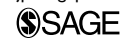


Walking to School: The Experience of Children in Inner City Los Angeles and Implications for Policy

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Abstract

Neighborhood walkability has become an important public health concern. The child's-eye view of safe and walkable environments is typically remiss from the literature. Particularly the experience of inner city kids, very different from that of suburban neighborhoods, remains unreported. The study reported here offers new insights based on the walking to school experience reported by the children of inner city neighborhoods of Los Angeles. Interviews with fifth-graders from five grade schools suggest that the dangers in their social milieu are a much greater concern for them than the physical milieu, which the walkability research typically emphasizes. The findings necessitate new policies.

Keywords

child pedestrian, walkability, public health, transportation, neighborhood safety

The experience of growing up in cities—here and abroad—and implications for planning and design of the built environment has been a focus of several well-known studies that date back to the sixties and seventies (see Parr 1967; Dyckman 1961; Carr and Lynch 1968; Lynch 1976; Ward 1978; Chawla 2002). Most of these writings, some empirically based, some speculative if not normative in tenet, addressed the overall life experience of children in urban space in a comparative context, emphasizing the possible benefits of the city experience. Generally the focus of these writings was on the influence of the urban experience on cognitive and social development, as well as development of personal agency, control, ingenuity, and wits. In their writings, Carr and Lynch (1968) and also Dyckman (1961) spoke of the educative functions of the city. As the children are allowed to explore the streets of their neighborhood and the larger city, they are exposed to many different stimuli, diversity of people and activities, the variety of economic functions and transport, community celebrations and rituals, as well as a variety of sounds and smells that comprise the many beguiling aspects of the quotidian life in the city.

Some of these writings reflected a nostalgia for the inner city urbanism as prevalent in the multiethnic mixed use, and also walkable urban settings of the earlier part of the last century. There is some indication that children growing up in inner city tend to develop a higher level of street savvy and personal agency, than in suburban environments (see Lynch 1976; Anich et al. 2011; Padrón and Ballet 2011). The urbanism of the inner city no doubt contributes to the higher level of competency and capability in dealing with risks, dangers, and uncertainties of city life. In his book *The Child in the City* (1978), Colin Ward argues the city's need for social

space—"the demand of the city's children to be a part of the city's life"—in addition to providing a safe physical environment for the young. What differentiates a child's experience of space is scale, their attention to details albeit mundane from an adult perspective, their vivid and varied experiences obtained from previous mental associations or memories, and their perceptions shaped by more tactile instead of visual qualities of the surrounding environment. Ward contends the need for a shared city—that is, a city for children and adults alike—where the needs of the children have to be designed and shaped not as separate areas but integrated for their use anywhere and everywhere. He argues further that a strategy to achieve this goal is to reduce automobile-oriented traffic and make the city more accessible and negotiable for the child to walk, bike, and play.

While emphasizing the social and cognitive developments and personal agency and competency, these studies previously have not focused on the health benefits or the safety and security aspects of walking in inner city urban spaces. In recent years, the concern for safe and active school travel has increased in practical and scholarly importance, as encouraging children's walking is seen essential from a

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public health perspective. The rapid increase in childhood obesity over the past two decades is a cause for serious concern about adverse health outcomes (i.e., hypertension, type II diabetes, depression, etc.) and a consequent increase in health care expenditure associated with childhood obesity. In recognition of school travel as an important opportunity for promoting daily physical activity among children, policy-makers have put a special emphasis on promoting walking or biking.

With growing dependence on motorized travel, children now spend a considerable amount of their waking hours in the backseat of automobiles driven to and from organized activities even for a short distance. This trend is most evident in children's school travel. Whereas 48 percent of children between the ages of five and fifteen walked or biked to school in 1969—the time when Dyckman, Lynch and others wrote about inner city urbanism—it has now decreased to less than 16 percent (U.S. Environmental Protection Agency 2003). Yet despite a considerable decrease in the rate of walking, safety of child pedestrian remains a concern. Pedestrian injuries remain the second-leading cause of unintentional injury-related death among children, disproportionately affecting ethnic minority children from low-income families (National SAFE KIDS Campaign 2004). Particularly, a substantial number of pedestrian fatalities and injuries among school-aged children occurs during normal school travel hours, making walking the second most dangerous mode of travel after biking on a per mile basis (Transportation Research Board 2002).

These safety concerns have led to several policy measures at the federal and state levels. California was the first state in the United States to implement a statewide Safe Route to School (SR2S) program in 1999. A new federal program, earmarked specifically for children's safe and active school travel, was established in 2005. This legislation promised to provide \$612 million to the state's SR2S program over five fiscal years, largely supporting physical improvement projects to date.¹

Detractors of current interventions, however, argue that public investments so far do not always reflect a sound understanding of factors that influence children's travel generally, and walking to school in particular (McDonald 2006; McMillan 2005). The current state of knowledge on children's travel behavior is quite limited, and supportive policies for improving walkability of urban space are primarily derived from adult caregivers' (usually parents') attitudes and choices. Children's needs and perceptions are often subsumed by parental concerns and preferences, and those in turn become the proxy measures of children's propensity to walk to school.

The essential premise of this paper is that children are active agents in managing and negotiating their movement within the context of opportunities and constraints offered by the proximate built environment. Although some of the earlier works like the ones by Lynch (1976) and Chawla (2002) attempted to understand how children perceived, used, and valued their

proximate environment, the recent literature on walking to school are remiss of the child's-eye view of safe and walkable environment. The study reported in this paper addresses this lacuna, and offers new insights based on ten walking to school experience as reported by the children living in inner city Los Angeles neighborhoods. The children who participated in this study were all fifth-graders, from five grade schools—four public and one parish—in the vicinity of the University of Southern California (USC) campus and Exposition Park, considered a part of South Central Los Angeles.

Research Questions

Our research questions address some of these lacunae:

- How do children perceive safety in their proximate environment and the various appeals and barriers in their experience of walking to school?
- What are the relevant policy measures for the improvement of children's propensity to walk by mitigating actual and perceived risk?
- What are the risk and modifying factors associated with children's current school travel at the individual, household, and neighborhood level?

The existing research suggests that a set of nested, interconnected elements at individual, household, community, and institutional/policy level collectively influences the propensity of children's outdoor activities in general and walking to school in particular. That is, environmental risk elements involving both the built environment (traffic, land use, pollution, etc.) and the social milieu (crime, drugs, gangs, etc.) influence children's as well as parents' perception of risk, which is then modified by household, community, and institutional supports (such as social programs and services).

What follows is a brief summary of children's travel behavior pertinent to walking and risks and modifying factors that are likely to influence the safety of child pedestrians at individual, household, institutional, and community level.

Children's Perception of Safety and Spatial Behavior

Children's experience, perception, and behavior in geographical space have long been of interest to scholars from several disciplines. Environmental psychologists have typically focused on the "lifeworlds" of children (see Aitken 1994; Matthews 1992). Studies suggest that this lifeworld is negotiated between child, parents, and their environment (Perez and Hart 1980). Moreover children's spatial movement, or "license" (c.f. Hillman, Adams, and Whitelegg 1990; Spilsbury 2005; Risotto and Tonucci 2002) to move around independently is influenced by several attributes: age and sex of the child (Hart 1979; Hillman and Adams 1992; Matthews 1987); ethnicity and other sociocultural characteristics of the family (O'Brien et al. 2000; Valentine 1997a);

parents' (especially of mothers') psychosocial milieu (i.e., sense of community, perceived safety or danger, social network, etc.) (Blakely 1993; Prezza et al. 2001; Valentine 1997b); and the characteristics of the proximate environment (Kytta 1997; Mattsson 2002; O'Brien et al. 2000).

Some of this literature suggest that children are often more competent in managing their own personal safety than parents would normally believe. Furthermore, children often actively engage in negotiating their parents' understanding of their environmental competence. (Valentine 1997b)

Propensity to Walk and Active Living

Although considerable knowledge has accumulated primarily from child pedestrian safety and accident prevention studies (e.g., Christoffel et al. 1991; Mayr et al. 2003; Roberts et al. 1995), very little is known about what would encourage children to walk in the first place. The following presents a brief review of walking behavior (not necessarily of children) from different disciplinary approaches.

The likelihood for individuals to walk has been empirically tested for different neighborhood types (Handy 1996; Handy, Cao, and Mokhtarian 2006; Moudon et al. 1997; Shriver 1997); land use pattern (Cervero and Duncan 2003; Cervero and Kockelman 1996; Frank and Pivo 1994; Greenwald and Boarnet 2001); street network, including accessibility and connectivity (Cervero and Duncan 2003; Cervero and Kockelman 1996; Krizek and Johnson 2006); and pedestrian environment features (Alfonzo et al. 2008; Rodriguez and Joo 2004). This literature provides evidence of a correlation between various aspects of the built environment and adult walking trips. Children however are considered simply as trip generators who influence the amount of household travel (especially of mothers) and range of travel options (see McDonald 2005b).

Unlike urban and transportation planning studies that have considered walking for the utilitarian purpose of transport, health researchers traditionally have exclusively focused on a different subset of physical activity—walking for recreation (Sallis et al. 2004). Over the past decade, the field of physical activity research has been evolving rapidly to widen their horizon by embracing the idea of “active living” that incorporates a broader range of physically active behaviors (e.g., occupational or utilitarian activities) and by expanding its focus beyond individual and cognitive domains (Sallis et al. 2006). In order to incorporate various factors that may influence behavior, ecological models that encompass the role of individual, social, environmental, and policy variables are of interest now (see, e.g., Hoehner et al. 2003; King et al. 2002; Saelens et al. 2003; Sallis et al. 2004; Spencer and Blades 2006).

Risk and Modifying Factors

Individual level: child characteristics. Safe travel behavior requires an adequate level of cognitive and behavioral skills

such as recognizing risks, comprehending possible actions, making appropriate decisions, and taking related actions (Thomson et al. 1996). Accordingly, age becomes an important consideration in restrictions parents place on a child's travel activities (i.e., how far the child can go, whether he or she can cross major roads, or ride a bicycle, etc.; Hillman, Adams, and Whitelegg 1990). Parents, however, tend to allow more independence to boys than girls of the same age, which might partly explain a higher rate of pedestrian injuries and fatalities among boys (see National Highway Traffic Safety Administration 2006).

Yet, the influence of a child's gender on travel to school seems mixed. A few studies suggest that more boys than girls walk or bike to school (Evenson et al. 2003; McMillan et al. 2006; Timperio et al. 2006). Other studies report no significant gender differences in travel to school (McDonald 2005a; Wen et al. 2008).

Household level: family characteristics. Along with financial resources, availability of a household motor vehicle or the number of drivers' license holders seem to be positively correlated with auto trips to school (Bradshaw 1995; DiGiuseppi et al. 1998; Ewing, Schroeer, and Greene 2004; Wen et al. 2008). In California, children from households with annual income below \$25,000 are nearly three times more likely to walk or bike than those from households with annual income above \$75,000 (Surface Transportation Policy Project 2003).

In addition, studies suggest that parental or family support, especially maternal presence (Rosenbloom 1987; Yarlagadda and Srinivasan 2008), parents' attitudes toward walking (Black, Collins, and Snell 2001; McMillan 2005), their perceptions of neighborhood safety (Ahlport et al. 2008; DiGiuseppi et al. 1998; Ziviani, Scott, and Wadley 2004), and their own travel activities (McMillan et al. 2006), are likely to determine how children travel to school and thus their exposure to pedestrian injury risks.

Institutional level: school characteristics. Location of schools and their accessibility is clearly the most notable barrier to walking. Previous research has consistently found that distance (either actual or perceived) is most likely to influence how children travel to and from school (e.g., Black, Collins, and Snell 2001; Bradshaw 1995; Ewing, Schroeer, and Greene 2004; Timperio et al. 2006). McDonald (2007) suggests that increasing travel distance alone may account for half of the decline in walking to school between 1969 and 2001 in the United States.

It is apparent that school travel is also influenced by contemporary education reform strategies to redress unequal educational opportunities. Parents now have more choices in selecting appropriate schools, often bypassing neighborhood schools. For example, one study found that children who attended nonneighborhood schools traveled 4.5 times more miles and as to be expected, were six times less likely to walk to school than those attending neighborhood schools (Wilson,

Wilson, and Krizek 2007). The trend suggests a gradual denouement of Clarence Perry's (1929) classic neighborhood unit principles that, institutionalized by the American Public Health Association (1948), became the basis for school siting policy in the latter half of the last century.

Community level: neighborhood characteristics. The presence of certain physical and social attributes in the neighborhood may affect perception of safety, as suggested in the "broken windows" syndrome (c.f., Wilson and Kelling 1982). Signs of abuse and neglect in the built environment (i.e., graffiti, litter, empty beer bottles, and boarded-up or abandoned buildings or cars) and social incivilities (i.e., homelessness, public drunkenness, gangs, drug-selling activities, tagging graffiti) can be daunting, and thus limiting walking choices and propensity (Day 2006; Loukaitou-Sideris 2006). Also, obstructed views or limited visibility in the proximate environment, limited surveillance or absence of the "eyes on the street" (c.f., Jacobs 1961), and lack of familiarity can cause apprehension and thus deter walking (Kaplan, Kaplan, and Ryan 1998).

Various studies have identified the risk factors for child pedestrian injuries. These include streets with high traffic volumes, posted speeds and number of parked cars, and absence of play areas (Agran et al. 1996; Appleyard 1981; Roberts et al. 1995). Although many parents drive their children to schools for safety reason, high traffic volume in the vicinity of the school remains a threat (Collins and Kearns 2001). Absence or inadequate provision of pedestrian amenities such as sidewalks, crosswalks, and signalization can also provoke a higher risk (Transportation Research Board 2002).

The literature suggests that the deterrents to walking to school involve both the characteristics of the proximate built environment and also certain traits of the social milieu that define the neighborhood environment, as we have noted previously. Recent research on active living has produced a number of built environment audit tools as recently reviewed by Lewis (2010, 2011). But very little of that work provided child-specific or elderly-specific audits: the two extremes of age-contingent limits of competency (Uhm, Lewis, and Banerjee 2011). The notion of "environmental press"—that is, the degree to which the attributes of the environment can impede or facilitate performance of activities for a given level of competence—discussed by Lawton and Nahemow (1973) suggests that the proximate environment needs to be more user-friendly for population with developing or declining competencies. Our findings may contribute to development of a new generation of audit system designed for children and elderly.

Methodology

Five elementary schools located in the historic University of Southern California's University Park campus surrounding area were recruited to participate in the study conducted in

the spring of 2007. Figure 1 presents the study schools and their attendance boundaries.

Located in low-income minority communities, just a few miles south of downtown Los Angeles, the study schools enrolled predominantly Hispanic students, ranging from 77 percent of student body (Foshay) to 97 percent (Norwood) (see Figure 2). Most students in three public schools were receiving free or reduced-price meals. The service areas (i.e., school attendance boundaries) range from 0.55 to 1.09 square mile and their population densities range from 24.15 to 42.86 per acre, much denser than that of the City of Los Angeles (13.10 persons per acres). Land use is mainly residential ranging from 78 to 91 percent of the total land areas, except in the Norwood neighborhood, where it is more mixed. All of the study schools, except Weemes, are located along high traffic arterials or close to freeways.²

In consultation with the school principals, a total of six fifth-grade classrooms from the five study schools were selected, comprising 176 child-parent pairs eligible for the study.³ Written informed parental consent and the assent of the children had to be obtained according to the IRB protocol and a total of 104 children (59 percent participation rate) agreed to participate. As to be expected, close to 90 percent of the participating children were of Hispanic origin, overall comprising more girls (54 percent) than boys (46 percent). Consenting parents agreed to complete and return a survey questionnaire. Eighty-seven parents returned the surveys (49 percent response rate). Table 1 summarizes demographic and socioeconomic characteristics of the children by schools.

At the *individual* level, written, verbal, and visual recording methods provided different yet complementary information about children's insight into school travel and neighborhood environment. The protocol included a range of hands-on methods developed to elicit children's perspectives of "lived" experience (see Greene and Hogan 2005 for review): their perception of the neighborhood, values and preferences about their proximate environment, their chosen routes, and experience of travel to and from school.

Child-Centered Activities

The study required three classrooms sessions over a three-week period. In the *first session* all children in a classroom received an introduction packet that included parent informed consent form, child assent form, and parent questionnaire⁴ and child-friendly leaflets that explained the study and their expected participation in different activities.

The *second session* began with collecting the signed consenting documents and completed parent questionnaires to identify study participants. All children who agreed to participate in the study with their parents' consents received an aerial photo of the school neighborhood with all the street names clearly shown. Children were first asked to locate their school and home on the map, and then to draw their normal route(s) to and from school with a colored pen, using



Figure 1. Study school neighborhoods.

arrows to indicate travel directions. A total of 143 school travel routes (1.38 routes per child in average) were recorded, irrespective of mode of travel. Children then were asked to identify places that they liked, disliked, or felt unsafe on the map to write brief comments explaining why. Children were able to identify a total of 399 places (2.84 places per child in average). Overall, places that children liked were most frequently mentioned (67 percent), followed by disliked (24 percent) and unsafe places (9 percent), in respective order. The project team⁵ later visited and photographed the places mentioned by the children.

In the *third and last session*, the children first completed a survey questionnaire inquiring (1) their current travel mode to and from school; (2) experience of school journey (i.e., encountered barriers); (3) perceptions of environmental risk on way to and from school; and (4) preference for travel mode to and from school.⁶ A total of hundred questionnaires were completed.⁷ Finally photos of the places previously identified by children were presented to the children with their locations marked on the map. An evaluation form comprising a safe–unsafe binary scale was distributed to the

children to evaluate the photos based on either their experiences with the place or visual qualities of the scene, or both.

Built Environment Measures

Our audit of the built environment involved several measures: geographic information system database, hard-copy maps, aerial photographs, and data collected from field visits. The school service areas were first divided into 0.25- × 0.25-mile grid cells (or forty acres) and urban form measures were collected from the cells that contained children's self-reported school travel routes. In total, forty-three grid cells were measured on four broad themes suggested to influence walking: land use density and diversity, street pattern, pedestrian infrastructure, and traffic levels across the four school neighborhoods. Of the attributes listed above, those with areal measures, such as street area, were computed as a fraction of each grid cell. Other attributes such as crime density was converted to per-acre measures by dividing the number of incidents in the grid square divided by its area. The inventory also included streets with surveillance from Kid Watch











	Street Network • Study School	School	Area (sq. mi.)	Pop. Den (per acre)	School Type	Total Enroll.	Hispani- c %	Free/ Reduced Meal
Foshay			0.55	27.84	Trad. K-12	3,533	77.4%	88.5%
Norwood			1.09	24.73	Trad. K-5	947	96.7%	92.9%
St. Agnes			0.64	44.02	Private K-8	330	87.6%	NA
Vermont			0.64	44.02	Trad. K-5	1,008	90.0%	95.7%
Weemes			0.62	27.88	Trad. K-5	1,240	71.4%	90.2%

Figure 2. Selected sites and school characteristics.

Sources: 2000 US Census; Public school data: ed-source 2005-06 school report; private school data: National Catholic Educational Association (NCEA); Private School Universe Survey data for the 2003-2004 school year.

volunteers—local residents keeping an eye on the streets typically traveled by children walking to school.⁸ Assessment of selected pedestrian infrastructure and design elements required field visits by the research team.

Findings

Mode of Travel

When asked about how they travel to school, 63 percent of the children reported that they are driven to school either alone or with other children. Approximately 32 percent of the children indicated walking or biking to school most days. As to be expected, a higher percentage of children walked or

biked (48 percent) coming home, while the car rides decreased to 51 percent. This increased rate of walking home suggests that working parents were unable to drive them home midafternoon.

Travel Routes

The travel distance between home and school was measured from the routes drawn by children on aerial-view maps. Figure 3 summarizes the selected characteristics of the children's travel routes. Typically they walked or biked much farther than a quarter mile, normally considered appropriate walking distance for grade school children. On average,

Table 1. Child Demographic and Socioeconomic Characteristics (in Percentage).

Characteristics	Schools					Total (n = 87)
	Foshay (n = 9)	Norwood (n = 15)	St. Agnes (n = 11)	Vermont (n = 43)	Weemes (n = 9)	
Female (child)	88.9	40.0	61.5	56.4	55.6	54.0
Living with both parents (or a parent and an unrelated adult)	66.7	53.4	81.8	67.5	66.7	66.7
Living with a single parent	33.3	33.3	18.2	27.9	33.3	28.7
Missing	0.0	13.3	0.0	4.7	0.0	4.6
Siblings in a family (age <16 years)	55.6	73.3	36.4	58.1	44.5	56.3
Missing	0.0	20.0	36.4	32.6	33.3	27.6
Median household income <\$15,000	44.4	26.7	45.5	30.2	11.1	31.0
Income between \$15,000 and \$35,000	33.3	26.7	36.4	46.5	33.3	39.1
Missing	11.1	13.3	0.0	9.3	44.4	12.6
Living without a car	0.0	13.3	9.1	4.7	22.2	8.0
Missing	0.0	20.0	9.1	16.3	11.1	13.8
Parent born outside the United States	22.2	80.0	54.5	69.8	44.4	62.1
Missing	22.2	6.7	9.1	14.0	11.1	12.6
Parent completed high school or less	44.4	66.7	54.6	72.1	77.7	73.4
Missing	0.0	13.3	9.1	9.3	11.1	9.2
Lived in the neighborhood >10 years	80.0	66.6	100.0	75.8	88.9	71.0
Missing	0.0	6.7	0.0	4.7	0.0	3.4

children walked nearly 0.48 miles for the trip to school and those who were driven traveled about 0.61 miles. For the trip from school, children (including those driven to school one way) walked a longer distance (0.54 miles).

The proportion of children walking or biking to school decreased with increasing distance (especially when greater than a half mile) (Table 2). Even of those who lived closer to school, a significant proportion—43 percent living within a quarter mile and more than 56 percent living within a quarter to a half mile—were driven to school. This trend was true for trips from school as well.

Route Choices

Interestingly, children who walked to or from school often did not take the shortest route between home and school, contrary to what previous studies presumed (e.g., Timperio et al. 2006). Some routes were much longer than the shortest route in network distance (0.45 mile). Possible reasons are to avoid heavy traffic or unsafe area, to walk with friends on the way to or from school, to experience interesting walking environment, or simply distortions in their cognitive maps.

Children's travel routes were further subjected to an audit of the proximate environment based on secondary data and field observation. Table 3 summarizes objective characteristics of the routes chosen, categorized by land use, street pattern, traffic environments, pedestrian-friendly features, appearance, and social milieu.

Correlation analysis showed that none of the land use, urban form (street pattern), traffic environment, and

aesthetic variables (appearance, that is) was significantly associated with a child's school travel choice to or from school. For the trip to school, only percentage street area ($r_{pb} = -.21$) (lower the percentage, the less traffic volume) and crime density ($r_{pb} = -.22$) (the lower the density the safer) were inversely correlated with active commuting to school.⁹ For the trip from school, the number of Kid Watch sites was positively associated with active commuting from school ($r_{pb} = .21$), whereas well-maintained sidewalks (i.e., absence of broken surfaces, pot holes, cracks, obstructions, etc.) ($r_{pb} = -.21$) and crime density ($r_{pb} = -.32$) were inversely associated with children walking or biking for this trip. The negative association between sidewalk maintenance and walking from school is counterintuitive to a general assumption that well-maintained sidewalk conditions can create a more amenable pedestrian environment with comfort and safety. We believe that this counterintuitive finding may simply reflect a paradox in children's route choice influenced by their preference for safer, but busier, streets where sidewalks may be less well maintained or in a constant state of maintenance—curb cuts, utility connections, street hardware repair, etc.—and avoiding quiet and empty residential streets with well-maintained sidewalks.

The density of crime along the child's travel route was the only factor found to be significantly inversely associated with both walking to and from school, consistent with the concerns raised by the Kid Watch¹⁰ volunteers from focus group discussion and survey. The issues related to gangs and drug activities, particularly during school commuting hours, were most frequently mentioned.






School	Travel Routes	Travel distance		Walked route	
		Walked (mi.)	Driven (mi.)	Arterial (%)	Crossings (no. of times)
Foshay (n=8)		T =0.81 F =0.81	T =0.74 F =0.76	T =14.3 F =14.3	T =3.00 F =3.00
Norwood (n=29)		T =0.53 F =0.56	T =0.56 F =0.57	T =19.2 F =22.9	T =4.46 F =4.61
St. Agnes (n=13)		T =0.40 F =0.39	T =0.65 F =0.48	T =78.0 F =86.0	T =5.00 F =5.00
Vermont (n=39)		T =0.40 F =0.52	T =0.58 F =0.60	T =31.7 F =33.4	T =3.50 F =4.27
Weemes (n=9)		T =0.86 F =0.76	T =0.63 F =0.61	T =30.0 F =52.5	T =8.00 F =8.00
Total		T =0.48 F =0.54	T =0.61 F =0.59	T =32.6 F =34.9	T =4.17 F =4.57

Figure 3. Selected characteristics of children's school travel routes (on average).

Note: T = to school; F = from school.

Table 2. Travel Mode to and from School by Travel Distance (in Percentage).

	<¼ mile		¼–½ mile		½–1 mile		>1 mile	
	T	F	T	F	T	F	T	F
Active	42.9	33.3	43.2	54.2	28.6	54.1	12.5	40.0
Motorized	42.9	50.0	56.8	45.8	71.4	45.9	87.5	60.0
Missing	14.3	16.7	0.0	0.0	0.0	0.0	0.0	0.0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Note: T = to school, F = from school.

Perception of Safety

About 54 percent of the children perceived walking as safe, while 41 percent of them responded otherwise. As expected, children who perceived walking as safe were more likely to walk to and/or from school (Table 4). However, the perceived safety of walking was found significantly related only to current mode to school, $\chi^2(1, n = 95) = 5.20, p < .05$. Especially, girls appeared to be more influenced by safety perception in walking than did boys. When controlling for gender, significantly more girls who perceived walking as safe walked to school (56 vs. 23 percent) than those who perceived unsafe, $\chi^2(1, n = 53) = 5.84, p < .05$.

When asked what made walking to or from school unsafe, the children most frequently selected “fast-moving cars,” followed by “many strangers” and other such social dangers (Table 5). Deficits in the built environment ranked relatively low compared to the concerns about the proximate social milieu. The rankings of perceived risk were very similar between the two groups, $r_s(16) = .76, p < .01$.

When asked what would make walking to school safer or more appealing, appearance of the proximate environment seemed to matter most for these children. Thus, “cleaner street” was most frequently selected (over 69 percent) followed by “no graffiti” and “less crime in my neighborhood” (66 and 65 percent, respectively) (Table 6). Crossing the street also ranked high, especially for the walkers who identified “safe places to cross the road” as the top concern. Nevertheless, there was a high level of agreement between the two groups of children regarding the rankings of perceived positive attributes supportive of walking to school, $r_s(21) = .80, p < .01$.

Neighborhood Environment and Walkability

Place-mapping activities captured children’s positive, negative, or safety related apprehensions. Each child identified approximately four places on average; a total of 177 different places were identified along (but not limited to) children’s travel routes. Places that children identified as liked, disliked, or dangerous were classified into six categories: residential area or street (including freeway, travel route, intersection, alley and underpass); shops or restaurants; park

or recreational facilities; nonrecreational community facilities; home (including homes of friends or relatives); and other (i.e., construction site, vacant lot, abandoned building, parents’ workplace, etc.).

Places Liked

Children mentioned commercial establishments most often as their favorite places (36 percent), including a variety of stores and restaurants ranging from a small food market to a large chain grocery store and a shopping center in the neighborhood. This suggests that commercial establishments serve as a cognitive anchor, more frequently selected than parks and recreational facilities (14 percent) contrary to conventional wisdom.

However, children’s affinity for these places was closely related to the perceived conviviality and the public life of these places, offering opportunities for various physical, social, and commercial activities (70 percent), and safety (22 percent). Children enjoyed the presence of other people and chance to “bump into” friends. Also these places seemed to provide children with a sense of security with the familiarity with places and people, reminiscent of Jane Jacobs’s observations of about “eyes on the street” in sidewalks fronting various commercial activities and the random social contact—the essence of public life. They also felt safe where there was formal surveillance.

Places Children Disliked or Where Felt Unsafe

Residential areas/streets were consistently mentioned most often as disliked (76 percent) or unsafe (74 percent) places, followed by parks and recreational facilities (10 or 14 percent, respectively). Why a place was disliked was associated with safety issue (73 percent) and, to a lesser extent, with sensory qualities such as noise, dirty street, and ugly houses (22 percent). Table 7 summarizes the children’s risk perceptions categorized by the characteristics of places. Their responses suggest that signs of social incivilities or social dangers by far were of greater concern (86 percent) than perceived traffic dangers (8 percent).

Gang-related activities dominated personal safety concerns. Children were very much aware of places where gangs frequently appeared or adorned with their territorial markers like graffiti:

Unsafe because sometimes there’s gangsters drinking and smoking and there is also tagging on the floor and the walls.

Children were very much aware of crime hot spots in the neighborhood where violent crimes occurred or sometimes they witnessed:

I don’t like Adams Street because there’s a lot of violence, brutality, gangsters, drive-by, and murders.

Table 3. Objective Built and Social Environmental Characteristics of Route Choices for Walking to and from School.^a

	Mean	Minimum	Maximum
Land use			
Net residential density	20.03	2.06	40.88
Land use mix	0.44	0.05	0.67
Retail floor ratio	0.47	0.05	0.79
Street pattern			
Average block size	5.86	1.01	9.26
Street connectivity	94.44	10.94	136.25
% street area*	26.68	4.27	34.29
Traffic environments			
Traffic capacity	2.72	0.38	3.52
Traffic speed	29.13	4.31	38.38
Transit stop density	3.79	0.17	9.14
Pedestrian features			
Streetlight coverage	35.09	4.42	50.40
% street segments with sidewalk width more than 5 feet	58.58	0.00	84.35
% street segments with pedestrian amenity	22.40	0.00	66.65
% street segments with well-maintained sidewalk [†]	69.72	13.96	97.90
% street segments with no sidewalk obstruction	85.75	10.21	97.80
% street segments with natural surveillance	56.92	10.83	83.40
Appearance			
% street segments with no litter	89.12	8.54	100.00
% street segments with no abandoned or vacant lot	83.18	16.67	100.00
% street segments with well-maintained buildings	91.88	16.67	100.00
Social milieu			
Crime density ^{*,††}	14.88	1.92	23.33
Kid Watch site density [†]	30.82	6.08	61.00

^aValues summarized for the travel routes of 102 children, measured either at the 0.25- × 0.25-mile grid cell or at the street segment level that contained a child's travel route; average number of grid cells assessed = 4.01 (minimum = 1, maximum = 8) per individual route; average number of street segments assessed = 14.02 (minimum = 2, maximum = 33) per individual route.

* $p < .05$, point-biserial correlation with travel mode to school.

[†] $p < .05$, point-biserial correlation with travel mode from school.

^{††} $p < .01$, point-biserial correlation with travel mode from school.

Table 4. Percentage of Walking Trip by Gender and Safety Perception.

Gender	Safety Perception					
	Safe			Unsafe		
	T	F	Total	T	F	Total
Girls	55.6	74.1	100.0	23.1	46.2	100.0
Boys	33.3	40.7	100.0	20.0	26.7	100.0
Total	44.4	57.4	100.0	22.0	39.0	100.0

Note: T = to school, F = from school.

I don't like this place because there is gun shooting at night and police cars.

I don't like these places because I saw a dead body.

Often children were torn between opportunities some places afforded and attendant safety concerns. They talked about their daily struggles in some of the neighborhood parks

where their access and use was intimidated by the presence of risk elements, ranging from dangerous objects to gang activities:

[We] like because kids play (but) unsafe because many trash, glass rocks, chips in sand.

I don't feel safe on Toberman Park because there are a lot of gangs.

They perceived streets as dangerous where fast-moving cars often didn't stop for pedestrians and the risk of being hit by a car:

I dislike that place because the cars always go fast.

Sometimes cars don't stop, and there might be an accident.

In their photo evaluation, safest places were all linked to their social functions (i.e., school, church, library, grocery store, or shopping mall). Freeway underpass and dark alleys were perceived the least safe, along with the places with barking dogs.

Table 5. Children's Perceived Risks in Walking to/from School (in Rank Order).

Perceived Risks	YES _o (%)	Rank _o	Rank _a	Rank _p
Fast-moving cars	68.8	1	1	1
Many strangers	66.7	2	2	1
Dogs without leash	62.5	3	4	2
Homeless people	62.5	3	2	1
Graffiti	58.3	5	5	4
Bullies or gangs	52.1	6	5	7
Tagger	52.1	6	9	5
No crossing guard	49.9	8	7	8
Difficult to cross a road	39.6	9	14	8
Drug activities	39.6	9	7	11
No stop light for pedestrians or bikers	33.3	11	10	13
Empty street with no people	29.2	12	15	10
No sidewalk or broken sidewalk	27.1	13	11	14
No bike path or broken bike path	27.1	13	15	11
Lights at intersections change before I can cross the street	27.1	13	11	14
No crosswalk	27.1	13	11	14

Note: YES_o = overall percentage, Rank_o = overall ranking, Rank_a = ranking by children who are active travelers, Rank_p = ranking by children who are passive travelers.

Table 6. Things That Would Encourage Children to Walk to School.

Perceived Attractors	YES _o (%)	Rank _o	Rank _a	Rank _p
Cleaner street	69.1	1	1	2
No graffiti	66.0	2	2	4
Less crime in my neighborhood	64.9	3	3	2
Safe places to cross the road	61.9	4	4	1
Cars moving slower	54.6	5	7	6
Crossing lights giving more time to cross the street	54.6	5	4	7
School crossing guard	53.6	7	8	5
Push buttons to change crossing signs	49.5	8	9	8
Less cars*	48.5	9	4	15
No abandoned buildings or vacant lot	46.4	10	9	12
More crossing light	45.4	11	11	9
More children to walk with	41.2	12	13	9
Better street lighting	41.2	12	13	9
Wider sidewalk	39.2	14	13	12
More Kid Watch volunteers	36.1	15	18	14
More bike paths	35.1	16	13	16
More stores that I can visit**	34.0	17	11	21
Lighter school bag	33.0	18	17	17
More shady street	32.0	19	18	17
More streets with sidewalk	28.9	20	20	17
More speed bumps	24.7	21	21	20

Note: YES_o = overall percentage, Rank_o = overall ranking, Rank_a = ranking by children who are active travelers, Rank_p = ranking by children who are passive travelers.

*p < .01, based on a χ^2 test.

**p < .05, based on a χ^2 test.

Place Dissonance: Setting Deprivation and Aggravation

Group discussions with children further embellished their views of the proximate environment that they valued or

preferred. A good fit between environmental settings and users activities is an important performance characteristic of good city form (Lynch 1981). Children in inner city are likely to suffer from a higher level of "place dissonance," which may limit opportunities for their participation in the

Table 7. Unsafe Areas and Safety Concerns Raised by Children.

	Place	Safety Concerns	Frequency
Personal safety	Residential areas/streets	Gangs, strangers, homeless, taggers, drunken people, skateboarders, shooting, murder, drive-by, rape, scary house, gunshot, stray dogs, dirty and dark, beggars, police presence/arrest	59
	Parks/recreational facilities	Gangs, homelessness, killing, bugs	16
	Shops/restaurants	Gangs, strangers, homeless people	12
	Nonrecreational community facilities	Homeless people, strangers	4
	Other (abandoned house, construction site)	Dogs, rape, gangs	3
Road safety	Local streets/intersections	Fast-moving cars, reckless driving, traffic, car crash, short crossing time	8
	Freeways	Car crash, reckless driving	6

fullest range of activities (Banerjee and Baer 1984). Using the methodology used by Banerjee and Baer, children's sense of place dissonance was seen of two types: "setting deprivation" or the absence of things (settings) that they would like to have in the neighborhood, and "setting aggravation" or the presence of things that children would want to get rid of.

As shown in Table 8, elements that children wanted to have in their neighborhoods were relatively evenly distributed between the four categories: environmental items (such as streets, sidewalks, trees, open spaces, etc.), commercial facilities, social milieu, and community facilities. The things that children did not want to have in their neighborhoods, however, largely fell into environmental items (47 percent) and social milieu (40 percent).

Summary and Conclusions

In this study, we attempted to understand children's experience of walking to school, and how their cognitive, enactive, and affective responses shape their experiences and preferences. In this study, inner city minority children demonstrated an acute awareness about community safety issues. Particularly, they reported a high level of safety hazards in their neighborhoods and along their school travel routes, much of which are social in nature. Thus, the social milieu of their quotidian life mattered much more in shaping their walking experience than the quality of the built environment, which ironically, has dominated the focus of active living research. Yet it is apparent to us that policy efforts to promote walking to school thus should address children's concerns about crime, drug, and gang-related issues, along with traffic. These children were quite forthright with their ideas about how to make their neighborhood safer and walking more enjoyable. Many of these ideas called for improvements in the built and social environments and in the community facilities, as also typically recommended by planners.

The purpose of and motivation for this research was to provide much needed information about children's travel, particularly for safe walking trips, based on their

experiences, supplemented by their parents' perceptions (not reported here because of limitations of space).¹¹ The results from our analyses lead to several observations.

First, the trip to school and the trip from school are two distinct events and influenced by parental perceptions and mobility means. Overall, the trip to school was more a matter of expediency and time, whereas the trip from school was influenced by parents' perceptions of their child's competence, preference, and social supports available in the neighborhood. This may be a result of attitudinal adjustment if parents are not able to transport children to and from school. While existing research generally view the school travel as a single event, this finding suggests the need for strategies to target each trip separately.

Second, children appear to walk longer than normally assumed—quarter mile as the appropriate walking distance. Furthermore, children may take more roundabout routes than the shortest route between home and school, resulting in much longer walks. Thus, the majority of research that largely uses the distance as the crow flies or the shortest network distance as a proxy measure of travel distance may not reflect children's actual travel choice of routes and thus systematically underestimate the distance. This study demonstrated the use of aerial map as an effective tool in collecting children's actual school travel routes.

Third, parents' perception of probable risks for their children does not appear to well reflect barriers that children actually encountered as well as their perception of risks. Parents' view of their neighborhood tended to be more negative than their child's perception, and they were generally more concerned about traffic-related barriers compared to children's reports of actually encountering them en route to school. Thus, while parents' sense of safety may be increased by such policy measures as completion of sidewalk network or installment of additional traffic signal, as found in the evaluation of SR2S projects (see Boarnet et al. 2005), it may not necessarily enhance children's sense of safety or comfort.

Fourth, both barriers to and attractors of walking were more closely related to children's perception of the social milieu of the proximate environment than traffic or other

Table 8. Place Dissonance as Identified by Children.

	Setting Deprivation: “Things to Have”	Setting Aggravation: “Things to Get Rid Of”
Environmental items: $n_d = 31$ (26%); $n_a = 25$ (47%)	Safer and cleaner street ^a Wider/better/clean sidewalk ^a Street lights (brighter) Stop, road, or traffic signs ^a Slower light change ^c More freeways; More parking Speed bump ^b ; More bike parks ^c Bike rack; More bike lanes ^b Bus (free bus pass) ^c School buses ^c ; Crosswalk ^c Caution signs (for crossing streets) ^b More benches ^c ; More trees ^c More shade ^c ; Open space More gardens ^c ; Water fountain ^c Art on the wall ^c ; Wet places Better civilized places Relaxing places; Car alarms ^b More places to look at; More houses ^c Fun places on the way ^c ; Cleaner house More construction (to fix)	Dirty street Traffic/less traffic around malls/at intersection ^a Fast driving ^b Cars that don't stop at red lights Drunken drive; Less cars ^c Freeway entrances; Freeways Unsafe streets; Broken streets Alleys; Abandoned building/house Vacant land/lot Apartment Less pollution/air ^c Less secondhand smoking ^c Graffiti ^a ; Junkyards Junk/garbage/trash Sprinklers Trees (obstructing views) Broken trees; Abandoned cars No tagging ^b ; No littering ^c
Commercial facilities: $n_d = 32$ (26%); $n_a = 7$ (13%)	Burger king, Jack in the box Chuckee cheese, Home town buffet Restaurant, Trader Joes Ice cream truck or vendor Hot dog stand; Candy shop ^c Vending machine/healthy foods ^c Healthier breakfast while you are walking to school ^c Fabric store, Clothing store Circuit city, Starbucks, Wall mart Mall, Comic book store Toy store/game store; Theme park/amusement park; (Movie)theater ^c Casino, Video arcade More school supply store Tattoo parole, Beauty salon Jewelry store, Pet store More retail stores ^a ; Fortune teller; Gas station ^b Cheaper things	Bars Liquor store ^c Unhealthy foods (fast-food, junk food, vendors) Less taco places Donut cars Less gun stores ^c Ice cream truck that sell drugs
Community facilities: $n_d = 31$ (26%); $n_a = 0$ (0%)	After school program ^b Day care ^b ; More schools/college Library (safer and closer) ^b Museums (science center) ^c Church ^b ; Religious altars ^b More temples; Donation center Homeless shelter; Animal shelter ^b More community centers ^c Cultural center; More gyms ^c More sports playing fields (soccer field with grass/baseball field) ^c More playhouses for kids Safer playground (at school) ^c More parks/bigger parks ^c Skateboard park; Skating rinks Community garden; Dance complex Fire department ^b ; Post office Police station (closer); Highway patrol Clinic ^b ; Kids hospital (more doctors) Public bathrooms; Zoo; Fairs	NA

(continued)

Table 8. (continued)

	Setting Deprivation: "Things to Have"	Setting Aggravation: "Things to Get Rid Of"
Social milieu: $n_d = 27$ (22%); $n_a = 21$ (40%)	More Kid Watcha More people watching you when you walk (outside protect) ^c More adults on the street ^b More parent supervision ^c More new people ^c Crossing guards ^a , Safe drivers ^c Safer people; More nice people More English/Spanish speakers More friends (going to friend's house) ^c ; Community meetings ^b Walking with friends (or parents) ^c Vanpools for after-school activities ^b More fire fighters ^b More cops (who care) ^a Police giving tickets to bad drivers ^b Public safety ^b ; Military ^b ; Security guards ^b ; More surveillance cameras ^b Better police dogs ^b ; Guard dogs ^b Good animals (that don't attack) ^b Dogs to walk with ^c ; More animals; More people who pick up trash ^c	Crazy people nasty people Strangers Bullies ^c No killers ^b Child molesters Alcoholics; drunken people ^c Robbers; Homeless/bums ^c Less old drivers ^b Skate boarders Less people doing graffiti ^c Gangs ^a ; Guns, shooting Less gang activities ^c Drugs (dealers, activities) Crime No auto break-ins ^b Drive-by; Car racing Stray dogs (bull dogs; pit bulls) Less war ^b
Total	$N_d = 121$	$N_a = 53$

^aIndicates items valued for both safety and enjoyment of walking.

^bIndicates items valued as things that would make the neighborhoods safer.

^cIndicates items valued as things that would make walking to school more enjoyable.

environmental features, regardless of their current mode of travel to and from school. Children had an acute sense of place-based knowledge about the safety issues in their neighborhoods. They perceived some residential streets or areas as most dangerous for the reasons mainly associated with gang-related activities, drugs, crimes, shooting, or murder, occasionally witnessing such incidents. When given a chance, children are more than capable of forming and expressing their thoughts about the issues pertaining to the planning and design of their everyday surroundings.

In these neighborhoods, children being outside or walking alone to or from school were viewed as a sign of parental neglect and considered as placing children in unnecessary danger. Children were constantly advised not to play in the street at all. In turn, children liked commercial places most. These places dominated children's cognitive maps as strong landmarks. In addition to the consumption opportunities, children frequently expressed a sense of security by being in the presence of informal and formal surveillance and for opportunities for meeting people or bumping into friends. Thus, busy commercial arterials with more traffic were perceived a safer walking environment than quiet and isolated, albeit more aesthetic, residential streets without traffic.

Finally, planners or policymakers' most typical responses toward children's environmental needs such as parks or playgrounds received significantly less favorable votes and less

likely to be recognized as landmarks by children. Many children expressed frustrations with such child-designated places as they were often threatened and felt unsafe by the presence of social disorders, while they longed for play opportunities. Any policy responses aimed to promote walking among children thus should be responsive to children's concerns about gangs, drugs, and crime as they pertain to how children experience and perceive their local environments in low-income inner city areas. Clearly children's perception of the unsafe social milieu is in part derived from the appearance of the built environment and the cues it transmitted—accumulation of trash, preponderance of graffiti—the classic "broken windows" syndrome (see Wilson and Kelling 1982). Better maintenance and clean up of the proximate environment might help redress some of the concerns of the children, but not just superficially one would hope.

The relatively small sample size in this research may influence the level of significance in observed relationships. Although the research did not set to test the proposed model or to conduct a rigorous quantitative analysis, the sample size did not allow to examine interactions among identified elements and thus to understand their relative influence on active school travel. By adopting a convenience sampling strategy largely controlling for ethnicity and income within limited inner city areas, the results from this study may lack generalizability. However, the qualitative nature of this

research intends to reflect the diversity and depth of individual child's perceptions and experiences. Future research can add to the contribution of the current research by engaging children in other settings and contexts (nonurban, non-ethnic minority, high income, etc.) that would make it possible to examine differences or similarities.

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Notes

1. According to a recent report, 70 percent of the funding in California has been awarded for infrastructure projects (see Hubsmith 2007).
2. The service area does not apply to St. Agnes, a parish school. Students come from a larger service area than that of Vermont School located next door.
3. The study requested multiple class visits, which made up about 2.5 hours of in-class activities. Thus, the recruitment of classrooms was largely dependent on the willingness of classroom teachers and class schedules. The Vermont School was most willing, in which two classes volunteered to participate.
4. Materials for parents were written in English and then later translated into Spanish. Parents received both versions.
5. Initially, the methodology was developed to distribute a disposable camera to each child so children can document their environments en route to and from school. However, it was rejected by the University of Southern California (USC) institutional review board on the ground that it might endanger children (i.e., possibility of causing unnecessary distractions and being exposed to social and traffic dangers, etc.).
6. Questions included items comparable to those from the parent survey questionnaire in order to examine congruence in the responses of the children and their parents.

7. For the activities in the third session, the study missed four children. They were either absent on the day of the session or in a different classroom for other lessons.
8. A program initiated by USC and its Family of Schools. Dwellings of residents volunteering for this program are marked with a special decal, and the children can approach those residents if they perceive any threats.
9. The point-biserial correlation coefficient (r_{pb}) provides a correlation measure of the strength and direction of relationship between a dichotomous variable (walking to/from school or not walking to/from school in this case) and a nondichotomous variable.
10. A neighborhood-based program where residents volunteer to keep an eye on children walking to and from school.
11. These findings can be found in *Pedestrian Safety of School Children: Toward Improving Walkability of Inner City Neighborhoods*. Draft Final Report (project no. 07-21), Metrans Transportation Center, University of Southern California. See also Uhm 2008.

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