Influences of Physical and Social Neighborhood Environments on Children's Physical Activity and Obesity

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Objectives. We investigated the association between physical and social neighborhood environments and fifth-grade students' physical activity and obesity.

Methods. We collected data on 650 children and their primary caregivers during phase 1 of Healthy Passages, a multisite, community-based, cross-sectional study of health risk behaviors and health outcomes in children. We conducted independent systematic neighborhood observations to measure neighborhood physical characteristics, and we analyzed survey data on social processes. We modeled children's physical activity and obesity status with structural equation models that included latent variables for the physical and social environments.

Results. After we controlled for children's sociodemographic factors, we found that a favorable social environment was positively associated with several measures of physical activity and that physical activity was negatively associated with obesity in these children. Physical environment was not significantly associated with physical activity.

Conclusions. Our findings suggest that neighborhood social factors as well as the physical environment should be considered in the development of health policy and interventions to reduce childhood obesity. (*Am J Public Health.* 2009; 99:271–278. doi:10.2105/AJPH.2007.128702)

The prevalence of childhood obesity in the United States has gone up dramatically in recent decades: overweight prevalence has increased from 6.5% in 1976 to 1980 to 18.8% in 2003 to 2004 among children aged 6 to 11 years.[1] Childhood obesity is worrisome not only because it can cause immediate morbidity, but also because the physical inactivity and poor dietary habits associated with obesity in childhood can persist into adulthood.[2]

Several factors at both the individual and contextual levels might contribute to childhood obesity. At the individual level, considerable differences exist in childhood obesity and physical activity levels by socioeconomic status, race/ethnicity, and gender.[3–5] For example, Mexican American boys and Black girls are more likely than are other children to be overweight.[6] Adolescent activity levels and correlates of physical activity also vary by gender[7,8] and race/ethnicity.[9]

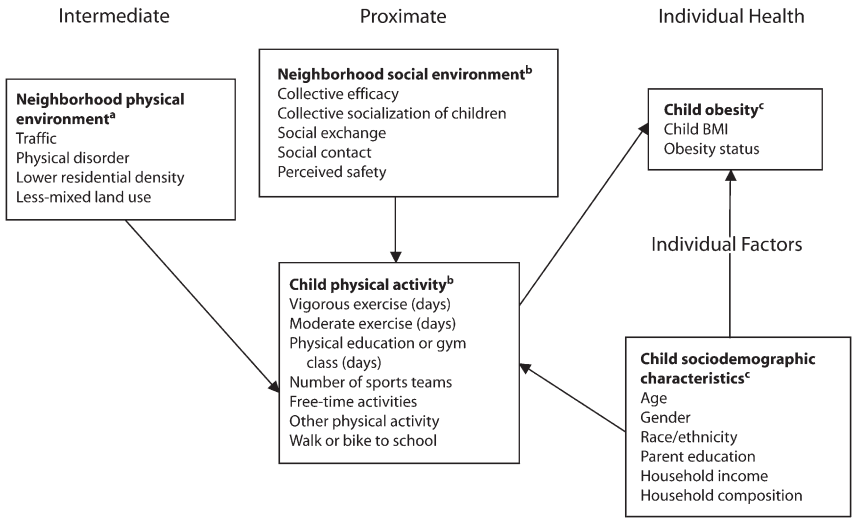
At the contextual level, the effects of parenting, the home environment, and developmental and psychological factors on diet, obesity, and physical activity have received significant attention.[10–14] Recently, the importance of the broader social and physical environment on obesity has been recognized.[15–17]

Researchers have investigated the direct and indirect effects of neighborhood environments on physical activity among adults,[18,19] but few studies have focused on youths.[17,20] In addition, most of this research has focused on the influence of neighborhood physical environment on physical activity. The influence of neighborhood social environment has received less attention. Research has linked only a few aspects of the social environment, specifically neighborhood safety and cohesion, to physical activity and obesity.

For our theoretical framework, we drew on the Social Determinants of Health and Environmental Health Promotion model,[21,22] which describes how fundamental, intermediate, and proximate socioeconomic processes interacting with the built environment determine population health. We focused on specific relationships between intermediate factors (the physical environment), proximate factors (the social environment as perceived by residents and physical activity), and health (obesity). The social environment, which includes social integration and stressors such as safety, was included as a proximate factor even though it is a community-level factor because it is measured as perceived at the personal level. We were unable to include fundamental factors, such as economic inequalities and residential segregation. Figure 1 depicts the relationships we studied.

A large amount of literature on the physical environment, physical activity, and obesity addresses several aspects of the neighborhood physical environment. Studies that used ecological models[23] showed that several aspects of the physical environment had an effect on obesity in adults.[24] For example, residents of a mixed-land-use neighborhood (i.e., both residential and commercial) or a high-density neighborhood were likely to be more active because of opportunities to walk to stores and other destinations. However, the empirical evidence on land use and density and adult obesity is mixed.[25–31] Little is known about the influence of land use and density on children's physical activity. One of the few studies on this subject did not find a positive relationship between residential density and children's physical activity.[32] One study found that children living in areas with high population density were more likely to walk or bike to school.[33]

Traffic and physical disorder (graffiti and litter) in the physical environment are likely to discourage physical activity by increasing perceived danger on the street and public places and reducing a sense of neighborhood social cohesion that might attract outdoor or group activity. Among children, research showed that less traffic and the presence of sidewalks in good condition were associated with more walking or biking to school and other destinations.[8,34,35] Although physical disorder has been associated with less physical activity and more



Note. BMI = body mass index. Arrows indicate direction of influence.
[a]Data obtained from Systemic Social Observations.
[b]Data obtained from questionnaire.
[c]Data obtained from measurements.

FIGURE 1—Theoretical model for childhood obesity.

obesity among adults,[36] one study found no such association in children.[37]

The neighborhood social environment may be at least as important to physical activity as the physical environment, but its role has not been adequately studied. Previous research on neighborhood social environments focused primarily on safety. Inadequate neighborhood safety is likely to curb outdoor activities and has repeatedly been correlated with low physical activity levels among schoolchildren.[37–40] In qualitative research on barriers to physical activity, middle-school students reported safety concerns as a major barrier.[41,42] However, Sallis et al. found no links between parents' perceptions of neighborhood safety and physical activity in fourth- and fifth-grade students,[43] and another study found a negative association between girls' physical activity and parents' perceptions of park safety.[44]

Social cohesion has been shown to influence health at the neighborhood level.[45] Neighborhood social cohesion might also influence young people's physical activity levels through several potential pathways. Increased social contact and social exchange among members of a community may lead to the adoption of more-healthful behaviors and a culture favoring fitness. The availability of a network of parents who know each other and who are willing to watch out for neighborhood children (collective socialization of children) could facilitate enforcement of healthful norms, including support for physical activity, as well as increase awareness of programs for youths. Neighborhood collective efficacy, a measure of willingness of neighbors to come together for the common good, facilitates collective action, including improving availability and access to recreational resources for children.[46]

Some studies have found that neighborhood cohesion influences physical activity. Social capital at the county level was positively associated with physical activity levels,[47] and neighborhood social cohesion was associated with increased levels of physical activity among older adults.[48] Collective efficacy was associated with lower body mass index (BMI; weight in kilograms divided by height in meters squared) among adults and adolescents.[49] Molnar et al. found that lower social disorder was associated with more recreational activity among children and adolescents.[37]

We investigated the association between physical and social neighborhood environment and fifth-grade students' physical activity and obesity through multiple measures of neighborhood physical characteristics and social processes. We measured neighborhood physical factors with independent systematic neighborhood observations and social processes with survey data.

We hypothesized that, after we controlled for children's sociodemographic characteristics (Figure 1), the physical environment (measured by more traffic, more physical disorder, low residential density, and primarily residential neighborhood) would be negatively associated and the social environment (measured by safety and social cohesion) would be positively associated with children's physical activity levels and that these levels would correlate with childhood obesity.

METHODS

Data Collection

Our data were collected as part of phase 1 of Healthy Passages,[50] a multisite, community-based cross-sectional study of children's health. We collected data on 650 fifth-grade students and 1 of their primary caregivers (usually a parent) between May and September 2003 at the University of Alabama, Birmingham; the University of California, Los Angeles/RAND Corporation; and the University of Texas Health Sciences Center, Houston.

The sample frame included all fifth-grade students enrolled in public schools with fifth-grade class enrollments of at least 25 students in the 3 cities and their metropolitan areas. We selected schools by a 2-stage probability sampling procedure. We first selected schools randomly, with a school's probability of selection proportional to a weighted measure of its size. We then invited all fifth-grade students in regular classrooms in the sampled schools to participate. The 21 schools selected yielded a potential pool of 1848 fifth-grade students. The parents of 1059 (57%) students gave written permission to be contacted about the study. Because our time for data collection was limited, only 871 (82%) of the families were fully pursued. A total of 650 (75%) families completed both the parent and child interviews. The final sample consisted of 236 non-Hispanic Blacks, 205 Hispanics, 157 non-Hispanic Whites, and 52 members of other non-Hispanic racial/ethnic groups. The majority of participants lived in urban areas.

All 3 Healthy Passages research sites used standardized data collection materials and protocols, including training manuals, field

manuals, and validation procedures. Two trained field interviewers met each parent and child to collect anthropomorphic data on the child. During the session, the child and parent each completed (in English or Spanish) a face-to-face computer-assisted personal interview and an audio computer-assisted self-interview carried out without the interviewer present. Two trained observers simultaneously completed a structured neighborhood observation of the face-block (i.e., both sides of the street between 2 consecutive intersections) on which the child lived.

Measures

The field interviewers measured each child's height and weight with standard procedures.[51,52] They measured height to the nearest millimeter (margin of error: ±5 mm) with a portable stadiometer (PE-AIM-101; Perspective Enterprises, Kalamazoo, MI). They measured weight to the nearest 0.1 kg (margin of error: ±0.2 kg) with a electronic digital scale (BWB-800S; Tanita, Tokyo, Japan). The field interviewers completed all measurements twice and added a third measurement if the first 2 differed by a preestablished amount. The average of the 2 measures in closest agreement was used to calculate BMI (kg/m^2). BMI percentiles were calculated with gender- and age-specific charts published by the Centers for Disease Control and Prevention.[53] Children were classified as overweight if their BMI was between the 85th and 94th percentiles and obese if their BMI was at or above the 95th percentile.[54]

Individual sociodemographic factors obtained from the face-to-face parent interview included child gender, age (in months), race/ethnicity (Black, Hispanic, White, other), household composition (2 parents living at home vs other family types), parent education (7 categories from less than high school to professional or doctoral degree), and household income (20 categories from <$5000 to ≥$250 000).

The child's physical activity level was assessed with questions from the Youth Risk Behavior Survey, compiled by the Centers for Disease Control and Prevention. Children answered face-to-face interview questions about (1) the number of days in the past week of vigorous exercise (makes the heart beat fast or the child breathe hard) for at least 20 minutes, (2) the number of days in the past week of moderate exercise (did not make the heart beat fast or the child breathe hard) for at least 30 minutes, (3) the number of days per week of physical education or gym class at school, (4) the number of sports teams in which the child participated during the past 12 months, and (5) participation in other organized physical activity or lessons (e.g., karate, dance, gymnastics, tennis). The parent face-to-face interview included 2 questions about the child's preferred free-time activities (more likely to pick quiet activities, more likely to pick movement activities, or equally likely to pick either) and the child's mode of transportation to school.

Neighborhood data included physical observations collected by trained observers and neighborhood perceptions from parents' answers to the face-to-face interview. We derived many of our neighborhood perception of social processes measures from the Project on Human Development in Chicago Neighborhoods Community Survey questionnaire.[55] We assessed collective efficacy with 2 scales: Social Cohesion (5 items), to assess closeness, common values, trust, and helpfulness at the community level, and Informal Social Control (5 items), to assess willingness to intervene if children misbehaved or skipped school or if a community problem arose.

We measured collective socialization of children (5 items) to evaluate the availability of a social network of parents and neighbors and the willingness of neighbors to watch that children were safe and not getting into trouble. We used the Neighborhood Exchange Scale (5 items) to assess how often people in the neighborhood exchanged favors, such as watching over each other's property. The Social Ties Scale (3 items) assessed whether neighborhood families were acquainted with their neighbors or visited one another's homes. We measured perceived neighborhood safety with a question about the safety of walking alone in the neighborhood after dark. Internal reliability (Cronbach α) coefficients for neighborhood social processes scales ranged from 0.66 to 0.86 (Table 1).

We used the neighborhood structured observations of the trained observers to assess neighborhood physical characteristics. The Traffic Scale (2 items) measured the flow of traffic and the number of lanes on the face-block. The Physical Disorder Scale (6 items) assessed the frequency of abandoned cars, litter, and graffiti. The Residential Density Scale (1 item) measured the prevalence of residential units that were not stand-alone houses or duplexes, and the Mixed Land Use Scale (1 item) assessed whether the face-block was primarily residential (these scales were recoded). The Cronbach α was 0.76 for traffic and 0.78 for physical disorder (see Table 1 for interrater reliabilities).

Statistical Analysis

We analyzed data from the 544 observations that had no missing information. Of the 106 participants whose data we did not analyze, 90% had missing information on BMI (46 participants), income (45 participants), or both (4 participants). A logistic regression predicting the absence of BMI from the sociodemographic factors, site, and neighborhood social and physical environments found no evidence of selection ($P > .05$ overall). We also estimated the models with imputed income and obtained results similar to those presented here.

We computed descriptive statistics, including percentages, means, and SDs, for neighborhood and individual variables. Next, we estimated multivariate models of categorical obesity outcomes and BMI with the physical and social neighborhood environments modeled as 2 latent variables. Latent variables are hypothesized unobservable constructs (such as a unidimensional true physical environment as it pertains to obesity) that can only be measured indirectly through a series of measures observed with error. We used the observed scales of more traffic, more physical disorder, low residential density, and primarily residential neighborhood as indicators of the latent variable physical environment. We used collective efficacy, collective socialization of children, neighborhood exchange, social ties, and perceived safety scales as indicators of the social environment. We used MPlus (Muthen & Muthen, Los Angeles, CA) software to estimate structural equation models with latent variables. All analyses accounted for the complex survey design, appropriately adjusting standard errors for the effects of weights and the clustering of students within schools.[56–58]

As the first step of the multivariate analyses, we tested the measurement models for each latent variable and its indicators. Once we confirmed these, we estimated the corresponding structural models (Figure 1). First, we estimated

TABLE 1—Individual and Neighborhood Characteristics of Fifth-Grade Students: Healthy Passages Phase 1, 2003

	Mean (SD) or %	Minimum	Maximum	Cronbach α	κ (Item Level)
Neighborhood scales, score					
Collective efficacy[a]	3.63 (0.72)	1.10	5	0.86	
Collective socialization of children[b]	3.74 (0.73)	1	5	0.82	
Neighborhood exchange[c]	2.57 (0.80)	1	4	0.84	
Social ties[d]	4.34 (0.94)	1.75	6.75	0.66	
Safety[e]	2.88 (0.78)	1	4		
Traffic[f]	1.10 (1.01)	0.50	5	0.76	0.56–0.93
Physical disorder[g]	1.72 (0.57)	1	3.17	0.78	0.44–0.76
Low density[h]	0.58 (0.49)	0	1		0.70–0.82
Land use[i]	0.80 (0.40)	0	1		0.74
Physical activity					
Vigorous exercise, d/wk	3.80 (2.39)	0	7		
Moderate exercise, d/wk	2.32 (2.15)	0	7		
Physical education or gym class, d/wk	2.91 (1.92)	0	5		
Sports participation, no. teams[j]	2.66 (1.18)	1	4		
Physically active free-time activities[k]	1.86 (0.69)	1	3		
Participation in other physical activity or lessons[l]	42				
Walking or biking to school	18				
Sum of *z* scores	0.04 (2.78)	−7.31	9.37		
Location					
Houston, TX	29				
Birmingham, AL	32				
Los Angeles, CA	39				
Demographic characteristics					
Age, y	11.30 (0.51)	10.00	14.08		
Body mass index, kg/m^2	21.21 (5.20)	13.19	43.61		
Parental educational attainment, score on scale[m]	3.12 (1.71)	1	7		
Household income, $	34 650 (25 150)	<5 000	>250 000		
Body weight					
Underweight/normal weight	59				
Overweight	16				
Obese	25				
Race/ethnicity					
Hispanic	30				
Black	38				
Other	8				
Girls	55				
Two parents at home	58				

[a]Scale had 10 items. Scored from 1 (strongly disagree) to 5 (strongly agree): close knit neighborhood, people willing to help a neighbor, people get along, people share the same values, and people can be trusted. Scored 1 (very unlikely) to 5 (very likely): neighbors willing to intervene if fire station is closed, or if someone has been beaten or threatened, or if children skip school, spray paint graffiti, or show disrespect to an adult.
[b]Scale had 5 items. Scored 1 (strongly disagree) to 5 (strongly agree): neighborhood has adults that children look up to, adults keep children safe, parents know their children's friends, adults know local children, and parents know each other.
[c]Scale had 5 items. Scored 1 (never) to 5 (often): neighbors do favors for each other, watch over each other's property, ask personal advice, have neighborhood parties, and visit each other.
[d]Scale had 3 items. Scored 1 (<5 times/y) to 7 (every day): frequency of getting together, having friends over to one's home, and visiting a friend's home.
[e]Scale had 1 item. Scored 1 (extremely dangerous) to 4 (completely safe): safe to walk alone after dark.
[f]Scale had 2 items. Scored 0 (very light) to 5 (very heavy): traffic flow and traffic lanes.
[g]Scale had 6 items. Scored 1 (none) to 4 (many): abandoned cars, garbage or litter, cigarettes, bottles, graffiti, and painted-over graffiti.
[h]Scale had 1 item. Scored 0 (1 or more multiple-occupancy buildings, high- or mid-rise buildings, trailers, or housing over a store) or 1 (no multiple-occupancy buildings, high- or mid-rise buildings, trailers, housing over a store). In this scale, κ refers to items in the question on which the score is based (presence of multiple-occupancy buildings, high- or mid-rise buildings, trailers, and housing over a store).
[i]Scale had 1 item. Scored 0 (not primarily residential) or 1 (primarily residential).
[j]Scale had 1 item. Scored 1 (0 teams), 2 (1 team), 3 (2 teams), or 4 (3 or more teams).
[k]Scale had 1 item. Scored 1 (picks quiet activities), 2 (equally likely to pick quiet or movement activities), or 3 (picks movement activities).
[l]Scale had 1 item. Scored 0 for no, 1 for yes.
[m]Scale had 1 item. Scored 1 (did not finish high school), 2 (high school graduate), 3 (some college), 4 (associate degree), 5 (undergraduate degree), 6 (master's degree), or 7 (professional or doctoral degree).

structural models for the various measures of physical activity according to the form of the dependent variable (continuous, categorical, count, or ordinal). Next, we created a composite score for physical activity by summing standardized *z* scores of all physical activity variables; we used this composite in the structural models for child BMI (continuous) and 2 categorical measures of obesity status: binary (underweight or normal weight vs overweight or obese) and ordinal (underweight or normal weight, overweight, obese).

We reported the following measures of fit: the comparative fit index, the root mean square error of approximation, and the standardized root mean square residual. We reported results as standardized regression coefficients, which represented standard deviation of change in the outcome per standard deviation change in the independent variable. These estimates allowed comparisons of effect sizes across independent variables.

RESULTS

Sample Characteristics

Neighborhood and individual factors are described in Table 1. On average, neighborhood residents in this study met with friends approximately 2 or 3 times a month but interacted with neighbors "rarely" to "sometimes." Parents rated their neighborhood as somewhat safe on average, typically reporting that walking alone after dark was "somewhat dangerous" to "fairly safe." Traffic was generally light. Face-blocks were somewhat disorderly, with 82% having litter and approximately 40% having graffiti. Most neighborhoods were primarily residential.

The average age of the children was 11 years; 55% were girls and 41% were overweight or obese. Most children were Hispanic (30%) or Black (38%). The children reported, on average, doing vigorous exercise approximately 4 days a week, participating in physical education in school 3 days a week, and participating in 2 to 3 sports teams. Their parents had some college education and a median household income of $30 000 to $35 000.

Multivariate Models

Fit of the data to the measurement model was good (comparative fit index=0.95; root mean square error of approximation=0.05; standardized root mean square residual=0.05). All the social environment indicators were significant in the expected direction, with higher values of the latent variable implying a more favorable social environment. All the physical environment indicators were also significant. Higher values of the latent variable implied a more favorable physical environment for physical activity. The correlation between the latent variables was −0.09 ($P<.05$).

The standardized regression coefficients for the neighborhood latent variables and the individual observed variables on each physical activity measure are provided in Table 2. Hispanic and Black children had lower overall physical activity than did White children after other factors were taken into consideration. A favorable neighborhood social environment was positively associated with overall physical activity, days of vigorous exercise, days with physical education in school, and favoring free-time movement activities. The physical environment was not significantly associated with any measure of physical activity.

The structural model for the ordinal measure of child obesity (underweight or normal weight, overweight, obese) is provided in Figure 2. As is the convention in structural equation modeling, variables represented by ovals are latent constructs, with their indicators (the observed variables) shown as rectangles. Other observed variables included in the model are also shown as rectangles. Neighborhood physical environment had no significant association with activity levels. A favorable social environment was positively associated with physical activity, which was negatively associated with child obesity after we controlled for individual sociodemographic factors. The model with obesity status measured as a binary variable (underweight or normal weight vs overweight or obese) and the model for child BMI provided very similar results (not shown).

DISCUSSION

Unlike many studies on the effects of neighborhood environment on physical activity and obesity levels, our study characterized several physical and social dimensions of the neighborhood environment. As in previous research, we found that the neighborhood environment was related to physical activity and obesity in fifth-grade students after control for children's sociodemographic factors. However, a favorable social environment appeared to be more strongly related to physical activity than was the physical environment.

The social environment was associated with 4 measures of physical activity; the physical environment was not associated with any measure of physical activity. We speculate that this lack of association could be attributable to the measures of physical activity and physical environment in this study. If children get most of their physical activity by participating in teams, lessons, and gym class in school, then neighborhood physical characteristics such as traffic, density, and land use would be less relevant. It could also be that children's physical activity is less affected by the physical environment because their exposure is only through parents' decisions about activities. Our data fill a gap in the literature by adding to the understanding of the association between the social environment and physical activity and obesity in children, a subject previously investigated primarily in adults.[47,48,59]

By modeling the physical and social environments as latent variables, we were able to include different dimensions while avoiding problems of collinearity. In contrast to some other studies, ours analyzed several dimensions of the social environment. Higher collective efficacy, more collective socialization of children, more exchange and social ties among neighbors, and perceptions of higher neighborhood safety described a favorable neighborhood social environment, which correlated positively with physical activity, which in turn correlated negatively with child obesity. Safety, the most extensively studied neighborhood social factor,[37–42,59,61] was a strong indicator of a favorable social environment for children's physical activity. But social cohesion and informal control (collective efficacy), the availability of a network of neighbors willing to watch out for neighborhood children (collective socialization of children), and neighbors watching out for each other (exchange) were even stronger indicators. Only collective efficacy[62] and social cohesion[48] were investigated in previous research on physical activity and obesity.

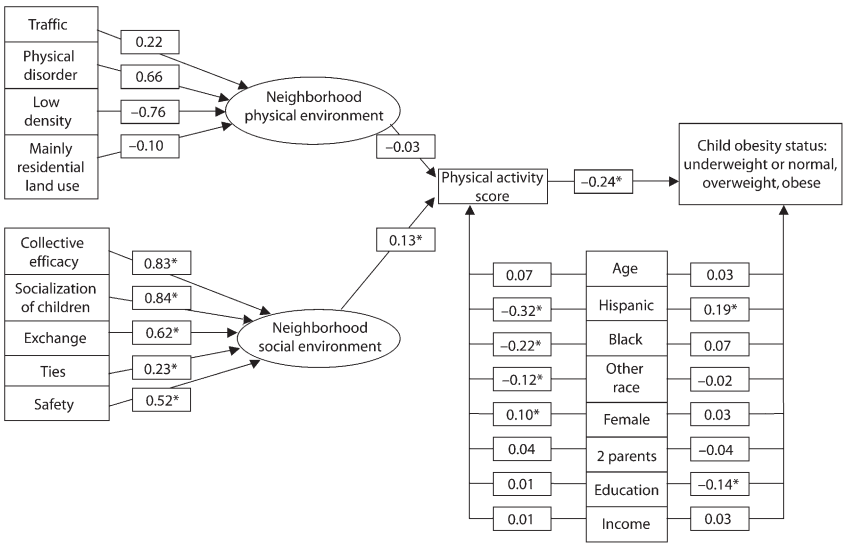
TABLE 2—Structural Equation Models of Individual and Neighborhood Factors on Measures of Physical Activity

	Physical Activity *z* score, B (*t* Statistic)	Vigorous Exercise, d/wk, B (*t* Statistic)	Moderate Exercise, d/wk, B (*t* Statistic)	Physical Education Class, d/wk, B (*t* Statistic)	Sports Participation, No. Teams, B (*t* Statistic)	Participation in Other Physical Activity or Lessons, B (*t* Statistic)	Walking or Biking to School, B (*t* Statistic)	Physically Active Free-Time Activities, B (*t* Statistic)
Neighborhood social environment	0.15** (2.35)	0.57** (2.90)	−0.24 (−0.52)	0.39** (4.18)	−0.05 (−0.91)	−0.004 (−0.06)	0.05 (0.68)	0.19** (3.16)
Neighborhood physical environment	0.03 (0.22)	0.17 (0.44)	0.17 (0.29)	0.01 (0.08)	−0.06 (−1.00)	−0.02 (−0.27)	0.16 (1.30)	−0.01 (−0.07)
Age	0.07 (1.59)	0.08 (0.37)	0.23 (1.26)	−0.02 (−0.29)	0.01 (0.20)	0.13** (2.05)	0.02 (0.38)	0.02 (0.22)
Girls	0.10** (2.06)	−0.05 (−0.33)	0.29 (1.34)	−0.02 (−0.42)	0.09** (2.51)	0.20** (3.86)	0.02 (0.23)	−0.10** (−1.98)
Two parents at home	0.04 (0.75)	−0.30 (−1.30)	−0.09 (−0.40)	0.34** (3.06)	0.07 (1.22)	−0.06 (−1.13)	0.02 (0.25)	0.02 (0.26)
Parental educational attainment	0.02 (0.29)	0.60** (2.58)	0.44** (1.97)	−0.15 (−0.75)	−0.01 (−0.23)	0.15** (2.27)	−0.06 (−0.39)	−0.24** (−5.53)
Race/ethnicity								
Hispanic	−0.28** (−3.57)	0.60** (2.06)	−0.45 (−1.61)	−1.21** (−5.75)	0.09 (1.43)	−0.12** (−2.11)	−0.04 (−0.16)	−0.24** (−3.12)
Black	−0.18** (−2.30)	0.15 (0.55)	−0.74** (−2.75)	−0.36 (−1.41)	−0.01 (−0.12)	−0.02 (−0.25)	−0.07 (−0.36)	−0.11* (−1.70)
Other	−0.10 (−1.77)	0.22** (2.12)	−0.31* (−1.86)	−0.31** (2.77)	0.01 (0.22)	−0.001 (−0.01)	−0.16* (1.91)	−0.03 (−0.79)
Log household income	−0.01 (−0.15)	0.51* (1.78)	0.06 (0.21)	−0.29** (−2.73)	0.03 (0.50)	0.13** (2.15)	−0.02 (−0.14)	−0.11 (−1.55)
Type of model	continuous	count	count	count	ordinal	categorical	categorical	ordinal

Note. Measurement models were not reported.
*$P < .10$; **$P < .05$.

Limitations

This study had several limitations. The theoretical model we used was restricted. It did not include the fundamental determinants and included only some of the intermediate and proximate pathways of the social determinants model.[21] Another limitation was that neighborhood characteristics, such as sociodemographic characteristics from census data and the prevalence of amenities (e.g., trails and parks), were not available for analyses. Neighborhood observations were limited to the face-block on which the child resided. This decision was based on cost and on empirical evidence that similar results were obtained from observations of face-blocks and of street clusters.[60]



Note. Numbers in boxes are standardized regression coefficients.
*$P < .05$.

FIGURE 2—Structural equation model of individual and neighborhood factors on childhood obesity status with mediating physical activity.

Conclusions

Our results contribute to growing evidence in other areas on the role of the social environment compared with the physical environment. For example, the broken windows theory of urban decline, which proposes that forms of public physical disorder lead to serious crime[63] and worse mental and physical health among children and adolescents,[64–66] has recently been questioned.[67,68] Conversely, aspects of the social environment, such as collective efficacy and social capital, have been increasingly linked to both crime and health outcomes, including obesity, self-rated health, and mortality.[46,47,69–72]

Our findings indicate that policies and interventions to reduce childhood obesity must take into consideration neighborhood social factors rather than focusing solely on

improvements in the physical environment. However, changes in neighborhood social processes are more difficult to achieve. Social processes related to disparities are likely to be deeply rooted in neighborhood structural characteristics, such as social and economic inequalities, poverty, and residential segregation.[69] Therefore, policies to reduce economic disadvantage and inequality—for example, by promoting neighborhood revitalization and desegregation—would be needed to reduce neighborhood social and economic disparities and improve social processes.

Our results highlight the important influence of the neighborhood social environment, in addition to the physical environment, on children's physical activity, which affects obesity risk. Future research on the influence of context on physical activity and obesity should include multiple dimensions of neighborhood social environment. ■

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Contributors

L. Franzini originated the study, completed the analyses, interpreted the findings, and led the writing of the article. M.N. Elliott interpreted the data and substantially contributed to the analyses and content revision. P. Cuccaro, M. Schuster, M.J. Gilliland, J.A. Grunbaum, F. Franklin, and S.R. Tortolero substantially contributed to the conception and design of Healthy Passages. S.R. Tortolero reviewed the article and made final edits. All authors contributed to revising the content and approving the final version of the article.

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