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Associations between Body Mass Index and Park Proximity, Size, Cleanliness and Recreational Facilities

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Abstract

Purpose—To determine whether body mass index (BMI) is associated with proximity to neighborhood parks, the size of the parks, their cleanliness and the availability of recreational facilities in the parks.

Design—Cross-sectional.

Setting—New York City.

Subjects—13,102 adults (median age 45 years, 36% male) recruited from 2000–2002.

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Measures—Anthropometric and socio-demographic data from study subjects were linked to Department of Parks & Recreation data on park space, cleanliness, and facilities. Neighborhood level socio-demographic and park proximity metrics were created for half-mile radius circular buffers around each subject's residence. Proximity to park space was measured as the proportion of the subject's neighborhood buffer area that was total park space, large park space (a park > 6 acres) and small park space (a park <=6 acres).

Analysis—Hierarchical linear models were used to determine whether neighborhood park metrics were associated with BMI.

Results—Higher proximity to large park space was significantly associated with lower BMI (beta = −1.69 95% CI = −2.76, −0.63). Across the population distribution of proximity to large park space, compared to subjects living in neighborhoods at the 10^{th} percentile of the distribution, the covariate adjusted average BMI was estimated to be 0.35 kg/m^2 lower for those living in neighborhoods at the 90^{th} percentile. The proportion of neighborhood area that was small park space was not associated with BMI, nor was park cleanliness or the availability of recreational facilities.

Conclusions—Neighborhood proximity to large park spaces is modestly associated with lower BMI in a diverse urban population.

Keywords

Obesity; Body mass index; park proximity; neighborhood

Purpose

As public health advocates seek ways to curb the rise in obesity, they have given increasing attention to the role of the built environment in promoting physical activity.[1, 2] City parks and recreational facilities are of particular interest because, as public facilities, they are open to the public at little or no charge and are amenable to policy intervention. However, research on the association between park proximity and physical activity or body mass index (BMI) has found inconsistent results. In research on children and youth, proximity to parks has been associated with physical activity in most studies[3–8] but not all.[9] Among adults the findings are more mixed, with some studies finding an effect on physical activity[10–14] while others do not.[15–19] Research on weight outcomes is even more equivocal: with a few exceptions,[20, 21] most studies report no significant association between park proximity and BMI or obesity.[19, 22–25]

These inconsistent findings may reflect heterogeneity among parks in characteristics that are relevant to physical activity and BMI or obesity. For instance, a nearby park may provide little benefit for health if it is too small to support physical activity, or if it is poorly maintained or lacks recreational facilities.[26] Some research has found that larger parks or those with more facilities are more likely to promote physical activity or active use of parks.[3, 25, 27–31] However, little is known about whether park size or facilities are associated with BMI or obesity. In addition, although qualitative studies have documented concerns about poor park maintenance,[32] prior research provides no systematic evidence about the relationship between park cleanliness and physical activity or weight outcomes.

To fill this gap, the current study examined whether proximity to parks, larger park size, the presence of recreational facilities and park cleanliness were associated with objectively measured BMI for a large and diverse sample of adults in New York City. The study takes advantage of objective and unusually detailed measures of park cleanliness and facilities that were collected by the New York City Parks & Recreation Department. We hypothesized that park proximity, larger park size, the presence of recreational facilities, and the cleanliness of available parks would be associated with lower BMI. Because neighborhood walkability may influence both usage of parks and BMI, we assessed possible confounding effects of population density, an indicator of neighborhood walkability.[33, 34] In addition, we hypothesized that the association between park space and BMI would be moderated by park cleanliness, and that the association between park facilities and BMI would be moderated by age, gender, and neighborhood poverty.

Methods

Design

The study utilized a cross-sectional design in which measures of park proximity, size, cleanliness, and recreational facilities were appended to health survey data.

Sample

The analyses presented here employ data collected during the 2000–2002 baseline enrollment of subjects for the New York Cancer Project (NYCP), a study of residents of New York City and the surrounding suburbs that has been described extensively elsewhere.[33, 35] Of the total sample, 14,147 individuals had geo-coded addresses falling within New York City boundaries, and 13,102 had complete data for objectively measured height and weight (subjects with extreme height or weight values or combinations of values that produced BMI scores>=70 were excluded, a BMI of 70 is above the 95th percentile of BMI values observed in NHANES[36]) and questionnaire measures of age, race and ethnicity, gender, and educational attainment. The demographic profile and spatial distribution of the sample are similar to those derived from the 2000 Census summary file 3 and from the 2002 New York Community Health Survey.[33] Analyses of BMI, individual demographic variables, and appended neighborhood characteristics were approved by the Columbia University Medical Center Institutional Review Board. Sample characteristics were described previously.[33]

Measures

a. Park proximity—The study subject's neighborhood was defined as a half-mile (805 meter) "radial buffer," created by drawing a circle with a half-mile Euclidean radius around his or her geo-coded residential address. Socio-demographic and park variables were constructed for each neighborhood. Geo-spatial data on park boundaries, facilities, and cleanliness ratings within parks were provided by the New York City Department of Parks & Recreation (NYCDP&R). For each neighborhood buffer, we calculated the total area of all parks divided by the area within the buffer using the Intersect operation in ESRI ArcGIS 9. (See figure 1 for an illustration.) We also created separate measures for the proportion of the neighborhood buffer that was large park space and the proportion that was small park space, using the NYCDP&R's definition of large parks as those greater than six acres. For administrative purposes, these large parks are divided into smaller zones; for instance, there are 62 zones within Central Park. Between 2000 and 2002, the NYCDP&R administered 646 large park zones and 1,526 small parks zones. All three park space measures (proportion of neighborhood covered by parks, by large parks only and by small parks only) were modeled as continuous variables in analyses predicting BMI. To better assess the linearity of the relationship, the proportion of park space was also modeled as a five-level ordinal variable. For this variable an absence of parks was coded as zero and used as the referent group and then four categories of increasing proximity to park space were coded for as 1, 2, 3 and 4. The four categories of proximity to park space were defined using the quartile values of the distribution of proportion park space among those with any park space in their neighborhood as cut points to break the continuous measure into categories.

b. Park Cleanliness—Data on park cleanliness were collected by the NYCDP&R Parks Inspection Program (PIP), which audits each park zone at least twice a year on up to 16 metrics (http://www.nycgovparks.org/sub_about/parks_numbers/ratings.html). The PIP uses a rigorous protocol to assign satisfactory/unsatisfactory scores for each metric, with data entered into hand-held computers on-site and accompanying photographs documenting issues. The PIP protocol includes four cleanliness measures documenting the presence of glass, graffiti, weeds, and litter. To develop park quality measures "satisfactory" was coded as 0 and "unsatisfactory" as 1; within each park zone, the mean score for each cleanliness metric was calculated across inspections performed each year and then this score was averaged across the years 2000–2002. To construct neighborhood-level measures, we averaged these zone-specific mean scores, weighting by the portion of each zone falling within the neighborhood buffer. The four weighted-average cleanliness metrics have a range of 0–1, with higher scores indicating lower cleanliness. Neighborhoods with a score of 0 had no inspection failures for the cleanliness metric for any park zones falling within the neighborhood, while 1 represents a failure for that metric on all park zone inspections within the neighborhood. For each zone, a total area-weighted cleanliness score was calculated for each year by summing the average scores for weed, glass, litter and graffiti. The total cleanliness score ranged from 0–4 with higher scores indicating lower cleanliness. The sensitivity of the data analyses to weighting and the apportioning of zones that partially fell within a neighborhood buffer was assessed using two alternative versions of the neighborhood park cleanliness scores: one in which park zones were not weighted at all, and a second which used the entire zone area to weight park cleanliness scores.

Between 2000 and 2002, when NYCP study subjects were enrolled, the PIP program included most but not all park zones. Among those with any parks within a half-mile of their home, on average 74% of this park space was inspected and rated for cleanliness at least once between 2000 and 2002. The total amount of park land in each study subject's neighborhood was highly correlated (r=0.84) with the amount of park land inspected and rated for cleanliness. The proportion of residents in a neighborhood who were black or were below the poverty level was positively associated with the percentage of park area inspected and rated for cleanliness. Analyses of park proximity were conducted using all parks zones and repeated for only those zones for which cleanliness data were available.

c. Park Recreational Facilities—In addition to park cleanliness, analyses examined total counts of park-based recreational facilities and the number of different types of facilities available within the park zones intersecting the subject's radial buffer. Facilities included baseball fields, full basketball courts, basketball hoops or half courts, beaches, football fields, golf courses, handball courts, hockey rinks, swimming pools, soccer fields, tennis courts, running tracks and volleyball courts. Due to the right-skewed distribution of the facilities data, study subjects were categorized into four categories, coded as 1, 2, 3, and 4, representing increasing availability of facilities. Quartile values from the distribution of the total number of facilities across subjects were used as cut points to break the continuous measure of availability of facilities into categories. Using the same approach study subjects were also categorized into four groups by quartiles of the number of different types of facilities.

Analysis

Associations between BMI and park proximity, size, cleanliness, and facilities were assessed using cross-sectional, multilevel modeling[37] with the SAS Proc Mixed procedure.[38] Because the neighborhood-level measures were generated for person-specific buffers, these measures were treated as Level 1 variables. Inter-correlations among individuals, reflecting similarity among those living in proximity to each other, are expected to exist across a geographic scale larger than the half-mile buffers. To account for this, we estimated our multilevel models with Community District as the Level 2 unit of analysis. New York City's 59 Community Districts are administrative units that correspond to named areas such as the Upper West Side and East Harlem. Although no predictive variables were measured at level 2, use of this nested data structure allowed for the estimation of standard errors that reflect non-independence between subjects and neighborhood conditions within these larger administrative units. Analyses were adjusted for individual- and neighborhood-level socio-demographic characteristics. At the individual level, all analyses were adjusted for age, gender, race/ethnicity, and education; income was not included in the models because, after adjustment for education, income does not predict BMI in this study sample.[33] To adjust for the effects of neighborhood composition on BMI that may be independent of individual-level socio-demographic characteristics, our models also adjusted for the proportion of residents below the federal poverty line, proportion Black or African American, and proportion Latino or Hispanic using data from the 2000 United States Census summary file 3.[39, 40] Analyses were also adjusted for population density, which is an indicator of neighborhood walkability and is inversely associated with BMI in this study sample.[33]

Results

Table 1 provides descriptive statistics for the measures of park proximity, cleanliness, and facilities across the study population. Almost all study subjects (99%) lived within a half mile of at least one park. However, there was more variation among study subjects in proximity to large parks, in the cleanliness of nearby parks, and in the number of nearby recreational facilities. Only 68% of study subjects lived in neighborhoods with large parks and the inter-quartile range for the proportion of the neighborhood that was large park space extended from 0.00 to 0.09. Considering the park zones rated for cleanliness, 38% of subjects lived in neighborhoods in which all rated park zones passed all inspections for weeds; the corresponding proportions for litter, glass, and graffiti were 8%, 44% and 27% respectively. Among those with parks within their neighborhood, 92% of the subjects had at least one park-based recreational facility in their neighborhood, however the numbers of such facilities varied widely. Because many facilities are distributed in large groups, such as a dozen handball courts in one complex, some of the study subject's counts of total amenities are very high (Table 1). When availability of facilities is defined as the number of different types of facilities, for instance counting 12 handball courts as 1 facility type, study subjects had a median of 4 types of available facilities.

In multivariate analyses controlling for confounding factors, the proportion of the residential neighborhood dedicated to park space was significantly associated with lower BMI in the study subjects ($b = -1.67$ 95% CI = −2.74, −0.61). This effect, however, differed by park size, with a significant association found for the proportion of large park space ($b = -1.69$, 95% CI = −2.76, −0.63) but not for small park space ($b = 0.40$, 95% CI = −8.52, 9.31). Compared to subjects living in neighborhoods at the 10^{th} percentile of the population distribution of proximity to large parks, the covariate adjusted average BMI of those living in neighborhoods at the 90^{th} percentile was estimated to be 0.35 kg/m^2 lower. Figure 2 shows the adjusted mean BMI by categories of large park space. Population density was also significantly inversely associated with BMI ($b = -0.31$ per 10,000 people per KM^2, $p<0.001$).

Table 2 displays the associations between park cleanliness measures and BMI after adjustment for confounders. Neither the overall cleanliness score nor any of the four individual measures were associated with BMI. The results do not change substantially after adjustment for the proportion of park space in the buffer. In sensitivity analyses, omitting the weights or using an alternative weighting scheme made little difference to the results after control for individual and neighborhood socio-demographics. Because we hypothesized that the association between park space and BMI would be moderated by park cleanliness, we examined interactions between the proportion of large park space and overall park cleanliness (using a median split) in predicting BMI. The association between the proportion of large park area and BMI did not vary significantly across strata of overall cleanliness (p for interaction = 0.27). Beta coefficients for the association between the proportion of large park land and BMI were −1.18 (95% CI −2.89, 0.53) in neighborhoods with cleaner parks and −2.72 (−4.91, 0.53) in neighborhoods with less clean parks.

Table 3 reports associations between the extent of recreational facilities available in the parks and BMI. After control for individual and neighborhood socio-demographic characteristics, there was no significant association between BMI and the count or number of types of park physical activity facilities. Again, the results changed little with adjustment for the proportion of park space in the buffer. The inverse associations between BMI and park proximity remained after control for the total count of facilities and for the number of facility types. In analyses that included measures of proximity to large or small parks, recreational facilities, and the cleanliness scores, neither availability of facilities nor cleanliness predicted BMI, but the proportion of large park space remained significantly inversely associated with BMI.

Because the elderly may be less likely to use recreational facilities, analyses were conducted restricting the study population to those under the age of 60 and also to those under the age of 50. In neither analysis was the total count or the number of types of park recreational facilities associated with BMI. When analyses were conducted stratifying by gender, recreational facilities were not associated with BMI in either gender. It was also anticipated that park facilities might play a more important role in poorer neighborhoods, where there may be fewer commercial physical activity venues. However, when analyses were restricted to those living in neighborhoods where the poverty rate was above the median for the study population, neither the total count nor the number of park facility types was associated with BMI.

Discussion

In a large, diverse sample of New York City residents, higher proximity to large parks, defined as a larger proportion of neighborhood area that is large park space, was associated with lower BMI. The magnitude of the association was quite modest and smaller than associations observed in New York City between BMI and indicators of neighborhood walkability[33, 34] and proximity to retail outlets selling healthy food.[41, 42] Compared to subjects living in neighborhoods at the 10th percentile of the distribution of proximity to large parks, the covariate adjusted average BMI was estimated to be 0.35 kg/m^2 lower for those living in neighborhoods at the 90th percentile. Similarly estimated differences in BMI associated with variation in several indicators of neighborhood walkability ranged from ~0.33 to ~1.00 kg/m^2 and was 0.80 kg/m^2 for variation in access to retail outlets selling healthy foods.[33, 41] The current study is one of the few studies to analyze the association between proximity to parks and BMI among adults. Past studies associating park proximity with adult physical activity or weight have produced inconsistent findings, with some studies finding a beneficial effect of parks[10–13, 21] while others have not.[16–19] The results reported here suggest that accounting for park size may help explain these mixed findings.

Because data on physical activity were not collected from the respondents, it is not possible to determine in our sample whether differences in activity mediate this association between park proximity and BMI. The finding that only proximity to large parks predicts BMI is consistent with the interpretation that the observed association is due to increased physical activity; many small parks are not large enough to support physical activities. Parks may serve as locales for physical activity and as pedestrian destinations of interest that might encourage walking; however, parks are also venues for sedentary activities, such as sun bathing and picnicking.[29, 43] In addition, some parks in New York City also serve as venues for retail food outlets, particularly for food trucks, and have become destination eating spots.[44, 45] Because of the potential for parks to affect both sides of the energy balance equation, positive effects of park proximity on individual's physical activity patterns may be apparent at the population level as only modest differences in the average BMI of neighborhood residents.

In densely-populated urban environments, residents may live near multiple parks which vary in terms of size, cleanliness, and available facilities and thus in their implications for physical activity or body size. To our knowledge, no previous analyses have considered all these factors simultaneously, and no previously published studies have examined the association between park cleanliness and BMI in adults. Contrary to expectations, among those with parks in their neighborhoods, neither park cleanliness nor recreational facilities within the parks were associated with BMI. While park cleanliness was hypothesized to deter park usage and thus to be inversely associated with BMI, it is also possible that litter and glass in parks could indicate heavy usage. Alternately, the park cleanliness measures may be "too" sensitive, measuring problems that are not sufficient to deter park usage and thus are not associated with BMI.

Because a previous study of adults and several of children found an association between the number of park-based recreational facilities and physical activity, the number of such facilities was also expected to be associated with lower BMI. It is possible that the half-mile buffers used to define the neighborhood in this analysis were too small. Some facilities, such as tennis, handball, and basketball courts, may attract players from substantial distances; past work on park usage suggests that many people travel more than half a mile to use parks.[10] Given the paucity of research on park cleanliness and facilities, more work is indicated to understand the implications these characteristics have for park use, physical activity, and BMI.

Strengths of this study include precise and objective measures of BMI and of park proximity, size, cleanliness, and recreational facilities. Our measure of park proximity –the proportion of a radial buffer around each study subject's home address that is park land – has two primary advantages. First, it more accurately measures availability of park land than simple counts of parks, which overlook differences in the space available for physical activity.[46] Second, the use of individualized radial buffers ensures that study subjects are centered within consistently sized neighborhoods.[46] An alternative approach would have been to use neighborhood buffers based on street networks and pedestrian paths, which would take into account potential barriers to proximity, such as highways or cliffs.[46] However, at the time of this study the NYCDP&R had not yet geo-coded park entrances and aligned them with the geo-spatial data on street networks, precluding network-based analyses. Because of the regular gridded pattern of New York City streets, however, substitution of network-based measures is unlikely to have a substantial effect.

Primary limitations of the study include the lack of physical activity measures as well as an observational design which limits causal inference. While it is plausible that park proximity influences physical activity behavior and in turn body size, it is also possible that individuals with an active lifestyle choose to live near parks and would have a lower body size regardless of where they lived. Such self-selection would present a case of reverse causality, in which park proximity merely acts as selection factor causing people with an active lifestyle and lower body size to cluster together. Residential choice in New York City is constrained, with socio-economic status being a major determinant of residential patterns, and with substantial clustering along racial and ethnic lines. While overall proximity to parks in New York City is higher in poorer Census tracts, wealthier neighborhoods have higher proximity to large parks.[47] However, our analyses adjusted for individual-level educational attainment, a measure of socioeconomic status, and for individual-level race/ethnicity and adjusted for neighborhood-level poverty rate and racial and ethnic composition; adjustments which may limit the biasing effects of residential selection associated with these characteristics. In addition, this study may have limited generalizability, the unique physical characteristics of New York City, such as high walkability, mixed land use and a strong public transport infrastructure, may influence the utilization and effects of parks. However, the analyses adjusted for population density, an indicator of neighborhood walkability that also correlates with public transit access and land use mix.[33] Lastly in regards to generalizability, these analyses utilize population data from 2000–2002 and since then the Department of Parks and Recreation and community groups have been implementing programs in parks to encourage physical activity. Thus the results presented here may not reflect current circumstances.

In many urban areas, proximity to parks is widespread but the size and quality of these parks varies substantially. This study confirms previous findings of the health benefits of large parks – here, parks of more than 6 acres – and finds that the result is unchanged after control for park facilities and cleanliness. While this area based threshold is used administratively by the Department of Parks & Recreation, from the perspective of a park being supportive of physical activity this criteria for defining a large park is somewhat arbitrary, the optimal threshold for defining a park as being large enough to support physical activity is unknown. In addition this definition of a large park does not take into account possible influences of park layout or shape. The results suggest that city planners can promote physical activity by creating large parks or expanding existing ones. While not associated with BMI, small parks and recreational facilities may provide other benefits related to health, such as promoting social interaction and community engagement. The association between park proximity and BMI is modest and weaker than associations observed between BMI and other built environment characteristics such as neighborhood walkability and access to retail outlets selling healthy food.[33, 34, 41] However, the analyses presented here, which adjust for an indicator of neighborhood walkability, suggest that multiple elements of urban design may independently affect obesity risk. Given potential financial, space and social constraints, urban planners need to be aware of the relative magnitudes of the estimated effects of different built environment interventions expected to affect obesity. In densely settled environments where little land is available for new park development, planners could instead develop trails to link existing parks together. For instance, in New York City, a nonprofit organization, CLIMB (“City Life Is Moving Bodies”), is working to link parks in northern Manhattan. Such efforts can provide physical activity resources to underserved urban neighborhoods.

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SO WHAT?

- **What is already known on this topic?** Past research on park proximity and physical activity and body mass index in adults has produced inconsistent results. Factors such as park size and cleanliness have largely been ignored.
- **What does this article add?** The article shows that neighborhood proximity to park space is associated with modestly lower body mass index but this association is restricted to proximity to large parks.
- **What are the implications for health promotion or research?** In space constrained urban areas where new large parks cannot easily be built, planners should focus on linking parks corridors of open green-space to create contiguous spaces conducive to physical activity.

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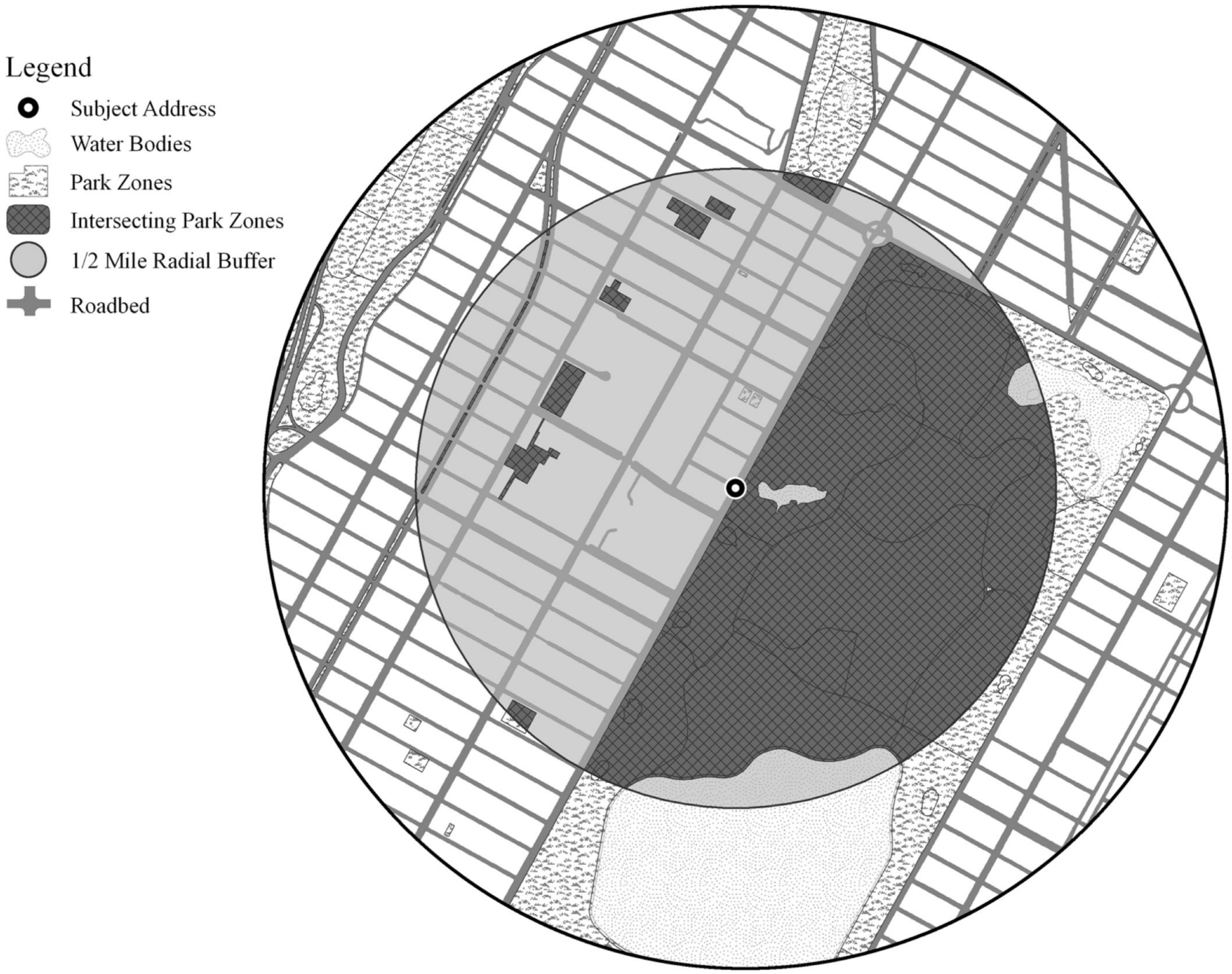

Figure 1. Example of a half-mile neighborhood buffer

Figure 1 shows a half-mile radial buffer drawn around a home next to Central Park. The buffer overlaps a portion of Central Park, fully encompassing several administrative zones within Central Park and also overlaps several small parks.

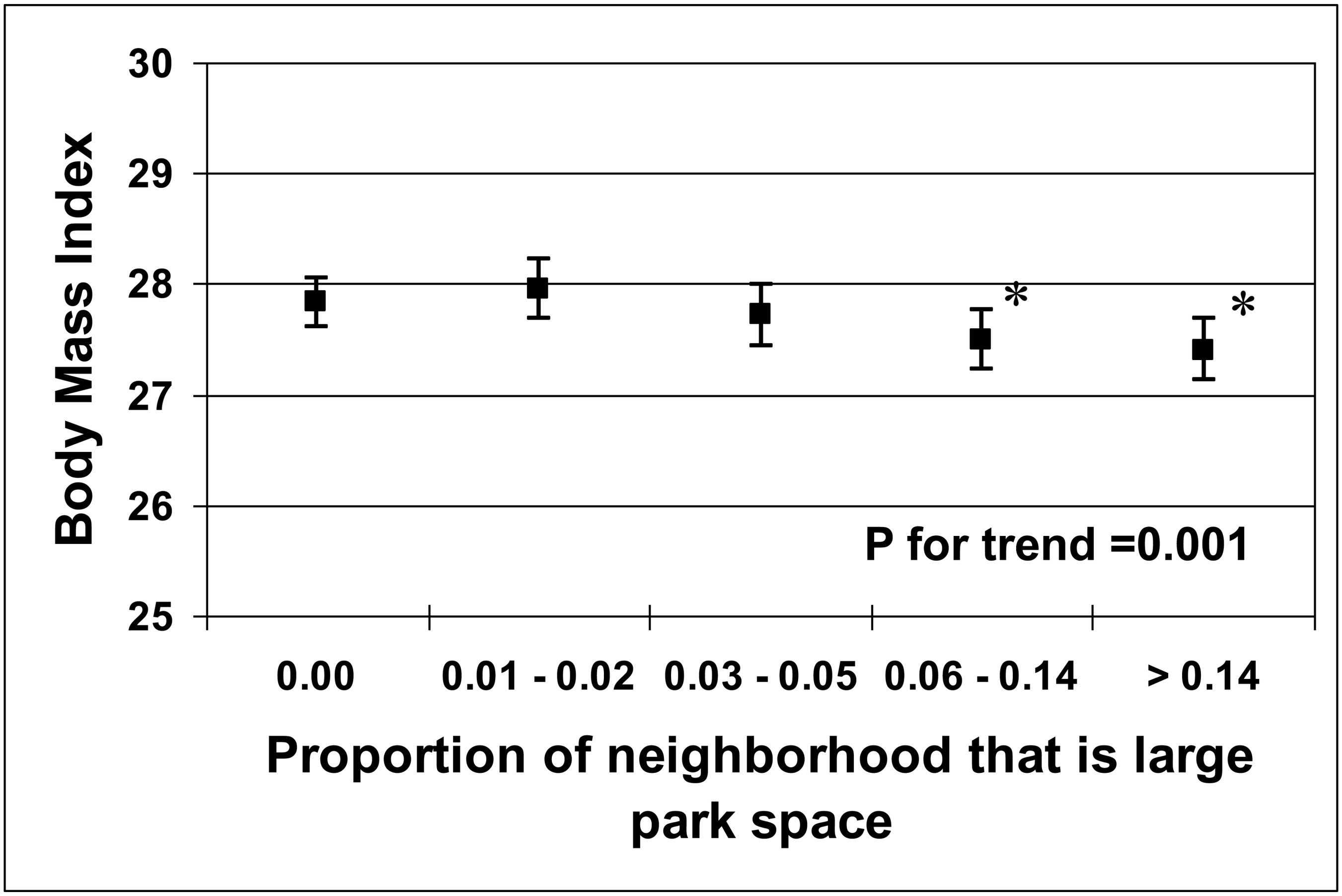

Figure 2. Adjusted mean BMI by categories of park proximity

Figure 2 shows the predicted adjusted mean BMI and 95% confidence interval by categories of the proportion of the neighborhood that is large park space. The categories represent no large parks within half-mile buffer and then quartiles of the proportion of the neighborhood that is large park space among those who have some large park space within their neighborhood. Analyses adjust for individual level age, gender, race/ethnicity, and education and for neighborhood-level proportion Black proportion Hispanic, percent poverty, population density and proportion of the neighborhood that is small park space. The covariate adjusted mean BMI values (marked with *) for subjects whose neighborhoods fell in the two highest large park proximity categories were significantly lower for subjects who had no large park area in their neighborhood.

Table 1

Descriptive statistics on park proximity, cleanliness, and facilities

Park proximity and Cleanliness Measures	Median (inter quartile range)
Neighborhood Access to Parks	
Proportion of neighborhood that is park space	0.04 (0.01, 0.11)
Proportion of neighborhood that is large park space	0.02 (0.00, 0.09)
Proportion of neighborhood that is small park space	0.01 (0.01, 0.02)
Neighborhood-level park cleanliness [a]	
Park zone area-weighted score	
Glass Score	0.01 (0.00, 0.07)
Weeds Score	0.02 (0.00, 0.10)
Litter Score	0.24 (0.10, 0.41
Graffiti Score	0.04 (0.00, 0.14)
Total Cleanliness Score	0.45 (0.22, 0.71)
Availability of Recreational Facilities	
Total number of facilities	20 (8, 34)
Number of types of facilities	4 (3, 6)

[a]The individual item cleanliness scales range from 0 to 1 and the total scale ranges from 0–4. Higher scale scores indicate lower cleanliness and a greater number of failures on the Park Inspection Program inspections.

Table 2

Associations between park cleanliness metrics and body mass index

Cleanliness score weighted by the area of the park zone	Association with BMI b[a] (95% CI)	Association with BMI b[b] (95% CI)
Weeds Score	−0.44 (−1.33, 0.45)	−0.34 (−1.25, 0.56)
Litter Score	−0.26 (−0.80, 0.29)	−0.20 (−0.75, 0.35)
Glass Score	0.21 (−0.76, 1.17)	0.22 (−0.75, 1.19)
Graffiti Score	−0.08 (−0.71, 0.86)	−0.12 (−0.92, 0.69)
Total Cleanliness Score	−0.13 (−0.40, 0.15)	−0.12 (−0.39, 0.16)

[a]Unstandardized beta coefficients for weeds, litter, glass and graffiti are from a single model and are mutually adjusted, higher score indicates worse cleanliness conditions. The total cleanliness score was analyzed separately from the component scores. Presented unstandardized beta coefficients are adjusted for individual age, gender, race/ethnicity, education and neighborhood percent Black, percent Hispanic, percent poverty and population density.

[b]Further adjusted for proportion of neighborhood that is small or large park land.

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Table 3

Park recreational facilities and body mass index

Total number of facilities	Association with BMI b[a] (95% CI)	Association with BMI b[b] (95% CI)	Number of types of facilities	Association with BMI b[a] (95% CI)	Association with BMI b[b] (95% CI)
0–9	Ref[c]	Ref[c]	0–3	Ref[c]	Ref[c]
10–20	−0.06 (−0.35, 0.26)	−0.05 (−0.34, 0.24)	4	−0.05 (−0.28, 0.47)	−0.04 (−0.32, 0.24)
20–35	0.11 (−0.20, 0.41)	0.16 (−0.16, 0.47)	5–6	−0.10 (−0.36, 0.16)	−0.05 (−0.32, 0.23)
36+	0.13 (−0.23, 0.50)	0.27 (−0.12, 0.66)	7+	0.10 (−0.28, 0.47)	0.20 (−0.20, 0.60)

[a]Unstandardized beta coefficients adjusted for individual age, gender, race/ethnicity, education and neighborhood percent Black, percent Hispanic, percent poverty and population density.

[b]Further adjusted for proportion of neighborhood that is small or large park land.

[c]Indicates the reference category against which the beta coefficients for the other categories are compared.