Association of Perceived Neighborhood Safety on Body Mass Index

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Objectives. We sought to determine whether there is an association between perceived neighborhood safety and body mass index (BMI), accounting for endogeneity.

Methods. A random sample of 2255 adults from the Los Angeles Family and Neighborhood Survey 2000–2001 was analyzed using instrumental variables. The main outcome was BMI using self-reported height and weight, and the main independent variable was residents' report of their neighborhood safety.

Results. In adjusted analyses, individuals who perceived their neighborhoods as unsafe had a BMI that was 2.81 kg/m^2 (95% confidence interval [CI] = 0.11, 5.52) higher than did those who perceived their neighborhoods as safe.

Conclusions. Our results suggest that clinical and public health interventions aimed at reducing rates of obesity may be enhanced by strategies to modify the physical and social environment that incorporate residents' perceptions of their communities. (*Am J Public Health.* 2010;100:2296–2303. doi:10.2105/AJPH.2009.183293)

Obesity is a major public health problem[1–5] that contributes to poor quality of life; increased incidence of diabetes, cardiovascular disease, and other chronic conditions; and higher mortality rates.[5] During the last decade, population-based strategies to reduce obesity have emphasized modification of physical and social environments, which may be particularly important in disadvantaged communities. Low neighborhood socioeconomic status (SES),[6] a higher proportion of Black and Latino residents,[7–10] barriers in the built environment (e.g., fewer places to walk),[11,12] lack of access to supermarkets or fresh fruits and vegetables,[6,13,14] and a higher density of fast food restaurants[15] are all characteristics of residential environments associated with obesity. Research also suggests that low levels of collective efficacy (a perception of mutual trust and willingness to help each other)[16] are associated with adolescent obesity. However, the mechanisms through which neighborhood social, economic, and physical characteristics lead to weight gain and obesity are not well characterized.

Perceived neighborhood safety is a mechanism through which neighborhood characteristics may influence obesity. Residence in a neighborhood perceived as unsafe may contribute to obesity in a number of ways, including increased secretion of stress hormones,[17–19] lower rates of walking or other outdoor physical activity,[20–28] and higher rates of stress-related eating.[29–32] Perceived safety may reflect the physical, social, and resource characteristics of neighborhoods. For example, residents may perceive a neighborhood to be unsafe if supermarkets and retailers that sell fresh fruits and vegetables are unwilling to locate in their neighborhoods, or if fast food restaurants and stores that sell low-cost, calorie-dense foods tend to locate in their neighborhoods.[33–35] Yet, the limited literature on relations between perceived safety and body weight is mixed. One study found that mothers with young children, residing in large cities, and perceiving their neighborhoods as unsafe were more likely to be obese,[36] and another study found no association between perceived safety and obesity.[37] Similarly, in the larger body of literature on neighborhood safety and physical activity, some studies found an association of perceived neighborhood safety with physical activity levels,[20–26] although other analyses showed no such relationship,[38–42] suggesting a more complex etiology.

We hypothesized that 1 reason for the inconsistent findings in these previous analyses—all of which were cross-sectional—is endogeneity bias, that is, the possibility that the findings from these studies may have been influenced by either reverse causality[36,43] or unmeasured neighborhood or individual characteristics influencing both perceived neighborhood safety and obesity. For example, reverse causality may occur if larger individuals, believing nobody would attack them because of their size, feel safer, or if larger individuals, being less agile and less physically fit and believing they cannot protect themselves, feel less safe. To address the possibility of endogeneity from reverse causality or unmeasured neighborhood or individual characteristics, we studied the association between perceived neighborhood safety and obesity in a population-based, geographically sampled cohort of residents in Los Angeles County, California. We used 2-stage least squares regression, a special case of an instrumental variables analysis that is a method developed to produce statistically consistent estimates when the covariate of interest is potentially endogenous. To our knowledge, no studies to date have used instrumental variables analysis to assess the relationship between neighborhood safety and obesity.

METHODS

These analyses used data from the first wave of the 2000–2001 Los Angeles Family and Neighborhood Survey (LA FANS) and the 2000 US Census Summary File.[44] The design of LA FANS has been reported elsewhere.[45,46] Briefly, LA FANS is a population-based study of Los Angeles County families in a stratified random sample of 65 census tracts with oversampling of poorer households. A representative sample of 65 tracts was identified—20 very deprived tracts (90th to 100th percentile rank for percentage of residents living in poverty), 20 deprived tracts (60th to 89th percentile rank), and 25 not deprived tracts (1st to 59th percentile rank). These analyses include data only from the randomly sampled adults (aged 18 years or older).

Variables

The dependent variable was body mass index (BMI; defined as weight in kilograms divided by height in meters squared, or kg/m^2), using self-reported height and weight. We evaluated BMI as a continuous variable. The main independent variable was perceived neighborhood safety, derived from the survey question "How safe is it to walk around alone in your neighborhood after dark?" There were 4 possible responses: extremely dangerous, somewhat dangerous, fairly safe, and completely safe. In separate models we included perceived safety as a continuous variable and as a dichotomous variable, collapsing the responses into 2 categories based on the variable distribution and a priori hypotheses: dangerous ("extremely dangerous" or "somewhat dangerous") or safe ("fairly safe" or "completely safe"). The main results did not differ appreciably, so only the results treating the variable as dichotomous are presented.

Additional covariates included in the analyses are based on the published literature[6,12] and those covariates identified as potentially strong confounders of BMI. Individual sociodemographic characteristics included age, gender, race/ethnicity, marital status, immigration status, educational level, annual household income, current employment status, and health insurance coverage in the last 30 days. Clinical covariates included the presence of a chronic condition (self-report of diabetes, hypertension, coronary artery disease, history of myocardial infarction, or arthritis), smoking status, and self-reported health. Annual household income was a composite covariate derived from the earnings of household members. We included annual household income in separate regression models as a continuous variable and as a categorized variable ($0, $1 to $20 000, $20 001 to $40 000, and $40 001 or more). The findings did not differ appreciably, so only the results based on income categories are presented.

At the neighborhood level, we included in the models a measure of neighborhood socioeconomic environment, the neighborhood SES index, which has been previously used to assess neighborhood influences on mortality and health status in analyses of both nationally representative[47] and LA FANS data.[48] Neighborhood SES is derived from the unweighted average of 5 standardized variables measured at the census tract level by using the 2000 US Census Summary File 3[44]: (1) percent of adults aged 25 years or older without a high-school degree, (2) median family income, (3) median home value, (4) percentage of adults with blue collar occupations, and (5) percent unemployed. The neighborhood SES index was then used to categorize the residential census tracts into tertiles corresponding to the original LA FANS sampling frame: very deprived, deprived, and not deprived.

Statistical Analyses

To compare our results to those from previous studies, we first used ordinary least squares (OLS) regression to estimate the association between BMI and perceived neighborhood safety, adjusting for the other covariates in the model. Standard single-equation regression methods such as OLS do not address bias resulting from potential endogeneity (i.e., unmeasured neighborhood or individual characteristics associated with both perceived neighborhood safety and BMI, or reverse causality such as individuals perceiving their neighborhood safety based on their BMI), which may account for the inconsistent conclusions of earlier literature. To assess the extent to which endogeneity may have biased our estimates, we re-estimated the model using an econometric technique known as instrumental variables. Instrumental variables methods were developed to address such endogeneity bias and have been successfully applied to medical effectiveness research.[49,50] More specifically, we used a special linear case of instrumental variables estimation known as 2-stage least squares regression. We used the Durbin-Wu-Hausman test (augmented regression) to test the null hypothesis that perceived neighborhood safety is exogenous in the obesity regression. Rejecting the null hypothesis implies that there is endogeneity and, therefore, instrumental variables estimation should be used rather than OLS.[49,51]

Instrumental variables methods rely on the existence of variables, known as instruments, which are highly correlated with the potentially endogenous regressor (perceived neighborhood safety) but are only indirectly correlated with the outcome (BMI). We considered 2 possible instruments. The first candidate instrument was household crime, reported by the randomly sampled adult based on the following question:

> While you have lived in this neighborhood, have you or anyone in your household had anything stolen or damaged inside or outside your home, including your cars or vehicles parked on the street?

The second candidate instrument was neighborhood collective efficacy, a construct that is a composite of endorsements of several statements about social cohesion and willingness to intervene.[52] The response set for each question was a 5-point Likert scale: very likely, likely, unsure, unlikely, or very unlikely. Responses were totaled for each individual and averaged across each census tract, creating a collective efficacy score for each neighborhood.

Both low collective efficacy and experience of household crime have been associated with developing a fear of crime, a sense of victimization, and a heightened perception of neighborhood social disorder.[53–56] Both instruments, collective efficacy and experience of household crime, are conceptually unlikely to be related directly to BMI except through perceived neighborhood safety, thereby meeting the 2 most important criteria for an instrument.[50,57,58] To assess whether the assumptions of the instrumental variable model were satisfied, standard validity tests were conducted including the nonzero average causal effect, overidentification, and Cragg-Donald weak identification tests[49,59,60] (Appendix 1, available as a supplement to the online version of this article at http://www.ajph.org). Both the OLS and instrumental variables models were weighted by using survey weights to account for the sampling design and the use of 1990 US Census boundaries.[45,46] Stata version 10 (StataCorp LP, College Station, TX) was used for all analyses.

Sensitivity Analyses

We conducted sensitivity analyses for both the OLS and instrumental variables models. To reduce the likelihood that individual answers to the collective efficacy questions could disproportionately influence the neighborhood collective efficacy score, we excluded all neighborhoods with fewer than 30 observations per census tract from the analysis.

In a second sensitivity analysis, we included the presence of depressive symptoms as a covariate to test whether depression, which may contribute to weight gain,[61] mediated the association between perceived low safety and obesity. Depressive symptoms during the previous 12 months were identified either (1) by using the short form of the Composite International Diagnostic Interview (CIDI),[62] or (2) by participant report of physician diagnosis of "major depression" or "emotional problem," or report of seeing a psychiatrist within the last 12 months. Because the depression screening tool (CIDI) was administered systematically only to adults in households with children (approximately 75% of the total households), we were unable to include the screener in the full model.

RESULTS

The LA FANS included 2618 adults (70% response rate). We excluded participants missing data for BMI (n=275), perceived safety (n=12), educational level (n=32), health insurance status (n=13), smoking status (n=2), household income (n=2), self-report of a chronic condition (n=1), or self-report of household crime (n=1). As in previous studies, we also excluded from these analyses participants with a BMI>47 (n=25) because of the high likelihood that these BMI reports represented data collection and entry errors. In sensitivity analyses including these participants, we did not find any significant change in our estimates. Our final analytic sample included 2255 adults.

Descriptive Statistics

Mean BMI for the sample was 26.6 kg/m^2 (Table 1). The neighborhood of residence was perceived as unsafe by 32% of the sample. The mean collective efficacy score was 3.5 (SD=0.32) on a scale of 1 to 5; 43% of the sample reported an experience of household crime.

The mean age of our sample was 39.6 years; 57% were female and 52% were married; 28% were White, 55% Latino, 9% Black, 8% Asian or Pacific Islander, and 1% Native American; and 54% self-identified as

TABLE 1—Descriptive Characteristics of Participants, Households, and 2000 US Census Tracts: Los Angeles Family and Neighborhoods Survey, 2000–2001

	Mean (SD) or %
BMI, kg/m^2	26.6 (5.12)
Participant sociodemographic characteristics	
Age, y	39.6 (14.4)
Female	57
Race/ethnicity	
White	28
Latino	55
Black	9
Asian or Pacific Islander	8
Native American	1
Married	52
Immigration status	
First-generation immigrant	54
Second-generation immigrant	8
Nonimmigrant	37
Annual household income	
$0	15.6
$1–$20 000	30.7
$20 001–$40 000	23.8
> $40 000	29.9
Education level	
Less than high-school degree	34.4
High-school degree or GED	20.7
Some college or vocational school or higher	44.9
Currently employed	66
Reported health insurance coverage during the past 30 d	67
Health characteristics	
Self-rated health	
Poor, fair	22
Good, very good, excellent	78
Current smoker	16
Presence of chronic disease[a]	28
Perception of safety and crime	
Residents perceiving neighborhood as unsafe	32
Residents reporting crime against household or individual while residing in current neighborhood	43
Neighborhood characteristics	
Collective efficacy, scale of 1–5	3.5 (0.32)
Socioeconomic status index (census tracts)[b]	
Very deprived tracts	49
Deprived tracts	26
Not deprived tracts	25

Note. BMI = body mass index; GED = General Educational Development diploma. N = 2255.
[a]Self-report of diabetes, hypertension, coronary artery disease, history of myocardial infarction, or arthritis.
[b]As defined by 2000 US Census Summary File 3: very deprived census tracts (90th-100th percentile rank for percentage of residents living in poverty); deprived tracts (60th-89th percentile rank); and not deprived tracts (1st to 59th percentile rank).[44]

first-generation immigrants. Thirty-four percent of the sample reported having less than a high-school degree, 66% of the sample reported being currently employed, and approximately 46% reported annual household income of less than $20 000; 67% reported having health insurance within the past 30 days, 22% of the sample identified their self-rated health as poor or fair, 16% were current smokers, and 28% reported at least 1 chronic condition.

The mean neighborhood SES index was −0.17 (SD=0.88): 49% of the participants were identified as residing in very deprived census tracts, 26% in deprived tracts, and 25% in nondeprived tracts.

Multivariate Results

We obtained different associations between perceived neighborhood safety and BMI in the OLS compared with the instrumental variables models (Table 2). In OLS models, perceived neighborhood safety was not significantly associated with BMI (B=−0.07; 95% CI=−1.07, 0.93). By contrast, in instrumental variables models that controlled for the potential endogeneity bias, perceived neighborhood safety was associated with BMI (B=2.81; 95% CI=0.11, 5.52). In both the OLS and instrumental variables models, Latino ethnicity and the presence of a chronic condition were associated with higher BMI, although women and immigrants had lower BMI than did men and the native-born. In the OLS model, but not in the instrumental variables model, residence in very deprived or deprived census tracts was associated with higher BMI.

Sensitivity Analyses

When we excluded 14 census tracts with fewer than 30 respondents each (345 observations), the BMI was 3.11 kg/m^2 (95% CI=0.21, 6.00) higher among those who perceived their neighborhood as unsafe. In a second sensitivity analysis, adjustment for depressive symptoms did not appreciably alter the main finding: BMI was 3.78 kg/m^2 (95% CI=1.23, 6.33) higher among residents who perceived their neighborhoods as unsafe.

DISCUSSION

We hypothesized that residents' perceptions of the safety of their neighborhoods would be associated with BMI. Analyses using instrumental variables models confirmed this hypothesis, through the finding that the BMI of residents who perceived their neighborhood as unsafe was 2.81 kg/m^2 higher than was the BMI of those who perceived their neighborhood as safe after adjusting for individual sociodemographic and clinical characteristics and neighborhood SES. These findings were robust to our sensitivity analyses. Previous literature, which has found mixed association between perceived neighborhood safety and obesity, may have been limited by endogeneity bias. After accounting for this potential bias in our analyses, we identified a significant negative association between perceived neighborhood safety and obesity. Future cross-sectional analyses to study the association between neighborhood characteristics and health should consider the possibility of endogeneity bias and address it through appropriate methods.

Among residents who perceived their neighborhoods as unsafe, BMI was 2.81 kg/m^2 higher than for those who perceived their neighborhoods as safe, corresponding to a 7.7 kilogram weight increase for a person 1.65 meters tall. The magnitude of this BMI increase is comparable to or higher than the changes in BMI observed in other studies of individual or neighborhood characteristics and BMI. Two notable studies, focused on neighborhood characteristics and individual eating patterns, found similar associations. After adjusting for other factors, including individual SES, mean BMI was 1.51 kg/m^2 higher (approximately 4.1 kilograms for a 1.65-meter individual), in a very low SES area compared with a very high SES area.[13] Compared with persons who consumed a healthy diet, those persons whose diets consisted mainly of white bread had an annual increase in BMI of 0.05 kg/m^2 and those persons whose diets comprised mainly meat and potatoes had a 0.25 kg/m^2 annual increase in BMI.[63]

In this analysis, we have focused on the "subjective" perception of safety rather than on other indicators of public safety that might be viewed as "objective," such as crime rates and neighborhood physical disorder. Although these physical hazards may contribute to perceived neighborhood safety, there is limited literature on the association of crime rates or other hazards and either BMI or obesity. Two recent studies found that higher levels of neighborhood disorder and neighborhood psychosocial hazards (composed of indicators of neighborhood social and physical disorganization, physical safety, and economic deprivation) were associated with higher BMI and higher rates of obesity in adults.[64,65] The paucity of published studies on the association between health outcomes such as BMI and crime rates and other physical and social hazards may be because of limitations of the available data, among them inconsistent reporting of crime and other neighborhood exposures across geographic units, different data sources, and overall quality of the data.

There are several reasons why the links between perceived neighborhood safety and obesity may be important to researchers, policymakers, and clinicians. Perceived neighborhood safety appears to incorporate the measurable physical and social hazards described above and may reflect other important factors that can influence obesity, among them a lack of resources in areas widely perceived as unsafe. Perceived neighborhood safety may influence residents' health behaviors and may have physiologic effects that influence levels of stress hormones contributing to deleterious outcomes, such as dysregulation of blood pressure and blood glucose. Asking residents about the safety of their neighborhoods is a relatively simple method for identifying at-risk environments and persons at particularly high risk for obesity in those settings.

There are some potential limitations to these analyses. One caveat regarding the use of instrumental variables is that the estimates usually generalize only to the marginal population.[66] In our analyses, however, the marginal population consists of individuals for whom experience of household crime or neighborhood collective efficacy would change their perception of neighborhood safety. If most individuals are likely to fall into this category, the estimates ought to apply quite broadly. Another potential limitation of any instrumental variables model is the assumption that the instruments do not directly affect the outcome[57–60]; otherwise, the

TABLE 2—Weighted Ordinary Least Square and Instrumental Variables (2-Stage Least Square) Models for Body Mass Index Among Adults (N = 2255): Los Angeles Family and Neighborhoods Survey, 2000–2001

	Ordinary Least Squares Model B[a] (95% CI)	*P*	Instrumental Variable Model B[a] (95% CI)	*P*
Resident perceives neighborhood as unsafe	–0.07 (–1.07, 0.93)	.89	2.81 (0.11, 5.52)	.042
Sociodemographic characteristics				
Age	0.001 (–0.03, 0.03)	.93	0.004 (–0.03, 0.03)	.78
Female gender	–1.17 (1.71, –0.62)	<.001	–1.22 (–1.74, –0.70)	<.001
Race/ethnicity				
White (Ref)	1.00	–	1.00	–
Latino	1.55 (0.33, 2.77)	.01	1.58 (0.31, 2.85)	.02
Black	0.36 (–0.61, 1.34)	.46	0.32 (–0.69, 1.33)	.53
Asian or Pacific Islander	–0.51 (–2.00, 0.98)	.5	–0.40 (–1.83, 1.03	.58
Native American	0.87 (–0.92, 2.67)	.34	0.62 (–1.40, 2.63)	.54
Married	0.41 (–0.28, 1.10)	.24	0.30 (–0.38, 0.97)	.38
Immigration status				
First-generation immigrant	–1.09 (–1.95, –0.23)	.01	–1.16 (–2.03, –0.28)	.01
Second-generation immigrant	–0.80 (–2.00, 0.40)	.19	–0.91 (–2.07, 0.24)	.12
Nonimmigrant (Ref)	1.00	–	1.00	–
Annual household income				
$0	–1.03 (–2.10, 0.04)	.06	–1.11 (–2.26, 0.04)	.06
$1–$20 000	0.14 (–0.71, 1.00)	.74	0.06 (–0.82, 0.94)	.89
$20 001–$40 000	0.56 (–0.35, 1.47)	.23	0.50 (–0.39, 1.39)	.27
> $40 000 (Ref)	1.00	–	1.00	–
Education level				
Less than high-school degree (Ref)	1.00	–	1.00	–
High-school degree or GED	0.14 (–0.61, 0.88)	.72	0.12 (–0.65, 0.90)	.75
Some college or vocational school or higher	0.13 (–0.85, 1.12)	.79	0.13 (–0.92, 1.19)	.8
Currently employed	0.11 (–0.81, 1.03)	.81	0.21 (–0.70, 1.12)	.65
Reported health insurance coverage in past 30 d	0.24 (–0.39, 0.86)	.45	0.30 (–0.34, 0.94)	.36
Health characteristics				
Self-rated health				
Poor, fair	0.43 (–0.47, 1.32)	.35	0.08 (–0.89, 1.05)	.87
Good, very good, excellent (Ref)	1.00	–	1.00	–
Current smoker	–0.63 (–1.57, 0.32)	.19	–0.75 (–1.75, 0.25)	.14
Presence of chronic disease	1.93 (1.18, 2.67)	<.001	2.00 (1.31, 2.68)	<.001
Neighborhood characteristics				
SES index (census tracts)[b]				
Very deprived tracts	1.35 (0.42, 2.27)	.005	0.65 (–0.36, 1.66)	.2
Deprived tracts	0.86 (0.13, 1.60)	.02	0.55 (–0.09, 1.20)	.09
Not deprived tracts (Ref)	1.00	–	1.00	–

Note. CI = confidence interval; GED = General Educational Development diploma.
[a]Instrumental variables: self-report of household crime and collective efficacy.
[b]As defined by 2000 US Census Summary File 3: very deprived census tracts (90th-100th percentile rank for percentage of residents living in poverty); deprived tracts (60th-89th percentile rank); and not deprived tracts (1st to 59th percentile rank).[44]

estimates may lead to over- or understating the association. Although this possibility cannot be completely excluded, all the statistical tests of validity supported the assumption that the instruments—experience of crime and neighborhood collective efficacy—were excludable, that is, not directly associated with BMI after controlling for perception of neighborhood safety. One potential concern might be that, conceptually, collective efficacy could be associated directly with BMI. To our knowledge, no study has evaluated collective efficacy and perceived neighborhood safety together in relation to BMI. We have found 1 earlier study

suggesting, without controlling for perceived safety, an association of collective efficacy and BMI in adolescents[16]; previous work with adults has not found a similar direct association of collective efficacy and BMI.[36] A strength of the instrumental variables model is that it allows perceived neighborhood safety to act as a mediator between collective efficacy and BMI.

The results of these cross-sectional analyses of data from 1 large metropolitan city, with a high proportion of first-generation Latino immigrants, may not generalize to many other areas in the United States. However, given recent demographic shifts in many large US cities, these findings may have important implications for other urban areas with emerging immigrant populations. Additionally, census-derived characterizations of neighborhoods may not accurately reflect the social and physical environment thought to be contributing to individual health and behaviors. However, previous LA FANS data suggests that respondents' reports of the size and boundaries of their neighborhoods are highly correlated with census-tract definitions of neighborhood size.[67] Additional qualitative and longitudinal studies are needed to better understand how neighborhood exposures may influence the health and behaviors of residents.

The study also uses self-reported weight and height. Recent literature on self-report suggests that height is overestimated and weight underestimated and that this reporting varies by race/ethnicity.[68] For these analyses, the underestimation of BMI would likely result in an underestimate of the association seen between perceived neighborhood safety and BMI, and any bias introduced is unlikely to differ by perceived neighborhood safety. The study does control for race/ethnicity and neighborhood SES, which may minimize these potential biases.

Last, we used a general definition of perceived safety and did not have details about specific features of neighborhoods that contributed to safety. The heterogeneous findings of previous studies may be because of endogeneity bias or the use of definitions of perceived neighborhood safety that did not capture true resident perceptions of neighborhood safety. Another possibility is that there were gender differences in perceived neighborhood safety. Single-equation analyses were conducted using an interaction term between perceived safety and gender. The single equation, without controlling for endogeneity, found no association between perceived safety and BMI for men and found only a marginal association for women, which suggests endogeneity bias may influence both sexes. There was insufficient power to perform the analyses using instrumental variables, either with an interaction term or using stratified samples.

Our findings suggest a need to consider alternate model specifications that can reduce confounding and endogeneity bias, and allow for more accurate detection of important neighborhood influences on obesity. In addition, efforts to change the behavior of individuals may be countered by neighborhood disorganization and perceived hazards, which promote weight gain or deter weight loss. Clinicians who provide counseling and treatment options to overweight or obese patients may need to consider the conditions in which their patients live and their patients' perceptions of their neighborhoods. These findings also suggest that clinical and public health interventions aimed at reducing the obesity epidemic may need to improve coping mechanisms, promote behavior modification that facilitates healthier dietary choices and reduces stress, and encourage patient engagement in community-level efforts to reduce physical and psychosocial hazards in their residential neighborhoods.

Critical components of policy efforts and intervention design to reduce the burden of obesity may need to include understanding the following: why residents perceive their neighborhoods as unsafe; how these perceptions may influence physiologic measures of stress, health-related behaviors such as diet and physical activity, and both short- and long-term health outcomes; and whether these effects are reversible in the setting of greater perceived neighborhood safety. The identification of nontraditional influences on obesity suggests that a broader range of solutions must be sought to reduce rates of obesity in many communities. These solutions need to promote less stressful, more secure neighborhood environments through the coordinated efforts of urban planners, law enforcement personnel, elected officials, and community advocates, in addition to individuals affected by obesity and their health care providers. ■

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Contributors

J.S. Fish originated the study, completed all analyses, and led the writing of the article. S. Ettner assisted with the design of the study, analyses, and with writing the article. A. Ang helped with the analyses and writing the article. A. Brown assisted with the design of the study, analyses, and with writing the article.

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Human Participant Protection

The institutional review board at the University of California, Los Angeles, approved these analyses.

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