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Do Neighborhood Perceptions Account for Racial Disparities in Obesity?

By

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Master of Public Health

Epidemiology

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Sylvie Dodell

B.S.
Georgia Institute of Technology
2011

Faculty Thesis Advisor: Viola Vaccarino, MD, Ph.D

An abstract of
A thesis submitted to the Faculty of the
Rollins School of Public Health of Emory University
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Abstract

Do Neighborhood Perceptions Account for Racial Disparities in Obesity?
By Sylvie Dodell

Obesity prevalence has increased substantially in recent decades, and the rates of obesity are higher among minority groups. Examining the impact of neighborhood perceptions along with more objective neighborhood factors could be useful in proposing interventions to help address obesity among different groups. A secondary data analysis was conducted using cross-sectional data from the META-Health study, including 376 African American and white adults. The goal was to investigate the role of neighborhood perceptions in racial differences in BMI by examining the impact of individual-level neighborhood factors on the estimate for race in linear and logistic regression models accounting for confounders such as socioeconomic status, gender, and smoking status. The results suggest that neighborhood perceptions accounted for a small amount of the disparity in obesity between African American and White adults in Atlanta (0.24 units of BMI in the linear model and 5% of the disparity in the logistic model). Activities with neighbors and social cohesion accounted for the largest portion of the disparity when the neighborhood perception scales were examined individually.

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Background/Literature Review

Obesity Overview

The prevalence of obesity in the United States has increased substantially over the last few decades, and more than one third of adults more than 20 years old are obese. Obesity is also a risk factor for various chronic diseases including Type 2 diabetes and heart disease (1, 2). Interventions have been able to address obesity at the individual level and on the short term, but this problem has been much more difficult to address on a population level (3).

Many studies during the last two decades, almost all of which have been cross-sectional, have investigated the impact of different types of environmental factors on the presence of obesity and related conditions such as hypertension. A prevailing concept is that factors such as the physical neighborhood environment (including the built environment), individual and community-level emotional and psychological factors (including social interaction), and socio demographic characteristics (such as the general neighborhood education and poverty level) all affect each other, as well as individual health behavior and the prevalence of obesity and related conditions (4, 5).

Self-reported BMI was the most common way of representing obesity in the literature. Out of 131 studies examining the impact of physical and socio-demographic elements of the environment on cardio metabolic risk factors, 91% had a weight-related outcome, which was body mass index (BMI) in most studies, and the remaining studies tended to use skin-fold measures or waist-to-hip ratios.

For 55% of these studies, the weight-related outcome was self-reported (4). Additionally, all 27 studies included in a review by Carter and Dubois on the relationship between children obesity and the physical and social environment used BMI as the outcome, either directly or to calculate the main outcome, such as through using percentiles based on age for studies involving children or adolescents (6). The types and strengths of the associations found with BMI in these studies varied depending on which physical or social neighborhood factors were used as the exposures.

Neighborhood Factors and the Built Environment

It is very difficult to use summary measures to describe associations in studies of physical and social environments due to inconsistencies in definition and measurement of the exposures and outcomes. Some examples of inconsistencies include how socioeconomic status is defined, how the built environment is defined, how many and which neighborhood level factors and individual level factors are used, and the overall definition of neighborhood (7, 8).

It is also important to address the concept of neighborhood, including how neighborhood is defined, and what types of neighborhood level factors have been examined. Leal and Chaix's literature review found that 50% of the studies used administrative data for neighborhood level factors, 34% used Geographic Information Systems (GIS) to define regions, and about 7% used self-reported assessment from individuals living in the same neighborhood to define neighborhood-level factors. This pattern was reflected in other literature reviews, as

the vast majority of studies examined used census tracts or a similar type of administrative boundary to define neighborhoods (4).

A common type of neighborhood factor examined is the built environment, which has been defined in many different ways (7). It includes elements such as the presence of sidewalks and access to parks and grocery stores. Studies have examined the food environment, including food deserts, which are areas with limited access to healthy and affordable foods and their impact on diet and the prevalence of obesity. Such studies generally find that living closer to (or having easy access to) healthier foods is associated with a healthier diet and better health outcomes; conversely, living closer to convenience stores or having less access to healthy food is associated with less healthy diets and poorer health outcomes (9). For instance, in a cohort study of 4,008 adults from six cities around the United States, obesity incidence for people who reported better access to healthier foods in their neighborhood was 12% lower after adjustment for risk factors such as age, sex, and SES (10).

Neighborhood Perceptions

Black and Macinto discuss several studies that examine a more subjective neighborhood environmental factor, perceived safety. There are inconsistencies in how safety has been measured, which limits the conclusions that can be drawn, but there is evidence of associations between different elements of perceived safety (or lack of safety) and physical activity, as well as obesity (11). Using a Neighborhood Psychosocial Hazards scale in a cohort study of 1140 older adults in Maryland, Glass

et. al. found that the quartile that perceived the highest amount of psychosocial hazards had an obesity rate of 53%, compared with a rate of 27% in lowest quartile. Another multilevel analysis found a significant direct association between BMI and neighborhood crime, as well as between cardiovascular disease and crime (3). In a multivariate model (adjusted for SES measures and individual health behavior) for a cross-sectional study of 1151 adults in Australia, perceived safety was the only of three neighborhood perception variables (the other two were social capital and social cohesion) still significantly associated with BMI. Higher perceived safety was associated with lower BMI, and together the three explained 1.5% more of the variance in BMI when added to a model containing the individual variables mentioned previously (12). Perceived measures are not included as often as objective measures in studies, though both perceived and objective measures show important, though differing, possible associations with physical activity and obesity (13).

Social cohesion refers to the strength of the social ties between people within a social group or community. Relationships among close friends and family are important for social support and neighborhood health, but so are "weak ties", relationships among community members that are not as close. Neighborhoods with low levels of social cohesion (referred to as social disorder) may have lower levels of perceived safety and higher levels of perceived violence (5).

In general, while neighborhood perceptions may be more accurate measures, it is necessary to consider possible biases, and several factors such as race, home ownership and age can "predict" neighborhood perception(14). Additionally, racial

stereotyping and neighborhood appearance can play a role in the perception of neighborhood safety(15).

Obesity and Socioeconomic Status

It is important to use multiple variables for defining socio-economic status, as the relationships between variables such as income, wealth and education, among others, are complex. This can be done either by using multiple variables and/or using scales and indexes to represent overall concepts (16, 17).

Based on a literature of 16 studies on the association of various neighborhood factors with obesity, Black and Macinto noted that even after accounting for individual SES, a variety of indicators such as lower area income and living in a materially deprived neighborhood were associated with increased odds of obesity (3). When examining literature on a wider variety of cardio-metabolic risk factors, Leal and Chaix also noted that negative health outcomes (i.e. higher blood pressure, obesity) were often associated with those types of socio-economic related neighborhood level factors, after adjustment for individual SES (4).

Race and Obesity

It is also necessary to consider how race is being used as a variable, as the relationship between racial and socio-economic disparities is complex (16). One study by Black and Macinto found that that people living in areas with a black population of greater than 25% had a 13% larger odds of obesity compared with other neighborhoods; however, two other studies examined by the same authors

found no significant association between obesity and the racial composition of neighborhoods, and a third found an association between obesity and racial composition only among African Americans (3).

Based on the studies examined, racial differences in obesity are confounded by socioeconomic status and neighborhood characteristics. In an analysis based on a sample of 771 non-pregnant black and white women from a cross-sectional survey of adults from two "economically homogenous" and "racially integrated" census tracts, among demographically similar women in a similar income bracket, black women had similar odds of being obese as white women (OR 1.25, 95% CI 0.90 to 1.74). The authors compared the sample to women from a national sample, where black women had slightly higher odds of obesity than white women (OR 1.99, 95% CI 1.71 to 2.32) (18). Some studies have also suggested that sex may have a moderating role. For example, 3 studies referred to by Black and Macinto observed significant associations between neighborhood SES and weight only among women (3).

Literature Summary and Overview of Analysis

Overall, there have been many studies, usually cross-sectional, on the impact of the social and physical environment on obesity. These studies often used administrative boundaries such as census tracts to represent neighborhoods, and measured objective neighborhood factors such as the number of fast food restaurants and, less often, perceived neighborhood characteristics, such as perceived neighborhood walkability. There has been more focus on improving measurements in recent years, but the variety in definitions of neighborhood,

covariates, methods of analysis and methods of measurement can make it difficult to compare studies. It is important to account for confounding factors such as socio-economic status and age. Many studies have examined the impact of neighborhood factors on cardiometabolic health (i.e., whether walkability is associated with a lower BMI). Some have examined race/ethnicity as a moderator or covariate, and others have included neighborhood racial/ethnic composition as a component in a multi-level model. Few studies, however, have investigated whether neighborhood social and environmental factors account for disparities between racial/ethnic groups.

We investigated the role of neighborhood perceptions in racial differences in obesity by examining the impact of individual-level neighborhood perceptions on the estimate for race in models accounting for confounders such as socioeconomic status, gender, and smoking status. Measures of social interaction and neighborhood perception are less commonly used in analyses on the social and physical neighborhood environment (4,14). We hypothesized that adding the neighborhood perception scales to the models containing other covariates would account for part of the racial disparity in obesity, and that the perceived availability of healthy foods and social cohesion would account for more of the disparity than the other scales when the scales were examined individually.

Methods

The study data were from a two-stage cross-sectional META-Health study (Morehouse-Emory Partnership to Eliminate Cardiovascular Health Disparities), which was a collaboration between Emory University and Morehouse School of Medicine. The first stage was a telephone survey of 3391 metro Atlanta adults in 4 counties gathered from a random-digit dialing sample from GENESYS Marketing between 2005 and 2010. The sample was divided into 8 strata based on median county income according to the 2000 US census. The probability sampling method used was similar to the BRFSS method. The second stage included 469 adults from Stage 1 who agreed to come in person to Emory or Morehouse School of Medicine to receive additional assessments including further demographic and anthropometric information. Eligible participants were white or African American, non-Hispanic, US citizens, between 35 and 60 years old and living in Cobb, Fulton, DeKalb, or Gwinnett counties. The final sample used in the models included participants with data for all variables (n=376). The institutional review boards at Emory and Morehouse School of Medicine approved all study protocols. Consent was obtained from each participant. Approval from the Emory Institutional Review Board was also obtained for this secondary analysis.

The outcome, BMI (in kg/m^2), was obtained by measuring the height and weight of participants and using these measures to calculate BMI. BMI was examined both as a continuous variable and as a dichotomous variable using 30 as a cut point. Perceptions of neighborhood health were assessed using the

neighborhood questionnaire designed by Mujahid and Diez-Rouz et al. (19). It examines the neighborhood physical environment and social environment using 7 scales (aesthetic quality, walking environment, availability of healthy foods, safety, violence, social cohesion and activities with neighbors). This analysis included 5 of these scales (removing the scales for neighborhood violence and aesthetic quality). Average scale scores were assigned for each scale among participants who completed at least 50% of a scale. Some of the variables considered throughout the modeling process included general demographic information such as age, sex, ethnicity, highest grade in school obtained, employment status, income, and marital status. Smoking status was defined as being a smoker or not being a smoker (includes former and never).

The demographic factors, along with average BMI, were examined among the entire group, among African Americans only, and among white participants only for comparison purposes. Between the latter two groups, chi-square tests or Wilcoxon Mann-Whitney tests (for ordinal variables) were used to evaluate differences in distribution of variables related to sex, education, smoking status and neighborhood perceptions between African American and white participants. Differences in age and BMI were evaluated using two-sample T-tests.

Multivariate logistic and linear models were used to assess the association of individual and neighborhood level factors with the outcome of obesity (measured using BMI). Variables were chosen for inclusion in the model based on their relationship with obesity as reported in the literature, and consideration of possible collinearity issues between the factors related to socio-economic status and

between the neighborhood scales. The first model included race and BMI only, the second model included race, BMI, and possible individual confounders (sex, age, current smoking status, unemployment, education, and household income), the third group of models included the covariates previously mentioned along with each neighborhood scale, and the final model included the covariates and all five of the neighborhood scales. The results were calculated as prevalence odds ratios or linear estimates with 95% confidence intervals. SAS version 9.3 (SAS Institute Inc, Cary, NC) was used for all analyses.

Results

According to Table 1, the white participants included a similar proportion of women (69% white versus 66% black, p=0.38), a slightly higher average age (51.6 years for white versus 49.1 years for black, p=0.0002), a higher percentage of people who had graduated college (71% for white versus 39% for black, p=<0.001), and a higher average income (6.7 white versus 5.3 black on a scale of 1 through 8, p=<0.001, see Table 1 for categories). The black participants included a higher percentage of smokers (20% for black versus 13% for white, p=0.04), a larger percentage of people who were married or living with a partner (42% for black versus 35% for white, p=<0.001), a slightly larger percentage of unemployed people (12% black versus 8% white) and a higher average BMI (31.7 for black versus 28.2 for white). The only scale where black participants had a "better" (lower) average perception of their neighborhood was the activities with neighbors scale (1.57 black versus 1.93 white, p=<0.001). Two scales had average scores that were not significantly different between the white and black participants, including the violence scale (p=0.45) and the safety scale (p=0.44). All the other neighborhood scales showed significantly more adverse characteristics among blacks compared with whites.

According to Table 3, the average unadjusted difference in BMI between white and black participants was 3.28 units (95% CI: 1.84-4.73), which decreased to 3.05 units (95% CI: 1.48- 4.63) after adjusting for individual confounders. When the neighborhood perception scales were included individually in the adjusted models,

walking environment accounted for 0.02 units of BMI, availability of healthy foods accounted for 0.07 units, activities with neighbors accounted for 0.21 units, social cohesion accounted for 0.13 units and neighborhood safety accounted for 0.04 units. Together, the five scales accounted for 0.24 units of BMI. The logistic models showed similar results, with an adjusted odds ratio of 2.88 (95% CI: 1.73-4.75) when comparing the odds of obesity in black participants to white, and when all the neighborhood scales were added to the adjusted model, they accounted for about 5% of the disparity in obesity.

Discussion

Our results suggest that neighborhood perceptions accounted for a small amount of the disparity in obesity between African American and White adults in Atlanta. Activities with neighbors and social cohesion accounted for most of this effect when the neighborhood scales were examined individually.

There are descriptions in the literature of possible pathways between neighborhood perceptions and obesity. As walking is a common form of physical activity, walking outdoors could be influenced by how safe people feel in their neighborhood surroundings (3). Even if perceptions of neighborhood safety do not emulate how objectively safe the neighborhood is, it can still impact people's habits and how they "interact with the local environment"(20). Additionally, a less amenable walking environment could be associated with being less physically active (13). The availability of healthy foods is a frequently examined aspect of the built environment, and easier access to foods that support a healthy diet could make it more likely for people to choose those options (9). Finally, social cohesion and activities with neighbors have similar pathways in which they could influence weight. Feeling as through you can trust your neighbors and that you are part of the community around you can influence how safe you feel as well as your stress levels, which can in turn influence your daily habits (5).

Similarly to previous studies, on average, black participants had a higher average BMI and higher prevalence of obesity that white participants (21). In this

analysis, the odds of obesity among African Americans were over twice the odds of obesity among white participants.

In a cross-sectional study of 1048 adolescents in Connecticut, social ties were more strongly associated with exercise habits than neighborhood safety. In a multi-level random effects model predicting number of days of physical activity, neighborhood social ties had a statistically significant coefficient of 0.253 while neighborhood safety had a non-statistically significant coefficient of -0.183 (both measured at the individual student level, and accounting for a variety of socio-demographic, built environment and behavioral variables at the individual and neighborhood levels). This is a relatively small coefficient, and the authors suggest that strong social ties may be sufficient to overcome unsafe overall perceptions of a neighborhood (22).

Similarly, in this analysis, neighborhood activities, which include questions such as how often neighbors ask each other for advice and watch over each other's property, accounted for slightly more of the disparity in BMI than neighborhood safety (0.21 units versus 0.04 units). This is consistent with other literature. There are cross-sectional studies that give support for associations between perceived neighborhood safety and physical activity (as well as obesity). However, a literature review of 41 studies noted that findings have been mixed, and that measurements of perceived safety that incorporate more information on the sources of the perceived lack of safety and people's emotional responses might better reflect the association between perceptions of a safe environment and physical activity (and, though that, obesity) (11).

According to the literature, lack of access to healthy foods is associated with obesity (9). A cross-sectional study of 5,774 adults in North Carolina comparing perceptions of access of healthy food with GIS-based densities of supermarkets and smaller stores found that the two were associated, though not completely reflective of one another(23). However, in our analysis, the perception variable for access to healthy food accounted for only 0.07 units of the disparity between African American and white participants. Similarly, perceived walkability only accounted for 0.02 units.

Based on a multilevel analysis of 2003-2008 NHANES data of adults 20-64 years, while aspects of the built environment were associated with obesity, built environment characteristics did not account for much of the disparities in obesity between ethnicities (white, black, and Hispanic) in women, and increased the odds ratios of obesity between ethnicities in men. While their analysis focused on objective rather than perceived neighborhood characteristics, and the Hispanic and black participants in their sample had on average more favorable neighborhood characteristics for some aspects (such as better access to parks), this does have some similarities with the results of this analysis (21).

Strengths and Weaknesses

One limitation of this analysis is the lack of data on aggregated "neighborhood" level data, such objective built environment measures. However, neighborhood perceptions at the individual level, as in our analysis, should be more relevant in shaping behaviors. Also, the analysis was cross-sectional, which limits

inferences about causality. In addition, the focus was on main effects and did not consider interaction terms or mediation. Strengths of this analysis include the use of multiple dimensions of socioeconomic status (i.e. income, education) when controlling for individual SES, and the use of measured BMI rather than self-reported BMI. In addition, we examined perceived neighborhood factors, which incorporated participants' definitions of neighborhood, rather than administrative boundaries such as census blocks.

Implications/Future Directions

There have been many studies examining the socio-demographic and neighborhood factors and their impact on obesity in order to find ways to address obesity on a population level. These studies examined aspects of the built environment such as access to healthy food and walkability, and proposed possible theoretical pathways in which these factors influence each other, behavioral habits, and obesity. Looking not only at the reality of a neighborhood but also how people subjectively perceive that reality can be useful in proposing interventions to help address obesity among different groups. However, the heterogeneity in definitions and measures of elements of the built environment (such a variety of scales and GIS-based measures from census or other administrative data) can make it difficult to compare studies and assess the current state of the field in linking different elements to obesity and investigating if they account for differences in obesity between different groups.

As these associations are not generally examined in the method used in this analysis, it is difficult to compare the results directly with other studies. One next step could be to compare how much of the disparity in obesity is accounted for by perceived neighborhood factors versus more objective neighborhood characteristics, and to see if together they account for more of the disparity than separately. This could also be examined using a multilevel model, with careful consideration of which factors should be included at the individual level, neighborhood level, or both. It would also be interesting to investigate how neighborhood perceptions mediate the relationships between behavioral habits such as physical activity and diet and obesity among different socio-economic and racial/ethnic groups.

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Tables

Table 1: Selected demographic and individual level characteristics among 469 adults 35-60 years old from a cross-sectional survey in Atlanta, GA

	All (n=469)	White (n=224)	Black (n=245)	P Value
County, %				<.001
Cobb	0.21	0.27	0.16	
DeKalb	0.39	0.35	0.43	
Fulton	0.22	0.12	0.31	
Gwinnett	0.18	0.26	0.11	
Female, %	0.68	0.66	0.69	0.38
Current Smoker, %	0.16	0.13	0.20	0.04
Age, mean (SD)	50.5 (9.6)	51.6 (9.5)	49.5 (9.53)	0.02
Married or member of unmarried couple, %	0.53	0.35	0.42	<.001
Graduated college	0.54	0.71	0.39	<0.001
Unemployed, %	0.10	0.08	0.12	0.34
Income (ordinal), %				<0.001
Less than 10k	0.08	0.06	0.10	
10k to <15k	0.04	0.01	0.06	
15k to <20k	0.05	0.03	0.06	
20k to <25k	0.07	0.01	0.11	
25k to <35k	0.07	0.05	0.09	
35k to <50k	0.15	0.10	0.19	
50k to <75k	0.23	0.24	0.21	
75k or more	0.32	0.49	0.17	
Average	6 (2.22)	6.7 (1.97)	5.3 (2.24)	
BMI, mean (SD)	30 (7.5)	28.2 (6.5)	31.7 (8.03)	<0.001
Obese (BMI 30+), %	0.42	0.30	0.52	<0.001
Neighborhood Health Scales, mean (SD)				
Aesthetic quality[a]	2.08 (0.72)	2.01 (0.68)	2.14 (0.75)	0.01
Walking environment[a]	2.2 (0.67)	2.16 (0.65)	2.3 (0.68)	0.01
Availability of healthy foods[a]	2.46 (1.03)	2.29 (0.98)	2.62 (1.05)	0.0003
Safety[a]	3.01(0.54)	2.98 (0.5)	3.04 (0.58)	0.45
Violence[b]	0.27 (0.50)	0.25 (0.44)	0.29 (0.56)	0.44
Social cohesion[a]	2.32 (0.69)	2.17 (0.63)	2.47 (0.71)	<0.001
Activities with neighbors[b]	1.75(0.73)	1.93 (0.66)	1.57 (0.75)	<0.001

[a] maximum of 5, higher score indicates "worse" perception

[b] maximum of 3, higher score indicates "worse" perception

Table 2: Racial differences in obesity (comparing African American with White adults) using logistic regression among 376 adults 35-60 years old from a cross-sectional survey in Atlanta, GA

Characteristic	Model 1: Unadjusted	Model 2: Adjusted [a]	Model 3: Walking Environment[a]	Model 4: Availability of Healthy Foods[a]	Model 5: Activities with Neighbors[a]	Model 6: Social Cohesion[a]	Model 7: Neighborhood Safety[a]	Model 8: All Scales[a]
Race	2.63 (1.71-4.06)	2.88 (1.73-4.75)	2.88 (1.74-4.75)	2.81 (1.7-4.65)	2.74 (1.65-4.54)	2.77 (1.67-4.59)	2.88 (1.74-4.75)	2.71 (1.63-4.52)
Neighborhood Perception Scales								
Walking environment	----------	----------	1.27 (0.9-1.78)	----------	----------	----------	----------	1.08 (0.71-1.66)
Availability of healthy foods	----------	----------	----------	1.13 (0.91-1.40)	----------	----------	----------	1.04 (0.81-1.34)
Activities with neighbors	----------	----------	----------	----------	0.78 (0.56-1.07)	----------	----------	0.88 (0.61-1.25)
Social cohesion	----------	----------	----------	----------	----------	1.5 (1.05-2.13)	----------	2.77 (1.69-4.54)
Neighborhood safety	----------	----------	----------	----------	----------	----------	1.02 (0.76-1.36)	0.84 (0.60-1.17)

The table shows the odds ratios and the 95% confidence intervals (in parenthesis) for race (Blacks vs. Whites) and for each neighborhood factor. Separate models were constructed for each neighborhood factor except for model 8. In all models, the dependent variable was obesity (BMI≥30).

[a]Adjusted for sex, age, current smoking status, unemployment, education, household income

Table 3: Racial differences in BMI (comparing African American with White adults) using linear regression among 376 adults 35-60 years old from a cross-sectional survey in Atlanta, GA

Characteristic	Model 1: Unadjusted	Model 2: Adjusted	Model 3: Walking Environment[a]	Model 4: Availability of Healthy Foods[a]	Model 5: Activities with Neighbors[a]	Model 6: Social Cohesion[a]	Model 7: Neighborhood Safety[a]	Model 8: All Scales[a]
Race	3.28 (1.84-4.73)	3.05 (1.48-4.63)	3.03 (1.46-4.61)	2.98 (1.39-4.56)	2.84 (1.25-4.43)	2.92 (1.34-4.51)	3.01 (1.44-4.59)	2.81 (1.30-4.42)
Neighborhood Perception Scales								
Walking environment	----------	----------	0.74 (-0.35-1.84)	----------	----------	----------	----------	0.20 (-1.16-1.56)
Availability of healthy foods	----------	----------	----------	0.32 (-0.39-1.03)	----------	----------	----------	0.12 (-0.69-0.92)
Activities with neighbors	----------	----------	----------	----------	-0.87 (-1.9-0.16)	----------	----------	-0.59 (-1.75-0.57)
Social cohesion	----------	----------	----------	----------	----------	0.93 (-0.18-2.05)	----------	0.43 (-0.96-1.83)
Neighborhood safety	----------	----------	----------	----------	----------	----------	0.52 (-0.39-1.45)	0.17 (-0.87-1.31)

The table shows the β estimates and the 95% confidence intervals (in parenthesis) for race (Blacks vs. Whites) and for each neighborhood factor. Separate models were constructed for each neighborhood factor except for model 8. In all models, the dependent variable was BMI.

[a]Adjusted for sex, age, current smoking status, unemployment, education, household income