Journal of Urban Health: Bulletin of the New York Academy of Medicine, Vol. 81, No. 4,

doi:10.1093/jurban/jth139

Child Pedestrians: the Role of Parental Beliefs and Practices in Promoting Safe Walking in Urban Neighborhoods

Andrea Carlson Gielen, Susan DeFrancesco, David Bishai, Patricia Mahoney, Shiu Ho, and Bernard Guyer

ABSTRACT *The purpose of this study was to describe parents' child pedestrian safety practices, knowledge, risk perceptions, and beliefs. We surveyed 732 parents from four elementary schools in urban neighborhoods that differed in income, and child pedestrian injury risks. Findings indicated that most parents taught their children street safety. Few (16%) knew basic pedestrian safety facts; 46% believed children younger than 10 years could safely cross streets alone; 50% believed a child pedestrian crash was likely. Parents in lower income neighborhoods reported the highest rates of unpleasant walking environments and concerns about drug dealers, crime, violence, and trash. We conclude that education should focus on children's risk, developmental capabilities, and supervision needs. Promoting physical activity in urban neighborhoods, especially lower income ones, must address concerns about the physical and social environment.*

KEYWORDS *Child pedestrian safety, Injury prevention, Neighborhood walkability, Safety practices, Supervision.*

INTRODUCTION

Among children ages 0–9 years in the United States, pedestrian crashes caused 10,000 injuries and 270 deaths in 2001, and more than one fifth (22%) of all traffic fatalities in this age group were attributable to pedestrian injury.[1] The rates of child pedestrian injury have been declining in recent years, most dramatically among 5- to 9-year-olds, who had a drop in traffic-related pedestrian death rates from 4.4/100,000 in the late 1970s to 0.81 in 2000,[1,2] a decline that has been attributed to reduced exposure to the traffic environment.[3–6]

Although the improvement in pedestrian injury deaths is a positive outcome, it must be weighed against potential negative consequences of more sedentary lifestyles for children. The benefits of walking include those associated with increased physical activity for individuals (e.g., bone strengthening and protection from heart disease) as well as improved community quality of life (e.g., reducing traffic noise and increasing social support networks).[3] Promoting walkable neighborhoods must ensure that children are protected from injury risk, such as by having safe play areas and routes for walking to and from school. These issues are especially important for

Drs. Gielen, DeFrancesco, Bishai, Mahoney, and Guyer are with the Johns Hopkins Bloomberg School of Public Health, Baltimore, Maryland. Dr. Ho is with the University of Maryland School of Medicine.

Correspondence: Andrea C. Gielen, ScD, ScM, CHES, Center for Injury and Policy, Johns Hopkins Bloomberg School of Public Health, 624 North Broadway, Baltimore, MD 21205. (E-mail: agielen@jhsph.edu)

children living in urban areas, where large proportions of children walk to school, and rates of child pedestrian injuries are high.[7]

The behavior of parents is potentially one of the most important factors that influence children's pedestrian risk, yet it has not been well studied. A survey of over 2,000 parents by Rivara et al.[8] found that, although 94% thought 5- to 6-year-olds were too young to cross residential streets alone, one third allowed their kindergarteners to do so. In a study of 142 injured pedestrians ages 5–12 years, Wills et al.[9] found that only 36% were supervised at the time of the injury. Roberts[10] found that having adult accompaniment on the trip from school to home can have a protective effect on child pedestrian injury risk.

The cognitive and affective factors that underlie these parental behaviors are not well understood. Dunne et al.[11] reported that parents of 5- to 8-year-olds greatly overestimated their children's pedestrian skills. In a qualitative study with 32 parents in the United Kingdom,[12] mothers' fear of speeding traffic was one of the main concerns, and a majority drove their children to school even though they would have preferred that their children walked. All of the mothers interviewed could relate stories of real accidents and "near misses." Another British study of 2,000 parents of school-aged children found that 90% were very or extremely worried about traffic danger and about the fear of abduction.[13]

A better understanding of parents' perceptions of the pedestrian risks to their children, the walkability of their neighborhoods, and their current child pedestrian safety practices (e.g., supervision, child skills training) could contribute much needed information for development of targeted prevention messages and interventions. We had an opportunity to investigate the role of parents in child pedestrian injury risk as part of a larger study examining how four urban school neighborhoods that differ in income-adjusted child pedestrian injury rates may also differ in characteristics of the physical environment and safety practices of the families who live there.[14,15] The purposes of this report were to describe children's exposure to traffic and parents' child pedestrian safety practices, knowledge, risk perceptions, and beliefs about walkability and compare these findings between parents from higher and lower risk neighborhoods.

METHODS

Sample

Four urban elementary schools agreed to participate in this study. The schools were selected from four census tracts defined by their child pedestrian injury rate; police crash reports for the years 1995–1999 and median household income from the Census Bureau for the year 2000 were used for the definition. All city census tracts were stratified as "higher" or "lower" income, using the city median value as the cut point. Multivariate regression was used to estimate the expected rate of child pedestrian injury for each census tract, using median income, percentage of dwellings occupied, and male unemployment rate as variables.

Based on the regression results, we then identified census tracts with observed child pedestrian injury rates that were most divergent (both higher and lower than expected) within each income strata. For each strata, we then selected the six most extreme census tracts (three higher and three lower than expected) and located the elementary school with school neighborhood boundaries that most closely matched the selected census tract boundaries. This yielded 12 potential schools, from which

the study team purposively selected 4 schools to achieve a diverse range of city neighborhoods and to minimize logistical difficulties for conducting the study. In the lower income strata, the higher risk school neighborhood had a median household income of $29,199 and a child pedestrian injury rate of 310/100,000 population; these figures were $22,413 and 229/100,000, respectively, in the lower risk school neighborhood. In the higher income strata, the higher risk school neighborhood had a median household income of $52,678 and an injury rate of 313/100,000; these figures were $76,229 and 35/100,000, respectively, in the lower risk school neighborhood.

After receiving approval from the city school system and the Johns Hopkins Committee for Human Research, we asked the participating schools to distribute and collect surveys of their children's parents. The principals or their designee from two of the four schools also served on a community steering committee that provided guidance to the investigators in implementing the study. In three of the schools, all kindergarten through fifth-grade teachers sent surveys home with all students. Because of the large number of students in the fourth school, a random selection process (stratified by grade) was used to distribute the surveys through selected classrooms. The population surveyed was 1,959 students.

Incentives were used to increase response rates: Parents received $10 for completing the survey, and students received a small gift (e.g., pencils, key ring) when they brought the completed survey back to their teacher. Two weeks after the initial distribution of the surveys, a reminder postcard was sent home with all students.

Survey Instrument

The survey instrument included 50 items to assess the child's exposure to traffic; parent safety practices, knowledge, risk perceptions, and beliefs about neighborhood walkability; and sociodemographic characteristics. The instrument was developed based on a literature review and input from the community steering committee, parent focus groups, cognitive testing, pilot testing, and a readability assessment to ensure that the reading level was at or below the seventh grade.

Measures

Exposure to Traffic Parents were asked a series of questions about how their child travels to and from school "most of the time." A mutually exclusive variable was constructed to classify respondents by whether the child never walks, always walks with a parent or another adult, or walks alone some or all the time. Three items were used to determine how often in the last month the child played in a yard (their own or a neighbor's), at a playground or park, and in the street. Two dichotomous variables were created: the child plays in a yard or playground at least weekly and the child never plays in the street. Parents were also asked whether their street had a lot, some, a little, or hardly any traffic.

Safety Practices Four areas of safety practices were included: teaching safe crossing skills, teaching safe routes to school, limiting where the child can play, and close supervision.

Parents were asked if they had taught their child to wait for a walk signal before crossing, not to cross in the middle of the block, and to cross where crossing guards are present. A dichotomous summary variable was constructed to indicate whether the respondent reported teaching the child all three of these skills.

Teaching about taking safe routes to school was assessed for parents who reported that their child walked to school, with a single dichotomous item asking if the parent had talked with the child about the safest route to walk to school.

Parents were asked if they ever limited where the child can play outside and their reason for doing so. Answer options included unsafe cars and trucks, drug dealers, violence, or some other reason, and parents could choose multiple answers.

Supervision was measured by asking parents to choose the from the following answers the one that best described how they usually kept an eye on the child when the child played outdoors: my child does not need me to watch or check on him/her; I stay somewhere where I can check on my child from time to time; I stay somewhere where I can see my child all the time; or I stay outside and watch my child. Close supervision was defined as either being able to see the child at all times or staying outside with the child.

Knowledge Four items were used to measure child pedestrian safety knowledge: (1) in which age group is a child in our city most likely to be hit by a car (<5 years, 5–14 years, 15–24 years), (2) where is a child in our city most likely to be hit by a car (in the middle of the block, at an intersection), (3) which is most likely to happen to children in our city (be shot by a gun, be hit by a car, be kidnapped by a stranger), and (4) at what age do you think a child can safely cross the street you live on. Correct answers were (1) 5–14 years, (2) in the mid block, (3) hit by a car, and (4) ages 10 or older. A total correct score was calculated.

Risk Perceptions One item asked parents how likely they thought it was that a child in their neighborhood would be hit by a car sometime in the next year (very unlikely, somewhat unlikely, somewhat likely, and very likely). A second item asked how likely it was that the respondent's child would be hit compared to other children in the neighborhood of the same age and sex (less likely, just as likely, more likely).

Walkability A list of reasons why people might not like to walk in their neighborhoods was provided, and respondents were asked to check off all that were true for their neighborhood (too much trash, sidewalks not usable, too much traffic, neighbors not friendly, drug dealers, crime or violence). A second yes/no item asked parents: "In general, is your neighborhood . . . a nice place to walk around or not a nice place to walk around?"

Statistical Analysis

Frequency distributions for each variable are presented by neighborhood and for the total sample. We used χ^2 tests to compare distributions between the higher and lower risk neighborhoods within each of the two income groups. For 2×2 comparisons that were statistically significant ($P \leq .05$), we report the 95% confidence intervals (CIs) around the difference in proportions.

RESULTS

Sample

Of the total 1,959 students, 788 (40%) parents returned their surveys, of which 723 were usable (47 were duplicates, 15 had too much missing data, and 3 were concerning children younger than 5 years). The response rates did not differ between

schools (33% to 43%). Parents were instructed to respond to the survey items in reference to only one of their children if more than one child attended the school. However, because the anonymous survey was sent home with all children in the selected classrooms, there was no way to exclude the ineligible siblings from the denominator of total students surveyed. Thus, because of the inflated denominator, our response rates are conservative estimates.

To examine the extent to which our sample was representative of the broader community, we compared our respondents with census data for the population within the school neighborhood boundaries on two household characteristics that were available from the surveys. On household size, our sample had an average number of people in the home that was larger than in the entire neighborhood for each school neighborhood. In the lower income neighborhoods, the respective mean numbers were 4.3 versus 3.1 in the higher risk and 3.9 versus 2.4 in the lower risk neighborhoods. In the higher income neighborhoods, the respective mean numbers were 4.3 versus 2.9 in the higher risk and 3.8 versus 2.2 in lower risk neighborhoods. On household income, our sample reported proportionally lower income than in the entire neighborhood for each school neighborhood. In the lower income neighborhoods, the respective proportions with less than $50,000 income were 97% versus 73% in the higher risk and 98% versus 81% in the lower risk neighborhoods. In the higher income neighborhoods, the respective proportions with less than $50,000 income were 83% versus 49% in the higher risk 40% versus 35% in the lower risk neighborhoods. Because of differences in categorizing the income variable between our survey and the available census data, we were unable to compare more refined categories below $50,000.

Characteristics of our sample are presented in Table 1. A majority of the sample (79%) reported on children who were younger than 10 years of age (mean age was 7.7 years; SD = 1.9 years). More than three quarters of the respondents (78%) were the child's mother; their average age was 35.6 years, and mean years of education was 12.7. In the lower income neighborhoods, there were significant differences between the higher and lower risk neighborhoods: Respondents from the higher risk neighborhoods were more likely to own their own homes (95% CI 0.10–0.28) and less likely to be the child's mother (95% CI 0.05–0.20). In the higher income

TABLE 1. Sample characteristics: comparisons between parents living in neighborhoods at higher and lower risk for child pedestrian injury, stratified by median household income in the neighborhood

	Lower income neighborhoods		Higher income neighborhoods		
	Higher risk (N = 181), n (%)	Lower risk (N = 214), n (%)	Higher risk (N = 209), n (%)	Lower risk, (N = 119), n (%)	Total (N = 723),* n (%)
Mother respondent	135 (75.0)	188 (87.9)†	139 (67.5)	101 (84.9)†	563 (78.3)
Owns home	67 (37.4)	39 (18.4)†	126 (61.5)	94 (80.3)†	326 (45.7)
Drives car ≥ once per week	84 (47.2)	83 (39.2)	132 (64.7)	112 (95.7)†	411 (57.8)
Male child	94 (51.9)	108 (50.5)	104 (49.8)	55 (46.2)	361 (49.9)
Child younger than 10 years	148 (81.8)	176 (82.2)	152 (72.7)	93 (78.2)	569 (78.7)

*Sample size varied from 711 to 723 because of missing data for individual items.

†$P < .05$ for comparisons within lower income and higher income neighborhoods.

neighborhoods, there were also significant differences between the higher and lower risk neighborhoods. Respondents from the higher risk neighborhood were less likely to own their own home (95% CI 0.09–0.29), less likely to be the child's mother (95% CI 0.08–0.26), and less likely to drive at least once a week (95% CI 0.23–0.38).

Children's Exposure to Traffic and Play Areas

The distributions on how children traveled to school differed significantly between the higher and lower risk neighborhoods in both the lower income and higher income neighborhoods (Table 2). In the lower income neighborhoods, respondents from the higher risk neighborhood differed most noticeably in being more likely to report that their child did *not* walk to school (24.1% vs. 14.6%) and less likely to allow their child to walk to school without an adult (29.3% vs. 38.0%). In the higher income neighborhoods, respondents from the higher risk neighborhood were more likely to report that their child walked to school, both alone (36.2% vs. 5.2%) and with an adult (21.6% vs. 7.0%).

Play areas differed significantly across the neighborhoods (Table 2). In lower income neighborhoods, respondents from the higher risk neighborhood were more likely to report that their child played in the street (95% CI 0.00–0.14). In the higher income neighborhoods, respondents from the higher risk neighborhood were less likely to report that their child played in a yard or playground (95% CI 0.10–0.27) and were likely to report that their neighborhood had a lot of traffic (95% CI 0.11–0.30).

Safety Practices

The vast majority of parents reported teaching their children about safe street crossing (85.8%), safe routes to school (95.5%), and limiting where their child

TABLE 2. Child pedestrian exposure variables as reported by parents: comparisons between parents living in neighborhoods at higher and lower risk for child pedestrian injury, stratified by median household income in the neighborhood

	Lower income neighborhoods		Higher income neighborhoods		
	Higher risk (N = 181), n (%)	Lower risk (N = 214), n (%)	Higher risk (N = 209), n (%)	Lower risk (N = 119), n (%)	Total (N = 723),* n (%)
School travel					
Does not walk	42 (24.1)	30 (14.6)†	84 (42.2)	101 (87.8)†	257 (37.1)
Always walks with adult	81 (46.3)	97 (47.3)	43 (21.6)	8 (7.0)	229 (33.0)
Walks alone some or all the time	51 (29.3)	78 (38.0)	72 (36.2)	6 (5.2)	207 (29.9)
Protected play areas					
Plays in yard or playground at least weekly	137 (77.0)	167 (79.1)	143 (69.1)	104 (87.4)†	551 (77.1)
Street play area					
Ever plays in the street	29 (16.5)	20 (9.5)†	36 (17.6)	25 (21.2)	110 (15.5)
Street traffic					
A lot of traffic	94 (52.2)	111 (52.4)	74 (35.7)	18 (15.4)†	297 (41.5)

*Sample size varied from 693 to 723 because of missing data for individual items.

†$P < .05$ for comparisons within lower income and higher income neighborhoods.

plays (81.4%) (Table 3). Fewer respondents reported close supervision of children at play (52.3%). In the lower income neighborhoods, there were no differences between respondents living in higher and lower risk neighborhoods. In the higher income neighborhoods, respondents in the higher risk neighborhood were more likely to report teaching safe crossing skills (95% CI 0.01–0.19) and to provide close supervision when their child played outdoors (95% CI 0.02–0.24).

Although the respondents did not differ in proportions who reported limiting where their child played outdoors (78%–84%), there were striking differences in the reasons why. Among respondents in the higher income neighborhoods, those in the higher risk neighborhood were more likely to limit their child's play area because of drug dealers (95% CI 0.28–0.46) and violence (95% CI 0.20–0.41). In the lower income neighborhoods, these rates did not differ by child pedestrian injury risk, although they were much higher than in the higher income neighborhoods (over 70% for both drug dealers and violence). Overall, 73% of respondents said they limited their child's play area because of unsafe cars and trucks, a rate that did not differ across neighborhoods.

TABLE 3. Parents' child pedestrian safety practices, knowledge, and risk perception comparisons between parents living in neighborhoods at higher and lower risk for child pedestrian injury, stratified by median household income in the neighborhood

	Lower Income Neighborhoods		Higher Income Neighborhoods		
	Higher risk (N = 181), n (%)	Lower risk (N = 214), n (%)	Higher risk (N = 209), n (%)	Lower risk (N = 119), n (%)	Total (N = 723),* n (%)
Safety practices					
Teach safe crossing	153 (84.5)	194 (90.7)	180 (87.0)	91 (77.1)†	618 (85.8)
Close supervision	104 (58.1)	124 (58.8)	105 (50.5)	44 (37.6)†	377 (52.7)
Teach safe school route‡	151 (96.8)	186 (95.9)	138 (95.2)	31 (88.6)	506 (95.5)
Limit play areas	140 (78.2)	172 (81.9)	175 (84.1)	94 (80.3)	581 (81.4)
Due to drug dealers	138 (78.4)	154 (74.4)	99 (48.8)	14 (12.1)†	405 (57.7)
Due to violence	132 (75.0)	151 (72.9)	106 (52.2)	25 (21.6)†	414 (57.3)
Due to unsafe cars and trucks	126 (71.6)	149 (72.0)	149 (73.4)	88 (75.9)	512 (72.9)
Knowledge (n and % correct)					
5- to 14-year-olds at greatest risk	146 (80.7)	171 (79.9)	181 (86.6)	107 (89.9)	605 (83.7)
Midblock riskier than intersection	124 (68.5)	155 (72.4)	153 (73.2)	90 (75.6)	522 (72.2)
Hit by car more likely than gunshot or kidnap	69 (38.1)	68 (31.8)	93 (44.5)	71 (59.7)†	301 (41.6)
Children > 10 years to safely cross	105 (58.0)	128 (59.8)	109 (52.2)	47 (39.5)†	389 (53.8)
All four items correct	29 (16.6)	27 (13.0)	32 (15.5)	23 (19.3)	111 (15.5)
Risk of child pedestrian crash					
Likely in your neighborhood	101 (56.4)	138 (64.5)	92 (44.9)	29 (24.4)†	360 (50.2)
Likely for your child	44 (25.1)	61 (28.8)	57 (28.2)	41 (34.5)	203 (28.7)

*Sample size varied from 702 to 723 because of missing data for individual items.

†$P < .05$ for comparisons within low-income and high-income neighborhoods.

‡Among 529 children who walked to school.

Knowledge

A minority of respondents (15%) answered all four knowledge questions correctly (Table 3). Incorrect responses for each item were as follows: 15% did not know that children 5–14 years old were at greatest risk; 27% did not know that midblocks were riskier than intersections; and 45% thought children younger than 10 years old could safely cross the street. For the final item, which asked what happens most often to children in our city, 46% selected being shot by a gun, 42% selected being hit by a car, and 8% selected being kidnapped by a stranger.

In a separate analysis, we only looked at the respondents who knew that children younger than 10 years should not cross streets alone to determine how many let their children (under 10 years) walk to school (data not shown). The rates for the lower income neighborhoods were 23% in the higher risk neighborhood and 25% in the lower risk neighborhood; the rates for the higher income neighborhoods were 18% in the higher risk versus 6% in the lower risk neighborhood.

Risk Perceptions

One half of the sample thought it was likely that a child would be hit by a car in their neighborhood, a rate that varied between the respondents in the two higher income neighborhoods: Those in the higher risk, compared to the lower risk, neighborhood were more likely to think that this could happen (95% CI 0.10–0.31). When asked about their own child's risk, 29% said their child was just as likely or more likely to be hit, a rate that did not differ across neighborhoods.

Walkability

One third of the sample reported that their neighborhood was not a nice place to walk (Table 4). One half of the sample from the lower income neighborhoods felt this way. Among respondents from the higher income neighborhoods, respondents from the higher risk neighborhood were more likely to feel this way (95% CI 0.13–0.26) and were more likely to report concerns about drug dealers (95% CI 0.17–0.33) and crime and violence (95% CI 0.13–0.30). Compared to respondents in higher

TABLE 4. Parents' perceptions of walkability: comparisons between parents living in neighborhoods at higher and lower risk for child pedestrian injury, stratified by median household income in the neighborhood

	Lower Income Neighborhoods		Higher Income Neighborhoods		
	Higher risk (N = 181), n (%)	Lower risk (N = 214), n (%)	Higher risk (N = 209), n (%)	Lower risk (N = 119), n (%)	Total (N = 723),* n (%)
Not nice place to walk	88 (50.3)	101 (50.2)	41 (21.1)	2 (1.7)†	232 (33.8)
Too much trash	42 (23.3)	44 (20.7)	19 (9.3)	2 (1.7)†	107 (15.0)
Sidewalks not usable	9 (5.0)	13 (6.1)	10 (4.9)	13 (11.1)†	45 (6.3)
Too much traffic	58 (32.2)	72 (33.8)	48 (23.5)	23 (19.7)	201 (28.2)
Neighbors not friendly	14 (7.8)	25 (11.7)	9 (4.4)	3 (2.6)	51 (7.1)
Drug dealers	134 (74.4)	135 (63.4)†	67 (32.8)	9 (7.7)†	345 (48.3)
Crime or violence	112 (62.2)	126 (59.2)	64 (31.4)	12 (10.3)†	314 (44.0)

*Sample size varied from 688 to 723 because of missing data for individual items.

†$P < .05$ for comparisons within lower income and higher income neighborhoods.

income neighborhoods, respondents from the lower income neighborhoods (regardless of child pedestrian injury risk) were more likely to report concerns about drug dealers, crime, violence, and trash. More than one quarter of the sample reported concerns about too much traffic, rates that did not differ across neighborhoods.

DISCUSSION

Although this was a descriptive study, we had expected to find that children in higher risk neighborhoods had more traffic exposures, and that their parents would report fewer safety practices, lower knowledge scores, and lower perceived risk. We found few systematic differences between higher risk and lower risk neighborhoods in the lower income neighborhoods: Only exposure to street play distinguished the lower and higher risk neighborhoods in the expected direction. The absence of other significant associations suggests that factors such as characteristics of the physical environment should be examined.

In the higher income neighborhoods, there were many more differences between the higher risk and lower risk neighborhoods. Families in the higher risk neighborhood reported more walking to and from school, more exposure to "a lot" of traffic, and less playing in yards or playgrounds. These families also reported more safety teaching, more close supervision, more limitations on children's play areas (because of drug dealers and violence), and more correct knowledge of the age at which children can safely cross the street. They also rated child pedestrian crashes as more likely. These findings suggest that parents recognize the risks associated with the increased exposure to traffic that their children face and are taking steps to deal with it through supervision, teaching, and restricting play areas. The fact that their neighborhoods are objectively riskier reinforces the need to look to changes in the physical environment to protect child pedestrians. This inference is consistent with the literature on the importance of the physical environment in child pedestrian injury.[3]

Limitations of the study include potential concerns about measurement. We were limited regarding items that could be included because the survey was self-administered and needed to be brief and easy to read. This limitation may be particularly important regarding measurement of exposure and parental supervision, which yielded particularly interesting findings. The potential importance of the physical environment and parental supervision warrants future methodological studies on improving the ability to measure these factors. Although the number of items we used was limited, we have a good degree of confidence that they were well understood by respondents because of the cognitive interviewing and pretesting that was done as part of the study.

Regarding generalizability, our response rates were less than optimal, even with the use of reminders and incentives. The extent to which our completed sample mirrored the school population could not be estimated, although we did find that our sample tended to have lower household incomes and more people living in the households relative to the entire population in each of the school neighborhoods. Thus, our results may not be generalizable to all families living in the school neighborhoods included in this study. This is not a major limitation if the reason is that families not in our sample do not have young children in school, which is plausible given the differences we observed. Consistent with our initial study aims, our sample of schools was purposively selected to represent school neighborhoods that differed in child pedestrian injury rates and median household income. Thus, our

results should be generalized only to other urban neighborhoods that share similar characteristics to those in this study.

Although results from four urban neighborhoods should not be generalized to all urban families, data from our large and diverse sample of respondents can provide useful needs assessment data for parent education programs in the area of child pedestrian safety. For example, virtually all parents reported teaching their child several of the recommended pedestrian safety skills, which is encouraging because it indicates that parents are interested and engaged in the topic. In fact, other data from this study demonstrated that parents are very willing to work toward promoting child pedestrian safety in their neighborhoods.[14,15] However, a potential unintended consequence of having taught their children these skills is that some parents may feel a false sense of security. This may explain why 30% (or almost one half of all walkers) reported letting their child walk to school without an adult, even in higher risk neighborhoods, and 47% did not provide close supervision of their child at play outdoors. It is also quite plausible that parents are unavailable to walk their child to school or supervise their outdoor play because of employment or other competing responsibilities, although data to answer this question were not available in our study.

Our results indicate some specific parent learning needs regarding child pedestrian safety. Only 16% of parents knew four basic child pedestrian facts, and 45% thought that children younger than 10 years could cross the street unaccompanied. Although one half of parents thought child pedestrian injury was likely in their neighborhood, far fewer thought it could happen to their child. This result illustrates the optimistic bias phenomenon, which is said to occur when individuals see their relative risk as more favorable than that of comparable others.[16]

Although the effectiveness of parent education about child pedestrian safety has not been studied, the knowledge gaps we identified suggest that such educational programs should incorporate information about the reality of child pedestrian risks and children's developmental characteristics that affect their ability to protect themselves during the early elementary school age years. Messages to be emphasized include the need for close supervision and accompaniment of children younger than 10 years of age when crossing streets. Information about the appropriateness of specific types of skills training for children is available and should be communicated to parents.[3]

Our findings suggest that efforts to promote child pedestrian safety may be well received by urban parents, especially in lower income neighborhoods. Overall, 42% reported there was a lot of traffic in their neighborhoods, and more than one half of families in lower income neighborhoods reported this concern. Among families who reported restricting where their child could play (a majority of the sample), three quarters reported it was because of unsafe cars and trucks. Moreover, one half of the sample thought a child pedestrian crash was likely in their neighborhood, a rate that increased to two thirds in one low-income neighborhood. More than one third (34%) of the total sample reported that their neighborhood was not a nice place to walk. Families in lower income neighborhoods, compared to those in higher income neighborhoods, were more likely to report that their neighborhood was not a nice place to walk and to have concerns about drug dealers and crime. Likewise, families in neighborhoods at higher risk for child pedestrian injury compared to those at lower risk were also more likely to have concerns about drug dealers and crime. These findings suggest that campaigns to promote children's increased physical activity through increased walking should consider how to tailor efforts to the

unique characteristics of specific neighborhoods. For many urban areas, these efforts will need to include addressing community concerns about traffic, drugs, and crime.

ACKNOWLEDGEMENT

This research was supported by a grant to the Johns Hopkins Center for Injury Research and Policy from the Centers for Disease Control and Prevention, National Center for Injury Prevention and Control (R49CCR302486).

We wish to acknowledge and thank the participating schools, community advisory board members, and parents for making this work possible. We also thank the Central Maryland Regional Safe Communities Center for contributing incentive items for the students who participated in the study.

REFERENCES

1. US Department of Transportation, National Highway Traffic Safety Administration. *Traffic Safety Facts, Pedestrians, National Center for Statistics and Analysis, Research and Development*. Washington, DC: US Department of Transportation; 2001. Publication DOT HS 809478.
2. Agran P, Winn D, Anderson C. Epidemiology of pediatric pedestrian injuries. Background papers for Panel to Prevent Pedestrian Injuries, Centers for Disease Control and Prevention; September 27–28, 1998; Atlanta, GA.
3. Schieber RA, Vegega ME. Reducing childhood pedestrian injuries. Summary of a multidisciplinary conference. *Injury Prev*. 2002;8(suppl 1):1–10.
4. Roberts I. What does a decline in child pedestrian injury rates mean? *Am J Public Health*. 1995;85:268.
5. US Department of Transportation, Federal Highway Administration. *Final Report, The National Bicycling and Walking Study, Transportation Choices for a Changing America*. Washington, DC: US Department of Transportation; 1994. Publication FHWA-PD-94–023.
6. Rao R, Hawkins M, Guyer B. Children's exposure to traffic and risk of pedestrian injury in an urban setting. *Bull N Y Acad Med*. 1997;74:65–80.
7. Insurance Institute for Highway Safety Web site. Available at: http:/ /www.hwysafety.org/safety_facts/qanda/peds.htm. Accessed November 28, 2003.
8. Rivara FP, Bergman AB, Drake C. Parental attitudes and practices toward children as pedestrians. *Pediatrics*. 1989;84:1017–1021.
9. Wills KE, Christoffel KK, Lavigne JV, et al. Patterns and correlates of supervision in child pedestrian injury. *J Pediatric Psychol*. 1997;22:89–104.
10. Roberts I. Adult accompaniment and the risk of pedestrian injury on the school-home journey. *Injury Prev*. 1995;1:242–244.
11. Dunne RG, Asher KN, Rivara FP. Behavior and parental expectations of child pedestrians. *Pediatrics*. 1992;89(3):486–490.
12. Dixey R. Child pedestrian safety and the effect on parents of an unsupportive environment. Paper presented at the Seventh International Conference on Safe Communities. Rotterdam, The Netherlands, May 13–15, 1998.
13. DiGuiseppi C, Roberts I, Li L, Allen D. Determinants of car travel on daily journeys to school: cross section survey of primary school children. *BMJ*. 1998;316:1426–1428.
14. Bishai D, Mahoney P, DeFrancesco S, Guyer B, Gielen AC. How willing are parents to improve pedestrian safety in their community? *J Epidemiol Community Health*. 2003;57:951–955
15. DeFrancesco S, Gielen AC, Bishai D, Mahoney P, Ho S, Guyer B. Parents as advocates for child pedestrian injury prevention: what do they believe about the efficacy of prevention strategies and about how to create change. *J Health Educ*. 2003;34:S-48–S-53.
16. Weinstein ND. Optimistic bias about personal risks. *Science*. 1989;246:1232–1233.