

A community survey on neighborhood violence, park use and youth physical activity

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Abstract:

Background: Neighborhoods can be an important feature of the built environment influencing physical activity; however, neighborhood poverty and violence may pose significant barriers for youth physical activity. We conducted a community survey of 107 households with youth 3–12 years of age in select neighborhoods of the city of Newark, New Jersey, a highly impoverished and racially/ethnically segregated city of the United States. **Results:** The majority of sampled households did not have access to a park, and nearly 60% of youth were not engaged in a team or organized physical activity program. Hearing gunshots and seeing drug deals in the neighborhood were reported by 74% and 56%, respectively, of study participants. In adjusted regression models, a 1-unit increase in self-reported neighborhood safety was associated with perceptions that parks were safe for youth to use (OR = 1.7, CI = 1.3, 2.3) and increased odds of youth using parks (OR = 1.3, CI = 1.0, 1.6). Self-reported neighborhood violence was marginally associated with lower levels of Metabolic Equivalent (MET)-min/week of moderate PA ($\beta = -54.25$, $P = .05$). **Conclusion:** To ensure national goals of increased physical activity and use of outdoor spaces, addressing the neighborhood contexts under which the most vulnerable of our youth live will be required.

Keywords: built environment | obesity | disadvantaged youth | poverty

Article:

Low levels of physical activity have been observed across the population, but disproportionately so for low income and racially/ethnically diverse youth.^{1–5} Current federal recommendations suggest that youth engage in 60 minutes/day of moderate to vigorous activity on most days of the week.⁶ The 2009 Youth Risk Behavior Surveillance Survey⁷ indicated that 39.9%, 32.6%, and 33.1% of White, African-American, and Latino/Hispanic high school students, respectively, reported being physically active at least 60 minutes/day on 5 or more days of the week. Moreover, a higher proportion of Black (32.1%) and Latino (23.9%) adolescent youth in this survey did not engage in any form of activity in the previous 7 days compared with their White (20.3%) peers. In addition to the overall health benefits of being physically active,^{8,9} weight status can also be influenced.^{10–13} The prevalence of overweight and obesity is substantially

higher among African-American and Latino youth compared with non-Hispanic White youth.^{14,15}

Features of the neighborhood context have been associated with a range of physical activity behaviors for both young and adult populations. Neighborhood socioeconomic condition, access to physical activity resources, walkability, aesthetics and social cohesion, for example, have all been associated with walking and physical activity.^{16–19} In studies involving youth samples, specifically, several studies have found that youth living in poor neighborhoods are less likely to be physically active^{20–22} and more likely to be sedentary²³ than youth living in more affluent places, including having increased hours of screen or television time. Moreover, access to physical activity resources such as parks has been associated with increased physical activity among youth.^{24–26}

A feature of neighborhoods that has received less attention in the literature is the role of neighborhood violence in patterning physical activity among youth. While neighborhood violence has a long history of study in the United States (US)^{27–29} and has been linked to various other chronic health conditions,^{30–32} only recently have studies explicitly examined the role of neighborhood violence in shaping physical activity, particularly among low-income, racially/ethnically diverse youth.^{20,33–35} For example, Molnar et al³³ showed that neighborhoods characterized with a high degree of social disorder and lack of safety for playing were associated with significantly lower mean hours of activity. Moreover, a 2009 review by Lovasi et al³⁶ found that between 1995–2009, only 45 studies (with sample sizes of 100 or larger) examined built environment correlates of obesity and physical activity specific to disadvantaged populations.

In the current study, we document a range of neighborhood characteristics relevant to physical activity for youth living in select, high-poverty urban neighborhoods in New Jersey and examine how these neighborhood exposures are associated with youth physical activity.

Methods

Study Setting

Newark, New Jersey is one of the oldest metropolitan cities in the United States and is the largest city in the state of New Jersey. At the turn of the century, Newark was a thriving city with a strong industrial base and a growing population that nearly reached half a million.³⁷ However, a series of housing and taxation policies beginning in the 1930s led to a precipitous decline in the social and economic fabric of the city, including the exodus of White middle-class families to surrounding suburbs and the concentration of poor, racial/ethnic minority families within the city core.³⁸ Today, Newark has a total population of approximately 277,140, and is 52% African-American, 34% Hispanic/Latino, and 12% non-Latino/Hispanic White.³⁹ The median income of Newark residents is \$26,913 (compared with \$41,994 for the US) and only 12.3% of the population 25 or older has a college degree, compared with approximately 35% for the state. In addition, 30% of families with children under the age of 18 years of age earn incomes falling below the federally-established poverty line, which in 2008 was \$22,570 for a family of 4.³⁹

Study Population

The study consisted of a cross-sectional household, door-to-door survey of residents living within a 0.5-mile radius surrounding the development of a new neighborhood park in the Central Ward of Newark, NJ. This area was selected for the potential of future research efforts to document changes in physical activity over time due to the opening of the park. Further, a door-to-door community survey was implemented because of the growing body of research documenting sampling under coverage (and hence lower estimates of health behaviors) of youth and the poor when using traditional surveying techniques such as random digit dialing (RDD) landline telephone surveys.⁴⁰

A total of approximately 535 single-family homes, plus 415 units located within low-income complexes were enumerated in this area. Residents in single-family homes were more reluctant to participate in the study and only represented about 5% of the final sample. Thus the survey respondents almost exclusively represent residents living in large, low-income housing complexes surrounding the park. Permission was obtained from building managers of 3 separate housing complexes to conduct the survey. Each housing complex provided research staff with the total number of housing units in each building. From this list, a simple random selection of households was conducted. Because there was a larger goal of conducting follow-up assessments in the area, power calculations were based on change in MET-minutes/week of physical activity over time and suggested that a sample size of 110 participants would result in adequate power to estimate changes in physical activity after the opening of the park. Accordingly, a sample of 225 houses was selected to create a reserve sample from which replacements were selected due to ineligible households, household non participation, household non- response, and safety concerns. In each household, 1 adult 18–69 years of age completed the survey and answered questions on 1 randomly selected child 3–12 years of age living in the same household. We selected this age range because most research has focused on older youth (ie, adolescents) and relatively little is known about risk factors for this younger group. Further, prior research has shown better reliability of parental report of physical activity in younger populations (such as ours) than in older groups.^{41,42} The survey team included public health and nursing students and 2 of the 4 had either lived in the neighborhoods being surveyed or had extensive experience surveying hard-to-reach populations. The team received a 1-day training on the goals of the project, screening of households, and administration of the survey instrument and followed strict protocols for replacing addresses from the reserve list of randomly listed households if a selected household was found not to be eligible or was deemed unsafe. As the survey progressed, however, residents of the housing complex who were not randomly selected also requested to participate in the survey, representing approximately 30% of the final study sample. The participation rate among eligible households was over 90%. The surveys were conducted from June–September in 2009 with the interviews lasting approximately 15 minutes. Study participants received a \$10 supermarket gift card for their time. This study was reviewed and approved by the home institution of the principal investigator.

Study Measures

Study Outcomes. The adult respondent answered questions about him/herself and the health of the selected (index) child. The main youth outcomes included measurement of physical activity, youth use of parks, and adult perceptions of the safety of parks. The challenge of collecting

physical activity data in young populations is well documented.^{43,44} In this study, we assessed youth physical activity through parental proxy report using the International Physical Activity Questionnaire (IPAQ) short form.⁴⁵ While IPAQ has not been validated for parental proxy report, there is pretty consistent evidence from other comparable instruments to suggest fair reliability of parental proxy report.^{44,46,47} In the work conducted by Sithole et al,⁴⁶ the authors found even when reliability and validity estimates are on the lower end, the rank order of activity levels is fairly high and parental report can at times be more accurate than child report of activity, particularly for younger populations such as the ones targeted here. Thus, following standard IPAQ questions, youth activity was based on the number of days (frequency) within the previous 7 days the selected youth engaged in moderate or vigorous physical activity for at least 10 minutes at a time, and the amount of time (duration) spent in each activity (minutes/session).⁴⁵ As indicated in IPAQ, physical activities were assigned a Metabolic Equivalent (MET) intensity level (moderate activities = 4; vigorous activities = 8, and walking for adults = 3.3). As a reference, 1 MET is the energy expended at rest, 2 METs indicates the energy expended is twice that at rest, etc. Participants who reported 180 minutes or more of moderate or vigorous-intensity activity were recoded to equal 180 minutes. Finally, an MET-min/week score was obtained by multiplying the reported frequency, duration, and intensity level of the activity. Few respondents reported children engaging in vigorous-intensity activity and thus we present results for moderate activities only. Adults were also asked if there was a park near their home (in addition to the new one under construction) and whether they used this park (yes/no), if they felt safe taking youth to the park (yes/no), and whether the index youth had participated in sports or other forms of organized activities in the past 30 days (yes/no).

Main Exposures. Measures of the neighborhood context were based on previously published items^{17,29,48} and included scales assessing the walking environment (6 items), violence (9 items), safety (4 items), and collective efficacy of the neighborhood (10 items). The neighborhood was defined as approximately a 20-minute walk in the vicinity of their home. The walking environment scale was based on items using a 5-point Likert scale and assessed if the neighborhood offered general opportunity to be physically active, offered local resources for exercise (eg, sports clubs), was a pleasant place to walk, had trees that provide shade, had people walking, and had people exercising. A violence scale was adapted from the *Survey of Children's Exposure to Community Violence*⁴⁹ and asked adult participants to report if they had heard gunshots, seen arrests, seen drug deals, seen someone being beaten up, been robbed in their home, seen stabbings, seen someone get shot, seen gangs, and seen someone pull a gun on another person in their neighborhood in the past year. Each item was based on a 4-point Likert scale where 1 indicated never having experienced or witnessed a violent event, and 4 indicating having witnessed a violent event "many times." The safety scale (5-point Likert measure) included items such as feeling safe to walk at night or during the day, overall level of violence in the neighborhood, and safety from crime. Measures of collective efficacy and social cohesion were adapted from the Project on Human Development in Chicago Neighborhoods (PHDCN) study²⁹ and included items on how likely (5-point Likert scale) neighbors would "do something" if neighborhood children were skipping school and hanging out on a street corner, spray-painting graffiti on a local building, showing disrespect to an adult, or if a fight broke out in front of their house, and the extent to which the neighborhood is close-knit, neighbors trust each other, neighbors get along, neighbors share the same values, and willingness of people to help their

neighbors. With the exception of the violence scale, increasing neighborhood scores represent a more favorable neighborhood context.

Covariates. Demographic information included age, gender, and race for both the adult and child. The education of adult respondents was classified as less than high school, high school graduate, and some college or more. To measure employment status, participants were first asked if they are currently employed. Unemployed participants were classified as being unemployed <6 months, 6–12 months, and 1 year or more. Family income was categorized as < \$8000, \$8000–\$11,999, \$12,000–\$15,999, and \$16,000 or more based on the sample distribution.

Statistical Analysis

Descriptive statistics were used to summarize sociodemographic characteristics and key health measures of the adult and child participants. Separate logistic and linear regression models were fit to examine the association between neighborhood violence/safety and walking environment and each of the study outcomes, as appropriate. For the neighborhood scales, we calculated the internal consistency of each scale using Cronbach's alpha and kept each scale in continuous form since visual inspection and formal statistical tests indicated no significant violation of model assumptions in relation to any of the study outcomes. In Table 3, models were adjusted for the index youth gender, age, asthma status, and the adult respondent's education and income. Although participants are clustered within the same general neighborhoods, the study sample only represented 3 distinct census tracts, thereby precluding us from fitting more advanced multilevel analytic models to account for the potential correlation of study outcomes. All analyses were conducted in SAS version 9.2 (SAS Institute Inc., North Carolina).

Results

Table 1 presents descriptive statistics of the study population. Nearly all study participants were African-American females with a mean age of 36.2 years (SD = 11.9). The majority of respondents (76%) were the mother of the index youth, followed by grandmothers/foster parents who were raising the child and the child's father. Half of the respondents indicated that the gross family income of the household was less than \$8000 per year in 2008 and 67% were unemployed. Adult participants rated their overall health as very good or excellent, although 25% and 29% had been diagnosed with high blood pressure and asthma, respectively. Youth were approximately evenly distributed across preschool, school, and preadolescent years and 55% of the selected youth were female. Approximately 76% of youth did not have access to a park and nearly 60% of youth were not engaged in team or organized physical activity programs. The average number of hours they engaged in moderate physical activity per week was 10.6 (SD = 7.5). Youth were generally healthy, although one-fourth of the sample suffered from asthma and hence asthma was entered as a covariate in all regression models.

In our sample, the neighborhood scales showed moderate to strong internal consistency and participants reported high levels of exposure to neighborhood violence (Table 2). The Safety Scale had the lowest internal consistency measure (Cronbach's alpha = .62) with the highest measure observed for the Violence Scale (Cronbach's alpha = .86). Neighborhood exposure to violence was substantial in this sample. All participants reported witnessing at least 1 violent

event in their neighborhood. Strikingly, hearing gunshots or seeing someone pull a gun a few times or often in the past year, was reported by 74% and 56%, respectively, of study participants.

Table 1. Selected Characteristics of Adult and Sampled Youth, Newark Community Survey, 2009

Characteristic	Adult (N = 107)	Youth (N = 107)
Mean age, SD	36.2 (11.9)	7.1 (2.9)
Age distribution, %		
2–5	—	38
6–9	—	35
10–12	—	27
Female participants, %	85	55
African American, %	95	95
Educational attainment, %		
Less than high school	19	100
High school graduate	35	—
Some college/technical school	41	—
College or more	5	—
Unemployed, %	67	—
Family yearly income in dollars (2008), %		
<\$8000	50	—
\$8000–\$11,999	11	—
\$12,000–\$15,999	14	—
\$16,000 or more	25	—
Marital status, %		—
Single	75	—
Married	18	—
Divorced/widow	7	—
Relationship to youth		—
Mother	75	—
Father	11	—
Grandparent/foster parent	14	—
Health condition, %		
Overall health*	76	76
Diabetes	6	0
High blood pressure	25	0
Asthma	29	25
Physical activity		
Access to a Park	76	76
Walking (adults only)	—	—
Total number of hours/week	4.20 (4.8)	—
MET-minutes/week	823.4 (960.0)	—
Participates in team/group sports, % (youth only)	—	42
Moderate physical activity (youth only)	—	—
Total number of hours/week	—	10.6 (7.6)
MET-minutes/week	—	2541.8 (1797.7)

*Includes participants who rated their health as excellent or very good.

Table 3 shows odds ratios for youth use of parks compared with no use of parks, respondent perception of safety of the parks compared with lack of safety, and mean differences in youth MET-minutes/week of moderate physical activity associated with 1 unit increases for each of the neighborhood scales. Of the 4 scales examined, only perceived neighborhood safety was most consistently associated with physical activity. Specifically, increased neighborhood safety was

associated with increased odds of park use (OR = 1.2, CI = 1.0, 1.50), increased odds of park safety (OR = 1.6, CI = 1.3, 2.0), and increasing mean MET-min/week of moderate youth physical activity ($\beta = 119.3, P = .04$). Results remained virtually unchanged in fully adjusted models.

Table 2. Distribution of Neighborhood Exposures and Internal Consistency of Neighborhood Scales, Newark Community Survey, 2009

Neighborhood characteristic	No. of Items	Score/response range	Mean (SD)/%	Internal consistency (Cronbach's α)
Violence scale ^a	9	9–36	20.0 (6.62)	0.86
Safety scale ^a	4	4–17	9.5 (3.1)	0.62
Collective efficacy scale ^a	10	10–47	28.0 (8.3)	0.87
Walking Environment ^a	6	6–29	19.1 (4.7)	0.73
Heard gun shots ^b	1	1–4	74	—
Witnessed an arrest ^b	1	1–4	63	—
Witnessed drug deals ^b	1	1–4	65	—
Witnessed someone being beaten ^b	1	1–4	39	—
House was broken into ^b	1	1–4	7	—
Witnessed a stabbing ^b	1	1–4	5	—
Witnessed someone shot by gun ^b	1	1–4	19	—
Witnessed someone pull a gun ^b	1	1–4	56	—
Saw gangs in the neighborhood ^b	1	1–4	26	—

^a Increasing score represents increasing violence, safety, collective efficacy, and better walking environment.

^b Measures of witnessing violent events includes percent of respondents selecting “few or many times” to each item.

Table 3. Crude and Adjusted Logistic and Linear Regression Models of Use of Parks, Safety of Parks, and Moderate MET by Neighborhood Characteristics, Newark Community Survey, 2009

Neighborhood scales	Crude model	Adjusted model*
Use of Parks (Odds ratio, CI)		
Violence scale	1.0 (0.9, 1.1)	1.0 (0.9, 1.1)
Safety scale	1.2 (1.0, 1.5)	1.3 (1.0, 1.6)
Walking environment scale	1.0 (0.9, 1.1)	1.0 (0.9, 1.2)
Collective efficacy scale	1.0 (1.0, 1.1)	1.1 (1.0, 1.1)
Safety of Parks (Odds ratio, CI)		
Violence scale	1.0 (0.9, 1.0)	1.0 (0.9, 1.1)
Safety scale	1.6 (1.3, 2.0)	1.7 (1.3, 2.3)
Walking environment scale	1.1 (1.0, 1.3)	1.2 (1.0, 1.3)
Collective efficacy scale	1.0 (1.0, 1.1)	1.1 (1.0, 1.1)
Moderate MET-week (β coefficient, P -value)		
Violence scale	-50.3, $P = .07$	-54.5, $P = .05$
Safety scale	119.3, $P = .04$	115.0, $P = .08$
Walking environment scale	44.9, $P > .10$	54.6, $P > .10$
Collective efficacy scale	16.5, $P > .10$	6.5, $P > .10$

* Each of the neighborhood scales were kept in continuous form. Models are adjusted for child's gender, age, and asthma status, plus household income and education.

As an exploratory analysis to determine the consistency of our findings with other larger-scale studies²⁹ on neighborhood violence, we examined if neighborhood social cohesion and collective efficacy would predict neighborhood violence. Table 4 shows that a 1-unit increase in the perception of neighborhood collective efficacy was associated with a decreased report of neighborhood violence and an increased sense of neighborhood safety.

Table 4. Adjusted* Linear Regression Model of Neighborhood Violence and Neighborhood Safety on Neighborhood Collective Efficacy, Newark Community Survey, 2009

	Neighborhood Violence (β coefficient, <i>P</i>-value)	Neighborhood Safety (β coefficient, <i>P</i>-value)
Neighborhood collective efficacy	-0.32 (<i>P</i> < .001)	0.11 (<i>P</i> < .01)

* Models adjusted for adult respondent's age, marital status, income, education, and employment status.

Discussion

In this community survey of households with youth 3–12 years of age, adult respondents were simultaneously poor and living in poor neighborhoods characterized by a high degree of violence. The majority of respondents witnessed various forms of violence. Youth in these neighborhoods did not have access to a local neighborhood park and most were not participating in structured physical activity programs. Of the 4 neighborhood scales examined, increased perception of neighborhood safety was significantly associated with increased youth use of parks, increased perception of the safety of parks, and marginally associated with youth participation in moderate levels of physical activity. In exploratory analysis, increasing perception of neighborhood collective efficacy was associated with decreasing neighborhood violence and increasing neighborhood safety.

The results presented here were part of a baseline assessment of physical activity for youth living near the development of a new neighborhood park in the city of Newark, NJ. In a study conducted by the Trust for Public Land Inc.,⁵⁰ Newark was found to have the fewest acres of parkland per resident than any of the 55 largest cities in the United States, with 2.9 acres of land/1000 residents compared with 7.5 acres/1000 residents, on average, for the other metropolitan cities. Although the city is actively engaged in redressing this inequitable distribution of open spaces, the findings presented here suggest that the opening or revitalization of parks alone may not be enough. The fact that the neighborhoods surrounding the park were marred with violence has important implications for promoting parks as a physical activity resource in poor communities.^{18,22,26} Several decades of research has documented increasing levels of violence in communities throughout the United States.^{27,28,51} A national survey conducted by the Centers for Disease Control in 2003¹ found that 13% of Black parents of children 9–13 years of age reported a lack of safety in their neighborhood. In fact, soon after the park opened in this neighborhood, a 5-year-old girl was shot while playing in the park during the day. Thus, Newark, like other impoverished urban centers, challenges physical activity researchers to consider the neighborhood contexts under which parks are located and how to ensure that this resource provides a safe space for youth (and adults) to be physically active.

That only 1 of the 4 neighborhood scales was consistently associated with physical activity could be due to the relatively small sample size of the study, or measurement error more generally (see limitations discussed below); however, there is also some evidence to suggest complex interpretations and lived realities for residents of poor neighborhoods. In previous work, Echeverria et al¹⁷ found that while participants reported substantial levels of neighborhood problems they also reported their neighborhoods as “good” or “excellent” places to live. It may be that the notion of safety in one’s neighborhood may capture a distinct neighborhood phenomenon that goes beyond experiences of violence, crime, or other forms of social disorder. Residents of these neighborhoods may simultaneously recognize the inherent dangers present in

their communities but also have a deep rooted attachment to their neighborhood based on cultural, historical, or social experiences. Alternatively, some research suggests that the built environment, for example, may differentially influence physical activity behaviors for advantaged vs. disadvantaged populations since disadvantaged individuals may be forced to walk or use other forms of active transport out of necessity, regardless of the neighborhood context.⁵² The implications here are that unique interventions may be necessary that go beyond select features of the neighborhood/built environment to increase physical activity and stem the obesity tide in disadvantaged communities.

In our study sample, youth were engaged in relatively high levels of moderate activity (considering current recommendations of 60 minutes per day of activity for youth), with an average of 10.6 MET-hours/week of moderate intensity activity. One other study has also found higher than expected levels of activity for youth living in public housing projects.⁵³ In our fieldwork, we noted the presence of playground equipment and access to small open spaces and playgrounds in the public housing units surveyed, potentially serving as a physical activity resource for young children; however, our survey did not ask participants to report on the places where youth were most active. It may be that these small open spaces provided an essential outdoor space for youth to be physically active.

Other potential limitations in this study warrant attention. We were interested in residents' perceptions of neighborhood characteristics and how they relate to physical activity, but self-reported measures of exposures and outcomes are prone to measurement error and may have either decreased the precision of our estimates or biased our results toward the null.⁵⁴ Moreover, we collected data on the extent to which youth engaged in physical activity based on adult respondent reports. Youth were not directly interviewed. Adult respondents may have over or underestimated levels of physical activity for youth, which we were not able to validate. As previously noted, however, Sallis et al⁴³ and others have shown moderate to strong reliability between parental and youth report of physical activity, particularly among younger youth such as those sampled in our survey (ie, 3–12 year olds). In addition, although we followed standard protocol for analyzing moderate or vigorous activity using the IPAQ survey, MET estimates are based on adult energy expenditures⁵⁴ since the corresponding energy expenditure for youth has only recently been established.^{55,56} Lastly, given our sample size, we were not able to test for differences by gender or whether the gender of the parent/adult respondent would make a difference in reporting on youth activity.

The findings from this community survey emphasize the need to address the social determinants of physical activity disproportionately affecting racially/ethnically diverse youth. While making inroads in racial/ethnic disparities in health will require continued monitoring of national trends, there is also a need to examine health disparities in local settings to implement interventions that respond to community realities and needs. This study contributes to the growing recognition of the importance of ensuring that all communities are free of violence³⁵ and provide young people with safe and enjoyable places to live, learn, and play if we are to fulfill our national goals of decreasing obesity and increasing physical activity.

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