlett et al., 1999; Burdette & Whitaker, 2005a; Fjortoft, 2004; Mackett et al., 2007; Moore & Young, 1978; Sebba, 1991). This creative environmental engagement is highly beneficial for cognitive development. Outdoor play, particularly in natural environments, has also been linked to reductions in stress and anxiety among children, and improvements in mood, attention and other indicators of psychological well-being (Beunderman, 2010; Bird, 2007; Cosco & Moore, 2009; Faber Taylor & Kuo, 2011; Fjortoft, 2004; Gleave & Cole-Hamilton, 2012; Lester & Russell, 2008; Wells & Evans, 2003).

Children have consistently expressed a preference for playing outdoors in the neighbourhood with friends, even over popular indoor activities such as watching television or playing video games (Chawla, 2002a; Clements, 2004; Fjortoft, 2004; Gray, 2011; Singer, Singer, D'Agostino, & DeLong, 2009); when given the opportunity, they will naturally be drawn to interact with their outdoor environments in countless ways that are advantageous for their healthy development and well-being (Bartlett et al., 1999; Cosco & Moore, 2002). The freedom to playfully and independently roam through their community settings may in fact be necessary for children to thrive (Shaw et al., 2012).

The time children spend playing outdoors, however, is declining. Several studies have documented a steady reduction in children's free play across all age ranges since the 1950s, with the largest and most noticeable drops occurring within outdoor play (Gray, 2011; Hofferth & Sandberg, 2001). A recent US study by Clements (2004) supports these findings; over 800 mothers were asked to compare their own play experiences as children with that of their offspring. The majority of respondents (85%) agreed that their own children (aged 3 to 12 years) played outdoors less than they did as children, with 70% reporting having played outdoors daily, and for extended periods, as children (Clements, 2004). Only 31% of the mothers claimed that their own children now play outside on a daily basis (Clements, 2004). Gill's (2011) study of children's free time affirms this downward trend; more than one-third of child respondents played outside only once (or less) during a 2 week period, as opposed to their parents, most of whom (80%) reported spending time outside at least a few times a week as children.

A recent Australian study of children's activity patterns suggests a partial explanation for declining levels of outdoor play. Wen and colleagues found that almost 40% of children in a large cross-sectional study spent 30 minutes or less outside per day, while reporting 2 or more hours of daily screen time (Wen et al., 2009). A similar pattern is evident among children in Canada, where only 14% of children surveyed in a national study spent time playing outside after school but recorded 8 hours of screen time per day on average (Active Healthy Kids Canada, 2012). Canadian children are spending more than 60% of their after-school free time in sedentary, indoor activities (Active Healthy Kids Canada, 2012).

### **6.3.3 The interdependence of outdoor play and independent mobility**

Children's ability to freely engage in outdoor play and capitalize on its benefits may be related to their level of independent neighbourhood mobility. Children whose neighbourhood activity is less restricted have been shown to venture outside more often, engage in longer periods of outdoor play and exhibit higher levels of social interaction in the community (Mackett & Paskins, 2008; Page et al., 2010; Prezza et al., 2001; Prezza & Pacilli, 2007; Shaw et al., 2012). Children with fewer mobility restrictions also tend to have larger and more diverse neighbourhood domains for outdoor activity (Matthews, 1987; Rissotto & Tonucci, 2002; Villanueva, Giles-Corti, Bulsara, McCormack, et al., 2012). Wen and colleagues (2009) report that children who experienced some degree of freedom to walk around their neighbourhood on their own were almost three times as likely to spend 30 minutes outdoors after school than their peers with no freedom to do so. The same study found that independent mobility among 10 to 12 year olds was significantly associated with outdoor play after adjusting for other confounders (Wen et al., 2009). The seemingly inter-related nature of outdoor play and neighbourhood mobility suggest that these behaviours could be explored in concert, and that removing restrictions to one may have the effect of supporting greater license to engage in the other.



### 6.3.4 Changes in children's neighbourhood play experiences

Only a few studies to date have documented changes in children's experience of neighbourhood play and independence over time. Gaster (1991) investigated children's play experiences in a single New York neighbourhood over several generations, revealing substantially increased levels of parental supervision of children's activity over the previous 50 years, and into much later stages of childhood. The number and quality of the play settings in the neighbourhood that were accessible to children had also declined significantly (Gaster, 1991). Children's neighbourhood play and mobility had decreased so radically that Gaster questioned whether the concept of a child's 'home range' or 'domain' remained a valid or useful construct (1991).

Examining changes in Amsterdam neighbourhoods over several generations, Karsten (2005) noted the fundamental change in the definition and settings of play for contemporary children from that of their parents and grandparents. Play, once synonymous with 'outdoor play' has now, for many children, moved indoors from the public space of the street or neighbourhood into the private spaces of the home or institutionalized places such as child care or formal recreational facilities. Karsten (2005) suggests that substantial changes to children's daily schedules and geographies have given rise to at least two new categories of childhood play experience. In addition to the few '*outdoor*' children whose play activities remain predominantly in outdoor settings, there is now a large cohort of '*indoor*' children who play almost exclusively indoors, often under the supervision of adults. Many others are '*backseat*' children who spend a significant amount of their leisure time in vehicles being chauffeured from one activity location to the next, with little to no time spent outdoors (Karsten, 2005). Karsten's work not only confirms significant decreases in outdoor play in the study neighbourhoods but also in children's unstructured, independent recreational activity.

Burke (2005) similarly argues that the nature and landscape of play has changed so much as to be unrecognizable from that of previous generations. Developments in technology which have increased the availability of home-based entertainment such as television, computers, and video games (Burke, 2005; Clements, 2004; Copperman & Bhat, 2009;

Karsten, 2005; Kyttä, 2003; Mikkelsen & Christensen, 2009; Postman, 1985; Tandy, 1999), coupled with parents' heightened interest in providing 'safer', supervised activities (Clements, 2004; Gaster, 1991; Gray, 2011; Hillman et al., 1990; Irwin et al., 2007), have made indoor activities more appealing to both children and their parents. A number of studies reveal that contemporary parents no longer view the neighbourhood as a safe play space for children, or know or trust enough in their neighbours to look after their children while playing outside (Irwin et al., 2007; Shaw et al., 2012). Fears of stranger abduction or of danger from traffic or bullies, lead many parents to accompany their children on excursions outdoors in the community, or else keep them indoors all together (Clements, 2004; Gill, 2011; Irwin et al., 2007; Karsten, 2002; Mikkelsen & Christensen, 2009; O'Brien et al., 2000; C. G. Pooley et al., 2005; Shaw et al., 2012). Family schedules have also changed to accommodate parental activity or commuting patterns, as well as children's increased involvement in structured out-of-school activities (Copperman & Bhat, 2009; Gray, 2011; Karsten, 2002; Mackett, Lucas, et al., 2005). The net result is an increase in the time children spend indoors in private settings, or in vehicles being driven to a range of organized activities, often outside of their immediate neighbourhood (Christensen & O'Brien, 2003; Karsten, 2002, 2005; Mikkelsen & Christensen, 2009; C. G. Pooley et al., 2005; Wridt, 2010; Zenk et al., 2011). The public, outdoor settings of the neighbourhood have become inaccessible or infrequent domains for play (Gray, 2011; Karsten, 2005; Mikkelsen & Christensen, 2009; Prezza & Pacilli, 2007; Spilsbury, 2005). For many children, there are now few places beyond home which they can travel to on their own, or even in the company of friends (Veitch et al., 2008). Independent neighbourhood play and exploration have become endangered childhood experiences.

### **6.3.5 The adverse effects of restricted neighbourhood play and mobility**

These downward trends in both local independent mobility and outdoor free play are disturbing not just for the potential loss of associated developmental benefits but because reductions in these experiences may pose a threat to children's health (Kyttä, 2003; Mikkelsen & Christensen, 2009; Shaw et al., 2012; Spilsbury, 2005; Tranter & Pawson, 2001; Woolley, 2006). Restricted neighbourhood access has been associated with

reduced levels of physical activity and more time spent in sedentary pursuits, which may have negative consequences for children's physical fitness (Ekelund et al., 2004; Karsten, 2005; Page et al., 2005; Schoeppe et al., 2012). Reduced neighbourhood play and mobility can also hinder the development of personal skills. Lack of exposure to the broader social environment of the neighbourhood can obstruct the development of a sense of social identity and a child's interest in participating in public life (Christensen & O'Brien, 2003; Matthews, 2003; Mikkelsen & Christensen, 2009; Prezza & Pacilli, 2007). Restricted children also tend to interact less with adults besides their parents and have more difficulty developing social relationships beyond their family (Prezza & Pacilli, 2007; Spilsbury, 2005). The less children interact with the social and physical environments of the neighbourhood, the less knowledge of and comfort they will experience in non-home environments (Hart, 1979; Prezza & Pacilli, 2007; Rissotto & Tonucci, 2002; Spilsbury, 2005). Gray (2011) also contends that the reductions in free, outdoor play can be linked to rises in psychopathologies among children and adolescents including anxiety, depression, and feelings of isolation and of helplessness. In addition to these adverse effects on children's healthy development, there is evidence that the longer independence for local play and mobility is withheld from children, the greater the potential delays in some physical, social and cognitive developments (Hillman et al., 1990). Increasing children's neighbourhood activity and mobility should therefore be considered a priority issue for health research and advocacy initiatives.

### **6.3.6 An affordance-based approach to evaluating and supporting child-friendly neighbourhoods**

Creating more child-friendly neighbourhood environments may help to reverse declining levels of independent, outdoor play. Environmental behaviour scholars have long studied children's place use and preferences to pinpoint environmental indicators of child-friendliness. One of the most compelling works is Chawla's comprehensive study (2002) replicating Lynch's classic 1977 'Growing Up in Cities' research, gathering information on children's environmental needs and activities from a diverse, international cohort of children aged 10 to 15 years old (Chawla, 2002a; Lynch et al., 1977). Results revealed a consistent set of indicators for child-friendly environments that crossed socio-

cultural boundaries, but also remained remarkably similar over a quarter century (Chawla, 2002a; Kyttä, 2003). Chawla's work confirmed that children perceive an environment as child-friendly first and foremost when at least basic services were available to them, and their physical safety was not in jeopardy (2002). Above these basic needs, children identified conditions such as being awarded a high level of independence, and having a versatile environment exhibiting a strong community identity and a level of social uniformity (Chawla, 2002a). Access to safe natural areas, as well as the availability of social spaces for gathering with peers, were also identified as indicators of child-friendly environments (Chawla, 2002a).

Building on these results, Kyttä developed a valuable framework for evaluating the 'child-friendliness' of neighbourhoods based on two of the fundamental criteria from Chawla's study: children's level of independent mobility and the availability of versatile 'affordances' in the environment. Affordances are a useful theoretical concept for understanding children's environmental behaviour and preferences. Affordances, as originally theorized by J.J. Gibson, are the functional possibilities for action inherent in a physical environment that a person can engage to meet their needs or interests (Kyttä 2003; Heft 1997; Gibson 1979). Affordances are environmental resources that are relational by nature; an individual will perceive opportunities in line with their physical attributes and capabilities, but also their specific intentions (Heft, 1997; Heft & Kyttä, 2006; Kyttä, 2003). A raised horizontal surface, for example, may be perceived as providing an opportunity to sit if its dimensions and height above the ground align with the bodily qualities of the potential sitter. The perception and use of this affordance, however, will also be influenced by the individual's motivation to sit (Heft & Kyttä, 2006; Kyttä, 2003). The socio-cultural context is also critical to affordance use; despite perceiving the possibility of sitting, an individual will often take into account whether it would be appropriate to sit, perhaps avoiding sitting in a reserved seat or in a chair that is part of a museum display (Heft & Kyttä, 2006; Kyttä, 2003). Kyttä argues that each individual views the world through their own set of "affordance spectacles", perceiving the possibilities for action that match their particular interests and capabilities at a given time (2003, pg. 50). A single environment can therefore offer different affordances to

each individual or even alternative possibilities for the same individual at different times or under different circumstances.

Affordance theory is particularly valuable for examining children's environmental interactions as it can acknowledge children's unique functional perspective, as well as their diverse and changing preferences (Clark & Uzzell, 2002; Heft, 1988; Kyttä, 2003). Children view their worlds in fundamentally different ways than do adults, in part because they have differing capabilities and are driven by different motivators (Heft, 1988; Kyttä, 2003). They will also perceive and value different affordances at different points in their development, reflecting their developing skills and their changing interests (Kyttä, 2003). Understanding the environmental affordances that appeal to children at different stages of childhood, and which are perceived as being supportive of their interests, can help to identify features and conditions that can serve to make environments more child and youth friendly.

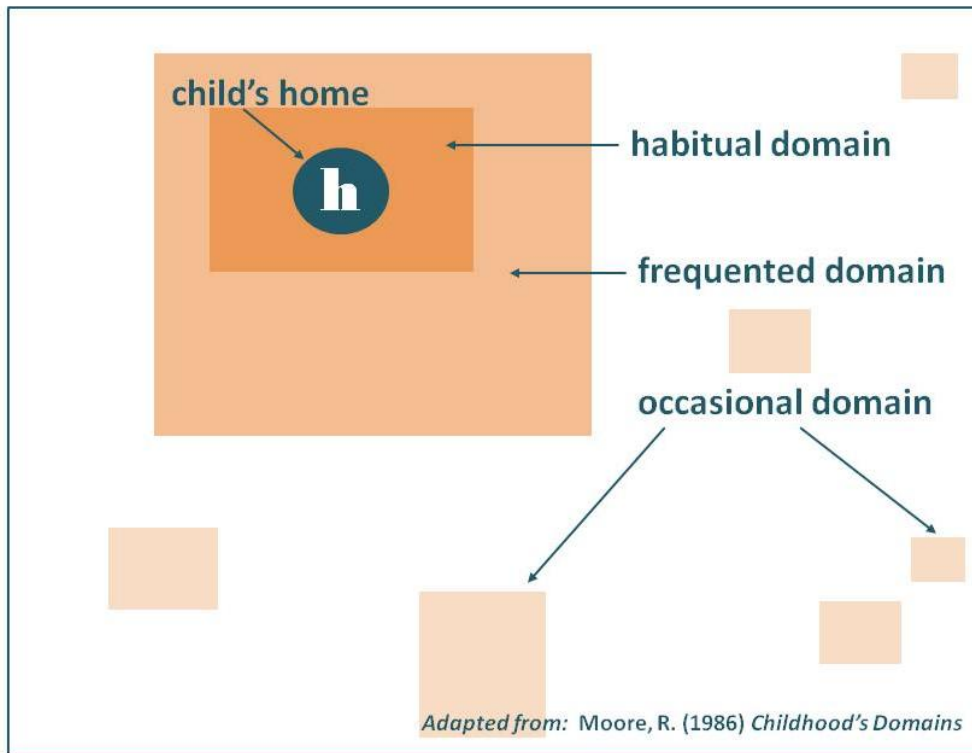
Kyttä points out, however, that the availability of affordances in the neighbourhood is not the sole criteria for child-friendliness. It is not enough to perceive affordances, a child must also be given the freedom and opportunity to utilize them through some measure of independent mobility (Kyttä, 2003, 2004). Accordingly, Kyttä developed a matrix of child-friendliness that describes the environment at the intersection of high and low levels of independent mobility with high and low levels of environmental affordances (see Kyttä 2004). The ideal child-friendly environment is described as one where children experience both a high degree of independence for exploring their neighbourhoods, and local environments which offer a diverse range of affordances within in a safe and welcoming community (Kyttä, 2004). The child-friendliness for neighbourhood and city environments can therefore be measured by evaluating the environmental affordances offered against the levels of independence enjoyed by local children. An affordance-based approach can also help to identify the contextual factors which can impede the use of affordances, such as parental restrictions on activities, bylaws restricting skateboarding in a public plaza, or the quality of a play environment. Identifying and changing these contextual factors may increase engagement with local affordances, and increase the child's experience of a friendly, supportive environment.

The current study utilizes an affordance-based approach to evaluate children's neighbourhood activities, and whether they experience their local environments as child-friendly. Until recently, children's neighbourhood-based activity and mobility has largely been self-reported. Advances in portable technologies, such as GPS, now allow us to directly identify movements to provide a more accurate picture of children's everyday destinations and the scope of their neighbourhood domains. This tracking data, however, while incredibly valuable to researcher for identifying locations, still cannot testify to children's activity or place preferences or the environmental factors which influence neighbourhood use. To provide a more comprehensive and personalized account of children's habitual activities, it is imperative that we also employ complementary qualitative methods which involve speaking directly to children about their neighbourhood experiences. This study supplements the use of directly-measured activity data with multiple qualitative tools, analyzed together within a GIS, to better understand children's everyday geographies, and how the neighbourhood environment supports or restricts their independent activities.

### **6.3.7 Identifying children's neighbourhood 'domains'**

Our understanding of children's neighbourhood interactions is considerably enhanced when we are able to identify and examine the environmental domains in which their activity routinely takes place. To characterize the children's local activity spaces, this study capitalizes on the conceptual framework of neighbourhood activity domains developed by Moore in his classic study of British children's use of and movement through their neighbourhood environments (Moore, 1986a). Moore's model of childhood domains recognizes that children do not spend their time equally within all areas of their home range; some areas close to home (*habitual range*) see almost daily use while destinations further away, though accessible, may only be visited occasionally (*frequented and occasional ranges*). These three nested domains can help to characterize the spatial and temporal differences in children's use of their local environments (See Fig. 6.1).

The size of a child's *habitual range* is influenced by a number of factors, including, for example, a child's age (Moore, 1986). A child's *frequented range*, broader than their habitual range, includes those neighbourhood spaces that the child accesses periodically when granted both the time and freedom to do so by parents; these spaces are not necessarily accessed on a daily basis. Moore suggests that this *frequented range* is



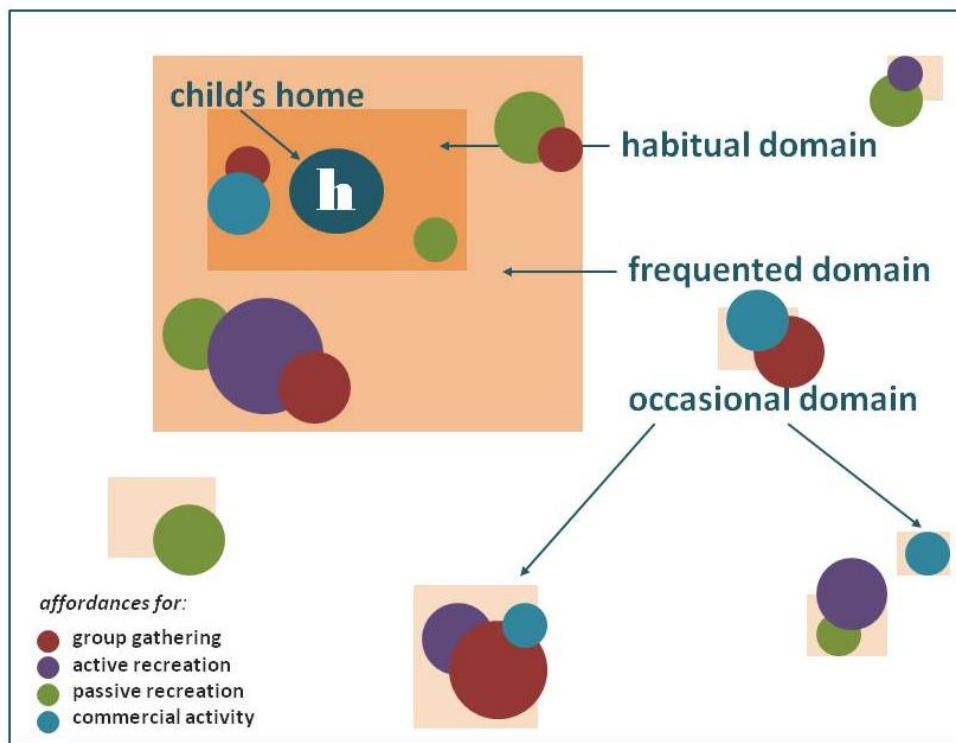
**Figure 6.1: Moore's model of nested childhood domains**

usually bounded by both parental restrictions and physical constraints such as busy roads (1986). The third domain, a child's *occasional range*, represents the absolute edges of a child's independent territory at any given time and includes those places that a child accesses only very occasionally or as part of a special outing. It also includes those places that a child may access via public transportation, and therefore no longer represents a strictly pedestrian territory. As a child matures, and is awarded higher degrees of independence, the size and nature of each of these domains usually expands to encompass more and more territory (Matthews, 1992; Moore, 1986a). However, the size of these domains is likely to be highly variable across children, depending on factors such

as age, gender, and a parent's confidence in their child's ability to successfully negotiate territories beyond their homes (Matthews, 1992; Moore, 1986a; Spilsbury, 2005; Villanueva, Giles-Corti, Bulsara, McCormack, et al., 2012).

As conceptualized by Moore, the majority of children's daily activities would therefore take place within the nested domains of the 'habitual' and 'frequented ranges', and the combination represents the activity space commonly used by children independently, and on foot or bicycle, in the course of their daily and weekly activity routines. Utilizing the more universal term 'activity space' in place of 'domains' or 'ranges', this study employs the concepts of 'habitual' and 'frequented activity spaces' to help visualize and characterize participant's neighbourhood-based activity.

In this study, the concept of affordances will be integrated with this conceptual model of nested domains to investigate the opportunities for activity or interaction that children perceive in their local environments and access to form their habitual and frequented domains (See Fig 6.2).



**Figure 6.2: An integrated affordance-domain model for environmental assessment**



## 6.4 Methods

### 6.4.1 Study participants and settings

This study utilizes data gathered during the first year of a multi-year study entitled the STEAM (Spatio-Temporal Environment and Activity Monitoring) Project. Year One of the study focused on two school neighbourhoods in London, Ontario, Canada, categorized respectively as ‘urban’ and ‘suburban’, which exhibit very similar socio-economic profiles but very different built environments. Both neighbourhoods tend toward the vulnerable end of the socio-economic scale; household incomes in both areas are generally lower than the city average, and exhibit higher levels of unemployment and proportions of lone parent families. Both communities also have relatively stable populations, but the urban community has a higher population density. The two neighbourhoods also have higher than average populations of children and youth aged 5 to 14 years old. Key informants in each community, including school principals and community support workers, suggest that both school neighbourhoods have a wide range of household types, including families living in social housing and many single parent families, as well as a diverse mix of ethnicities. Informants also claim that both neighbourhoods have areas that are considered “*rough*” or “*dangerous*”, and grapple with issues such as community violence, gangs or drugs.

The ‘urban’ school neighbourhood, located close to the city centre, has environmental features characteristic of many urban settings, including primarily a gridiron street pattern, a diverse mix of land uses, and a higher density of intersections. This neighbourhood also encompasses several commercial corridors and clusters, and is fairly well served by parks and other recreational facilities. The ‘suburban’ school neighbourhood, has the meandering street pattern with cul-de-sacs and low traffic volumes common to many suburban settings, and is dominated by medium-density residential areas with several large parks and a few scattered commercial properties or clusters. These school neighbourhoods were chosen to highlight the impact of the neighbourhood’s built environment on children’s local activities by holding as many other variables, such as socio-economic factors, fairly constant.

### 6.4.2 Study protocol and tools

The first phase of the STEAM project invited children to participate in a 7 day multi-tool protocol to document their neighbourhood perceptions, activities, mobility, and experiences. All children who received permission to participate from a parent or guardian, and who completed their own Child Assent Form, were allowed to participate in the study. Participating children wore portable GPS monitors (*Visiontac VGPS 900* by Visiontac Instrument Inc., Baltimore, MD) on lanyards around their necks during all waking hours for 6 to 7 days during the spring-summer season (May to June); GPS units marked spatial coordinates for each second of time the unit was in use. Participants also completed detailed daily activity and travel diaries, and filled in aerial photo maps of their neighbourhood indicating common destinations within the neighbourhood and those to which they could travel independently (without an adult). Participating children and their parents also completed detailed surveys on children's neighbourhood activities, impressions and mobility.

Children in the first year of the study also participated in small, interactive group discussions with a team researcher within a few weeks of completing the week-long STEAM protocol. A researcher engaged with the child participants, in groups of two or three children, in dynamic 60 minute discussions regarding their neighbourhood perceptions and behaviours. Prior to the interview, each participant's GPS tracks were loaded into *Google Earth* (2010 and 2011, from Google Inc, Mountain View, CA), allowing the children and researcher to conduct a virtual walk-through together of their weekly activities and settings, using the children's own GPS tracks and activity diaries as discussion prompts. Using visual methods or materials with children are considered both appropriate and effective approaches as they are less dependent on language skills than traditional tools, and they align well with children's capabilities and interests (Burke, 2005; Darbyshire et al., 2005; Driskell, 2002; Morrow, 2001). Children's interview comments related to specific neighbourhood resources or destinations were 'pinned' to specific spatial locations within Google Earth, later to be imported into a geographic information system (GIS). Group discussions yielded rich narratives to complement and clarify data from GPS tracks, diaries and maps; the use of Google Earth within the

interview framework also allowed this qualitative data to be immediately tied to specific neighbourhood locations.

One-third of all STEAM Year 1 participants who completed the protocol (n=27; 33%) participated in the group discussions. Only those interview participants, however, whose GPS data met minimum requirements were included in this analysis; it was decided that a child must have recorded at least three hours of out-of-school data on a minimum of two weekdays, as well as at least four hours of GPS data on at least one weekend day, to be included in the analysis<sup>5</sup>. The final participant sample (n=23) consisted of 12 urban school students and 11 suburban school students. Child participants ranged in age from 10 to 13 years; the median age was 11.0 years old. The majority (82%) of the participants were female.

Approvals for the STEAM study were obtained from University of Western Ontario's Non-medical Research Ethics Board as well as from the Research Offices of the London District Catholic School Board and the Thames Valley District School Board.

### **6.4.3 Data analysis methodology**

This study set out to identify and examine the nature and settings of children's independent neighbourhood activity, and to gain a more thorough understanding of the social and environmental factors that promote or restrict local behaviour and mobility. To accomplish this aim, data analysis was carried out in a series of complementary steps.

The first step in the analysis involved establishing the independent neighbourhood destinations and domains of the participants. GPS data recorded while the child was in school were removed; the resulting GPS dataset illustrated the full spatial range of all out-of-school activity, including destinations reached by vehicle. The pedestrian-based

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<sup>5</sup> *Personal GPS tracking is a relatively new field, and there is currently no standard practise with respect to acceptable length of wear time. Minimum data requirements for this study were guided by current standards for accelerometry wear time, typically 10 hours per day for a minimum of 3 days (Cliff et al., 2009; Colley et al., 2010; Penpraze et al., 2006). As we were interested in children's out-of-school free time, and children in our study were in school for approximately 7 hours each weekday, we selected 3 hours as a reasonable minimum for daily out-of-school time.*

domains around each child's home (i.e., those locations reached from home by walking or biking only) were established during a previous study (see Loebach & Gilliland, 2013). Multiple sources were then used to spatially pinpoint and categorize each child's independent activities by their locations. First, all independent destinations noted on the children's neighbourhood maps or located within Google Earth during group interviews were categorized by setting (e.g., residential, commercial) and destination type (e.g., variety store, friend's house), and geo-coded within a GIS (*ArcGIS* 10.0, from Environmental Systems Research Institute (ESRI), Redlands, CA). To ensure each child's full independent domain was captured, the *ArcGIS* Tracking Analyst tool was utilized to trace individually through each day of each participant's GPS data, checking for congruency with activities and locations noted in the child's daily activity diary, verifying the relative amount of time spent in noted activities and settings, and adding in any additional independent destinations not previously documented; these new points were also coded and added to the GIS dataset. This combined dataset illustrated each child's typical neighbourhood use, highlighted prominent destinations and activity settings, and allowed general patterns of use across and within neighbourhood environments to be examined.

The second part of the analysis involved an intensive thematic analysis of the children's interview narratives. A thorough immersion in and thematic coding of the interview narratives was used to examine the children's neighbourhood perceptions and clarify habitual patterns of neighbourhood use. Narratives were also used to assess the degree to which the children experience their local as child-friendly, and supportive of their preferred activities. Previous work exploring children's neighbourhood perceptions (Loebach & Gilliland, 2010) made for an initial thematic framework with which to consider the narratives; these themes were supplemented by characteristics of child-friendly environments gleaned from the literature (Chawla, 2002a; Jack, 2008; Kytta, 2003; Tranter & Pawson, 2001). Thematic categories were adjusted and supplemented as themes arose or diverged (See Table 6.1 for the full list of explorative categories and themes). Each child's narrative was explored first with the preliminary thematic framework, and again once themes and descriptive categories had been fully developed.

## thematic analysis framework

### **a neighbourhood perceptions regarding:**

- access to resources
- ease of mobility
- environmental supportiveness
- safety
- neighbourhood identity & culture

### **b neighbourhood activities & destinations:**

- preferences
- social conditions
- shifting interests
- seasonal differences

### **c activity facilitators or restrictors:**

- by parents
- by peers
- by other community members
- by social environment or circumstances
- by built environment

**Table 6.1: Framework for thematic analysis**

The final step of the analysis entailed a comprehensive re-examination of data assembled from all sources to classify each child's neighbourhood perceptions and habitual activities according to a series of categories, such as level of independent mobility and use of neighbourhood affordances (See Table 6.2 for full list of categories). Perceptual and activity classifications were combined in a GIS with the spatially-located qualitative data from interview narratives to consider the influence of the local environmental context on perceptions and behaviour. Patterns in children's environmental perception and use, both within and between neighbourhood types as well as within each major category, were then examined. To this end, the neighbourhood built environment around

each child's home was also characterized, noting factors such as the type and number of nearby commercial, recreational and other activity resources, features that promote walking or cycling, as well as morphological elements such as major roads, rivers or railroads that can constrain activity or hinder mobility. The derivation of these categories is outlined later in more detail.

## classification of neighbourhood perceptions and activity:

category	level or typology
size of independent neighbourhood domain	large, med, or small
no. of independent destinations	low, med, or high
activity schedule	very, semi or unstructured
reduced free time ( <i>on 2 or more weekdays</i> )	yes or no
volume of time spent in-vehicle	low, med, or high
daily screen time level	low, med, or high
childhood type (Karsten typology)	outdoor, indoor, or backseat
perception of neighbourhood activity affordances	low, med, or high
use of neighbourhood activity affordances	low, med, or high
independent mobility level	low, med, or high

**Table 6.2: Classification categories**

The combination of these three complementary analyses allowed for an examination of children's perceptions and behaviours both individually and collectively, and served to highlight factors influencing children's independent use of their neighbourhood environments.

## 6.5 Results

### 6.5.1 Part I: Children's independent neighbourhood domains and destinations

To help understand the level of neighbourhood mobility and activity each child experiences, the relative size of each child's neighbourhood domain was established, as

well as the number and diversity of local destinations, such as a variety store or a friend's house, to which they can travel independently. Children's pedestrian-based neighbourhood domains, or 'neighbourhood activity spaces', were established in a previous study (see Loebach & Gilliland, 2013) using their dataset of GPS points, isolating all neighbourhood activity at locations children reached on foot or bicycle. This GPS-derived neighbourhood activity space was compared against the children's hand-drawn maps of their independent neighbourhood destinations. The Tracking Analyst tool within ArcGIS was also used to trace each child's daily GPS routes to identify any additional pedestrian-based destinations. Triangulating this data with interview narratives allowed for the classification of their neighbourhood domain as *small*, *medium* or *large*. Compact activity spaces extending only a short distance from home were classified as small. Children with a small habitual activity space but who noted other destinations further into the neighbourhood which they independently travelled to on occasion were assigned a medium domain designation. Children with a large GPS activity space and a number of independent destinations located a fair distance from home were classified as having large neighbourhood domains.

Analysis of children's GPS data, hand-drawn maps, and interview narratives together revealed a diverse range of local settings to which the children have independent access (See Table 6.3). The most frequently noted destinations were nearby friend's homes and local parks or playgrounds, each comprising about one fifth of all independent destinations. Local streets and settings around the home, along with commercial outlets such as variety stores and retail outlets, were among the next most common destinations. The remaining locations included an array of formal and informal recreational settings such as ponds, multi-use paths and community centres, as well as retail and food outlets, homes of relatives, and a few institutional settings.

A surprisingly large number of participants visited or noted destinations quite far from their homes, and defined fairly large independent domains. There were, however, several children whose independent domains were very small and compact, usually encompassing only their yard and the street immediately in front of their home. There appeared to be no systemic pattern in domain size by age, but children at the older end of

the spectrum tended to note more independent destinations and spend more time in settings further from home.

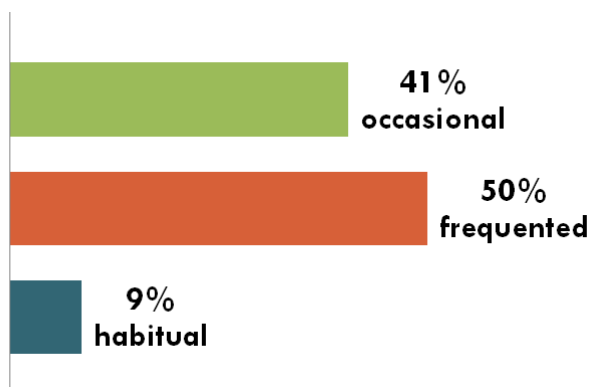
Child narratives clarified not only the type and location of independent destinations but also the frequency with which these settings were utilized, helping to establish the extents of the children's habitual versus frequented and occasional domains. Narratives revealed that few of the recorded independent destinations (only 9%) comprised part of the children's habitual activity space (Table 6.3 and Fig 6.3). Only parks, local streets,

<b>independent destinations</b>	<b>total (%)</b>
friend's houses	21.2
parks/playgrounds *	19.7
streets / cul de sacs *	10.1
variety stores *	8.2
home locations ( <i>back or front yard; common space</i> ) *	6.7
malls or other retail ( <i>department or drug store</i> )	6.3
wooded/natural areas ( <i>incl ponds, rivers, forests, ravines</i> )	5.3
multi-use trail/path *	4.8
dollar/thrift stores	3.8
coffee shop/cafe	3.4
fast food restaurants	3.4
relative's houses	2.4
grocery stores	1.4
video stores	1.0
libraries	0.5
churches	0.5
community centre	0.5
outdoor swimming pool	0.5
lesson/class locations	0.5

\* *destinations included in habitual domains*

**Table 6.3: Children's independent neighbourhood destinations**





**Figure 6.3: Proportion of independent destinations in neighbourhood domains**

variety stores, outdoor home locations and multi-use trails were used by some children on an almost daily basis, and habitual use of these neighbourhood settings was only found among a small proportion of participants. The majority of the independent destinations were more likely to comprise part of the child's frequented (50%) or occasional (41%) domains. Many children documented their ability to travel independently to a wide range of local destinations; most did not regularly utilize these neighbourhood settings.

### **6.5.2 Part II: Thematic analysis of children's neighbourhood perceptions and activities**

Analysis of children's GPS datasets, in concert with data from child-drawn maps and interview narratives, established the relative size of children's neighbourhood domains, and the type and frequency of their independent visits to local destinations. Results suggest that children, in general, are using only a small portion of their neighbourhood resources on a regular basis. The second part of the analysis involves thematic coding and evaluation of children's narratives to better understand the nature of children's neighbourhood activities and preferences, and the factors that may be limiting local play and mobility. Analysis of interviews also highlighted whether these children experience their neighbourhoods as child-friendly.

#### ***The social foundation of children's neighbourhood activities***

Detailed examination of activity diaries and interview narratives exposed a number of patterns in children's neighbourhood-based activities. The most striking characteristic is

the highly social nature of both their activities and travel. Almost without exception, independent neighbourhood activity primarily took place in the company of siblings or one or more friends. Travel around the neighbourhood was also often accompanied by a sibling, or a friend who lived nearby. Solo journeys were often designed to meet up with friends at some local setting. The presence of other children seemed to be a key factor in making parents more comfortable with independent neighbourhood activity and in some cases helping to expand the child's domain. When describing their domain boundaries, many children noted access to fairly large territories "*as long as I'm with a friend*", or noted that they were allowed to go further with a sibling or friend than they would be allowed on their own.

Interviewing children in small groups also highlighted the extremely intertwined nature of many of their neighbourhood activities. Even when addressing the activities of just one child, the recounting of stories and activities was often carried out by several or all members of the group, and revealed not only the social nature of their activities, but that many activities involved a shared use of local settings, as well as collective memories and knowledge of local places. Occasionally discussion highlighted differing experiences of local places, but more often illustrated that perceptions were alike due to not just similar but common experiences in neighbourhood settings.

### ***Preferred settings and shifting interests***

Recreational sites were highlighted as valued and frequent destinations, even though the children did not necessarily spend a large proportion of their time in these settings. Parks and playgrounds very often served as the common meeting place for friends living in the near neighbourhood, and feature as prominent locations for "hanging out", talking and general socializing. Play equipment in parks such as climbers, slides and swings are often assumed to be the primary attraction for children of all ages, but analysis of narratives underlined the shift in children's interests as they mature, and subsequently in the environmental opportunities they perceive and utilize. Visiting parks to use play equipment was now often related to the interests of younger siblings; a number of children reported having to escort younger family members to play parks, rather than a

personal interest in these facilities. When Erica<sup>6</sup> was asked why she visits a nearby park so often, she admits it is “ ‘cause my [younger] sister drags me to the park”.

The children in this cohort, most of whom were at the older end of middle childhood, noted that they were “*kinda done with play structures*”; instead, play equipment now often serves as the platform for talking and “*just hanging out*”, or for the occasional group game. Inhabiting swings and climbers for passive socializing rather than active play may in part be a function of an unsupportive environment; several children bemoaned the fact that most playgrounds and parks afforded few other places, besides on the ground, where they could gather in a group to sit and talk. Amenities for such socializing in shaded areas were even scarcer.

Play equipment did hold some appeal for the older children, but their enthusiasm was generally reserved for more complex and challenging equipment such as zip lines, or “*really, really, really tall slides*”; that is, equipment that better matched their more advanced capabilities and afforded enough challenge to still inject a little exciting trepidation. Several children noted a preference for playgrounds outside their neighbourhood that included such equipment, and to which they would ask to be driven. Local parks that primarily feature less advanced play equipment offer fewer affordances for older children whose activity interests have shifted. As this discussion with three ten-year old male participants illustrates:

*Richard: ‘Cause the park’s not really fun for us ... ‘cause we’re not going to, like, go down the slide or anything [laughs].*

*Researcher: So you think the stuff at the park is more for, like, younger children?*

*Richard: Yeah, we did that when we were little ...*

*Researcher: Is there anything in the park... anything they could put in the park that would make you want to go to the park?*

*Brad: Yeah, like zip lines!*

*Researcher: So if there was something that was more challenging... something you could climb...?*

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<sup>6</sup> The names of all people and locations in this study have been changed to protect the privacy of the participants. For the same reason, neither children’s annotated neighbourhood maps nor maps exhibiting participants’ GPS data are shown.

*Brad: Yeah, cooler!*

*Colin: Yeah, something cooler that you could grab on to and slide down... so fun!*

Although not always accommodating all of the interests of older children, parks and playgrounds still served as important neighbourhood nodes of activity. In addition to formal parks, a number of children also reported utilizing the common green spaces contained within their housing or apartment complexes. Despite having little to no backyard space of their own, many participants lived in complexes that provided fairly large common green spaces. Particularly with the high number of children typically living in the complex, these common areas were habitual nodes for outdoor play and socialization.

The children's narratives revealed that other simple yet flexible environmental affordances could also draw their interest and serve as neighbourhood activity nodes. In one part of the suburban neighbourhood all nearby participants, without exception, highlighted the man-made retention pond in a corner of the subdivision as a popular neighbourhood destination. The frequency with which children visited this area varied, particularly with proximity to it, but it was highly valued as a local destination by all participants. Two older girls outline their use and interest in the pond:

*Kelly: I like to go there a lot because, um, ... they have, like, in the water these sewers [drainage pipes] with the rocks all around and you can sit up top there ... and it's so relaxing to sit with your friends... and we like to climb it.*

*Researcher: Ah, okay. So who do you go with when you go? Is it friends or family? ... or both?*

*Kelly: If I'm babysitting my cousin then I do [go with family], but if I don't... then I go with friends.*

*Researcher: So your parents let you go alone with them?*

*Kelly: Yes. As long as I have my cell phone.*

*Researcher: Ah, okay. What about you Beth? Do you ever go up there too? To the pond?*

*Beth: Yes, sometimes.*

*Researcher: And what do you do up there?*

*Beth: Same thing Kelly does... hang out on the rocks with my friends.*

A couple of the neighbourhood boys explain the appeal of the pond for them:

*Researcher: Why do you like heading there [to the pond]?*

*Brady: Because you can, like, skip rocks and that though...*

*Matthew: Yeah...*

*Brady: ... and then just hang out there... and then there's a, like, path up here [points out path on screen] ... a little path where you can go down on a pile of rocks...*

*Matthew: Yeah...*

*Brady: Well, sometimes you may see other things... like, you may see a fish... or may see, like, a frog or something... wildlife.*

A simple pile of boulders around a drainage pipe jutting out into a small pond afforded the opportunity to climb up, to sit and talk, as well as a place to watch the water and local wildlife, making this an appealing activity and retreat destination for children living nearby.

Similarly, hills also figured largely in many of the children's narratives as magnet sites for activities. For example, a hill in one schoolyard served as a favourite gathering spot for one group of friends.

*Researcher: [So] when you hang out [at the schoolyard] you just hang out on the hill?*

*Richard: Yeah, I don't really go down [the hill] as much... 'cause, like, if it's a nice day [laughs] I just go lay down and look at the clouds.*

*Brad: It's also a good place to roll down! [...] ...to jump and pretend you can fly!*

In this case, the environmental features of the hill afforded opportunities for both restorative and playful activities. Children also specifically noted the hills in nearby parks, in green spaces within their housing complexes, and even one dirt hill left after some recent construction, as important activity sites. The diverse affordances offered by these dynamic and flexible spaces drew children year round, for a range of activities, from quiet socializing to more active pursuits such as running, rolling, biking or tobogganing down.

By contrast, other more naturalized, wild places nearby such as wooded areas and ravines were rarely, if ever, used during neighbourhood play and exploration. Several children

were not even aware of their nearby presence. Children who were attuned to these features noted that their interest in these natural spaces was waning:

*Sierra: Um, I used to go a down [to the ravine] a fair bit ... but I don't go that much anymore.*

*Researcher: Why is that? Has anything changed?*

*Sierra: Um, no it's just it's not really fun anymore.*

Shifting interests, and for some an aversion to the bugs and wilder nature of these settings, meant some natural places rarely drew older children.

### ***Commercial destinations and the call of the mall***

Children's shifting interests were most apparent among the oldest of the participants. A number indicated that they spend a lot of their free time now "hanging out" at the mall with friends, often being dropped off by parents early in the day and staying until they are picked up again hours later.

*Emily: Um, Maidstone [Mall]...I go there almost every weekend just to hang out with people.*

*Researcher: Do you usually go there together or you meet there?*

*Emily & Victoria [unison]: We go there together.*

*Researcher: What do you do there?*

*Victoria: Usually we first go to the movies 'cause it's right in the mall ... and after, sometimes... well, occasionally, we've bought stuff. We'll just walk around and look at things.*

Another older girl recounts similar interests:

*Alison: I go to the mall every weekend.*

*Researcher: And that's with your friends?*

*Alison: Yeah ... I went with my mom... like, my mom drops us off and then, like, in 3 hours she picks me up.*

*Researcher: So, do you just hang around or are you shopping the whole time?*

*Alison: We walk around and look at stuff.*

Rather than spending time in their local environments as many did when they were younger, these older children preferred the opportunities available at local shopping

centres. In addition to supporting their social, entertainment and consumer interests, malls are providing an indoor destination where they can hang out with friends, regardless of weather conditions, without being under the direct supervision of parents.

Commercial destinations in general were common destinations. Variety/convenience stores in particular were highlighted as a popular and frequent destination of the vast majority of participants, in some cases forming part of the child's habitual activity space. Primarily valued for their provision of "treats!" such as pop (soda), chips and candy, variety stores also figured as destinations where their parents would send them on errands, to buy household provisions such as milk or bread.

*Researcher: And you go there [to the variety store] sometimes?*

*Ivy: Yeah, I went there yesterday!*

*Researcher: What do you get at the corner store?*

*Ivy: Lots of candy... and they don't carry 5 cent candies anymore!*

*Researcher: So you just go there after school?*

*Ivy: Yeah... and to get errands, like, ketchup and stuff.*

*Leslie: Yeah.*

*Researcher: Errands? So your mom would send you...? ... And you can go on your own?*

*Ivy: Yeah... it's really close.*

*Leslie: Yeah, to get the milk.*

Permission to visit nearby commercial nodes such as variety stores can provide important opportunities for independent mobility among children; the generally short trip allows them to test their skills at negotiating local environments and provides opportunities for socialization with other neighbourhood adults and children. The appeal of the variety store as a provider of treats likely figures heavily in the child's interest in this type of destination and in negotiation with parents regarding permission to visit.

Dollar and thrift stores, as well as grocery and drug stores, also figured prominently in the set of appealing independent destinations. Similar to variety stores, these outlets offer a range of inexpensive food, toys, school and craft materials that are affordable even on a child's allowance; when located within reasonable proximity to children's homes, these

stores were included in many children's frequented, if not habitual, independent domains. Commercial outlets can serve as important neighbourhood nodes, providing appealing activities and products that entice children to make the journey to local destinations.

*The experience of child-friendly neighbourhoods?*

Scholars outline differing criteria for child-friendly environments but most indicators are related to the provision of safe, welcoming community environments that provide a diverse, attractive and stimulating range of opportunities for activity and interaction; children should feel that they are valued members of the community and have the freedom to legitimately and safely play in and travel through the neighbourhood environment (Chawla, 2002a; Churchman, 2003; Kyttä, 2003). In the strictest sense of these terms, the majority of the children in this study could be seen to experience their neighbourhoods as relatively child-friendly. Participants generally perceived their neighbourhoods as safe places that offered a respectable range of recreational opportunities, and felt the community was fairly easy to move around. Many children had peers close by with whom to play and socialize, and most had at least one nearby place where they could safely meet. Many of the participants experienced medium to high levels of independence, which allowed them to utilize the fairly large and diverse set of neighbourhood amenities at their disposal.

The narratives, however, suggested that most of the children are only engaging with their local settings in relatively limited or passive ways. Discussions around neighbourhood activities revealed few instances of creative use or shaping of the environment for activity, and little overall enthusiasm for the amenities provided. Children generally utilized the opportunities available close to home, but expressed little eagerness about the settings, or their activities within. Many of the children's neighbourhood activities were also passive and relatively sedentary; they primarily walked around with or sat and talked with friends. Occasionally they may play "*cheerleading*" or a group tag game called "*Manhunt*", but these activities seemed to be played in spite of, not inspired by, the built environment. The only environments which generated any enthusiasm or evidence of imaginative play were unstructured natural areas such as a ravine or wooded area; these



stories, however, were few and far between and even those children who utilized them admitted they did so infrequently and primarily when they were younger. Overall, narratives revealed little evidence of children's creative and enthusiastic engagement with their local environments.

Lack of stimulating interactions may be impeding the children's development of a relationship with their local environment. Very few of the children displayed any strong sense of attachment to their neighbourhood, or a sense of belonging to their local place. They used little to no proprietary language when discussing local settings, and though they raised few complaints, there was also little expressed passion for their places. When pressed to consider neighbourhood improvements they would like to see, or amenities they would wish to see installed, very few could think of specific suggestions for changes or additional resources. The children did not explicitly feel unwelcomed or unsupported in their neighbourhood, but it seemed they have become accustomed to only see, and expect, a narrow range of opportunities for neighbourhood activity. They may have become socialized to interact with their environments in only limited, acceptable ways; their 'affordance spectacles' seemed to be foggy. They could not envision that there may be other ways to use their neighbourhoods, or that these environments could be made to be more appealing and supportive of their preferred activities. Generally, most of the children did not seem to interact with the social or built environment of their neighbourhoods in ways that would help foster a strong relationship with their local place.

### *Unfriendly people and places*

The children were certainly aware of potential dangers or threats in their local environments. When asked about places in their neighbourhood where they felt uncomfortable or threatened, many identified a location or condition that caused them concern. These mentions were primarily related to social rather than built environment conditions. Many children expressed fears related to a specific person or group in the neighbourhood, often near neighbours, whom they considered to be "scary", or "weird"; often this was an aggressive person or group who would yell at them or drive them away

from local spaces. Brad's experience with one such neighbour limits his use of his local settings:

*Researcher: [What] would you say is your least favourite thing about your neighbourhood? Like, ... if there was one thing you could change, what would it be?*

*Brad: Um... people. ... some people are mean in my neighbourhood.*

*Researcher: Yeah? How are they mean?*

*Brad: Um... like, I'm trying to go in, like, this parking lot... and some people say, like, 'get out, this is our place'. [...] They live in this one house... and they're sometimes saying 'get out' when I go off this way [indicating a common green space near his house].*

*Researcher: So you don't... you don't feel comfortable hanging around back there because...*

*Brad: [interrupts] Yeah, I just don't go there.*

Ivy recounts similar experiences with scary or aggressive neighbours:

*Researcher: Ivy, what about you? Is there anything about your neighbourhood that you don't like or that makes you uncomfortable?*

*Ivy: Well, there's this guy named Tony... and he's really psycho... and he likes to swear and tell everyone that she's a [spells out expletive].*

*Researcher: So it's people for you too Ivy?*

*Ivy: It's just that one guy. And then other that I don't have any problems.*

Some children mentioned concerns about neighbourhood adults, but the bulk of their discomfort was related instead to the presence of older teens or young adults in public areas around their neighbourhood, particularly parks and playgrounds. Some children recounted being yelled at by these teens or told to leave the area, but confrontations or the experience of threats were actually rare; in most cases, the mere presence of, or even rumoured presence, of a group of older youth was in itself intimidating enough to lead them to leave the area or avoid it all together. A conversation with two female participants demonstrates this experience:

*Researcher : So... for the kids around your neighbourhood, are there places that you can play near to your houses?*

*Sheila: We go to Highland [public school playground]*

*Darlene: Oh, yeah, Highland. We play in the playground.... I usually have to go with friends because there's some issues there... with some... people there. [...] Sometimes we can't go there because there's these people that hang out by the portables ...*

*Sheila: Yeah, they're bad guys.*

*Darlene: Bad guys! [giggles]*

*Researcher: So they're just there sometimes? Is it at night?*

*Sheila: Yeah, just sometimes. At night usually. 'Cause one time I went with my friends... and there was this one guy on a motor bike and he was, like, running up to us really close...*

*Researcher: Was he joking around?*

*Sheila: I don't know... but he looked kinda mean.*

*Darlene: I get scared of people...*

*Sheila: ... so then we left.*

The presence of groups of older youth appeared for many children to particularly be an issue in the evenings, and may have contributed to the general perception of the neighbourhoods as unsafe at night. Consequently, most children felt safe frequenting these spaces during the day, especially when in the presence of friends. Adults who limit or discourage play behaviour are often cited as the bigger threat to children's experience of public spaces as child-friendly (Collins & Kearns, 2001b; Jack, 2008; Valentine, 1996), but for most of these children the presence of older youth was a more common barrier. Ironically, the children did not recognize that their own group presence in local parks, for example, would likely be intimidating to younger children hoping to use the same space. Many participants noted feeling uncomfortable in the presence of aggressive or scary neighbours, and subsequently generally avoided some parts of the neighbourhood, but often this was the only neighbourhood issue raised that gave these children concern.

Given the socially-based nature of their neighbourhood anxieties, it is not surprising that the most prominent call for change to local environments related almost exclusively to other inhabitants. Only a few isolated comments highlighted that the local built environment does not support the preferred activities of this group of children. Most children, for example, acknowledged that they often sat on play equipment to gather and

talk with friends, but only a few explicitly recognized that there are few other places in their neighbourhood that allows for them to gather or socialize in a group:

*Researcher: So is there anything at [the] plaza that you specifically go to?*

*Victoria: There's a boring mall... like, the mall there is pretty boring [laughs] ...*

*Emily: ... yeah.*

*Victoria: ... but we still go there and walk.*

*Emily: Yeah. I wish... I wish there was more... like, places to go just to hang out. Not, like, shop-wise but just places to sit ... and talk.*

These girls spend time walking around a local commercial plaza, not necessarily because the location itself appealed to them but because there were few other affordances for socializing available, especially indoors during winter or inclement weather. Richard and Colin also lamented the lack of local facilities for social activities; when asked what other amenities they would like to see in their neighbourhood they tried to communicate this wish for social activity space:

*Richard: yeah... but I would also like someplace that's, like...I don't know, like, cool... like, a clubhouse for, like, all the kids... or something...*

*Researcher: Like one you get to go build? Or where you ...*

*Colin: [interrupts] No, where you just get to hang out...*

*Richard: No, just like... sorta like the Boys and Girls club... [...] but in our neighbourhood, not all the way downtown... 'cause we're, like, probably never going to go there [to the downtown Boys and Girls club].*

These boys have trouble articulating their desire because they have not experienced many places that meet these needs; they have only a vague notion that there could be something better, more supportive. The issue of proximity to resources was also clear, highlighting children's difficulty in accessing amenities that are far from home, and out of walking distance. This barrier was echoed by others; several children mentioned that they wished a certain amenity was closer to home, such as a park, community centre, or variety store. Analysis of neighbourhood use suggested that children living closer to amenities tend to utilize them more frequently than those living further away, even when still within walking or cycling distance.

Participants do not necessarily experience their neighbourhood as *un*-friendly, as it generally meets their needs for safe places to gather and play, but these places are not the ideal child-friendly communities they could be. Most of the children would especially benefit from a larger and more supportive range of flexible settings for play and social interaction, available within a reasonable distance of home. While only documenting a few locations that cause discomfort, the children also did not demonstrate a strong attachment to or dynamic engagement with the people and settings of their communities as would be expected in a child-friendly neighbourhood.

### **6.5.3 Part III: Deep pattern analysis of neighbourhood perceptions and independent use**

Thematic analysis of the children's interview narratives highlighted a number of patterns in their neighbourhood perceptions and use, and suggested that both social and environmental factors are influencing their local behaviour. The third and final analysis component of this study digs even deeper into individual and neighbourhood-level patterns in children's local activities, in particular to assess patterns in children's play experience type, their perception and use of neighbourhood affordances, as well as the role of their level of independent mobility. To assist with the detection of patterns, as mentioned earlier all participant's habitual activities were classified according to a range of categories including levels of screen-based activities and time spent in vehicles (See Table 6.2). The process used to classify children's activities into each of these categories is outlined below.

#### **6.5.3.1 Classification of children's habitual neighbourhood activity and mobility**

To assess the degree to which the children were involved in structured activities within their weekly routines, such as sports teams, music lessons, or language classes, activity diaries and interviews were used to classify each child's schedule as either *unstructured*, *semi-structured* or *very structured*. Children regularly involved in structured activities three or more days per week were classified as *very structured*, while activities on one or two days would be classified as a *semi-structured* schedule. Children with no structured

activities, or who participated in such activities only on occasion, were considered to have *unstructured* schedules.

Similarly, to assess how much out-of-school time for neighbourhood play each child experienced, activity patterns were examined for the number of days per week their free time was reduced, either due to structured activities as noted above or because of time spent away from home as part of family errands or activities. Children whose out-of-school time was compromised on two or more school days per week were considered to have restricted free time for engaging in neighbourhood-based activity.

Children's free time for neighbourhood activity can also be compromised if they spend a substantial amount of time in a vehicle being driven to extra-curricular activities or accompanying parents on family activities or errands. Children's GPS data and activity diaries were used to establish whether they habitually spent a low, medium or high level of their out-of-school free time in a vehicle. Children who spent the majority of their free time on three or more days riding in a vehicle, or who spent a large portion (approximately one hour or more) in a vehicle on a daily or almost daily basis were classified as having *high in-vehicle time*. Children who spent a small portion of each day in a vehicle, or who spent a large portion of time in a vehicle on at least two days, were considered to experience *medium in-vehicle time*. Those participants who spent little to no time in a vehicle on a daily basis, or who spent a large portion in a vehicle on only one day, were classified as having habitually *low in-vehicle time*.

The detailed daily activity diaries also allowed us to assess whether a child exhibited a *low, medium or high* level of daily screen time, which also serves to reduce time available for neighbourhood play; these assessments were confirmed via the child interviews.

Screen time activities include watching television, playing video games, playing on the computer or on a portable gaming device; screen time related to homework assignments was excluded. When a child's diary listed screen-based activities as taking up the majority of their free time on a daily or almost daily basis, they were classified as having *high screen time*. A child who spent time in front of screens on a daily basis but also demonstrated substantial involvement in other activities were labelled as exhibiting

*medium screen time*. A *low level of screen time* was recorded for children who did not spend time in screen-based activities on a daily basis, or who spent only a small part of their daily free time in front of screens.

Kartsen (2005) suggests that children's primary play experience is no longer synonymous with outdoor play in the neighbourhood; some children now spend the vast majority of their leisure time either playing indoors, or in the backseat of a car being driven to activities taking place outside the home. In this study, each child's combined dataset of GPS tracks, activity diaries and interview narratives were examined in detail to determine individual habitual patterns in out-of-school activity and to classify their play experience according to Karsten's typology of *outdoor*, *indoor* or *backseat* childhoods. Habitual activity patterns and locations were determined by triangulating data from GPS, diaries and narratives, and relative time spent in vehicles. Children would be assigned a single childhood type if they appeared to spend the majority of their out-of-school activity each day either indoors, outdoors or in a vehicle.

The degree to which children perceived and used neighbourhood affordances was established primarily via child interview narratives, the set of independent neighbourhood destinations collected from interviews, maps and GPS tracking, and activity diaries. Perception of affordances related to children's awareness of activity opportunities or resources in their community whether they used them or not. Use of affordances was based only on those neighbourhood amenities that children confirmed that they use or visit. While establishing levels of perception or use is a fairly subjective process, generally children who showcased a strong awareness, or use, of a large number of nearby activity resources were classified as perceiving or using a *high* number of affordances. Children who were aware of, or utilized, few to no neighbourhood opportunities for activity were labelled as perceiving or using a *low* level of affordances. Children who fell in between these extremes, showing an awareness or use of a moderate number of nearby amenities were classified as perceiving or using a *medium* number of affordances.

Finally, we worked to establish each child's level of independent neighbourhood mobility, that is, the degree to which they could use or explore their neighbourhoods without being accompanied by an adult. Level of independent mobility related to the level of freedom awarded by parents as well as the overall size of the child's independent domain. In most cases, children directly outlined the boundaries of their independent activity spaces on their neighbourhood map. Each child was also asked directly about their level of independent mobility, and any specific mobility restrictions they were under, within their group interviews. Together these data were used to establish whether the child experienced a *high level of IM* (no mobility restrictions or restrictions that defined a large geographic area), a *medium level* (some restrictions, such as only being able to travel with friends or siblings rather than on their own, or only able to access a moderate geographical domain within a short distance of home), or a *low level of IM* (with either no ability to travel without an adult or an independent domain confined to the area within a block or two of home).

Of particular interest for this study were patterns in childhood play experience type (according to Karsten's typology), the perception and use of neighbourhood affordances for activity, and a child's level of independent mobility. Patterns within each of these categories are therefore outlined in more detail below.

### **6.5.3.2 Patterns in childhood play experience**

When attempting to establish the primary setting of each child's play experience according to Karsten's typology of *indoor*, *outdoor* or *backseat* childhoods, it proved difficult to strictly classify most children's weekly activities solely within one of these three categories, particularly as activity rhythms could exhibit opposing patterns on different study days, or include strong components of more than one type on a single day. Some children, for example, had days dominated by outdoor activity in the near neighbourhood, while exhibiting other days with exclusively passive indoor activities such as watching television. Children were therefore classified by a combination of categories if their activities seemed to equally demonstrate two differing childhood types.



There were no participants whose activities could be solely classified as either *outdoor* or *backseat*, but almost half of the participants could be categorized as strictly *indoors*, exhibiting little to no regular time outdoors, but also little time being chauffeured around in vehicles. About one-third of the children habitually spent some time outdoors, but only three children seemed to regularly spend more of their daily free time outdoors than indoors. Surprisingly, there were only a few participants who spent a large portion of their free time in vehicles during the study week, being driven to activities or else tagging along on family errands such as grocery shopping. This may be related in part to the lower income status of the residents who may have a lower ability to pay for play activities or even to access a private vehicle. Most children's activity patterns, therefore, were classified as *indoor*, *indoor-backseat* or else *indoor-outdoor*.

When we considered the other categories by which children or their environments were classified, patterns within each of these groups emerged (See Fig. 6.4). Children who had a strong outdoor component in their habitual activity pattern all had unstructured schedules, with little time spent in vehicles and almost no reduction of their out-of-school free time due to personal or family activities; that is, the children who spent more time outdoors tended to have more available free time at home than other participants. They also demonstrated lower levels of screen time. Children with an *outdoor* component also had higher levels of independent mobility, perceived higher levels of neighbourhood affordances and documented more local independent destinations. All participants in this group had medium to large independent neighbourhood activity spaces. An environmental analysis of their micro-neighbourhoods, that is, the built environment within a short walking distance of children's homes, also revealed a fairly large and diverse range of commercial and recreational resources close to each child's home. Perhaps as a result of having more free time and perceiving more nearby activity affordances, these children spent more time outdoors playing around their neighbourhoods; these factors may contribute to the fact that they all had fairly large independent domains.



**Figure 6.4: Patterns in childhood play experience**

Conversely, children with an *indoor* or *indoor-backseat* designation generally exhibited much smaller independent domains. The few children in these groups with larger independent domains, however, still demonstrated low use of neighbourhood affordances; that is, they had permission to travel further and utilize neighbourhood resources but they rarely did so. This difference in behaviour spells out the primary divide between the two prominent profiles among *indoor* children. The habitual schedules of the first group could be characterized by substantial time in vehicles and semi- or very structured schedules that combined to significantly reduce the amount of free, unstructured time available during the child's typical week. On the whole, these

children spent large portions of their out-of-school time being driven around by car or indoors at other locations engaging in structured activities such as dance class, piano lessons, or karate classes; they generally had little free time at home to play outdoors, though this reduced free time also coincided with lower screen time as well.

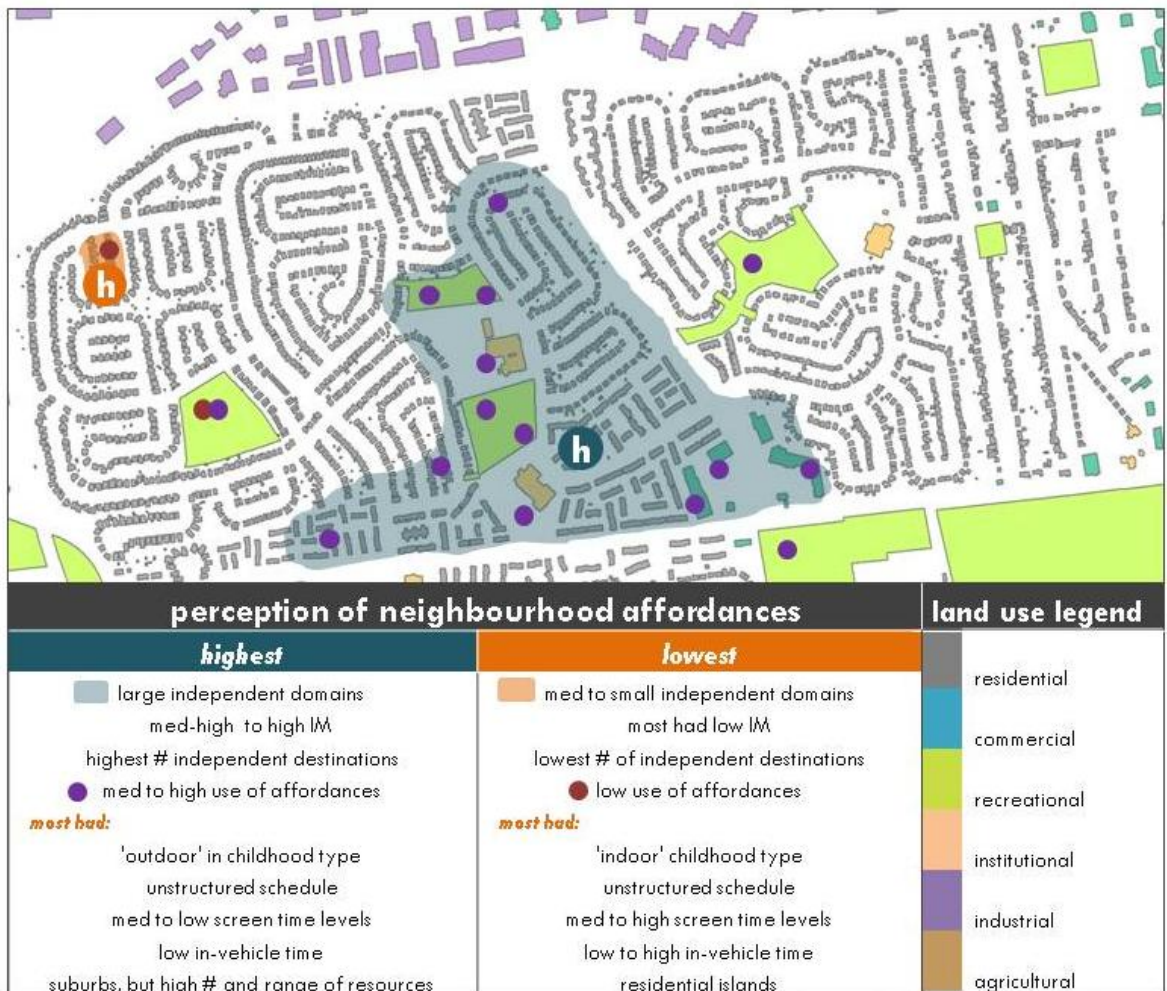
Surprisingly, most of this group exhibited fairly high levels of independent mobility and perceived a moderate level of local affordances, suggesting that the lack of time spent interacting neighbourhood environments is more a function of free time than permission. The second group of children with an *indoor* classification on the other hand exhibited mostly unstructured schedules with low in-vehicles times but extremely high screen times. Most in this group also had at least a medium level of independent mobility. That is, this group of children had the license and free time available for neighbourhood play but chose to spend it primarily indoors watching television, surfing the internet or playing video games.

Striking similarities were apparent across the entire group of indoor children when their local built environments were examined in detail (See Fig. 6.4). The micro-neighbourhoods of nearly all *indoor* children, regardless of neighbourhood type, could be described as ‘residential islands’; most lived in almost exclusively residential areas either surrounded by homes or located on the fringes of a residential neighbourhood against significant morphological boundaries such as major roads or ravines. There were few to no commercial or recreational resources within the near neighbourhood, and most of the children acknowledged that there was little to do in the area. As Sierra explains “*Well it’s kind of like ... there’s not really much places around ... that we can go... like, there’s just houses pretty much everywhere*”. Not surprisingly then, these same children perceived lower levels of nearby affordances and documented very few nearby independent destinations.

### **6.5.3.3 Patterns in neighbourhood affordance perception and use**

Clear patterns also emerged among children’s perception and use of neighbourhood activity affordances. Most children perceiving high levels of neighbourhood affordances exhibited higher levels of independent mobility and large independent domains, as well

as the highest number of local independent destinations (See Fig. 6.5). Most of these children also had an *outdoor* component to their childhood experience type, demonstrated fairly unstructured schedules, and spent low amounts of time both in vehicles and in front of screens. Interestingly, most resided in environments classified as ‘suburban’, often assumed to offer fewer activity affordances; closer examination illustrates that children perceiving high levels of local affordances tended to have to a large and fairly diverse range of recreational and commercial resources within close proximity to their home. This group generally had permission and significant time available to play outdoors, in an environment offering an ample range of nearby amenities.



\* map has been anonymized

**Figure 6.5: Patterns in perception of neighbourhood affordances**

Children who perceived few neighbourhood affordances, on the other hand, generally exhibited the opposite profile. Most had low levels of IM, demonstrated medium- to small-sized domains, and recorded few local independent destinations. The most prominent common characteristic, however, was that each child was classified as having strictly an *indoor* childhood; in turn they noted very low engagement with local affordances. Examining the micro-neighbourhood environments of this group revealed that, whether considered urban or suburban, most lived in residential islands with few formal resources located nearby. Whether the lack of perception and use of affordances springs from low independence and time spent outdoors, or vice versa, is unclear, but the results indicate a strong relationship between these factors.

The actual use of neighbourhood affordances followed very similar patterns among the highest and lowest users (See Fig. 6.6). The highest users of local affordances typically had more independence and more available free time, which many spent outdoors around the neighbourhood rather than in front of screens. The lowest users of affordances had less independence, perceived few local affordances and generally spent their free time indoors or in vehicles. Though most of these low affordance users lived in residential islands, the group generally divided into two activity profiles. One group exhibited relatively unstructured schedules with abundant free time, but with very high screen time levels. The second group had little available free time at home, as they revealed much more structured schedules, and tended to spend more time being chauffeured to activities or on family errands in vehicles. Children demonstrating the lowest use of neighbourhood affordances, therefore, either had little free time available, or perceived few neighbourhood opportunities that countered the appeal of television and computer screens.

It is important to note that perception of affordances did not always translate to use. In a few cases, children perceiving high levels of affordances were only awarded low levels of independent mobility, restricting their ability to utilize these opportunities. According to



**Figure 6.6: Patterns in the use of neighbourhood affordances**

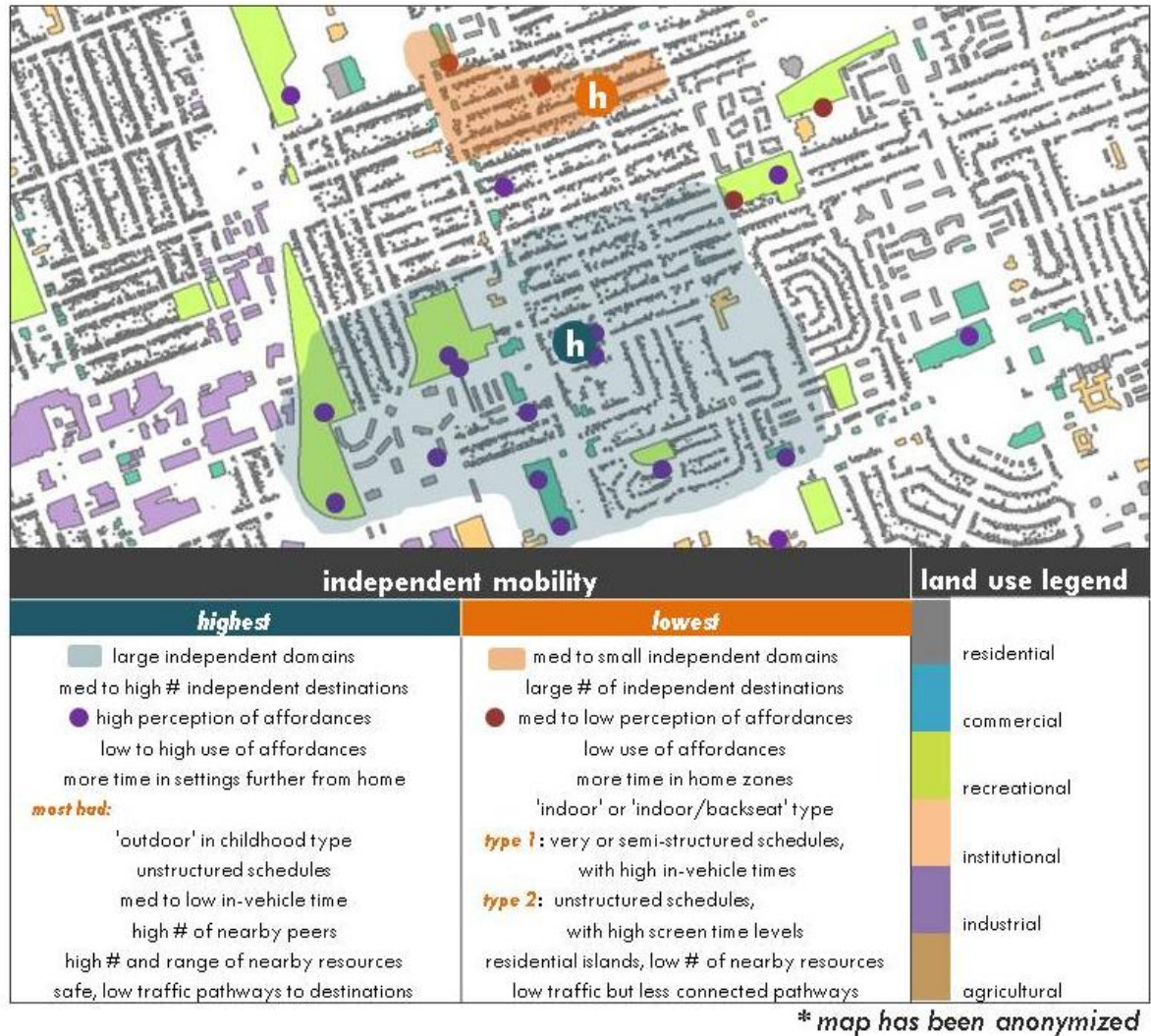
Kytta's matrix, low levels of IM and low perception of affordances translates to very low environmental child-friendliness. However, independent mobility was not always the deciding factor; a few children perceived many activity affordances and claimed to have fairly high levels of independence but spent the majority of their time at home, documenting very high levels of screen time. These results suggest that some children, despite having permission to be out, chose indoor television watching and video game playing over the activity opportunities available in their neighbourhoods.

#### 6.5.3.4 Patterns in independent mobility levels

Research to date has demonstrated that a child's level of independent mobility can influence the amount and quality of time spent outdoors in neighbourhood environments. The children in this study demonstrated a fairly broad range in their levels of local independence. No systematic pattern of mobility license, as awarded by parents, with respect to age or gender was apparent, contrary to many studies that have found these factors to be influential (Brown et al., 2008; Fyhri & Hjorthol, 2009; Mackett et al., 2007; Page et al., 2010; Prezza et al., 2001; Sener & Bhat, 2007; Spilsbury, 2005; Tranter & Pawson, 2001; Veitch et al., 2008). There were also no strict patterns related to childhood experience typology, time spent in vehicles or the degree to which their structures were scheduled (See Fig. 6.7).

Noticeable similarities were evident in the characteristics of and time spent within their neighbourhood domains; children with higher IM levels generally recorded larger independent domains, but also spent more time in settings further from home. These children also both perceived and utilized more neighbourhood affordances than those with low mobility, likely as a result of their greater ability to explore their neighbourhood environments.

Conditions of the social and built environment also appeared to influence the child's IM level. The micro-neighbourhoods of most children with higher IM exhibited fairly distinct morphological boundaries which defined a relatively large but finite geographical area; the delineated activity space usually offered a number of amenities and destinations, and therefore did not require children to negotiate the additional challenges posed by these boundaries to access play opportunities. These well-defined areas might also simplify child-parent negotiations of domain limits. In most cases too, there were a number of commercial and recreational destinations reasonably close to home but not immediately proximate; the appeal of these destinations perhaps drawing the children a bit further from home without being so distant as to feel uncomfortable. The micro-neighbourhoods of children with high IM levels also featured safe sidewalks or other low traffic paths to nearby destinations, which can facilitate easier walking and biking around



**Figure 6.7: Patterns by level of independent mobility**

the home environment. Another commonality was the presence of several nearby friends or peers, which, as noted earlier, likely provides greater appeal for neighbourhood activity among children, and greater comfort with increased child independence among parents. As explained by a young female participant: “*I could go on my own but they’d rather I be with friends*”.

Another factor that seemed to boost independent domain ranges for many children was possession of a cell phone. Almost ubiquitous among children and youth western countries today, possession of a cell phone was a key factor that allowed some to roam freely around a larger territory. Some children were required to call in regularly, but



many others indicated that they could go anywhere within their negotiated boundary “as long as I have my cell phone on me”. A conversation with two suburban girls aptly illustrates this condition:

*Researcher: Why do you think [your mom] doesn't like you to walk [to the mall]?*

*Alison: I don't know... it's far from home and I don't have a cell on me.*

*Researcher: Oh, okay, so you don't carry a cell phone?*

*Alison: I got one yesterday.*

*Researcher: Oh, you got one yesterday?! Do you have one, Erica? A cell phone?*

*Erica: Um, hmm [yes]. I got mine last year.*

*Researcher: Does that make a difference?*

*Erica: Oh yeah [emphatically]. [...] My parents wouldn't let me go to the park unless I was with a friend without my cell phone. Now that I have a cell phone they let me go whenever I want.*

Parental perception that they could, in theory, reach and locate their children at any time via their cell, seemed to help relax restrictions around independent neighbourhood travel.

Similar patterns emerge for children with the lowest levels of independence. About one quarter of the participants demonstrated very low levels of IM. Again, there were no clear patterns with respect to age, gender, degree of structured schedule or time spent in vehicles, but children with the lowest IM were all classified as having primarily *indoor* childhoods. These children, in turn, perceived and used few affordances in their local settings, reinforcing the relationships between IM, time spent outdoors and the perception and use of local affordances. The micro-environments around the homes of these children, as was evident among those with the most *indoor* childhoods, could also be classified as ‘residential islands’ with few nearby commercial and recreational destinations to draw them from their homes. A primarily residential area may provide a higher likelihood of having nearby peers, but this social condition was not necessarily enough to expand independent range; children with nearby social ties but few local amenities still demonstrated low mobility and low levels of neighbourhood use. Conditions of the social or built environment both appear influential in children’s

neighbourhood independence and use, but neither condition on its own is necessarily sufficient to support the expansion of a child's independent domain.

## 6.6 Discussion

The combined analyses in this study have helped to uncover the extents of children's independent domains, as well as their perception and use of activity opportunities in their neighbourhoods. Results have also illuminated the social or environmental conditions or affordances that may discourage independent neighbourhood activity and travel.

First, the detailed analysis of children's independent neighbourhood destinations and domains lends some credence to the claim by Gaster and others that childhood domains are shrinking from those of previous generations. The results of this study suggest that the largest change, however, may be in the frequency with which children spend time within independent neighbourhood domains, particularly those at distances further from home. Many children clearly had permission to travel to further destinations, particularly in the company of friends or siblings, yet most of these were strictly occasional destinations. The biggest reductions, therefore, may be in the size of children's habitual domains, that is, the neighbourhood environment they utilize on an almost daily basis. The children's frequented and occasional domains encompassed destinations in both the near and far neighbourhood, but their habitual domains were generally very small and primarily comprised of the environment within and immediately surrounding the home.

We learned too from thematic analysis of the children's narratives that their neighbourhood activities are highly tied to the nearby social conditions. Neighbourhood activities were almost exclusively carried out in the company of friends or siblings, and the presence or lack of affordances for supporting their social activities related to their impressions of the neighbourhood and its degree of child-friendliness. Neighbourhood social conditions could also negatively impact children's local activities, particularly interactions with aggressive neighbours or the intimidating presence of older youth. The built environment, however, or the perception of opportunities for activity that it afforded, also appeared to play a significant role in neighbourhood use. Children who perceived the highest levels of affordances in the neighbourhood and whose micro-

neighbourhood exhibited a large and diverse range of resources, spent large portions of their free time outdoors, and carved out large independent domains. While some children's ability to spend time in the neighbourhood was compromised due to a lack of available free time or mobility license, there were also children with a high level of IM and sufficient free time available who still chose to spend the majority of their time indoors at home, primarily in front of screens. The deep pattern analysis highlighted that one pattern common to this group of children was the nature of their micro-neighbourhood environments; all lived in 'residential islands' that afforded few activity opportunities, and had few to no nearby commercial or recreational resources. The local built environment offered few affordances that could help entice these children outdoors.

Analysis of child narratives also highlighted the very limited and passive way that many of these contemporary youth interact with their neighbourhood environments. Some children clearly recognized that the environment of the neighbourhood did not necessarily support their preferred activities, especially the oldest of the group who tended to desire more social-based activities or more challenging activity settings. These children, however, had difficulty visualizing how their neighbourhood could be more supportive or child-friendly.

The deep examination of patterns in neighbourhood experience and use was also extremely telling. Although very few children spent a substantial portion of their free time outdoors in the neighbourhood, very strong patterns emerged among children who more regularly utilize neighbourhood environments and those who do not. Children who spent more time outdoors in the neighbourhood had more unstructured free time available, experienced higher levels of independent mobility and in turn perceived and used a higher level of local affordances for activity; these children subsequently carved out larger independent domains, and registered more independent destinations in the neighbourhood. Children who spent more time in their neighbourhoods also tended to have higher numbers of peers living nearby and a local environment that offered a range of activity resources. The opposite conditions severely limited children's neighbourhood engagements and seemed to help drive their activities indoors, including reduced free time or independent mobility, and the lack of alluring amenities or peers nearby.

The specific layout of the nearby built environment also appeared to play a large role in defining independent territories for children. Major morphological elements around the child's home, such as higher traffic roads, ravines or railroad tracks, were influential in defining children's activity domains. Only one child in the study has permission to cross any of these major boundaries, and she only does so on an occasional basis and usually in the company of an older sibling. Whether due to the associated risks with traversing such a boundary, or simply that they served as distinct, legible edges by which parents and children could define a distinct independent territory, these elements almost always defined most of the edges of a child's frequented or occasional domain. This phenomenon was also observed with large swaths of industrial or agricultural lands; similarly acting as mobility barriers, concentrated areas of these land uses severely limited children's local movement in one or more directions, and effectively lowered their level of access to community resources. A local built environment featuring major mobility barriers and few affordances for activity can also turn children's attention indoors.

Kyttä suggests that 'environmental child-friendliness' can be assessed by cross-referencing a child's independent mobility with the number of activity affordances they perceive in their local environments. The ideal child-friendly environment is one where the child has a high degree of freedom to explore their communities, which in turn provide safe, welcoming and diverse settings for their preferred activities. According to this framework, a few children in this study could be classified as living in a very child-friendly environment. The majority, however, would fall into the middle or low end of the friendliness spectrum, experiencing either low levels of independence or sparse, uninspiring local environments. A few children, unfortunately, would experience both of these conditions, falling into Kyttä's 'wasteland' category; that is, these children have little ability to explore their neighbourhoods but were they allowed, there would be little of interest to them in this environment. Improving the neighbourhood experience of children in these least child-friendly environments should be our collective priority.

Overall, this study clearly highlighted that children's neighbourhood use is tied to a few key and mutually dependent factors: the time and freedom a child has for neighbourhood

exploration, the perception of diverse affordances that support their primary interests, and a supportive local environment. Our research, planning and policy priorities should then focus on improving neighbourhood affordances for children's activity as well as a child's ability to independent utilize them.

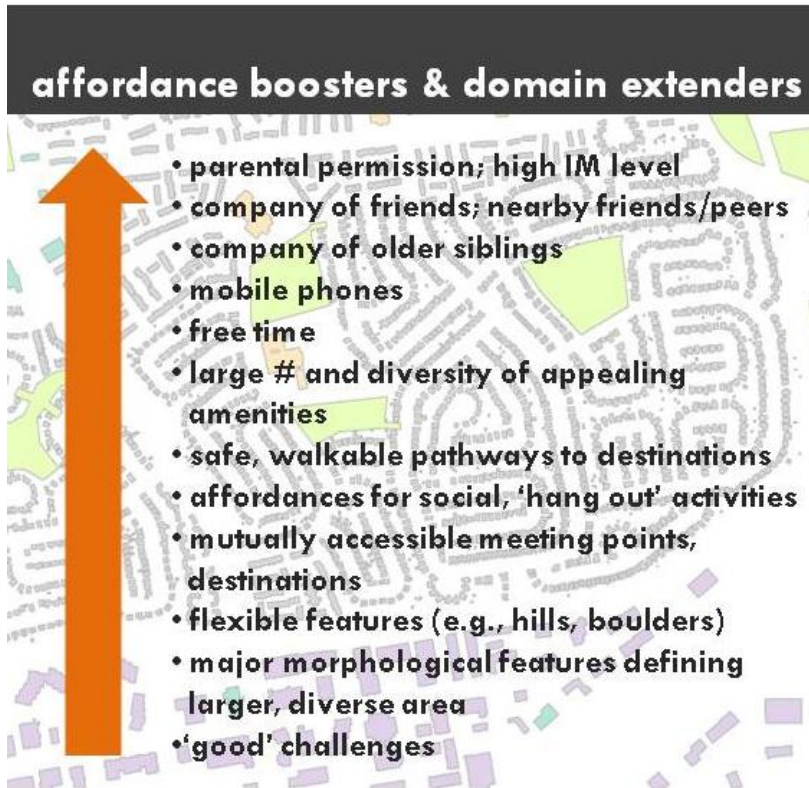
### **6.6.1 Creating affordance-rich environments**

This comprehensive analysis of children's neighbourhood behaviours has exposed a number of factors which seem to increase the perception or use of local affordances, or to facilitate the development of larger independent domains. Analysis also highlighted social and environmental attributes that can make it difficult for children to play and travel in their neighbourhoods. Communities can help to create affordance-rich environments for children by supporting conditions that expand activity and mobility opportunities, and limit or eliminate those that would hinder children's neighbourhood activity.

#### *Affordance boosters and domain extenders*

Primary among affordance or domain facilitators is a higher level of independence granted by parents to children (See Fig. 6.8). Higher levels of IM were associated with higher perception and use of neighbourhood opportunities, and translated to the development of larger domains. The child's level of IM and territorial range appeared to be influenced in turn by the local social environment. The presence of peers or siblings increased both child and parent comfort with unsupervised neighbourhood activity; children with higher numbers of nearby friends tended to spend more time in neighbourhood environments and had larger domains, which translated to higher neighbourhood use. Possession of a cell phone can also help to broaden domains of independence.

Social activities also dominated the list of the children's preferred activities; local environments that provide centrally located meeting places or 'activity nodes', and safe, comfortable facilities for 'hanging out' and talking with friends, could strengthen the



**Figure 6.8: Affordance boosters and domain extenders**

appeal and use of neighbourhood environments. The perception of affordances of interest could also be increased with the provision of conditions or facilities that still provide 'positive' challenges, such as higher 'mountains' to climb or more advanced play equipment, particularly for older children whose interests and capabilities have surpassed simpler play structures and other facilities for young children. Environments that provide safe and walkable pathways between these activity nodes would also likely increase the use of these amenities, and general travel through the neighbourhood. Activity affordances located near but not directly proximal to children's homes can also serve to expand their neighbourhood domains.

A number of participants also experienced significant reductions in their free time due to structured activities or family schedules. The simple provision of unstructured, free time appears to be a factor in the engagement of neighbourhood affordances; when coupled with higher levels of independence, time available to spend outdoors in the

neighbourhood was a key commonality among children with higher perceptions and use of affordances for activity.

### *Affordance limiters and domain restrictors*

Not surprisingly, parental restrictions on children's independent mobility figured strongly in discouraging children's engagement with local environments, and constraining the size of their domains (See Fig. 6.9). The lack of siblings or nearby friends with whom they can explore their neighbourhoods without being accompanied by an adult can also be a factor in limiting their neighbourhood activity. Although the presence of peers can help to extend children's domains, the social conditions in the local environment can also act as an affordance and domain limiter; the presence, or even rumoured presence, of scary or intimidating persons can prompt a child to leave or avoid some public neighbourhood spaces. Children may perceive appealing affordances for activity in a local environment, but be prevented from using them due to the 'threatening' presence of others.



**Figure 6.9: Affordance limiters and domain restrictors**

In a similar way, the local built environment can also pose risks that limit activity; living close to a morphological boundary can diminish the area available for safe activity and travel, and reduce the number and proximity of appealing amenities. Both social and environmental threats can emerge, or intensify, for children at night; environments that are perceived as safe during the day project riskier conditions at night, and can decrease affordances available for use, and the extent of a safe neighbourhood domain. Social and environmental threats can individually and collectively make up the ‘negative’ challenges that can severely limit children’s neighbourhood activity and mobility.

### **6.6.2 Methodological contributions and recommendations**

The unique data collection and analysis protocol of this study represents a number of advances for children’s environmental behaviour research. First, the protocol used a varied set of complementary tools to both collect and analyze data on children’s neighbourhood perception and use. The integrated use of both objective and subjective data provided by the suite of tools to analyze individual- and neighbourhood-level patterns provided a rare and detailed glimpse of the everyday geographies of children in a specific context, two lower income neighbourhoods in a mid-sized Canadian city, and the social and environmental factors that influence how environmental behaviour, or its restrictions, manifest.

The extensive GPS tracking of children’s environmental behaviour served as a necessary foundation for the deep and comprehensive activity analysis carried out in this study. As the reliability and portability of GPS technology advanced substantially in recent years, environment-behaviour researchers quickly recognized the value of being able to directly monitor activity ‘in place’ and the numerous new research avenues this technology put within their reach. Data provided by GPS units has proven more accurate than previous self-report measures of movement or activity, helping to eliminate recall bias and minimizing interference by the researcher (Elgethun, Yost, Fitzpatrick, Nyerges, & Fenske, 2006; Kerr, Duncan, & Schipperjin, 2011; Quigg et al., 2010). In this study, both the GPS and diary datasets were remarkably complete for all participants, and also found to be highly congruent with one another. Within this group of participants, there were



only a few cases where a trip or activity was not recorded or where GPS equipment was unintentionally turned off or left at home. The high level of compliance with the protocol and inter-tool consistency allowed for most diary data to be integrated with geographical locations within the GIS, substantially aiding spatial analysis of neighbourhood activity.

GPS data is a valuable tool for researchers but is limited to some degree in that it only provides a snapshot of children's behaviour and may not be fully representative of their habitual activity or settings. The digital mapping interviews using Google Earth proved not only to be highly novel and engaging for the child participants, but served to validate the GPS and activity diary data, highlighting habitual versus occasional activities and destinations. These mapping-enhanced interviews were also critical for uncovering 'why' (or 'why not') children spend time in their neighbourhoods, and highlighting the specific settings and activities to which they are drawn. In previous studies, neighbourhood walking tours or experiential methods such as the use of 'photovoice' have been similarly employed to illuminate children's experience by directly connecting experiences and perceptions to specific places or conditions in the built environment (Carpiano, 2009; Dennis Jr et al., 2008; Loebach & Gilliland, 2010; Wilson et al., 2007). Although effective, these methods can be extremely time and resource intensive, which can limit the extent of the child's neighbourhood domain that can be addressed with these approaches. The digital mapping-enhanced interviews used in this study acted as an effective alternative to neighbourhood tours or photo-mapping exercises, pinning perceptions and activities to specific neighbourhood locations while covering a larger geographical area in a shorter period of time. Carrying out the interviews in small groups of peers or children living in the same micro-neighbourhoods provided a richer and more comprehensive account of children's context-specific neighbourhood activities, and the degree to which children's behaviour is intertwined.

Few studies to date have integrated qualitative data, such as interview narratives, into a GIS for spatial analysis. Early work in this fledgling area of 'qualitative GIS' has demonstrated that this integration hold enormous potential for environment-behaviour research and as an aid to community planning (Dennis Jr, 2006; Knigge & Cope, 2006; Kwan & Knigge, 2006). The current study incorporated insights and patterns from child

narratives with GPS tracking and activity diary data within a GIS so as to reveal the environmental influences and context of individual behaviours and perceptions. This more holistic picture of children's local activity is critical to our understanding of their neighbourhood needs, experiences and desires. This clearer appreciation is necessary to help direct research, planning and policy efforts to provide more supportive, child-friendly neighbourhoods for youth.

This study also effectively employed an affordance-based framework to examine children's neighbourhood use as well as to assess local environments themselves. Incorporating the concept of affordances into Moore's original model of nested childhood domains also provided a valuable framework for examining the activity affordances offered to children by both proximal and more distant settings of a neighbourhood environment, and assessing localized child-friendliness (See Fig 6.2). Such a framework can also highlight gaps or inequalities in neighbourhood activity opportunities and in turn direct community planning initiatives. Actively involving children in this community assessment and planning could heighten the efficacy of both the process and any neighbourhood interventions.

Finally, the results of this study suggest methodological changes for future work, particularly the need for a re-examination of the traditional classification of neighbourhood environments under the categories of 'urban', 'suburban' and 'rural' settings, particularly as they apply to the influential environments of children. Analysis of interview narratives and GPS tracks suggested that a simplified urban/suburban designation was not sufficient to characterize the neighbourhood environment of participating children. Children's activity and mobility seemed much more highly tied to the specific micro-neighbourhood environment in the immediate vicinity of their homes than a generalized portrait of their school neighbourhood. After initial consideration by the generic categories of 'urban' and 'suburban' settings, it was necessary to subsequently regroup participants into smaller micro-neighbourhood clusters of children with homes within close proximity to one another and with very similar built characteristics within their immediate environment. This regrouping reinforced the drawbacks of a simple urban or suburban characterization as micro-settings in both types

of environments were found to exhibit characteristics similar to one another, transcending the typical urban/suburban divide. Some children in the ‘urban’ neighbourhood, for example, actually exhibited micro-environments typically associated with suburban environments, such as primarily residential settings with little or no mixed land use, and few nearby commercial or recreational amenities. Children’s activities within these similar micro-neighbourhoods often exhibited more commonalities than among children within their same ‘urban’ or ‘suburban’ category. Although many contemporary studies attempt to provide a more nuanced assessment of children’s neighbourhood environments, this study reinforces the need to move away from a simplified metrics of neighbourhood type.

## **6.7 Limitations and next steps**

Although clear patterns emerged within the neighbourhood perceptions and activities of this group of participants, the small overall number of children and of study neighbourhoods make it difficult to generalize this behaviour even within other neighbourhoods of the same Canadian city. As this and other studies show, the environmental context is highly influential in how behaviour, as well as health outcomes, manifest. So while this study is small, it still makes a valuable contribution to the body of work that is attempting to better understand the role of specific socio-cultural and built environment conditions on children’s local opportunities and behaviour.

The majority of the participants in this study were female, limiting our ability to address potential gender differences in both activity preferences and mobility restrictions levied. Although there were indications that age plays a role in the activities and settings preferred, as well as the level of independence that may be granted, the small number of participants also prevent us from drawing many age-related conclusions. Future work with a larger contingent of children in this same age range could help to confirm both gender- and age-related trends in activities and opportunities. The majority of children in this study also come from lower-income households, which may influence the opportunities and resources at their disposal. A larger study involving children from a

range of income levels would help to highlight the potential influence of socio-economic status on local behaviour.

The small number of participants was related in part to the time and resource intensive data collection and analysis methods employed. The volume and complexity of the data required for such deep pattern analysis can make it more difficult to undertake similar work with a much larger group of participants. However, both the technologies used to collect data, and the techniques for cleaning and processing data outputs, continue to be refined and similar studies with larger participant samples may be less burdensome in the future. Future work should then include deep, not just broad, analysis of children's context-specific behaviour patterns, engaging a larger group of participants, a greater range of ages, and a more diverse set of environments.

## 6.8 Conclusion

Examining the habitual activities of participating children provided a number of key insights about contemporary neighbourhood use and perceptions. Chief among these was the highly social and intertwined nature of their activities, and the role of peer companionship in their neighbourhood use and mobility. Participants not only typically travelled and played in the company of other children, but their local environments were valued by virtue of the shared use of these settings. The immediate social and built environment played a clear role in encouraging neighbourhood-based activity; children with nearby peers and a range of diverse destinations within a reasonable distance of home were more likely to be found spending time in their neighbourhood settings. Children's interest in destinations such as parks, playgrounds and green spaces, as well as commercial outlets such as variety and dollar stores, illustrates the importance of such shared neighbourhood nodes in encouraging community activity. Topographical elements, such as grassy hills or a pile of boulders by a pond, also acted as magnets for group gathering, supporting both quiet, social activities as well as more active pursuits. The value of such simple but flexible spaces reminds us that providing affordance-rich elements in a neighbourhood to support youth activity does not necessarily require the official appropriation of 'spaces for children' nor the installation of formal play

equipment. Concentrating, in fact, on the affordances that a given environment offers to children, is an effective strategy for evaluating the child-friendliness of a neighbourhood for child residents, and improving the activity support offered by local settings.

Results also clearly point to the role of independent mobility in the perception and use of neighbourhood affordances. Children awarded higher levels of mobility consistently spent more time in their neighbourhoods and in settings further from home, in turn exposing themselves to more activity affordances and experiences. It is not enough for children to perceive affordances in the neighbourhood; they must also be given the time and permission to explore these opportunities. Analysis clearly revealed a strong relationship between IM level and free time available to spend outside with the perception and use of neighbourhood affordances and the development of a larger independent domain. Parental mobility allowances and a less restricted schedule can provide children more time to explore their neighbourhoods, leading to the discovery, shaping and use of more affordances. These interactions build both the skills and confidence that encourages the expansion of their independent domain, opening up even more opportunities for interaction.

Child narratives also remind us of the role of the child's own interests in engaging with local environmental opportunities. Perception of and permission to engage affordances did not always translate to use; some children, despite time and permission, stayed indoors at home. The answer may lie in an examination of other social and environmental factors that may limit neighbourhood use, such as lack of appealing local amenities, available free time, or the supportiveness of the neighbourhood environment. For some children, the neighbourhood held sufficient appeal for play and exploration, particularly when provided with a richer social and built environment; for others, activity opportunities in the neighbourhood were not sufficient to compete with their interest in indoor, primarily screen-based, activities. The local environment also did not necessarily keep up with the changing interests of children as they matured; older children acknowledged that there were few "*cool*" places where they could just sit and talk with friends or settings that still offered a bit of challenge, opting instead to be driven to the local mall or the more stimulating park across town. Changing interests require different

or more flexible affordances; children can gain access to a wider range of resources when they are able to increase their independent domains. If children are barred from expanding their domains, or if the broader environment offers few additional affordances, the neighbourhood environment will not be able to support children's changing activity needs and preferences, and their free time will be spent elsewhere.

### **6.8.1 Creating child-friendly environments**

Creating child-friendly cities and neighbourhoods requires cultural and environmental changes, both of which take time and considerable effort. Ideally the entire neighbourhood or city provides a safe and stimulating activity setting for children, but cultural paradigms and existing infrastructure can make this prospect expensive, time-consuming and daunting. Results from this study, however, suggest some early steps for moving towards more child-friendly settings. We can begin by concentrating on the micro-environments in which children live, evaluating them in terms of the quality, diversity and accessibility of activity nodes they offer for children and youth. Similar to Lynch's framework for creating legible cities utilizing spatial elements such as paths, nodes, and edges (Lynch, 1960), or Forman's patch-corridor-matrix model for supporting healthy animal habitats (Forman, 1995), we can slowly begin to visualize and operationalize child-friendly environments by working to provide a network of safe and stimulating *activity nodes* or *patches* that provide affordances to support the diverse interests of resident children. Nodes can be existing recreational or commercial outlets such as parks and variety stores, but could be supplemented by both formal and informal amenities that appeal to children's needs and interests; for example, acknowledging the growing 'hang out' interests of 'tweens by providing scattered nodes with shaded and comfortable group seating opportunities within the neighbourhood network, such as along bike paths, in pocket parks or in public plazas. Less advanced play structures in parks could also be supplemented with both safe gathering spots and more challenging equipment or topographies. Nodes could also be comprised simply of flexible features that can be interpreted in various ways by all residents, for example, a set of tiered boulders or a small maze of gardens along a pathway.

Neighbourhood nodes should also be installed to ensure there are enough opportunities available to meet the needs of more than one group without conflict, either by providing multiple opportunities for similar activities, such as gathering and sitting, in a single setting or else providing environmental supports in several neighbourhood locations. Efforts should be particularly directed towards enriching or balancing the resources available in primarily residential neighbourhoods that have few nearby recreational or commercial amenities.

Multiple and diverse nodes of activity also need to be scattered through a neighbourhood in order to provide a range of destinations both near and far for all residents, and should be connected by a complementary set of interconnected *paths* or *corridors*. The ability to safely travel independently to local destinations requires a network of safe, accessible and walkable (or bikable) pathways; these corridors, which could include sidewalks, low traffic roads, and multi-use trails or greenways, need to link destinations with and within residential areas.

In this study, the micro-neighbourhood environment around a child's home proved very influential in facilitating or discouraging neighbourhood use. The size of the child's frequented activity space was usually defined, and limited, by major morphological boundaries. Evaluating the child-friendliness of an existing or new neighbourhood should consider the presence of these morphological barriers and attempt to optimize the size of the territory contained within their limits so as to provide a reasonably sized area for child and youth activity without the necessity of crossing these riskier boundaries. Ideally, these defined areas would provide a balanced mix of land uses and a range of activity destinations and nodes, ensuring a safe and legible territory for independent activity within a reasonable distance of home.

Evidence from studies on children's neighbourhood use and preferences can help planners and policymakers to utilize environmental design and local policy to maximize the 'good' challenges offered by stimulating features and settings, and to minimize the 'scary' challenges, such as group conflicts, disconnected destinations, and risky environmental barriers. Additional research evidence to shore up our understanding of

the features and conditions that boost neighbourhood affordances and help to expand children's independent domains would be valuable.

### **6.8.2 Creating a child-friendly culture**

Providing even the most stimulating and supportive built environments for children, however, would still be futile unless we also work to shift the cultural paradigms that limit children's independent use of their neighbourhoods. Parent's decisions to restrict children's unsupervised activities and mobility, while intended to ensure their safety, is likely the most influential factor governing their independent neighbourhood activity. The risk-averse discourse that currently defines what is safe and normative behaviour for children, and which has led some parents to severely reduce or eliminate unsupervised activity and travel, has eclipsed the evidence that reinforces the health and development benefits associated with some challenge and risk in the course of children's interactions (Gill, 2007; Karsten, 2002; MacDougall et al., 2009; Valentine & McKendrick, 1997). Policy and advocacy efforts should focus efforts on reminding parents and other caretakers that 'good' challenges are necessary for children to learn how to deal with risk, adversity and unfamiliar circumstances. Attempting to eliminate all risk by limiting activity to structured, supervised conditions may, in fact, undermine skill and knowledge development (Gill, 2007; Mikkelsen & Christensen, 2009; Shaw et al., 2012; Tranter & Pawson, 2001). Lack of meaningful engagement with neighbourhood settings also obstructs the development of attachment to local place, threatening the child's development of a healthy self-identity (Engwicht, 1992).

We might also frame efforts to shift cultural attitudes in terms of children's rights. Time for free play, unsupervised by adults, in safe and stimulating environments is now recognized as a basic right for all children, not just a privilege (Bartlett et al., 1999; Berg & Medrich, 1980; Holloway & Valentine, 2000; Matthews & Limb, 1999; Shaw et al., 2012). Children's right to play as it applies to neighbourhood activity is a two-fold issue. It refers not only to providing children with opportunity and access to play in safe and stimulating places within their communities, but also with a culture that accepts, in both policy and practice, children's legitimate right to inhabit all of the public places of their



neighbourhood. Over 30 years ago, Lynch suggested that children should be able to explore and utilize the entire city as their ‘learning grounds’, and this use depends on a number of spatial rights, including the right of presence and appropriation (Lynch, 1981; Lynch et al., 1977). There has since been a cultural shift, however, in the definition of the ‘natural’ places of children that has seen a marked reduction in children’s rights to and acceptance in public places. Predominant now is the notion that adults have a higher or more legitimate right to public places, and that children’s activity in these settings should be strictly controlled and supervised (Collins & Kearns, 2001b; Holloway & Valentine, 2000; Valentine & McKendrick, 1997); ‘child-like’ behaviour in public places, besides those, such as playgrounds, specifically designated for children’s use, is now often considered by adults to be inappropriate and often leads to conflict (Collins & Kearns, 2001b; Valentine, 1996; Woolley, 2006; Woolley & Johns, 2010). Children’s presence in public places, especially unaccompanied by adults, has been steadily dwindling as a result, as has the perception that their presence is a protected right (Karsten, 2005). Children, however, possess little power or opportunity to defend their marginalized position or their rightful presence. These changing perceptions have likely played a part in the drastic reductions in children’s play in the neighbourhood.

A child-friendliness framework can be a useful tool for evaluating neighbourhood environments and assessing the degree to which they support the healthy activities of children. Such a framework attempts to consider environmental as well as socio-cultural influences on neighbourhood activity and to strike a balance between providing safe yet stimulating and diverse opportunities for children. A key shift towards creating a child-friendly culture involves not only recognizing children’s rights to safe and healthy environments for play, but accepting that we all share responsibility for creating community environments that support children’s health and well-being.

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## 6.10 Supplement to Study 3

### 6.10.1 Forgotten factors in examinations of children's neighbourhood perceptions and use

There are a number of other factors besides those highlighted in Study 3 that are likely influencing children's use of neighbourhood environments for play but which are rarely discussed or explored. This study involved a fairly small number of participants, yet there were several children whose activities and rhythms were significantly influenced by the split nature of their family. Many contemporary children regularly divide their time between the homes and neighbourhoods of two custodial parents. Research efforts designed to establish the impact of a child's home or school neighbourhood environment on their healthy behaviours rarely acknowledges that many are exposed to more than one primary home environment, each of which sports different affordances, and which likely involves different family and activity rhythms. A 10 year old boy in the current study, Brad, exemplifies this case, emphasizing that while he has many friends living around his mom's house, where he spends a significant amount of time outdoors, he has few social contacts around his dad's place which is located well outside of his school neighbourhood. He finds the local kids quite intimidating in fact, and rarely goes outdoors there.

*Brad: There's a lot of bad kids in my dad's neighbourhood. My brother, he lives with my dad... one time he had his basketball net outside and slide... some kids broke his basketball net... and peed down the slide.*

*Interviewer: At your dad's place?*

*Brad: Yeah, at my dad's house [other boys express disgust and anger]*

*Interviewer: So are there places nearby [your dad's house]... are there places you can go?*

*Brad: No, I don't go anywhere else.*

*Interviewer: ... this cul de sac here? Do you ever play out there?*

*Brad: No, I don't play out... I stay inside and play video games*

Not only does he not have friends around his dad's, he also goes on to explain that though he keeps his skateboard at his dad's house, he rarely uses it because, unlike the area around his mom's house, the environmental conditions around his dad's home aren't really conducive to the activity. Neither the social nor the built environment at his dad's house supports his preferred activities, and as a result his behaviour pattern is significantly altered. His activities while at his mom's house have a strong outdoor component, but at his dad's home indoor activities predominate. In most investigations into the influence of the local environment on children's healthy behaviours, the tacit assumption is that children are based at a single residential location. The increasing number of children living under shared custody conditions warrants greater attention to the differing social and environmental conditions that may influence the activities, and in turn the health, of many contemporary children who inhabit more than one primary home neighbourhood.

The same consideration should be given to the growing number of single parent households. The activity schedules and free time of children living with a single working parent are often significantly influenced by the working schedule of the parent and the need for out of school care, which may reduce the amount of free time at home available for outdoor neighbourhood play. Single parent households may also be under stricter financial constraints that may limit the degree to which children can participate in fee-based extra-curricular activities, which also influences overall activity rhythms.

Another striking revelation arising from the child narratives was the highly seasonal nature of the children's neighbourhood activities. Though GPS and activity diary data provided a significant snapshot of children's activities during the study season, the narratives revealed that the spring activities captured are not necessarily representative of the activity engagements and rhythms at other times of the year. Analysis highlighted a fairly large and broad range of neighbourhood destinations perceived by the children, but the bulk of these destinations are primarily used during the warmer summer season. Often, these settings are *only* utilized in the summer, particularly when children are out of school and typically have more free time. Despite permission to access nearby settings at any time of the year, actual engagement appears highly dependent on the season.

Narratives revealed that there are a number of settings that are still commonly used in the winter, such as the hill in the park for tobogganing in the snow, but a surprisingly large number of the participants revealed that they mostly dislike the cold and snow, and primarily stay indoors during colder weather. Given that in climates like Canada, ‘colder weather’ can characterize one half to two-thirds of the year, additional attention should be directed towards the influence of weather conditions and seasonality on children’s activities. Studies of children’s behaviour should better acknowledge that many of the activity behaviours and patterns under study tend to only take place during a small portion of the year in colder climates. Additional efforts should also be directed towards understanding and facilitating the conditions that would encourage children’s outdoor activity and mobility during cold or inclement weather.

### **6.10.2 A caveat for study 3**

Since an active travel mode to school was one of the strongest predictors found in Study 2 of children travelling further from home and spending more time in neighbourhood settings, one may wonder why the role of travel mode to school it did not figure largely in the examination of neighbourhood patterns in Study 3. Although there was a high number of active travellers to school in Study 2 (over 50%), the children who qualified for inclusion in Study 3 were primarily non-active travellers. Most of the participants lived more than 1 kilometre from their school and were necessarily bussed or driven to school every day. Only 4 of the 23 children lived within reasonable walking distance of their school (less than 1600m), and regularly travelled to school on foot or bicycle. It was therefore difficult to gauge the role of active travel in the neighbourhood behaviours of the group as a whole. These children, however, all tended to have medium to high independent mobility licenses, and perceived and used higher levels of affordances in their neighbourhood. They all had low levels of time spent in vehicles and all but one had a strong outdoor component to their neighbourhood activities. It is likely that active travel to school is an indicator as well as a facilitator of greater time spent in neighbourhood environments. Additional work with a larger group of children could confirm this hypothesis

### 6.10.3 Reflections on methodological approach and tools

One of the advantages of this analysis was the wide range of tools utilized in the protocol and therefore the large volume and diversity of data collected during the study. A necessary complement to the GPS data used in Study 2 were the detailed daily activity diaries completed by child participants, helping to confirm locations of activity but also providing key information on the type of activities children undertook during their daily routines. Both the GPS and diary datasets were remarkably complete for all participants in this final study, and also found to be highly congruent with one another. Within this group of participants, there were only a few cases where a trip or activity was not recorded or where GPS equipment was unintentionally turned off or left at home. The high level of compliance with the protocol and inter-tool consistency allowed for most diary data to be integrated with geographical locations within the GIS, significantly aiding spatial analysis of neighbourhood activity.

The group digital mapping interview using Google Earth also proved to be a highly effective approach for engaging children in an analysis and clarification of their neighbourhood activities and experience. The ability to conduct interviews while viewing dynamic ‘breadcrumb trails’ of each child’s neighbourhood activity provided an effective alternative to neighbourhood walks. Although not a perfect proxy for walking tours, conducting the interviews with Google Earth allowed us to cover much more territory than would be possible on foot and supported discussions based on their complete mobility patterns, including destinations that typically reach by vehicle. As we learned in Study 1, the children oriented very well to aerial views of their neighbourhoods, and the interactive nature of the medium generated much enthusiasm among the participants. As with the neighbourhood walks, conducting the interviews with small groups of 2 or 3 participants also fostered dialogue among the peers that substantially added to our understanding of their neighbourhood activities.

The group interviews were also critically important for helping to clarify the frequency with which children visited neighbourhood destinations, and the consistency of their daily and weekly, and even seasonal patterns. A week, while providing a significant glimpse

into children's activities, is still only a fractional snapshot of their habitual neighbourhood travel and use. The interviews, in fact, on occasion painted a very different picture than the GPS and diary data alone would suggest. In some cases the study week actually represented an atypical week, where either an unusual pattern of activity appeared habitual or else a habitual activity happened to be missed. For example, one child's GPS and diary data demonstrated a daily pattern of stopping for breakfast at a coffee shop on the car trip from home to school. This child's interview, however, revealed that this was a highly unusual pattern only taking place because the child's grandma was in town visiting during the study week; the child typically walks to school each day and rarely stops to purchase food on the way. This example reinforces not only the need to speak directly to children to fine tune interpretations of behavioural data, but also the significant advantage of utilizing multiple, complementary tools to provide the fullest picture of behaviour possible.

The emergence of some atypical patterns in behaviour, however, also has implications for the accuracy of previous analyses that did not benefit from this understanding. That is, measures of children's neighbourhood activity spaces established in Study 2 assumed that the GPS data captured a relatively typical week of activity and travel. Therefore, these measures may under- or overestimate patterns in distance travelled or time spent in neighbourhood settings. It is impossible to ascertain how many measures represented atypical patterns without talking directly to the children or having relevant supplemental data. Future analyses would benefit from survey or interview questions which specifically solicit information on the frequency of activities and destinations. These potential errors also demonstrate the benefit of longer periods of activity tracking to ensure that habitual patterns emerge.

As a result of my own critical reflection on the methods utilized in this study, I must also highlight other potential limitations of the protocol used to collect and analyze data. First, although I consciously attempted to conduct interviews in such a way that my interest was apparent but where my reactions were neutral and non-judgmental, a review of transcripts highlights that I wasn't always successful in this regard due to the relaxed, friendly style I took with the child participants. There were also cases where questions

may have been too leading or specific. My reactions were almost exclusively positive but it is possible that children tailored their responses as a result. Secondly, I attempted to ensure that all participants in the group were given equal time and opportunity to discuss their neighbourhood perceptions and pursuits, but there were cases where one child appeared to dominate more of the discussion, especially as they were encouraged to participate in the discussion at all times. Although the informal group style fostered dialogue between peers and helped to highlight similarities and differences in experience, it may be beneficial in future studies to allot a specific portion of each interview to a single child to ensure that the voices of all children are heard equally.

Finally, this analysis included another attempt to marry qualitative data within a GIS to analyze the spatial contexts of narrative and perceptual information, and to connect this qualitative information with more objectively measured data. The ability to visualize children's neighbourhood perceptions spatially provided another invaluable layer of insight into the relationship between local environment and behaviour, and made several patterns much more apparent. Although strategies for integrating qualitative and quantitative data in a GIS are still being refined, the prospects of this opportunity for improving environment-behaviour research are immense. Qualitative GIS can significantly advance our understanding of the more individual nature of environmental experience, and will be an effective tool to complement more traditional quantitative analyses. Continued efforts to develop qualitative GIS protocols will be of enormous value to the study of children's geographies.

## 6.11 References

Active Healthy Kids Canada. (2012). *Is Active Play Extinct? The Active Healthy Kids Canada 2012 Report Card on Physical Activity for Children and Youth*. Toronto.

Akinbami, L. (2006). The state of childhood asthma, United States, 1980-2005. *Advance data*, (381), 1-24.

Anandan, C., Nurmatov, U., van Schayck, O. C. P., & Sheikh, a. (2010). Is the prevalence of asthma declining? Systematic review of epidemiological studies. *Allergy*, 65(2), 152-67.

Bartlett, S., Hart, R., Satterthwaite, D., De La Barra, X., & Missair, A. (1999). *Cities for children: Children's rights, poverty and urban management*. Earthscan.

- Berg, M., & Medrich, E. A. (1980). Children in four neighborhoods: The physical environment and its effect on play and play patterns. *Environment and Behavior*, 12(3), 320–348.
- Beunderman, J. (2010). *People Make Play*. London, England.
- Bird, W. (2007). Natural Greenspace. *The British Journal of General Practice*, 57(534), 69.
- Bjorklid, P. (1982). *Children's outdoor environment: A study of children's outdoor activities on two housing estates from the perspective of environmental and developmental psychology*. CWk Gleerup.
- Brown, B., Mackett, R., Gong, Y., Kitazawa, K., & Paskins, J. (2008). Gender differences in children's pathways to independent mobility. *Children's Geographies*, 6(4), 385–401.
- Buliung, R. N., Mitra, R., & Faulkner, G. (2009). Active school transportation in the Greater Toronto Area, Canada: an exploration of trends in space and time (1986-2006). *Preventive medicine*, 48(6), 507–12.
- Burdette, H. L., & Whitaker, R. C. (2005a). Resurrecting Free Play in Young Children Looking Beyond Fitness and Fatness to Attention, Affiliation, and Affect. *Archives of Pediatrics and Adolescent Medicine*, 159(1), 46–50.
- Burdette, H. L., & Whitaker, R. C. (2005b). A National Study of Neighborhood Safety, Outdoor Play, Television Viewing, and Obesity in Preschool Children. *Pediatrics*, 116(3), 657–662.
- Burke, C. (2005). "Play in focus": Children researching their own spaces and places for play. *Children, Youth and Environments*, 15(1), 27–53.
- Carpiano, R. M. (2009). Come take a walk with me: The "Go-Along" interview as a novel method for studying the implications of place for health and well-being. *Health & Place*, 15(1), 263–272.
- Chawla, L. (1992). Childhood Place Attachments. In I. & L. Altman S.M. (Ed.), *Human behavior and environment: Advances in theory and research* (Vol. 12). New York: Plenum.
- Chawla, L. (2002). Toward better cities for children and youth. In L. Chawla (Ed.), *Growing up in an urbanising world* (Vol. 13). Earthscan Publications Ltd.
- Christensen, P., & O'Brien, M. (2003). Children in the city: Introducing new perspectives. *Children in the City: Home, Neighborhood, and Community* (pp. 1–12). London and New York: Routledge Falmer.
- Churchman, A. (2003). Is there a place for children in the city? *Journal of Urban Design*, 8(2), 99–111.



- Clark, C., & Uzzell, D. L. (2002). The affordances of the home, neighbourhood, school and town centre for adolescents. *Journal of Environmental Psychology*, 22(1-2), 95–108.
- Clements, R. (2004). An Investigation of the Status of Outdoor Play. *Contemporary Issues in Early Childhood*, 5(1), 68–80.
- Cliff, D. P., Reilly, J. J., & Okely, A. D. (2009). Methodological considerations in using accelerometers to assess habitual physical activity in children aged 0-5 years. *Journal of science and medicine in sport / Sports Medicine Australia*, 12(5), 557–67.
- Colley, R., Gorber, S. C., & Tremblay, M. S. (2010). Quality control and data reduction procedures for accelerometry-derived measures of physical activity. *Health Reports*, 21(1), 63–69.
- Collins, D. C. A., & Kearns, R. A. (2001). Under curfew and under siege? Legal geographies of young people. *Geoforum*, 32(3), 389–403.
- Copperman, R. B., & Bhat, C. (2009). Children's activity-travel patterns and implications for activity-based travel demand modeling. *Transportation Research Board 88<sup>th</sup> Annual Meeting*, No. 09-0844.
- Cosco, N., & Moore, R. (2002). Our neighborhood is like that. In L. Chawla (Ed.), *Growing up in an urbanizing world*. London: UNESCO and Earthscan.
- Cosco, N., & Moore, R. (2009). Sensory integration and contact with nature: Designing outdoor inclusive environments. *The NAMTA Journal*, 34(2), 158–177.
- Darbyshire, P., MacDougall, C., & Schiller, W. (2005). Multiple methods in qualitative research with children: More insight or just more? *Qualitative Research*, 5(4), 417–436.
- Dennis Jr, S. F. (2006). Prospects for qualitative GIS at the intersection of youth development and participatory urban planning. *Environment and Planning A*, 38(11), 2039–2054.
- Dennis Jr, S. F., Gaulocher, S., Carpiano, R. M., & Brown, D. (2008). Participatory photo mapping (PPM): Exploring an integrated method for health and place research with young people. *Health & Place*, 15(2), 466–473.
- Driskell, D. (2002). *Creating better cities with children and youth: A manual for participation*. Earthscan.
- Ekelund, U., Sardinha, L. B., Anderssen, S. a, Harro, M., Franks, P. W., Brage, S., Cooper, A. R., et al. (2004). Associations between objectively assessed physical activity and indicators of body fatness in 9- to 10-y-old European children: a population-based study from 4 distinct regions in Europe (the European Youth Heart Study). *The American Journal of Clinical Nutrition*, 80(3), 584–90.

- Elgethun, K., Yost, M. G., Fitzpatrick, C. T. E., Nyerges, T. L., & Fenske, R. A. (2006). Comparison of global positioning system (GPS) tracking and parent-report diaries to characterize children's time-location patterns. *Journal of Exposure Science & Environmental Epidemiology*, *17*(2), 196–206.
- Engwicht, D. (1992). *Towards an Eco-city: Calming the traffic*. Sydney: Envirobook.
- Faber Taylor, A., & Kuo, F. E. M. (2011). Could Exposure to Everyday Green Spaces Help Treat ADHD? Evidence from Children's Play Settings. *Applied Psychology: Health and Well-Being*, *3*(3), 281–303.
- Fjortoft, I. (2004). Landscape as playscape: The effects of natural environments on children's play and motor development. *Children, Youth and Environments*, *14*(2), 21–44.
- Forman, R. T. (1995). *Land mosaics: The ecology of landscapes and regions*. Cambridge University Press.
- Fraga, A. M. a, Fraga, G. P., Stanley, C., Costantini, T. W., & Coimbra, R. (2010). Children at danger: injury fatalities among children in San Diego County. *European journal of epidemiology*, *25*(3), 211–7.
- Fyhri, A., & Hjorthol, R. (2009). Children's independent mobility to school, friends and leisure activities. *Journal of Transport Geography*, *17*(5), 377–384.
- Fyhri, A., Hjorthol, R., Mackett, R., Fotel, T. N., & Kyttä, M. (2011). Children's active travel and independent mobility in four countries: Development, social contributing trends and measures. *Transport Policy*, *18*(5), 703–710.
- Gaster, S. (1991). Urban Children's Access to their Neighborhood. *Environment and Behavior*, *23*(1), 70–85.
- Gibson, J. J. (1979). *The ecological approach to perception*. Boston: Houghton Mifflin.
- Gill, T. (2007). *No Fear: Growing Up in a Risk Averse Society*. London, England: Calouste Gulbenkian Foundation.
- Gill, T. (2011). *Free range kids : Why children need simple pleasures and everyday freedom , and what we can do about it*. Dairylea Foundation
- Gleave, J., & Cole-Hamilton, I. (2012). *A world without play : A literature review*. PlayEngland.
- Gray, P. (2011). The Decline of Play and the Rise of Psychopathology in Children and Adolescents s. *American Journal of Play*, *3*(4), 443–463.
- Greeno, J. G. (1994). Gibson's Affordances. *Psychological Review*, *101*(2), 336–342.
- Hart, R. (1979). *Children's experience of place*. Halsted Press.

- Heft, H. (1988). Affordances of children's environments: a functional approach to environmental description. *Children's Environments Quarterly*, 5(3), 29–37.
- Heft, H. (1997). The relevance of Gibson's ecological approach to perception for environment-behavior studies. In G. T. Moore & R. W. Marans (Eds.), *Advances in environment, behavior, and design* (Vol. 4, pp. 71–108). New York: Plenum Press.
- Heft, H., & Kyttä, M. (2006). A psychologically meaningful description of environments requires a relational approach. *Housing, Theory and Society*, 23(4), 210–213.
- Hillman, M., Adams, J., & Whitelegg, J. (1990). *One false move*. Policy Studies Institute London.
- Hofferth, S. L., & Sandberg, J. F. (2001). Changes in American Children's Time, 1981-1997. *Children at the millenium: Where have we come from, where are we going?* (Vol. 6, pp. 193–229). Elsevier Science Ltd.
- Holloway, S. L., & Valentine, G. (2000). Spatiality and the New Social Studies of Childhood. *Sociology*, 34(4), 763–783. doi:10.1177/S0038038500000468
- Irwin, L. G., Johnson, J. L., Henderson, a, Dahinten, V. S., & Hertzman, C. (2007). Examining how contexts shape young children's perspectives of health. *Child: care, health and development*, 33(4), 353–9.
- Jack, G. (2008). Place Matters: The Significance of Place Attachments for Children's Well-Being. *British Journal of Social Work*, 40(3), bcn142.
- Karsten, L. (2002). Mapping childhood in Amsterdam: The spatial and social construction of children's domains in the city. *Tijdschrift voor Economische en Sociale Geografie/Journal of Economic & Social Geography*, 93(3), 231–241.
- Karsten, L. (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.
- Kerr, J., Duncan, S., & Schipperjin, J. (2011). Using Global Positioning Systems in Health Research: A Practical Approach to Data Collection and Processing. *American Journal of Preventive Medicine*, 41(5), 532–540.
- Knigge, L., & Cope, M. (2006). Grounded visualization: Integrating the analysis of qualitative and quantitative data through grounded theory and visualization. *Environment and Planning A*, 38(11), 2021.
- Kwan, M., & Knigge, L. (2006). Doing qualitative research using GIS: an oxymoronic endeavor? *Environment and Planning A*, 38(11), 1999.
- Kytä, M. (2003). *Children in outdoor contexts: Affordances and independent mobility in the assessment of environmental child friendliness*. Helsinki University of Technology.
- Kytä, M. (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(2), 179–198.

- Lester, S., & Russell, W. (2008). *Play for a Change*. London, England.
- Loebach, J., & Gilliland, J. (2010). Child-Led Tours to Uncover Children's Perceptions and Use of Neighborhood Environments, *20*(1), 52–90.
- Lynch, K. (1960). *The image of the city*. Cambridge, MA: MIT Press.
- Lynch, K. (1981). *Good city form*. Boston, MA: The MIT Press.
- Lynch, K., Banerjee, T., & UNESCO. (1977). *Growing up in cities: studies of the spatial environment of adolescence in Cracow, Melbourne, Mexico City, Salta, Toluca, and Warszawa*. MIT Press.
- MacDougall, C., Schiller, W., & Darbyshire, P. (2009). What are our boundaries and where can we play? Perspectives from eight to ten year old Australian metropolitan and rural children. *Early Child Development and Care*, *179*(2), 189–204.
- Mackett, R., Brown, B., Gong, Y. I., Kitazawa, K. A. Y., & Paskins, J. (2005). Children's Independent Movement in the Local Environment, *33*(4).
- Mackett, R., Brown, B., Gong, Y., Kitazawa, K., & Paskins, J. (2007). Children's Independent Movement in the Local Environment. *Built Environment*, *33*(4), 454–468.
- Mackett, R., Lucas, L., Paskins, J., & Turbin, J. (2005). The therapeutic value of children's everyday travel. *Transportation Research Part A: Policy and Practice*, *39*(2-3), 205–219.
- Mackett, R., & Paskins, J. (2008). Children's physical activity: The contribution of playing and walking. *Children & Society*, *22*(5), 345–357.
- Matthews, H. (1987). Gender, home range and environmental cognition. *Transactions of the Institute of British Geographers*, *12*(1), 43–56.
- Matthews, H. (1992). *Making sense of place: Children's understanding of large-scale environments*. Harvester Wheatsheaf Hemel Hempstead.
- Matthews, H. (2003). Coming of Age for Children's Geographies. *Children's Geographies*, *1*(1), 3–5.
- Matthews, H., & Limb, M. (1999). Defining an agenda for the geography of children: review and prospect. *Progress in Human Geography*, *23*(1), 61–90.
- McDonald, N. C., Brown, A. L., Marchetti, L. M., & Pedroso, M. S. (2011). U.S. school travel, 2009 an assessment of trends. *American journal of preventive medicine*, *41*(2), 146–51.
- McMillan, T. E. (2007). The relative influence of urban form on a child's travel mode to school. *Transportation Research Part A: Policy and Practice*, *41*(1), 69–79.

Mikkelsen, M. R., & Christensen, P. (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.

Moore, R. (1986). *Childhood's domain: Play and place in child development*. Croom Helm Ltd.

Moore, R., & Young, D. (1978). Childhood outdoors: Toward a social ecology of the landscape. In I. Altman & J. Wohlwill (Eds.), *Children and the Environment* (Vol. 3, pp. 83–130). Plenum Publishing Corporation.

Morrow, V. (2001). Using qualitative methods to elicit young people's perspectives on their environments: Some ideas for community health initiatives. *Health Education Research*, 16(3), 255–268.

Ogden, C. L., Carroll, M. D., Kit, B. K., & Flegal, K. M. (2012). Prevalence of obesity and trends in body mass index among US children and adolescents, 1999-2010. *JAMA : the journal of the American Medical Association*, 307(5), 483–90.

O'Brien, M., Jones, D., Sloan, D., & Rustin, M. (2000). Children's Independent Spatial Mobility in the Urban Public Realm. *Childhood*, 7(3), 257–277.

Page, A. S., Cooper, A. R., Griew, P., Davis, L., & Hillsdon, M. (2009). Independent mobility in relation to weekday and weekend physical activity in children aged 10-11 years: The PEACH Project. *The international journal of behavioral nutrition and physical activity*, 6, 2.

Page, A. S., Cooper, A. R., Griew, P., & Jago, R. (2010). Independent mobility, perceptions of the built environment and children's participation in play, active travel and structured exercise and sport: the PEACH Project. *The international journal of behavioral nutrition and physical activity*, 7, 17.

Page, A. S., Cooper, A. R., Stamatakis, E., Foster, L. J., Crowne, E. C., Sabin, M., & Shield, J. P. H. (2005). Physical activity patterns in nonobese and obese children assessed using minute-by-minute accelerometry. *International Journal of Obesity* (2005), 29(9), 1070–6.

Pan, S. Y., Ugnat, a-M., Semenciw, R., Desmeules, M., Mao, Y., & Macleod, M. (2006). Trends in childhood injury mortality in Canada, 1979-2002. *Injury prevention : journal of the International Society for Child and Adolescent Injury Prevention*, 12(3), 155–60.

Penpraze, V., Reilly, J. J., MacLean, C., Montgomery, C., Kelly, L., & Paton, J. Y. (2006). Monitoring of physical activity in young children: How much is enough? *Pediatric Exercise Science*, 18, 483–491.

Pooley, C. G., Turnbull, J., & Adams, M. (2005). The journey to school in Britain since the 1940s: continuity and change. *Area*, 37(1), 43–53.

Postman, N. (1985). The disappearance of childhood. *Childhood Education*, 61(4), 286–293.

- Prezza, M., & Pacilli, M. G. (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, M., Pilloni, S., Morabito, C., Sersante, C., Alparone, F. R., & Giuliani, M. V. (2001). The influence of psychosocial and environmental factors on children's independent mobility and relationship to peer frequentation. *Journal of Community & Applied Social Psychology*, *11*(6), 435–450.
- Quigg, R., Gray, A., Reeder, A. I., Holt, A., & Waters, D. L. (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.
- Rainham, D. G., Bates, C. J., Blanchard, C. M., Dummer, T. J., Kirk, S. F., & Shearer, C. L. (2012). Spatial classification of youth physical activity patterns. *American journal of preventive medicine*, *42*(5), e87–96.
- Rissotto, A., & Tonucci, F. (2002). Freedom of movement and environmental knowledge in elementary school children. *Journal of Environmental Psychology*, *22*(1), 65–77.
- Ross, N. J. (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.
- Salmon, J., Salmon, L., Crawford, D., Hume, C., & Timperio, A. (2007). Associations among individual, social and environmental barriers and children's walking or cycling to school. *American Journal of Health Promotion*, *22*(2), 107–113.
- Schoeppe, S., Duncan, M. J., Badland, H. M., Oliver, M., & Curtis, C. (2012). Associations of children's independent mobility and active travel with physical activity, sedentary behaviour and weight status: A systematic review. *Journal of science and medicine in sport / Sports Medicine Australia*.
- Sebba, R. (1991). The landscapes of childhood: The reflection of childhood's environment in adult memories and in children's attitudes. *Environment and Behavior*, *23*(4), 395–422.
- Sener, I. N., & Bhat, C. R. (2007). An analysis of the social context of children's weekend discretionary activity participation. *Transportation*, *34*(6), 697–721.
- Shaw, B., Watson, B., Frauendienst, B., Redecker, A., Jones, T., & Hillman, M. (2012). *Children's independent mobility: A comparative study in England and Germany (1971-2010)*. London.
- Singer, D., Singer, J., D'Agostino, H., & DeLong, R. (2009). Children's Pastimes and Play in Sixteen Nations: Is Free-Play Declining? *American Journal of Play*, *1*, 283–312.

- Spencer, C., & Woolley, H. (2000). Children and the city: A summary of recent environmental psychology research. *Child: Care, Health & Development*, 26(3), 181.
- Spilsbury, J. (2005). “We Don”T Really Get To Go Out in the Front Yard’—Children’s Home Range and Neighborhood Violence. *Children’s Geographies*, 3(1), 79–99.
- Sutton, S. E., & Kemp, S. P. (2002). Children as partners in neighborhood placemaking: Lessons from intergenerational design charrettes. *Journal of Environmental Psychology*, 22(1-2), 171–189.
- Talen, E., & Coffindaffer, M. (1999). The utopianism of children: An empirical study of children’s neighborhood design preferences. *Journal of Planning Education and Research*, 18(4), 321–331.
- 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.
- Tranter, P., & Pawson, E. (2001). Children’s access to local environments: A case-study of Christchurch, New Zealand. *Local Environment*, 6(1), 27–48.
- Tremblay, M. S., Shields, M., Laviolette, M., Craig, C. L., Janssen, I., & Connor Gorber, S. (2010). Fitness of Canadian children and youth: results from the 2007-2009 Canadian Health Measures Survey. *Health reports / Statistics Canada, Canadian Centre for Health Information = Rapports sur la santé / Statistique Canada, Centre canadien d’information sur la santé*, 21(1), 7–20.
- Valentine, G. (1996). Angels and devils: moral landscapes of childhood. *Environment and Planning D*, 14, 581–600.
- Valentine, G., & McKendrick, J. (1997). Children’s outdoor play: Exploring parental concerns about children’s safety and the changing nature of childhood. *Geoforum*, 28(2), 219–235.
- Veitch, J., Salmon, J., & Ball, K. (2008). Children’s active free play in local neighborhoods: a behavioral mapping study. *Health education research*, 23(5), 870–9.
- Veitch, J., Salmon, J., & Ball, K. (2010). Individual, social and physical environmental correlates of children’s active free-play: a cross-sectional study. *The international journal of behavioral nutrition and physical activity*, 7, 11.
- Villanueva, K., Giles-Corti, B., Bulsara, M., McCormack, G. R., Timperio, A., Middleton, N., Beesley, B., et al. (2012). How far do children travel from their homes? Exploring children’s activity spaces in their neighborhood. *Health & Place*, 18(2), 263–273.
- Villanueva, K., Giles-Corti, B., Bulsara, M., Timperio, A., McCormack, G. R., Beesley, B., Trapp, G., et al. (2012). Where do children travel to and what local opportunities are available? The relationship between neighborhood destinations and children’s independent mobility. *Environment and Behavior*, 45(6), 679–705.

- Weller, S., & Bruegel, I. (2009). Children's 'Place' in the Development of Neighbourhood Social Capital. *Urban Studies*, 46(3), 629–643.
- Wells, N. M., & Evans, G. W. (2003). Nearby Nature: A Buffer of Life Stress Among Rural Children. *Environment and Behavior*, 35(3), 311–330.
- Wen, L. M., Kite, J., Merom, D., & Rissel, C. (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. *The International Journal of Behavioral Nutrition and Physical Activity*, 6, 15.
- Wiehe, S. E., Carroll, A. E., Liu, G. C., Haberkorn, K. L., Hoch, S. C., Wilson, J. S., & Fortenberry, J. D. (2008). Using GPS-enabled cell phones to track the travel patterns of adolescents. *International Journal of Health Geographics*, 7(1), 22.
- Wilson, N., Dasho, S., Martin, a. C., Wallerstein, N., Wang, C. C., & Minkler, M. (2007). Engaging Young Adolescents in Social Action Through Photovoice: The Youth Empowerment Strategies (YES!) Project. *The Journal of Early Adolescence*, 27(2), 241–261.
- Witten, K., Kearns, R. A., Carroll, P., Asiasiga, L., & Tava'e, N. (2013). New Zealand parents' understandings of the intergenerational decline in children's independent outdoor play and active travel. *Children's Geographies*, 11(2), 215–229.
- Woolley, H. (2006). Freedom of the city: Contemporary issues and policy influences on children and young people's use of public open space in England. *Children's Geographies*, 4(1), 45–59.
- Woolley, H., & Johns, R. (2010). Skateboarding : The City as a Playground. *Journal of Urban Design*, (April 2013), 37–41.
- Wridt, P. (2010). A qualitative GIS approach to mapping urban neighborhoods with children to promote physical activity and child-friendly community planning. *Environment and Planning B: Planning and Design*, 37(1), 129–147.
- Zenk, S. N., Schulz, A. J., Matthews, S. a, Odoms-Young, A., Wilbur, J., Wegrzyn, L., Gibbs, K., et al. (2011). Activity space environment and dietary and physical activity behaviors: a pilot study. *Health & Place*, 17(5), 1150–61.
- Zwerts, E., Allaert, G., Janssens, D., Wets, G., & Witlox, F. (2010). How children view their travel behaviour: a case study from Flanders (Belgium). *Journal of Transport Geography*, 18(6), 702–710.



## Chapter 7

### 7 Synthesis

#### 7.1 Summary of case studies

Each of the three major studies included in this dissertation investigated unique but complementary aspects of the child's perception and use of their neighbourhood environments for play and other leisure activities.

Study 1 (Chapter 4) sought to expose children's (aged 7 to 9 years) neighbourhood experiences through child-led neighbourhood tours and group discussion of neighbourhood photographs. This study illustrated that despite the disadvantaged local economic conditions and some threats to their sense of safety, the children of the East London neighbourhood were fiercely proud of being a part of this community, and secondly, that settings in the neighbourhood, particularly recreational and commercial sites, were relatively well used by many of the children in their leisure time. These places were particularly valued if they were close to home, and the child was able to visit them independently. This higher level of neighbourhood use, however, seemed to be related in part to the local social conditions; community social ties appeared very strong and children had many family and peer connections within the local neighbourhood. Physical features of the environment, especially high traffic roads and morphological barriers such as railway lines, influenced both child and parent perceptions of safety and tended to constrain children's local mobility. Despite the relatively high level of local activity, it appeared that most children's neighbourhood domains remained small and quite close to home. Although some strong patterns of perception and use emerged, analysis also reinforced the diversity of children's neighbourhood experiences and the danger of seeking generalizable patterns to the exclusion of telling contradictions.

This study also directed attention to the efficacy of the tools themselves for soliciting children's authentic views and for placing some control over the data collection and analysis processes into the hands of the children. The tools selected were very effective,

particularly when used in concert and when analyzed spatially. They also demonstrated the value of speaking directly to children about their environmental experiences, and using visual or experiential methods to capture their interest and prompt dialogue. Reflection on the tools and approaches used provided insights that directly influenced those utilized in the two studies which followed. In particular, experience gained during this study emphasized the need for multiple tools and vehicles for expression to capture children's diverse experience, as well as the value of speaking to children in small groups to maximize peer to peer dialogue.

Building on both the findings and the methodological insights of this first study, a protocol was developed for Studies 2 and 3 that more directly measures children's neighbourhood activity and capitalizes on the strength of multiple research tools. Needing to better understand the extent of their neighbourhood domains, Study 2 (Chapter 5) utilized direct monitoring via GPS to identify patterns of neighbourhood use, including distance travelled and time spent in neighbourhood settings. While still in its infancy as a methodological tool, direct monitoring through GPS represents the best contemporary tool for capturing children's spatial activity. Results from GPS monitoring effectively illustrated that while some children are travelling to settings fairly distant from home, time spent in neighbourhood settings is very low overall. Most of the children's activity in the study week took place indoors at home or outside, very close to home. Individual- and environmental-level factors were found to influence both the distance travelled and the time spent in neighbourhoods, reinforcing the need for an ecological framework to consider multiple spheres of influence on behavioural and health outcomes. The traditionally strong factors of age and gender did not emerge as highly significant variables in this group of 9 to 13 year old children. Rather, taking an active mode of travel to school and the level of independent mobility awarded by parents emerged as the strongest predictors for both outcomes. Permission from parents to travel independently was clearly influential, but the influence of parental perceptions of neighbourhood risk or resources remains somewhat unclear. Parent's perception of risk appeared to help predict the maximum distance travelled but not the relative amount of time spent in neighbourhoods. A closer look suggests that a child's age may in fact be

playing a role by moderating the effect of parental perceptions, influencing the neighbourhood activities of younger children more than the older cohort.

Built environment variables, while not as strongly predictive, were also influential and stressed the need for diverse local settings with proximal amenities which can be accessed via safe and well-connected pathways. Analysis also strongly reinforced that a simple neighbourhood typology of urban versus suburban is not sufficient to categorize the built environment of influence around children's homes.

The two types of metrics used to examine children's neighbourhood activity spaces were each found to be effective means of examining domains utilizing real-time GPS tracks, and each told an important part of the child's activity story. Analysis also suggested that socio-environmental conditions may contribute differently to the distances children travel versus the time they spend in the neighbourhood for play. These insights reinforced the value of multiple metrics to provide a fuller picture of neighbourhood use.

Gaining a more accurate representation of children's neighbourhood activity spaces from Study 2 provided a solid foundation for a more detailed examination of children's neighbourhood perceptions and use to answer questions of 'what' children do in their local settings, and 'why' (or 'why not') they choose the destinations and activities that they do. Study 3 (Chapter 6) utilized the copious data collected via a broad range of tools, including group interviews with participants, to understand why the children seemed to spend so little time in their neighbourhoods, and the conditions that foster or limit local activity. Analysis revealed that there is generally a diverse range of settings and destinations to which participants had access in theory, but that they only occasionally use or travel to these local amenities. Similar to Study 1, recreational and commercial sites were valued by the children but local activity spaces did not necessarily support their preferred activities. Proximity to destinations, as in Study 1, was important for use but this study also revealed the highly social nature of the children's activities and preferences; few neighbourhood activities took place without the company of friends or siblings. The availability of nearby peers and of settings that supported social activities significantly contributed to neighbourhood use. The perception of a lack of suitable or

challenging amenities appeared related to more time spent indoors at home or in settings outside the neighbourhood such as malls or mega-parks.

The participants of Study 3 were found to spend generally very little time outdoors or in the neighbourhood. Time outdoors in the neighbourhood, however, seemed to be tied to the amount of free out-of-school time available to them and the independent license for neighbourhood activity granted by parents. For some children, however, even time, license and other favourable conditions were not sufficient to entice them out of their homes for leisure activity. Again, similar to Study 1 and 2, the local built environment played a role in neighbourhood use, particularly the availability of nearby recreational and commercial resources and the locations of major morphological barriers. Overall, findings suggest that children's independent neighbourhood use is influenced by a combination of mobility restrictions, local social and environmental conditions, as well as children's individual interests. Neighbourhood environments which provide a diverse and flexible range of activity affordances, peers within close proximity, and a broad network of safe and walkable pathways to local destinations may improve parent comfort with independent neighbourhood activity as well as the appeal of the neighbourhood to a broader range of children.

The diverse range of tools employed together in Study 3 to investigate spatial patterns in perception and use, effectively clarified 'what' activities the children pursue in their neighbourhoods, and 'why' they might be drawn to various local settings. The study strongly reinforced that researchers must spend time talking directly with children to illuminate and 'ground-truth' their distinctive neighbourhood experiences .

## **7.2 Synthesis of Findings**

When considered as a whole, there are a number of congruencies among the findings of all three studies, as well as with the current body of literature related to children's healthy environments.

Together the studies emphasize in particular the importance of safe, accessible neighbourhood nodes to support local travel and activity. Studies 1 and 3 reinforce

children's preference for local recreational and commercial sites. Destinations such as variety stores or playgrounds feature heavily in children's neighbourhood use; many children mentioned one of these resources as a favourite local site that could entice them to travel further from home. These sites, whether formal or informal, can serve as important nodes for gathering and activity. Sites that they could visit on their own or in the company of friends were particularly valued. The social nature of neighbourhood activities, in fact, was one of the most striking insights from both Study 1 and 3; children's neighbourhood use, and the meaning they assign to local destinations, is highly intertwined with those of nearby peers. Many of the sites regularly utilized by participating children could be classified as shared settings. The need to support the social nature of children's neighbourhood activity is often neglected. All three studies, in fact, suggested that neighbourhood amenities may not be serving the diverse needs of local children and youth. Lack of interesting or challenging facilities, few opportunities for social gathering, and the intimidating presence of older youth or adults in public spaces all played a role in limiting the support of the neighbourhood for their preferred activities.

Accessibility was also highlighted as an important factor in children's travel to and use of neighbourhood sites, and could be facilitated or restricted in a number of ways. Access to local destinations was influenced not only by the proximity to home and the degree to which the built environment supported safe and easy travel, but also by the license for independent mobility granted by parents. All three studies highlighted that both the nearby social and environmental conditions influenced children's neighbourhood use and travel. These factors combined to affect the size of children's domains, either directly by increasing both child and parent comfort with independent neighbourhood activity, or indirectly by affording more appealing and accessible local opportunities for playful activity.

In most cases, however, socio-environmental conditions appeared to combine in ways which generally limited the size of children's domains. Although the specific contributing factors differed among children and among differing built environments, all three studies revealed that the habitual neighbourhood domains of most children are quite

small, with most out-of-school activity taking place inside or within a short distance of home.

It is interesting to note that while children were aware of some neighbourhood threats, and identified local areas where they felt some fear or discomfort, there were generally very few explicitly negative comments about their communities and little dialogue around these 'threats'. Potential dangers clearly affected some child and parent perceptions of the neighbourhood, and prompted children to modify their activity or travel patterns, but the overall lack of dialogue limits our ability to understand the relationship between negative neighbourhood experiences and children's local activity. It is possible that the lack of information was due to the nature of the methodology and the particular questions asked of the children, or else their level of comfort with sharing this information with a 'stranger'. This area, however, is worth further investigation, particularly as additional probing may shed light on reasons why children are spending little time in their neighbourhood environments.

In addition to areas of agreement between the three studies, there were also a number of ways in which study findings were inconsistent with one another, or with general trends in the literature to date. The most interesting incongruity is the lack of association in all three studies between neighbourhood use and gender. Historically, research has documented a clear gender gap, particularly in the license children are given to explore or spend time in their neighbourhoods; boys have consistently been given more freedom for independent neighbourhood activity, which has translated to larger neighbourhood domains and more time spent in local settings than girls of the same age (Brown et al., 2008; Fyhri & Hjorthol, 2009; Hart, 1979; Mackett et al., 2007; Matthews, 1987; Prezza et al., 2001; Tranter & Pawson, 2001). There was, however, no systemic gender differences apparent in the three studies presented here. Gender was not found to be a predictor of distance travelled or time spent in the neighbourhood, and neither the narratives nor activity tracking suggested any widespread differences in the neighbourhood licenses or behaviour of boys versus girls. Rather, these studies align with the small body of recent work reporting little to no gender imbalance, suggesting that traditional gender-based patterns may be changing (Johansson, 2006; Spilsbury,

2005; Trapp et al., 2012). It is possible that girls are still granted lower levels of independent travel but, as suggested by Brown and colleagues (2008), that girls employ different strategies than boys to increase their neighbourhood domains such as travelling more frequently with peers. It may also be that stereotypical perceptions of boys as better equipped to negotiate neighbourhood risks are falling away, and that restrictions (or licenses) are being employed more uniformly across both groups. Alternatively, although high levels of screen time were present among both boys and girls, it may be that more boys are electing to spend more of their free time indoors playing, for example, video games. Clarification of the mechanisms which may be helping to close the gender gap requires additional qualitative work with children, and would be a valuable addition to the field.

A child's age, also strongly and consistently associated in the literature with levels of independent mobility and the size of neighbourhood domains (Fyhri & Hjorthol, 2009; Hart, 1979; Matthews, 1992; Sener & Bhat, 2007; Spilsbury, 2005; Tranter & Pawson, 2001) did not seem to exhibit as strong or clear a relationship with neighbourhood behaviour in the dissertation studies. Study 1 utilized a younger cohort (7 to 9 years), and while neighbourhood domains were not extensive overall, many in this group appeared to spend more time in their neighbourhood than many of the older children (9 to 13 years) observed in Study 2 and 3. In Study 2, age did surface as a significant predictor of time spent in further located neighbourhood settings, but not in the maximum distance travelled. Older children may have been more likely to spend time in settings further from home, but they did not necessarily travel farther than their younger counterparts. Results from Study 2 do suggest, however, that parent's perceptions of neighbourhood safety, and the level of independent mobility they granted to their children, were highly correlated with age. Parents of younger children may be more wary of, and responsive to, potential neighbourhood risks, but, as this thesis demonstrates, a child's age alone does not always predict neighbourhood-based activity or mobility.

Contrary to a number of recent studies suggesting that most children now exhibit highly scheduled routines involving a number of structured, supervised activities often outside the neighbourhood and requiring access by vehicle, the children in Study 3 on the whole

did not fit this pattern. There were a number of children whose after school free time was reduced on several days due to organized activities, and these children usually experienced high levels of backseat time; this was not the norm for this sample of participants. Although not specifically measured in Study 1, it appeared that most of these participants experienced fairly unstructured schedules as well. These findings should remind researchers of the dangers of generalizing findings across a broad group of children, particularly when involving children from different environmental and socio-cultural contexts. In the case of the three studies presented here, context may, in fact, be making all the difference. All of the neighbourhoods involved in Studies 1 and 3, and half of those involved in Study 2, would be classified as low to medium-low income. Families with lower incomes may have less time and financial resources to involve their children in fee-based programs or the ability to easily access activities taking place in other parts of the city. The lack of consistent data on household income for study participants precluded an analysis of the impact of household-level socio-economic status on children's activities and geographies. It would be valuable to repeat these analyses in higher income neighbourhoods to see whether the same patterns found within the lower income communities in these case studies hold, as well as the overall influence of household income on children's neighbourhood behaviours.

Parent's perceptions of neighbourhood environments also demonstrated some inconsistencies between the three studies, as well as with some of the established literature. Child narratives from both Study 1 and 3 suggest that parent's perceptions of the neighbourhood play a strong role in children's level of independent mobility and the size of the local domains children are allowed to utilize for leisure activities. This finding was confirmed in part by the analysis in Study 2 which found parent's perceptions, of neighbourhood safety in particular, were strongly related to the distance travelled from home; children tended to travel further when their parent's perceived lower levels of neighbourhood risk. These results are highly congruent with other recent studies (Kerr et al., 2006; Panter et al., 2008; Shaw et al., 2012; Timperio et al., 2004; Tranter & Pawson, 2001; Wridt, 2010) Parent's perceptions, however, did not appear to predict the amount of time children spent in their neighbourhood settings. The influence of parent



perceptions may still, however, be implicit here as a mediator of the independent license parents grant to their children, which was a consistently strong factor predicting neighbourhood use. Similar to other work in the literature, this license is at least in part tied to parental perceptions of the local social and built environment, particularly as it relates to safety (Berg & Medrich, 1980; Hillman, 2006; Spilsbury et al., 2009; Valentine, 1997; Veitch et al., 2006). These findings together suggest that policy and planning efforts to improve children's independent access to and use of local environments should be at least a two pronged approach, targeting conditions of the built environment that increase children's safety but also working with parents and caregivers to understand the root of safety concerns so as to direct interventions that may alleviate anxieties.

Features of the local built environment were also found to influence children's neighbourhood use, but results did not necessarily add much clarification to the mixed results found within the existing literature. Although children tended to travel further in neighbourhoods classified as 'urban', consistent with some earlier studies (Badland, Duncan, & Mummery, 2008; Larsen et al., 2009; Shaw et al., 2012), there were no clear relationship patterns between metrics of neighbourhood use and other 'urban' built environment variables such as traffic volume, intersection density, population density and the availability of recreational opportunities, which have been documented as influential in previous work (Frank, Kerr, Chapman, & Sallis, 2007; Larsen et al., 2009; McMillan, 2005; Shaw et al., 2012). Commercial, residential, agricultural and residential land uses exhibited the strongest relationships with neighbourhood activity, in directions that generally confirm that 'urban' conditions may be more supportive of local activity and travel. The findings, however, also reinforce the inadequacy of simplified neighbourhood type classifications in the characterization of the local built environment. Although features of the broader community environment appeared to play some role in neighbourhood behaviour, closer examination revealed that the micro-environment within close proximity to the child's home appears to be the more influential built environment. At this scale, 'urban' and 'suburban' classifications disappear; micro-neighbourhood environments of children in both 'urban' and 'suburban' settings often exhibited remarkable similarities. These results emphasize the influence of a child's

nearby environment in promoting neighbourhood activity, as well as the need to utilize more nuanced classifications of the neighbourhood environment.

One potentially new insight from analysis of the built environment is the role of major morphological elements in the extent of children's neighbourhood activity domains. In each study, a closer examination of children's activity and travel highlighted the lack of movement beyond morphological features such as major roads, railroad tracks, ravines or rivers, even swaths of industrial or agricultural land. These features each have some level of risk associated with crossing over, and effectively acted as barriers to children's mobility. Only a small group of children were found to cross major morphological features, whether due to their own fears or to parental restrictions. The role of neighbourhood morphology in children's mobility should be studied in more detail, and these features should be considered in characterizations of neighbourhood environments.

Another striking difference across the three studies was the noticeable difference in children's feelings towards their neighbourhood environments. The children of East London (Study 1) exhibited strong, positive feelings about their neighbourhoods, and a palpable sense of belonging to and identification with their local community. This strong relationship with neighbourhood was largely absent among the children of Study 3. These children showed very little sense of pride, ownership or belonging to their communities and generally appeared quite detached from their local places. It is possible that the difference is related to variation in the methods used to elicit environmental perceptions, however, the strong place attachment exhibited by the East London children is likely in part due to the extensive social and familial networks most had established in the community. These children seem to have a greater experience of 'child friendliness' in their neighbourhood than did the children in the Study 3 communities, despite community problems with crime and the lack of local activity amenities. Children in East London generally felt more welcomed and enmeshed within their community than did the children in other neighbourhoods. This attachment to place is strongly related to a child's development of a healthy self-identity (Cosco & Moore, 2002; Engwicht, 1992; Jack, 2008; Tranter & Pawson, 2001). It is an important lesson to note that the

experience of ‘child-friendliness’ is not solely tied to the income level of the neighbourhood, or the type and quality of its local resources.

Narratives from both Study 1 and 3 also reinforced the very individual nature of neighbourhood experiences. The use of mixed methods and multiple tools helped to unearth contradictions in children’s experiences and perceptions within the same environments. For example, in Study 1, the local park, popular with many neighbourhood children, was instead considered threatening by others who experienced bullying or who observed debris from drug use. Children’s experiences can also shift by time of day or year, or depending on whether they are alone or accompanied. In Study 3, for example, a local retention pond was a popular social hangout by neighbourhood children during the day, but considered dangerous at night when it became populated by older, intimidating youth. Children’s experience of local environments, therefore, is neither consistent nor static. These findings are an important reminder for children’s environments researchers. A significant portion of contemporary studies in this field is comprised of larger-scale quantitative studies. The danger inherent in relying solely on these studies is the tendency to lose sight of the idiosyncratic nature of children’s environmental experiences. Social, cultural and environmental conditions combine in different ways to influence the neighbourhood behaviour of, for example, two 10-year old girls living side by side in the same community. It is imperative that we occasionally drop down to ‘ground-truth’ results from larger studies with the experience of different children in each environment. Although higher-level patterns can be useful guidelines, we must remember that these heuristics won’t necessarily apply equally to every child. Continued investigation the role of specific socio-environmental contexts on children’s individual opportunities and behaviours will make significant contributions to the body of children’s environments research.

Finally, the methods utilized in this dissertation emphasize that children are not only capable co-researchers but enthusiastic advocates for their rights and for their communities. Contemporary research with children must better recognize the right and ability of children for meaningful contribution and make a more deliberate effort to effectively integrate them into the research process, including the use of tools that

encourage and document their authentic voices. Such participatory research with children also holds enormous potential for collaboration with community initiatives or environmental interventions; children's environments researchers would do well to directly pair their work with community development planning and policy efforts.

### **7.3 Implications and next steps**

This dissertation set out to explore the contemporary relationship between children and their neighbourhood environments, and the factors that may influence its perception and use. A number of recent studies suggest that there has been a fundamental shift in children's relationship with their neighbourhood (Gaster, 1991; Hillman et al., 1990; Karsten, 2005; Shaw et al., 2012; Valentine & McKendrick, 1997; Veitch et al., 2008). The findings from this dissertation would support this hypothesis, revealing that participating children spent very little of their out-of-school leisure time in neighbourhood environments, and most activity was within very close proximity to their homes. Although some children still appear to access a larger frequented domain, overall their habitual neighbourhood activity spaces are very small, supporting the thesis that children's neighbourhood domains are shrinking from those of previous generations. The neighbourhood no longer serves as a primary activity setting for many children. The potential consequences for children's healthy development and place attachment are concerning.

This work also makes it clear that there are many factors influencing children's neighbourhood perceptions and their level of local activity. While both social and built environment conditions of the neighbourhood combined to either boost or limit affordances for play or socializing, it also appeared that neither on their own was necessarily sufficient to promote diverse and consistent use of neighbourhood environments. For example, the availability of a number of nearby peers did not necessarily encourage neighbourhood social activity when the local environment offered few interesting or supportive amenities. The degree of restriction on independent mobility levelled by parents surfaced as a significant predictor of neighbourhood use, suggesting that efforts to increase neighbourhood use need to target those factors,

whether social or environmental, that underscore parent's perception of neighbourhood risk. These studies also provided both direct and indirect evidence that children's particular interests or motivations play a large part in activity choices; a high level of independent mobility and nearby activity resources was still not enough to promote neighbourhood use among some children whose primary preferences were video games or other indoor pursuits. These findings serve as a reminder of the individualized nature of children's neighbourhood behaviours.

Although children in Study 1 demonstrated strong attachments to their local environment, the lack of relationship with neighbourhood places demonstrated by the children in the Study 3 communities could be interpreted as cause for concern. The relatively limited way, both in time and enthusiasm, with which most participants engaged with their neighbourhood environments suggests that either children's access to their neighbourhoods has been severely restricted, or the local people and built environment do not welcome or support the activities of children. It is crucial that children be given both the freedom and the time to explore their communities to begin building new skills as well as a relationship with local places. Engwicht claims that "... this freedom to explore the local neighbourhood is probably the key ingredient in children developing a feeling that they belong to a neighbourhood, a place. It not only gives them an opportunity to develop relationships with people of all ages who live in their neighbourhood, it gives them an opportunity to develop a relationship with the placeness of their physical environment. Robbing children of a sense of place robs them of the very essence of life" (Engwicht, 1992, 39). Access alone to opportunities, however, is not necessarily enough to promote activity. A child-friendly environment must support a diverse and shifting range of activity interests. Contemporary neighbourhood landscapes may be providing fewer high quality environments for children's activities. Gaster claims, as early as 1991, that "the cityscape today has much less to offer as a stimulus field for young minds, regardless of the extent or limitations of the child's ability to move around" (Gaster, 1991, 5).

So where do we go from here? Children's neighbourhood behaviour is influenced by myriad social, cultural and environmental factors. There is, therefore, no simple solution

to improving children's access to rich, diverse neighbourhood opportunities or increasing their engagement with community environments. Changes in the built environment, such as improving the 'walkability' of a neighbourhood, however, can no doubt support neighbourhood activity and mobility. Guidelines for 'child-friendly' environments emerging from contemporary research, including this dissertation, provide a valuable foundation for directing planning and policy changes. This work can steer us away from the accommodation of children's needs strictly through the traditional provision of playgrounds or other settings designed specifically for children, planning instead to make the neighbourhood as a whole 'child-friendly'. This does not mean privileging children's activities above those of other residents, rather, integrating opportunities for children to safely play and gather in public places of the neighbourhood among other members of their community.

Such improvements to the neighbourhood built environment, however, will have little effect overall if they are not accompanied by a paradigm shift in cultural attitudes. Large-scale change requires a concerted effort to shift contemporary societal attitudes towards children, debunking both the 'angel' and 'devil' stereotypes and positioning children instead as capable, resilient actors who not only require exposure to a diverse and welcoming community environment for their healthy development, but who have an inherent right to it.

As parents and caregivers likely have the strongest influence in the facilitation or restriction of children's local, independent activity, efforts to initiate a cultural shift could be directed toward broadening parent perceptions of healthy activity, and attempting to strike a better balance between children's safety and independence. Several studies have demonstrated that closely supervising children, and driving them to school or other nearby destinations, is currently considered by many to be a necessary component of 'good parenting', and that parents experience significant pressure to conform with this parenting culture (Collins & Kearns, 2001a; MacDougall et al., 2009; Shaw et al., 2012; Tranter & Pawson, 2001; Valentine, 1997; Valentine & McKendrick, 1997). Efforts to advocate for more free and unsupervised neighbourhood activity need to acknowledge this pervasive perspective, and work to increase caregiver understanding of the

substantial health and development benefits for their children of greater levels of independent neighbourhood play. Concurrently, programs can be put in place to help children learn how to more safely negotiate the neighbourhood environment, which should in turn increase parental confidence in their child's environmental competence.

There are two ways of framing awareness and policy efforts that may help to counterbalance the prominent discourse of protectionism. First would be to frame independent neighbourhood activity in terms of children's health. Parent's primary concerns, rightly so, are for the health and safety of their children. Protecting children from neighbourhood risk is imperative, but protective actions are in some cases based on over-exaggerated risks from people or conditions in the local environment. Efforts need to be made to clarify actual risks posed by the neighbourhood and to enact programs help children learn how to more safely negotiate the neighbourhood environment, which should in turn increase parental confidence in their child's environmental competence. Awareness campaigns also need to emphasize that there are key developmental milestones that can be reached through independent neighbourhood activity, and that granting children some local independence can be the healthy choice. Alternatively, caregivers should be coached to understand that protection at all costs is not the ideal, and that there can be detrimental consequences of restricting local play and mobility.

Substantial efforts are currently being made to advocate for and facilitate increased levels of physical activity to combat rising levels of childhood obesity. Advocacy campaigns or environmental interventions could broaden their definitions of healthy activity to include increased levels of free and independent play, particularly in outdoor neighbourhood environments. Evidence to date suggests that this type of play will likely in itself lead to more physical activity, while fostering the many other environmental interactions that are required for healthy development. Educators must also be targeted in order to preserve or even increase the levels of outdoor time for free and unstructured play during school hours, and prevent the reduction or elimination of school recesses, a recent trend in many schools in the United States. Municipal recreation departments could also be targets for awareness campaigns, as they are well positioned to provide places and programming for more neighbourhood-based activities.

We should also, however, frame efforts to shift attitudes and behaviours in terms of children's rights. A number of scholars now advise that time for free play, unsupervised by adults, in safe and stimulating environments is a basic right for all children, not a privilege (Bartlett et al., 1999; Berg & Medrich, 1980; Holloway & Valentine, 2000; Matthews & Limb, 1999; Shaw et al., 2012). This right to safe and appropriate play experiences has been entrenched by the United Nations in the 1989 Convention on the Rights of the Child. Children's right to play as it applies to outdoor neighbourhood activity is a two-fold issue. It not only refers to providing children with the opportunity and access to play in safe and stimulating places within their communities, but also an acceptance that children have a legitimate right to inhabit the public places of their neighbourhood and not just those officially sanctioned for their use such as parks and playgrounds. Lynch suggested in 1977 that children should be able to explore and utilize the entire city as their 'learning grounds', and that this use depends on a number of spatial rights, including the right of presence and appropriation (Lynch, 1981; Lynch et al., 1977). Several scholars have argued, however, that there has been a cultural shift in the definition of the 'natural' places of children that has seen a marked reduction in children's rights to and acceptance in public places. Predominant now is the notion that adults have a more legitimate right to public places, and that children's activity these settings should be strictly controlled and supervised (Collins & Kearns, 2001b; Holloway & Valentine, 2000; Valentine & McKendrick, 1997). Once associated primarily with outdoor settings, 'children's places' are increasingly considered to be in the private, and largely indoor, spaces of home, school and other institutionalized settings (Karsten, 2005); 'child-like' behaviour in public places, besides those specifically designated for children's use, is often considered by adults to be inappropriate and often leads to conflict (Collins & Kearns, 2001b; Valentine, 1996; Woolley, 2006; Woolley & Johns, 2010). As a result, children's presence in public places, especially unaccompanied by adults, has been steadily dwindling, as has the perception that their presence is a protected right (Karsten, 2005). Providing healthy environments for children should include explicit recognition of the legitimate rights of children to play in a diverse range of safe outdoor environments in their communities, and enabling their local independent mobility and exploration.



In attempting to support changes in policymaking and practice that protect and promote the rights of children to safe neighbourhood play, we must also remember that the focus should be kept squarely on play in all its forms, not just those that are more physically active. Though physical activity is an important focus given rising rates of obesity and sedentarianism among children in developed nations, maximizing the benefits for children's health in all areas requires exposure to a diverse range of play experiences and environments. Some of the earliest pioneers in children's development and environments, such as Piaget, Jacobs and Mead, have all drawn attention to the importance of environments beyond the home to provide the necessary ingredients for activity, socializing, learning and adventure. Without the time and freedom to independently and directly engage with their stimulating and complex local environments, from where will this diversity come? The developmental advances fostered by actively exploring and expanding a personal domain within the neighbourhood cannot take place from the backseat of a vehicle, nor when the engagement is directed or supervised by adults (Bartlett et al., 1999; Rissotto & Tonucci, 2002; Spilsbury, 2005; Tranter & Pawson, 2001). Awarding children higher levels of independent mobility, however, and providing them with richer social and environmental resources, could help to encourage more time spent in neighbourhood environments, and strengthen their experience of diverse, child-friendly environments.

#### **7.4 A final word on study methods and approaches**

On the whole, the methods used to collect and analyze data in each of the studies were very effective for helping to clarify children's neighbourhood behaviour and perceptions, and the strategies used to employ them represent one of the major innovations of this dissertation. These methods, however, appeared to yield better results when used in concert with other complementary tools, and when several approaches were taken to analyze and interpret the data. It is difficult, if not impossible, to fully understand the environmental experience of the child. The careful employment of multiple appropriate and sensitive tools can, however, help to provide a window into the child's lifeworld and minimize the role of the researcher in the interpretation of that experience. In each of the three studies, a multi-pronged protocol, with mixed data collection and analysis methods,

helped to provide a clear, and less biased interpretation of the children's perceptions and behaviour.

It was clear from these three analyses that portable GPS units in particular represent a significant leap forward in our ability not only to objectively document the environmental context of children's activity and travel, but in our ability to better characterize the 'neighbourhood' as it is relevant and meaningful to a child. Physical activity researchers have already taken significant advantage of these new measurement tools, but few children's scholars have yet to utilize GPS data to document children's neighbourhood activity spaces. These studies, therefore, make a significant contribution to the field in this regard.

Another insight, particularly from Studies 1 and 3, is the efficacy of an affordance-based approach to documenting and understanding children's place use and experience. Children's own functional perspective was apparent in many of the narratives; instead of referring to just a particular park or other recreational destination, they spoke of "the big fun tree", "the rock I like to climb" or "the bar that I pretend to do gymnastics on". Directing attention to the affordances for activity rather than just the larger setting also helped highlight the myriad ways different children use the same environmental feature, or the way children use environments in ways which weren't necessarily intended, such as "the baby swings [that] I like hanging upside down in". An affordance-based approach transcends traditional or intended functions and allows the researcher to see children's environments for the activity and engagement opportunities that they provide. This type of approach better reflects children's innate perception and use of their environments, and is well positioned to help the researcher document a more authentic record of children's place needs and experience.

The concept of affordances also holds great potential as a tool for auditing or evaluating the 'child-friendliness' of a given environment. Considering the affordances for activity and interaction that an environment provides better captures both the possibilities and the limitations of a setting as a child might see it. Rather than an audit tool that documents, for example, the number of play structures or park benches, an affordance-based tool

would instead be able to acknowledge opportunities for climbing, swinging, jumping, sitting and socializing outside of just these traditional features. Involving children more directly in the evaluation of child-friendly environments would exponentially improve our ability to assess and create diverse, flexible, challenging and stimulating places for children.

In general, it is a difficult endeavour to attempt to document and measure, let alone understand, children's neighbourhood perceptions and behaviour. Add to this complex task the fact that the physical and socio-cultural landscapes of children continue to shift and the effort becomes even more problematic. For example, the recent exponential increase in the number of children carrying their own cell phones may be having an expansive effect on their independent mobility. A few studies now suggest that by giving a child a mobile phone to carry, through which they can exercise a degree of remote monitoring and supervision, parents may feel more comfortable granting children more neighbourhood independence (Brockman, Jago, & Fox, 2011; Fotel & Thomsen, 2004). This 'monitoring' device, ironically, may be helping children to re-negotiate larger independent territories for themselves than they could access before they had a mobile phone. This development reminds us of the complex but also fluctuating nature of children's perceptions, behaviours and geographies. The effort, however, is a worthy one. Even small insights gained from the growing body of scholarship related to children, their health and their environments help to inform the development of more supportive and child-friendly policies and environments. This dissertation seeks to make its own small contribution to this valuable body of work. Continued efforts to understand not only children's neighbourhood behaviour, but their place needs and preferences, will help us all to provide neighbourhood cultures and environments that genuinely support the health and well-being of its resident children.

## **7.5 Critical reflection**

I grew up in the 1970s in a small, tight-knit rural community in Southwestern Ontario. Like many of my classmates I lived more than a kilometre from my school, but my house was also located on a local highway with no shoulder, let alone sidewalks. As a result, I

was bussed to school each day along with the vast majority of my school mates. Even though we had only a few ‘neighbours’ who lived close by, I knew most people in my community, and certainly everyone in my school of about 350 students. Although I couldn’t walk to school, and it was difficult to bike into ‘town’ or to friends’ homes because of both the distance and the lack of supportive infrastructure, I still feel like I grew up deeply embedded within my community and had a clear sense of belonging to my small town.

I also spent the bulk of my out-of-school time, at least in non-winter seasons, outdoors. Although I couldn’t use the highway to travel from place to place, I made full use of the vast network of fields, lanes and tractor paths around my home to travel long distances from my home. I was often accompanied by my older brother or a friend, but I was also given the freedom to range through the fields and bushes on my own. My mobility increased exponentially when my parents bought us a small all-terrain vehicle. I spent hours most days driving through field after field, often returning home only because it was getting dark. A large yard and an in-ground pool also worked to entice me out of the house. My strongest and fondest memories are of these activities outdoors in my ‘neighbourhood’. I spent my entire childhood and adolescence in this rural environment, and it no doubt shaped my perspective on children and childhood play. However, I have spent most of my adult years living in urban environments. Although I did not experience these settings as a child, through my observations I have come to appreciate the different but no less valuable opportunities urban settings offer to children and youth.

It is with this background that I come to my studies of children and their neighbourhood geographies. I am aware that my own experience is very different from most contemporary children with whom I’ve worked, especially as the majority of my research has taken place in urban and suburban environments. However, I also attempted to approach all of my graduate studies with this awareness in mind, and the potential prejudices it may engender. I have also attempted to shift control into the hands of participating children, and solicit feedback on my interpretations, whenever possible. I have ultimately tried to approach both the collection and analysis of data in an open and non-judgmental manner, and with an eye to when and how my own experiences of

childhood may be shaping my behaviour or my interpretations. There is, of course, no way to be absolutely successful in this approach, no matter how conscientious my intentions. It is impossible to remove my 'adult' lens or completely disregard my unique perspective which has been shaped by my own childhood landscapes and experiences. The best that I could do was to carefully and consciously choose methods that reduced the power imbalance between the children and myself, and which would help to minimize the interference of my particular adult perspective. In the future, I would choose to employ even more participatory methods, and embed more mechanisms for child interpretation and feedback, to reduce this interference even further. For now I have done my best to present the authentic voice and lifeworlds of the wonderful children with whom I had the privilege to work.

*We do not cease to play because we grow old.  
We grow old because we cease to play.*

~ *George Bernard Shaw*

## 7.6 References

- Badland, H. M., Duncan, M. J., & Mummery, W. K. (2008). Travel perceptions, behaviors, and environment by degree of urbanization. *Preventive Medicine, 47*(3), 265–269.
- Bartlett, S., Hart, R., Satterthwaite, D., De La Barra, X., & Missair, A. (1999). *Cities for children: Children's rights, poverty and urban management*. Earthscan.
- Berg, M., & Medrich, E. A. (1980). Children in four neighborhoods: The physical environment and its effect on play and play patterns. *Environment and Behavior, 12*(3), 320–348.
- Brockman, R., Jago, R., & Fox, K. R. (2011). Children's active play: self-reported motivators, barriers and facilitators. *BMC Public Health, 11*(1), 461.
- Brown, B., Mackett, R., Gong, Y., Kitazawa, K., & Paskins, J. (2008). Gender differences in children's pathways to independent mobility. *Children's Geographies, 6*(4), 385–401.
- Collins, D. C. A., & Kearns, R. A. (2001a). The safe journeys of an enterprising school: negotiating landscapes of opportunity and risk. *Health and Place, 7*(4), 293–306.

- Collins, D. C. A., & Kearns, R. A. (2001b). Under curfew and under siege? Legal geographies of young people. *Geoforum*, 32(3), 389–403.
- Cosco, N., & Moore, R. (2002). Our neighborhood is like that. In L. Chawla (Ed.), *Growing up in an urbanizing world*. London: UNESCO and Earthscan.
- Engwicht, D. (1992). *Towards an Eco-city: Calming the traffic*. Sydney: Envirobook.
- Fotel, T. N., & Thomsen, T. U. (2004). The surveillance of children's mobility. *Surveillance & Society*, 1(4), 535–554.
- Frank, L. D., Kerr, J., Chapman, J., & Sallis, J. (2007). Urban form relationships with walk trip frequency and distance among youth. *American journal of health promotion : AJHP*, 21(4 Suppl), 305–11.
- Fyhri, A., & Hjorthol, R. (2009). Children's independent mobility to school, friends and leisure activities. *Journal of Transport Geography*, 17(5), 377–384.
- Gaster, S. (1991). Urban Children's Access to their Neighborhood. *Environment and Behavior*, 23(1), 70–85.
- Hart, R. (1979). *Children's experience of place*. Halsted Press.
- Hillman, M. (2006). Children's rights and adults' wrongs. *Children's Geographies*, 4(1), 61–67.
- Hillman, M., Adams, J., & Whitelegg, J. (1990). *One false move*. Policy Studies Institute London.
- Holloway, S. L., & Valentine, G. (2000). Spatiality and the New Social Studies of Childhood. *Sociology*, 34(4), 763–783.
- Jack, G. (2008). Place Matters: The Significance of Place Attachments for Children's Well-Being. *British Journal of Social Work*, 40(3), bcn142.
- Johansson, M. (2006). Environment and parental factors as determinants of mode for children's leisure travel. *Journal of Environmental Psychology*, 26(2), 156–169.
- Karsten, L. (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.
- Kerr, J., Rosenberg, D., Sallis, J. F., Saelens, B. E., Frank, L. D., & Conway, T. L. (2006). Active commuting to school: Associations with environment and parental concerns. *Medicine and Science in Sports and Exercise*, 38(4), 787–94.
- Larsen, K., Gilliland, J., Hess, P., Tucker, P., Irwin, J., & He, M. (2009). The influence of the physical environment and sociodemographic characteristics on children's mode of travel to and from school. *Am J Public Health*, 99(3), 520–526.
- Lynch, K. (1981). *Good city form*. Boston, MA: The MIT Press.


- Lynch, K., Banerjee, T., & UNESCO. (1977). *Growing up in cities: studies of the spatial environment of adolescence in Cracow, Melbourne, Mexico City, Salta, Toluca, and Warszawa*. MIT Press.
- MacDougall, C., Schiller, W., & Darbyshire, P. (2009). What are our boundaries and where can we play? Perspectives from eight to ten year old Australian metropolitan and rural children. *Early Child Development and Care*, 179(2), 189–204.
- Mackett, R., Brown, B., Gong, Y., Kitazawa, K., & Paskins, J. (2007). Children's Independent Movement in the Local Environment. *Built Environment*, 33(4), 454–468.
- Matthews, H. (1987). Gender, home range and environmental cognition. *Transactions of the Institute of British Geographers*, 12(1), 43–56.
- Matthews, H. (1992). *Making sense of place: Children's understanding of large-scale environments*. Harvester Wheatsheaf Hemel Hempstead.
- Matthews, H., & Limb, M. (1999). Defining an agenda for the geography of children: review and prospect. *Progress in Human Geography*, 23(1), 61–90.
- McMillan, T. E. (2005). Urban form and a child's trip to school: The current literature and a framework for future research. *Journal of Planning Literature*, 19(4), 440.
- Panter, J. R., Jones, A. P., & van Sluijs, E. M. (2008). Environmental determinants of active travel in youth: a review and framework for future research. *The international journal of behavioral nutrition and physical activity*, 5, 34.
- Prezza, M., Pilloni, S., Morabito, C., Sersante, C., Alparone, F. R., & Giuliani, M. V. (2001). The influence of psychosocial and environmental factors on children's independent mobility and relationship to peer frequentation. *Journal of Community & Applied Social Psychology*, 11(6), 435–450.
- Rissotto, A., & Tonucci, F. (2002). Freedom of movement and environmental knowledge in elementary school children. *Journal of Environmental Psychology*, 22(1), 65–77.
- Sener, I. N., & Bhat, C. R. (2007). An analysis of the social context of children's weekend discretionary activity participation. *Transportation*, 34(6), 697–721.
- Shaw, B., Watson, B., Frauendienst, B., Redecker, A., Jones, T., & Hillman, M. (2012). *Children's independent mobility: A comparative study in England and Germany (1971-2010)*. London.
- Spilsbury, J. (2005). "We Don't Really Get To Go Out in the Front Yard"—Children's Home Range and Neighborhood Violence. *Children's Geographies*, 3(1), 79–99.
- Spilsbury, J., Korbin, J., & Coulton, C. (2009). Mapping Children's Neighborhood Perceptions: Implications for Child Indicators. *Child Indicators Research*, 2(2), 111–131.

- Timperio, A., Crawford, D., Telford, A., & Salmon, J. (2004). Perceptions about the local neighborhood and walking and cycling among children. *Preventive Medicine, 38*(1), 39–47.
- Tranter, P., & Pawson, E. (2001). Children's access to local environments: A case-study of Christchurch, New Zealand. *Local Environment, 6*(1), 27–48.
- Trapp, G., Giles-Corti, B., Christian, H., Bulsara, M., Timperio, A., McCormack, G. R., & Villanueva, K. (2012). Increasing children's physical activity: individual, social and environmental factors associated with walking to and from school. *Health Education & Behavior, 39*(2), 172–182.
- Valentine, G. (1996). Angels and devils: moral landscapes of childhood. *Environment and Planning D, 14*, 581–600.
- Valentine, G. (1997). "Oh yes I can" "Oh no you can't": Children and parents' understandings of kids' competence to negotiate public space safely. *Antipode, 29*(1), 65–89.
- Valentine, G., & McKendrick, J. (1997). Children's outdoor play: Exploring parental concerns about children's safety and the changing nature of childhood. *Geoforum, 28*(2), 219–235.
- Veitch, J., Bagley, S., Ball, K., & Salmon, J. (2006). Where do children usually play? A qualitative study of parents' perceptions of influences on children's active free-play. *Health & place, 12*(4), 383–93.
- Veitch, J., Salmon, J., & Ball, K. (2008). Children's active free play in local neighborhoods: a behavioral mapping study. *Health education research, 23*(5), 870–9.
- Villanueva, K., Giles-Corti, B., Bulsara, M., Timperio, A., McCormack, G. R., Beesley, B., Trapp, G., et al. (2012). Where do children travel to and what local opportunities are available? The relationship between neighborhood destinations and children's independent mobility. *Environment and Behavior, 45*(6), 679–705.
- Woolley, H. (2006). Freedom of the city: Contemporary issues and policy influences on children and young people's use of public open space in England. *Children's Geographies, 4*(1), 45–59.
- Woolley, H., & Johns, R. (2010). Skateboarding : The City as a Playground. *Journal of Urban Design, (April 2013)*, 37–41.
- Wridt, P. (2010). A qualitative GIS approach to mapping urban neighborhoods with children to promote physical activity and child-friendly community planning. *Environment and Planning B: Planning and Design, 37*(1), 129–147.



# Appendices

## Appendix A: Research Ethics Approval Forms

	<b>Office of Research Ethics</b> The University of Western Ontario Room 00045 Dental Sciences Building, London, ON, Canada N6A 5C1	
	<b>Use of Human Subjects - Ethics Approval Notice</b>	

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**Principal Investigator:** Dr. J.A. Gilliland  
**Review Number:** 11971E      **Review Date:** January 17, 2007      **Revision Number:** 4  
**Protocol Title:** Assessing the influence of environmental factors on obesity-related behaviours in youth.  
**Department and Institution:** Geography, University of Western Ontario  
**Sponsor:**  
**Ethics Approval Date:** January 17, 2007      **Expiry Date:** December 31, 2007  
**Documents Reviewed and Approved:** Revised study end date  
**Documents Received for Information:**

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This is to notify you that The University of Western Ontario Research Ethics Board for Health Sciences Research Involving Human Subjects (HSREB) which is organized and operates according to the Tri-Council Policy Statement and the Health Canada/ICH Good Clinical Practice Practices: Consolidated Guidelines; and the applicable laws and regulations of Ontario has reviewed and granted expedited approval to the above named research study on the approval date noted above. The membership of this REB also complies with the membership requirements for REB's as defined in Division 5 of the Food and Drug Regulations.

This approval shall remain valid until the expiry date noted above assuming timely and acceptable responses to the HSREB's periodic requests for surveillance and monitoring information. If you require an updated approval notice prior to that time you must request it using the UWU Updated Approval Request Form.

During the course of the research, no deviations from, or changes to, the protocol or consent form may be initiated without prior written approval from the HSREB except when necessary to eliminate immediate hazards to the subject or when the change(s) involve only logistical or administrative aspects of the study (e.g. change of monitor, telephone number). Expedited review of minor change(s) in ongoing studies will be considered. Subjects must receive a copy of the signed information/consent documentation.

Investigators must promptly also report to the HSREB:

- changes increasing the risk to the participant(s) and/or affecting significantly the conduct of the study;
- all adverse and unexpected experiences or events that are both serious and unexpected;
- new information that may adversely affect the safety of the subjects or the conduct of the study.

If these changes/adverse events require a change to the information/consent documentation, and/or recruitment advertisement, the newly revised information/consent documentation, and/or advertisement, must be submitted to this office for approval.

Members of the HSREB who are named as investigators in research studies, or declare a conflict of interest, do not participate in discussion related to, nor vote on, such studies when they are presented to the HSREB.

Chair of HSREB: Dr. John W. McDonald  
 Deputy Chair: Susan Hoddinott

*This is an official document. Please retain the original in your files.*

cc: ORE File

UWU HSREB Ethics Approval  
 2006-10-01 (HS-EXP)

11971E

Page 1 of 1



re-issued

## Use of Human Participants - Ethics Approval Notice

**Principal Investigator:** Dr. Jason Gilliland  
**Review Number:** 17918S  
**Review Level:** Delegated  
**Approved Local Adult Participants:** 1200  
**Approved Local Minor Participants:** 1200  
**Protocol Title:** Identifying casual effects on the built environment on physical activity, diet, and obesity among children.  
**Department & Institution:** Social Science\Geography, University of Western Ontario  
**Sponsor:** Canadian Institutes of Health Research  
 Heart and Stroke Foundation of Canada

**Ethics Approval Date:** June 08, 2011

**Expiry Date:** August 31, 2014

**Documents Reviewed & Approved & Documents Received for Information:**

Document Name	Comments	Version Date
Other	Revised Healthy Neighbourhood Survey for Parents.	
Other	Revised Health Neighbourhoods Survey for Youth	
Other	Revised Activity and Travel Diary for School Days and Weekend Days.	

This is to notify you that The University of Western Ontario Research Ethics Board for Non-Medical Research Involving Human Subjects (NMREB) which is organized and operates according to the Tri-Council Policy Statement: Ethical Conduct of Research Involving Humans and the applicable laws and regulations of Ontario has granted approval to the above referenced revision(s) or amendment(s) on the approval date noted above.

This approval shall remain valid until the expiry date noted above assuming timely and acceptable responses to the NMREB's periodic requests for surveillance and monitoring information.

Members of the NMREB who are named as investigators in research studies, or declare a conflict of interest, do not participate in discussions related to, nor vote on, such studies when they are presented to the NMREB.

The Chair of the NMREB is Dr. Riley Hinson. The NMREB is registered with the U.S. Department of Health & Human Services under the IRB registration number IRB 00000941.

*This is an official document. Please retain the original in your files.*

**The University of Western Ontario**  
 Office of Research Ethics  
 Support Services Building Room 5150 • London, Ontario • CANADA - N6G 1G9



## Office of Research Ethics

The University of Western Ontario  
Room 4180 Support Services Building, London, ON, Canada N6A 5C1

# COPY

### Use of Human Subjects - Ethics Approval Notice

**Principal Investigator:** Dr. J. Gilliland

**Review Number:** 16455S

**Review Level:** Full Board

**Review Date:** August 11, 2009

**Protocol Title:** Emerging Methodologies for Examining Environmental Influences on Children's Exposure to Air Pollution

**Department and Institution:** Geography, University of Western Ontario

**Sponsor:**

**Ethics Approval Date:** December 01, 2009

**Expiry Date:** August 31, 2010

**Documents Reviewed and Approved:** UWU Protocol, Letter of Information and Consent, Assent.

#### Documents Received for Information:

This is to notify you that The University of Western Ontario Research Ethics Board for Non-Medical Research Involving Human Subjects (NMREB) which is organized and operates according to the Tri-Council Policy Statement: Ethical Conduct of Research Involving Humans and the applicable laws and regulations of Ontario has granted approval to the above named research study on the approval date noted above.

This approval shall remain valid until the expiry date noted above assuming timely and acceptable responses to the NMREB's periodic requests for surveillance and monitoring information. If you require an updated approval notice prior to that time you must request it using the UWU Updated Approval Request Form.

During the course of the research, no deviations from, or changes to, the study or consent form may be initiated without prior written approval from the NMREB except when necessary to eliminate immediate hazards to the subject or when the change(s) involve only logistical or administrative aspects of the study (e.g. change of monitor, telephone number). Expedited review of minor change(s) in ongoing studies will be considered. Subjects must receive a copy of the signed information/consent documentation.

Investigators must promptly also report to the NMREB:

- a) changes increasing the risk to the participant(s) and/or affecting significantly the conduct of the study;
- b) all adverse and unexpected experiences or events that are both serious and unexpected;
- c) new information that may adversely affect the safety of the subjects or the conduct of the study.

If these changes/adverse events require a change to the information/consent documentation, and/or recruitment advertisement, the newly revised information/consent documentation, and/or advertisement, must be submitted to this office for approval.

Members of the NMREB who are named as investigators in research studies, or declare a conflict of interest, do not participate in discussion related to, nor vote on, such studies when they are presented to the NMREB.

Chair of NMREB: Dr. Jerry Paquette

## Appendix B: Curriculum Vitae

### Janet Loebach

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#### EDUCATION

- 2007- PhD Candidate (ABD), Geography  
 Department of Geography, University of Western Ontario  
 Dissertation: *Children's Neighbourhood Geographies: Examining children's perception and use of their neighbourhood environments for healthy activity*
- 2004 Master of Environmental Design Studies (MEDS)  
 School of Architecture & Planning, Dalhousie University  
 Thesis: *Designing learning environments for children: An affordance-based approach to providing developmentally appropriate settings*
- 1997 Bachelor of Civil Engineering & Society (B.Eng.Soc)  
 Faculty of Engineering / Engineering & Society Program, McMaster University  
 Thesis: *An investigation of the effects of environmental design on palliative patient health*

#### ACADEMIC & PROFESSIONAL EXPERIENCE

##### Research & Project Development

- 2012 – 2013 Research Associate, HEAL, Department of Geography, UWO
- 2010 – 2012 Project Manager, Human Environments Analysis Laboratory (HEAL), Department of Geography, University of Western Ontario
- 2007 – 2011 Research Assistant, Human Environments Analysis Laboratory (HEAL),
- 2006 – 2007 Research Associate, HEAL, Department of Geography, UWO
- 2006 – 2007 Developer, Online Study and Project Registry, Children & Youth Environments Network, EDRA
- 2003 Research Assistant, Christine Macy, Architect
- 1997 -- 1998 Research & Development Coordinator, Evans Forrec, Architectural Manufacturing & Specialty Construction

##### Design & Project Management

- 2005 – Present Environmental Design Consultant, J. Loebach Consulting
- 2004 – 2005 Renovation Project Manager, Vehicle Venture
- 2000 – 2002 Senior Project Manager / Design Consultant, RxScenarios, Design & Project Management Consultants
- 1998 – 2000 Project Manager & Designer, Evans Forrec

## RESEARCH & TEACHING EXPERIENCE

### Course Instruction

Spring 2010 – 2013	<i>Landscape Planning Studio: Designing Children's Environments</i> Fanshawe College (Guest Lecturer)
Spring 2011	<i>Introduction to Research Methods: Research with children</i> Department of Geography, U of Western Ontario (Guest Lecturer)
Fall 2005	<i>The Culture of Technology</i> Engineering & Society Program, McMaster University
Summer 2004	<i>Community Design: Introduction to Environment-Behaviour Issues</i> Faculty of Architecture & Planning, Dalhousie University

### Teaching & Research Assistantships

2007- 2013	Research & Teaching Assistant, Department of Geography, UWO
2004	Research & Teaching Assistant, School of Architecture, Dalhousie
2003	Research Assistant, Christine Macy, Architect

## PUBLICATIONS & RESEARCH CONTRIBUTIONS

### Refereed Contributions:

- **Loebach, J.** & Gilliland, J. (2013). Linking play and place: An affordance-based approach using qualitative GIS to examine patterns in children's neighbourhood activity preferences and use. *Children's Geographies* (to be submitted Oct 2013)
- **Loebach, J.** & Gilliland, J. (2013). Free range kids? Using GPS-derived domains to examine children's independent neighbourhood mobility and activity. *Environment & Behavior* (In Review; Submitted Sept 2013).
- Glen, K., Thomas, H., **Loebach, J.**, Gilliland, J. & Gobert, C. (2013). Fruit and vegetable consumption among urban Canadian schoolchildren living in a socioeconomically disadvantaged neighbourhood. *Canadian Journal of Dietetic Practice and Research*, Vol 74 (3), pp. 114-118.
- **Loebach, J.** & Gilliland, J. (2013). *Neighbourhood affordances for activity: social and environmental factors which influence children's independent use of neighbourhood settings*. Environmental Design Research Association (EDRA) Annual Conference. Providence, RI. May 2013. Paper Presentation.
- **Loebach, J.** & Bishop, K. *Fostering healthy environments for children: strengthening the integration of research, practice and policy*. Environmental Design Research Association (EDRA) Annual Conference. Providence, RI. May 2013. Full-day Facilitated Seminar.
- Gilliland, J., Rangel, C., Healy, M., Tucker, P., **Loebach, J.**, Hess, P., He, M., Irwin, J., & Wilk, P. (2012). Linking childhood obesity to the built environment: a multi-level analysis of home and school neighbourhood factors associated with body mass index. *Canadian Journal of Public Health*, Vol. 103 (9), Supp 3.

- **Loebach, J. & Gilliland, J. (2012).** *Free Range Children? Identifying Children's Domains with Qualitative GIS.* Environmental Design Research Association (EDRA) Annual Conference. Seattle, WA. May 2012. [Paper Presentation.](#)
- **Loebach, J. & Gilliland, J. (2012).** *Examining the environmental characteristics of children's neighbourhood domains with qualitative GIS.* American Association of Geographers Annual General Meeting. New York, NY. February 2012. [Paper Presentation.](#)
- **Gilliland, J. & Loebach, J. (2011).** *Do You Know the Way to School? Comparing Children's and Parent's Perceptions of the Route to School.* American Association of Geographers Annual General Meeting. New York, NY. February 2012. [Paper Presentation.](#)
- **Loebach, J. (2011).** The Magical Park of Aviacion: Lessons from a participatory design project with the children of Aviacion, Peru. *PlayRights*, Vol 11 (2).
- **Loebach, J. & Gilliland, J. (2011).** *Linking play and place: Identifying spatial patterns in children's outdoor activities using diaries, accelerometers and GPS.* International Medical Geography Symposium. Durham, UK. July 2011. [Paper Presentation.](#)
- **Gilliland, J., Loebach, J. & Holmes, M. (2011).** *Is the grass greener on the other side of town? Relationships among the availability, quality and children's use of public parks.* International Medical Geography Symposium. Durham, UK. July 2011. [Paper Presentation.](#)
- **Loebach, J. (2011).** *Exploring a participatory process for involving children in the design and building of spaces for play.* International Play Association Triennial World Conference. Cardiff, Wales. July 2011. [Paper presentation.](#)
- **Loebach, J. & Gilliland, J. (2011).** *Linking play and place: Identifying spatial patterns in children's outdoor activities using diaries, accelerometers and GPS.* OpenSpace PeopleSpace Conference. Edinburgh, Scotland. June 2011. [Paper Presentation.](#)
- **Gilliland, J., Loebach, J. & Holmes, M. (2011).** *Getting children outdoors: Factors influencing children's use of public parks.* OpenSpace PeopleSpace Conference. Edinburgh, Scotland. June 2011. [Paper Presentation.](#)
- **Glen, K., Thomas, H., Loebach, J., Gilliland, J. & Gobert, C. (2011)** *Fruit and vegetable consumption patterns among junior elementary students in a London, Ontario neighbourhood.* Applied Physiology, Nutrition & Metabolism Abstracts, 36(3):451.
- **Gobert, C., Glen, K., Thomas, H., Loebach, J., and Gilliland, J. (2011)** *Food consumption practices and body weights among senior elementary students in a London, Ontario neighbourhood.* Applied Physiology, Nutrition & Metabolism Abstracts, 36(3):452.
- **Loebach, J. & Gilliland, J. (2011).** *Examining the spatial and temporal patterns in children's neighbourhood- based activity and mobility using personal monitoring technology.* Environmental Design Research Association (EDRA) Annual Conference. Chicago, IL. May 2011. [Paper Presentation.](#)

- **Loebach, J.** (2011). *The Magical Park of Aviacion: A participatory design/build project with the children of Aviacion, Peru*. Environmental Design Research Association (EDRA) Annual Conference. Chicago, IL. May 2011. Paper Presentation.
- Gilliland, J. & **Loebach, J.** (2011). *Evaluating Methods for Observing the Spatial Patterns of Children's Neighbourhood Activities: A Closer Look at the Journey to School*. Environmental Design Research Association (EDRA) Annual Conference. Chicago, IL. May 2011. Paper Presentation.
- **Loebach, J.** & Gilliland, J. (2010). Child-Led Tours to Uncover Children's Perceptions and Use of Neighborhood Environments. *Children, Youth & Environments*, Vol. 20 (1), pp. 53-90
- Gilliland, J. and **Loebach, J.** (2010). Healthy Eating, Healthy Physical Activity in the Westminster Neighbourhood of London, Ontario: Baseline Survey Grades 5-8. London, Ontario: Child & Youth Network. Report.
- Gilliland, J. and **Loebach, J.** (2010). Healthy Eating, Healthy Physical Activity in the Westminster Neighbourhood of London, Ontario: Baseline Survey Older Youth. London, Ontario: Child & Youth Network. Report.
- **Loebach, J.** (2009). *The new GIS frontier: Integrating qualitative and participatory methods with geographic information systems in environment-behaviour research*. Environmental Design Research Association (EDRA) Annual Conference. Kansas City, MO. June 2009. Intensive Symposium Presentation; J. Loebach, Symposium Organizer & Presenter.
- **Loebach, J.** & Gilliland, J. (2009). *Utilizing qualitative GIS methods in environmental research and evaluation with children and youth*. Environmental Design Research Association (EDRA) Annual Conference. Kansas City, MO. June 2009. Intensive Symposium Presentation; J. Loebach, Symposium Organizer & Presenter.
- **Loebach, J.,** Gilliland, J. & Hess, P. (2009). *Do you see what I see? Examining children's perceptions of their neighbourhood in relation to parent perceptions and objective measures of the built environment*. Environmental Design Research Association (EDRA) Annual Conference. Kansas City, MO. June 2009. Paper Presentation.
- **Loebach, J.** & Gilliland, J. (2009). *Child Guides: The use of child-led walking tours as a participatory protocol for neighbourhood research and evaluation with children and youth*. American Association of Geographers Annual General Meeting. Las Vegas, NV. March 2009. Paper Presentation
- **Loebach, J.** & Gilliland, J. (2008). *Exploring innovative field survey techniques to uncover perceptions and use of neighbourhood environments*. Environmental Design Research Association (EDRA) Annual Conference. Veracruz, Mexico. June 2008. Paper Presentation.
- **Loebach, J.** & Gilliland, J. (2008). *Exploring the use of child-led tours to uncover perceptions and use of neighbourhood environments*. Canadian Association of Geographers (CAG) Annual General Meeting. Quebec City, Quebec. May 2008. Paper Presentation.

- **Loebach, J.**, Holmes, M., Gilliland, J. (2007). *Is the Grass Greener on the Other Side of Town? Examining the accessibility, quality, and use of public play spaces in London, Canada*. OpenSpace/PeopleSpace: Innovative Approaches to Research Excellence in Landscape and Health Conference. Edinburgh, Scotland. September 2007. Poster Presentation.
- Gilliland, J., Holmes, M., **Loebach, J.** (2007). *Examining relationships among the availability, quality, and use of public play spaces*. Canadian Public Health Association Annual Conference. Ottawa, Ontario. September 2007. Poster Presentation.
- **Loebach, J.** (2004). *Designing Learning Environments for Children: An Affordance-Based Approach to Providing Developmentally Appropriate Settings*. Halifax, NS: Dalhousie University. MEDS Thesis
- **Loebach, J.** (2004). *An Affordance-Based Approach to the Design of Effective Learning Environments for Children*. International Association for People-Environment Studies (IAPS) Bi-Annual Conference, 2004. Vienna, Austria. Paper Presentation.
- **Loebach, J.** (2004). *The Role of Children's Special Places in Facilitating Development and a Positive Sense of Well Being*. Environmental Design Research Association (EDRA) Annual Conference, 2003. Minneapolis, Minnesota. Paper Presentation.

### **Other Roles and Contributions:**

- **Visiting Scholar**
  - Centre for Hip Health and Mobility, Vancouver Coastal Health Research Institute (June 2012 and July 2013)
- **Reviewer** (2010-present)
  - Health & Place (Elsevier)
  - Environment & Behavior (Sage Publications)
  - Journal of Urban Affairs (Wiley-Blackwell)
  - Social Science & Medicine (Elsevier)
  - Children, Youth and Environments
- **Co-organizer** (June 2010)
  - Children's Health & Environments: International Workshop (UWO)

## **AWARDS & ACHIEVEMENTS**

### **Awards & Designations**

- London Community Foundation Clean Air Challenge grant recipient (2011-12)
- Ontario Graduate Scholarship: PhD (2010-11)
- Children's Health Foundation Graduate Student Fellowship (2010-11)
- Urban Geography Specialty Group Student Award (2009)



- Environmental Design Research Association Conference, Kansas City, MO – Travel Award (2009)
- E.G. Pleva Teaching Assistant Award for Geography (2008)
- Engineers Canada – TD Meloche Monnex National Scholarship Winner (2007-08)
- Canadian Federation of University Women (London) Student Award (2007)
- Entrance scholarship, Department of Geography (2007)
- Finalist for *IAPS Young Researcher's Award*, Int'l Assoc. for People-Environment Studies (2004)
- Professional Engineer Designation, Professional Engineers Ontario (2002)
- McMaster University President's Award of Excellence (1997)
- McMaster Engineering Society's President's Award (1997)
- Canadian Society of Civil Engineers Award for Outstanding Achievement (1997)

## **Leadership**

### **Professional Associations**

- Co-chair; Child, Youth & Environments Network, EDRA (2012-present)
- Vice president; International Play Association (Canada) (2011-present)
- National Steering Committee on Play Space Design (Canada) (2009-present)

### **Board Memberships**

- International Play Association – Canada (2008-Present)
- Environmental Design Research Association (2009-2011)
- Heart-Links (Cdn charity: Community Development in Peru) (2007-2010)

### **Dept of Geography / Human Environments Analysis Lab, UWO, 2007-present**

- Children's Health & the Environment Int'l Workshop 2010 – *Co-organizer*
- Department Space Committee
- Geography Graduate Students Association

### **City of London, 2006-2012**

- Healthy, Active Neighbourhoods Working Group – *Co-chair*
- Healthy Eating & Healthy Physical Activity (HEHPA) Working Group
- Childhood Obesity & Inactivity Steering Committee
- Active and Safe Routes to School (ASRTS) committee
- Child & Youth Network member
- Kipps Lane Youth Photovoice Initiative (REPRESENT) – *Co-organizer & facilitator*
- World Town Planning Day Initiatives (2007-2012) – *Organizer & facilitator*

### **Faculty of Architecture & Planning, Dalhousie University, 2002-2004**

- Architecture Students Association
- School of Architecture, Appeals Committee
- Faculty of Architecture & Planning, Appointments Committee

**Faculty of Engineering, McMaster University, 1992-1997**

- McMaster Engineering Society - President; Vice President, Internal; Civil Eng. Rep
- MACLAB Engineering Endowment Fund, McMaster University - Founder
- Student and Professional Affairs Committee- Co-chair with Dean of Engineering
- Civil Engineering Department – Student President

**PROFESSIONAL MEMBERSHIPS**

- Professional Engineers Ontario
- Environmental Design Research Association
- International Play Association – Canada
- Canadian Association of Geographers