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Latino Residential Isolation and the Risk of Obesity in Utah: The Role of Neighborhood Socioeconomic, Built-Environmental, and Subcultural Context

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Abstract

The prevalence rate of obesity in the United States has been persistently high in recent decades, and disparities in obesity risks are routinely observed. Both individual and contextual factors should be considered when addressing health disparities. This study examines how Latino-white spatial segregation is associated with the risk of obesity for Latinos and whites, whether neighborhood socioeconomic resources, the built environment, and subcultural orientation serve as the underlying mechanisms, and whether neighborhood context helps explain obesity disparities across ethnic and immigrant groups. The study was based on an extensive database containing self-reported BMI measures obtained from driver license records in Utah merged with census data and several GIS-based data. Multilevel analyses were performed to examine the research questions. For both men and women, Latino residential isolation is significantly and positively linked to the risk of obesity; after controlling for immigrant concentration, this effect gets amplified. Moreover, for men and women, the segregation effect is partly attributable to neighborhood SES and the built environment; and only for women is it partly attributable to obesity prevalence in the neighborhood. Place matters for individual risk of obesity for both men and women and there are multifarious pathways linking residence to obesity. Among the demographic, socioeconomic, physical, and cultural aspects of neighborhood context examined in this study, perhaps the most modifiable environment features that could prevent weight gain and its associated problems would be the built environmental factors such as greenness, park access, and mixed land use.

Keywords

Obesity; Residential segregation; Immigrant enclave; Built environment

Introduction

Obesity is a risk factor for a wide range of devastating health problems including but not limited to cancer, cardiovascular diseases, and diabetes [1, 2]. The prevalence rate of obesity in the United States has been persistently high in recent decades, and disparities in obesity risks are routinely observed. According to data from Behavioral Risk Factor Surveillance

System (BRFSS) surveys conducted during 2006–2008 [3], the average prevalence rate of obesity across groups was 25.6% during this 3 year period. Non-Hispanic blacks (35.7%) had 51% greater prevalence of obesity, and Hispanics (28.7%) had 21% greater prevalence, when compared with non-Hispanic whites (23.7%).

The ecological theory contends that both individual and contextual factors should be considered when identifying determinants of health [4]. Recent evidence suggests neighborhood features have strong contextual influence on obesity over and above individual factors [5]. As a global measure of neighborhood resources, neighborhood socioeconomic status (SES) has been most commonly examined to test residential contextual effects on health and behavior. Spatial separation between minorities and whites is another distinctive feature of the US residential pattern [6] and has been increasingly linked to health and mortality in recent years [7]. However, only a handful of segregation-health studies have addressed the obesity outcome per se, with black-white segregation most frequently examined and other groups' spatial separation from whites less studied. Evidence from two national studies identifies higher risks of excess weight associated with living in disproportionately black neighborhoods [8, 9], and one study conducted in Philadelphia reporting that black-white segregation increases obesity risks for women [10]. By contrast, we know little about how Latino residential segregation affects obesity. Only one study specifically examined this link, reporting that living in Latino-concentrated neighborhoods was positively associated with higher obesity risks, but this effect was rendered insignificant when neighborhood SES was simultaneously included in the model [11]. How residential segregation contributes to obesity and whether it helps explain the white-Latino disparity in obesity warrant more theoretical and empirical attention.

Background

Presumably, there are similarities and dissimilarities in terms of how health outcomes are affected by living in Latino-concentrated neighborhoods versus black-concentrated neighborhoods. Both types of minority neighborhoods likely share deprivation-related problems such as low SES, poor housing conditions, and less inviting built environment. They tend to differ, however, in local socio-cultural orientations. Latino neighborhoods likely contain many recent Latino immigrants, whereas immigration is a less-salient issue in black neighborhoods. Immigrant enclaves have many benefits, at least for newly arrived immigrants, providing social, emotional, and informational support as well as cultural familiarity [6, 11]. Latino immigrants are generally healthier than native whites, as confirmed by the Latino health paradox literature [12]. And immigrants, regardless of their nationalities and race, seem to be healthier than US-born whites in general and less likely to be obese in specific [12]. Therefore, neighborhoods concentrated with Latino immigrants rather than US-born blacks are likely to have lower prevalence of obesity which would contribute to a less tolerating and more alerting norm with respect to excess weight. There are thus conflicting views about how living in Latino neighborhoods can affect one's health and risk of obesity, with deprivation theories predicting a detrimental effect due to suboptimal neighborhood conditions and enclave theories foreseeing a protective effect due to the presence of a familiar cultural environment and generally lower prevalence rates of obesity among immigrants. Empirically, living in Latino enclaves has exhibited a mixed impact on the residents' weight-related behaviors; it corresponds to lower consumption of high-fat foods but also lower levels of physical activity among Latinos in four US cities [13]. Few studies have tested these conflicting hypotheses with respect to the effects on weight status of living in a Latino-concentrated neighborhood.

Neighborhood deprivation is typically manifested in poor socioeconomic and institutional resources [14], lack of health-promoting infrastructure [15], and a less inviting built

environment [16]. The deprivation and obesity argument is in line with the institutional model proposed by Jencks and Mayer [17] in explaining how one's neighborhood context might affect his or her well-being. If the deprivation mechanism gets an upper hand compared to the enclave one, then Latino residential isolation would correspond to higher risks of obesity considering that deprivation, at both the individual and neighborhood level, has been corroborated to be a serious risk factor of excess weight gain [7]. The hypothesis that neighborhood context explains racial/ethnic health disparities has been increasingly confirmed in recent years [11, 18, 19], although attempts to quantify the contribution of place to Latino-white disparities in obesity remain rare.

Latino residential isolation can also increase an individual resident's risk of obesity via a culture-related mechanism independent of the deprivation mechanism. The epidemic model suggests that the risk of obesity positively corresponds to the prevalence of obesity within the neighborhood because of the contagious effect of human behaviors [20]. As Latinos and blacks have higher prevalence rates of obesity than whites controlling for immigrant status [3], areas concentrated with these minority groups may exert contextual effect on individuals' gaining weight. Indeed, evidence has shown individuals residing in black-concentrated neighborhoods are at higher risk of obesity partly due to higher prevalence rates of obesity in the neighborhood [8]. Whether this pathway operates for the Latino-white segregation effect on obesity remains an empirical question.

In this study, we address these gaps in the literature by examining the associations between contextual Latino residential isolation and individual risks of obesity in Utah, using a unique and large scale population data set. Upon finding a contextual influence of Latino residential isolation on obesity, we further explore whether this link is strengthened or suppressed by immigrant concentration. Moreover, we test whether the residual effect of Latino residential isolation net of the impact of immigrant concentration is attributable to neighborhood SES, the built environment, and weight-related subcultural orientation. Lastly, we explore whether neighborhood context serves a mediating role in the observed obesity disparities.

We focus on Latino-white residential isolation to directly examine whether residence in more isolated Latino neighborhoods is associated with increased or decreased risk of obesity. We include three mutually exclusive groups in our analyses, US-born non-Latino whites, US-born Latinos, and foreign-born Latinos. Latinos are the largest minority group and constitute the majority of immigrants in Utah [21].

Methods

Data

The study was based on a unique source, the Utah Population Database (UPDB) [22]. The UPDB is one of the world's richest sources of linked population-based information for demographic, genetic, epidemiological, and public health studies. More detail on the breadth and quality of each key data source is available on the UPDB website <http://www.hci.utah.edu/groups/ppr/>.

We received UPDB data extracted from driver license records which included BMI and census tract information; all individual identifying information had been removed from these data. This information was then merged with census data and three GIS-based databases to generate a two-level data set with both individual and neighborhood variables included. The non-census neighborhood data sources include the tree canopy data in the 2001 National Land Cover Database, used to construct the greenness measure; the 2009 Public Park Data, used to construct the park access measure; and the 2000 BRFSS data, used to generate neighborhood prevalence of obesity.

The study sample consists of 376,192 men and 359,783 women living in 477 Census tracts in Utah between 1999 and 2008. Census tracts have been extensively used to identify neighborhoods in studies of neighborhood effects on health [23–25] because they are considered a good approximation for local neighborhoods. Our analytical data were limited to prime-age adults (aged 25–64). Because our analysis relied on secondary data, the study was exempted from IRB at the University of Utah.

Measures

Individual-level variables included a dichotomous indicator of being obese, age, gender, and ethnic/immigrant group (i.e., US-born non-Latino whites, US-born Latinos, and foreign-born Latinos). We focus on white vs. Latino contrasts and consequently have excluded a modest number of non-white, non-Latino individuals in Utah from our analyses. Obesity was defined in terms of self-reported body mass index ($\text{BMI} \geq 30 \text{ kg/m}^2$). We included an age-squared term in the models to account for the well-known curvilinear relationship between age and the risk of obesity [8].

Following previous work testing health impacts of residential segregation at the tract level [8, 10], Latino residential isolation was operationalized by percentage of Latino residents in a tract. Immigration concentration was captured by a scale based on two items, namely percent of residents who were immigrants arriving in the last 5 years and percent linguistically isolated households ($\alpha = 0.95$). Neighborhood SES was measured by a composite index based on four socioeconomic variables ($\alpha = 0.76$): percent of households with annual incomes of \$75,000 or greater, percent of residents in poverty, percent of residents who were college-educated, and percent of residents who were homeowners. Three factors were used to capture the built environment: greenness, access to parks, and percent of residents spending 1 h or more in commuting to work every day. Specifically, neighborhood greenness was represented as the percentage of area covered by tree canopy within each 30 m pixel, and access to parks was measured by weighted distance (in miles) from the neighborhood centroid to the nearest seven parks. Detailed information on the method used to construct the park access measure is available upon request. Percent long-commuting residents is used as a proxy for neighborhood design given that it is negatively associated with the proportion of residents who walk to work, which has been used as an effective proxy of mixed land use and walkability [22]. In addition, prevalence of obesity was also included to tap weight-related subcultural orientation in the neighborhood. All these neighborhood variables were standardized before being entered into the regression models.

Analysis

GIS techniques were employed to construct neighborhood greenness and access to parks. Principal component factor analyses were performed to construct the composite indices of neighborhood SES and immigrant concentration [26]. Multilevel logistic regression models were fit to examine our research questions. The same five nested models were fit separately for men and women given the well-established gender differences in neighborhood effects on health [10, 16, 23]. Model 1 is the baseline model including age, age-squared, and dummy variables that denote ethnic/immigrant group membership. Subsequently, Model 2 adds Latino residential isolation to the baseline model; Model 3 adds immigrant concentration; Model 4 adds Neighborhood SES and the three built environmental factors; and Model 5 adds prevalence of obesity. The multicollinearity issue was examined and no alarming problem was detected [27].

Results

Table 1 shows the sample statistics for individual and neighborhood variables. Men living in Utah are more likely to be obese (22.6%) compared to women (17.9%), while prevalence rates of obesity are lower than national averages for both genders. Table 2 presents analytical results of multilevel logistic regression models of risk of obesity for men. The baseline model shows that large disparities not only exist between whites and Latinos but also between native and immigrant Latinos. Among the US-born, Latinos are more likely than whites to be obese, but foreign-born Latinos are less likely to be obese than US-born whites. Controlling for individual variables, Latino residential isolation is significantly and positively linked to the risk of obesity (OR = 1.08; $P < 0.01$; Model 2). After controlling for immigrant concentration, this effect gets amplified (OR = 1.27; $P < 0.01$; Model 3). Both immigrant concentration (OR = 0.85; $P < 0.01$; Model 4) and neighborhood SES (OR = 0.90; $P < 0.01$; Model 4) correspond to lower risks of obesity. Among the built environmental factors, neighborhood greenness (OR = 0.89; $P < 0.01$; Model 4) is associated with lower obesity risks while percent long commuting residents (OR = 1.03; $P < 0.01$; Model 4) corresponds to higher obesity risks. Neither park access nor prevalence of obesity is associated with the risk of obesity for men (Model 5). A modest portion of the Latino-isolation coefficient (10.4%) is attributable to SES and the built environment. Group disparities in obesity cannot be explained by any of the neighborhood variables.

Table 3 presents the results for women. The same ethnic and immigrant disparity patterns are found for women as for men. Most neighborhood effects are similar to those for men in direction and statistical significance. In a few cases, the results for men and women differ. After adding prevalence of obesity to the model (Model 5), park access becomes significant and associated with a lower risk of obesity for women (OR = 0.96; $P < 0.01$; Model 5), whereas percent long-commuting residents is rendered statistically insignificant. Contrary to what was found for men, prevalence of obesity exhibits a significant influence on obesity for women (OR = 1.12; $P < 0.01$; Model 5). Compared to men, a greater portion of the Latino-isolation coefficient is attributable to SES and the built environment (20.5%) and prevalence of obesity (13.1%).

Discussion

To date there have been a limited number of studies on racial/ethnic residential segregation and health, and most prior work has focused on black-white segregation and mortality. Using a large-scale population sample in Utah, this study is among the first to examine and document how Latino-white spatial segregation is associated with the risk of obesity for Latinos and whites, whether neighborhood socioeconomic resources, the built environment, and subcultural orientation serve as the underlying mechanisms, and whether neighborhood context helps explain obesity disparities across ethnic and immigrant groups.

Consistent with a handful of studies that have investigated the link between black segregation and obesity [8–10], this study found Latino residential isolation was linked to increased risks of obesity for residents of Latino-concentrated neighborhoods. Previous work has rarely considered immigrant concentration when examining the segregation and health link. Since we are interested in Latino-white segregation we need to consider how the theoretically conflicting forces of residential segregation by ethnicity and immigrant enclave would bear out empirically. In this study, the theoretical *prior* that immigrant-concentrated neighborhoods can offer benefits despite the structural deprivation they often face received consistent empirical support. Net of individual and neighborhood variables, immigrant concentration was negatively correlated with the risk of obesity. However, the net detrimental effect of segregation suggests that the injurious deprivation forces are stronger

than the protective cultural forces in isolated Latino neighborhoods. We also found that foreign-born Latinos have significantly healthier BMI levels and lower risks of obesity whereas US-born Latinos are the most disadvantaged in terms of the risk of obesity compared to whites and foreign-born Latinos. These findings echo another national study documenting that once immigration's impact is teased out, the net level of Latino-white disparities greatly increases, suggesting the American obesity epidemic would be much more severe without the mass immigration that began in 1965 [28]. Clearly, immigration must be taken into account when addressing obesity disparities and more work needs to be done to investigate how to check the erosion of immigrants' initial body composition advantage.

Another interesting finding of this study is that neighborhood effects are generally stronger for women than for men. This is consistent with previous findings that women's health-related outcomes are more responsive to neighborhood context [10, 16, 23]. We also found gender differences in terms of the relationship between residential isolation, neighborhood features, and obesity. Socioeconomic and physical features helped explain about 10% of the isolation effect for men and about 20% for women. For men, the isolation effect was not attributable to higher prevalence of obesity in more isolated neighborhoods at all; however, for women, neighborhood prevalence played a notable role (13%). A similar pattern of the mediating role of obesity prevalence in the segregation-obesity link was reported in a national sample focusing on black-white residential segregation [8], but that study did not conduct a gender-stratified analysis. Sources of the observed gender differences in neighborhood effects are evasive. It can be speculated though that women are more affected by the neighborhood environment because they tend to spend more time at home as well as in local neighborhoods considering their lower levels of labor market participation and their typically heavier duties of child care compared to men. Moreover, as previously argued [10], the status of being obese may be becoming normative in segregated ethnic enclaves, and women, being more sensitive to weight-related norms given that they are more likely than men to compare themselves to others with respect to appearance, would be more affected by a neighborhood weight-related subculture that is more tolerant and less stigmatizing than the mainstream culture. These speculations cannot be directly tested in this study and warrant further investigation.

Despite the observed gender differences, one emerging pattern from this study is that place matters for individual risk of obesity for both men and women. This is in line with a small but rapidly growing literature [22, 29]. Higher neighborhood SES exhibited significant association with lower risks of obesity. Net of the SES and segregation effect, several aspects of the built environment simultaneously featured strong influences. In addition, obesity prevalence exerted additional impact on the risk of obesity. These associations showed up independently of one another, suggesting multifarious pathways linking residence to obesity. Among the demographic, socioeconomic, physical, and cultural aspects of neighborhood context examined in this study, perhaps the most modifiable environment features that could prevent weight gain and its associated problems would be the built environmental factors such as greenness, park access, and mixed land use.

That said, we also found neighborhood context did not help explain why Latino natives are disadvantaged whereas Latino immigrants are advantaged compared to US-born whites in terms of the risk of obesity. Previous research has found neighborhood context was an important mediator underlying health disparities between blacks and whites [19]. Whether place explains Latino-white disparities in obesity has not been well examined and is worth exploring further.

Several limitations of this study are noteworthy. First, this study relied on self-reported height and weight which can incur response bias. Second, few individual control variables are available in our data; therefore, some of the observed neighborhood effects may be overestimated. Third, the cross-sectional nature of this study disallows any causal inference on the association between neighborhood context and the risk of obesity. Selection bias cannot be ruled out from the analyses. Fourth, the sample is based on one state, Utah, which is characterized by an especially healthy population (perhaps due to health practices of Mormons) [30]. We must therefore be cautious in generalizing from these results to patterns in other places. Nevertheless, it can be argued that there is a need to understand how obesity and other health issues manifest themselves in particular communities, even if those communities have some unusual characteristics.

Future work equipped with richer individual and neighborhood variables should continue to inquire into how residential segregation is linked to weight status, and more attention should be paid to minorities such as Latinos and Asians that are traditionally under-researched in the health-segregation literature. Immigration should be routinely considered when addressing public health concerns with respect to these groups. Moreover, health disparities across Latino and Asian subgroups should be detailed; these nuanced analyses are rarely available. Most importantly, longitudinal studies are urgently needed to sort out the causation versus selection effect in the observed associations between neighborhood context and weight status.

New Contribution to the Literature

This study is among the first to provide gender-specific evidence regarding how Latino-white spatial segregation is associated with the risk of obesity for Latinos and whites, whether neighborhood socioeconomic resources, the built environment, and subcultural orientation serve as the underlying mechanisms, and whether neighborhood context helps explain obesity disparities across ethnic and immigrant groups. These are under-researched questions in the literature of health disparities in general and the segregation-obesity link in specific.

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References

1. National Heart L, Blood Institute. Clinical guideline on the identification, evaluation, and treatment of overweight and obesity in adults: the evidence report. 1998. [cited 2010 May, 8]; Available from: http://www.nhlbi.nih.gov/guidelines/obesity/ob_gdlns.htm
2. US Department of Health and Human Services. The Surgeon General’s call to action to prevent and decrease obesity. 2001. [cited 2010 May 18]; Available from: <http://www.surgeongeneral.gov/topics/obesity/calltoaction/CalltoAction.pdf>
3. Pan L, et al. Differences in prevalence of obesity among black, white, and Hispanic adults—United States, 2006–2008. *Morb Mortal Wkly Rep*. 2009; 58(27):740–4.
4. Bronfenbrenner, U. *The ecology of human development: experiments by nature and design*. Cambridge: Harvard University Press; 1979.

5. Grafova IB, et al. Neighborhoods and obesity in later life. *Am J Public Health*. 2008; 98(11):2065–71. [PubMed: 18799770]
6. Wen M, Lauderdale DS, Kandula NR. Ethnic neighborhoods in Multi-Ethnic America, 1990–2000: resurgent ethnicity in the ethnoburbs? *Soc Forces*. 2009; 88(1):425–60.
7. Acevedo-Garcia, D.; Lochner, KA. Residential segregation and Health. In: Kawachi, I.; Berkman, LF., editors. *Neighborhoods and Health*. New York: Oxford University Press; 2003. p. 265–287.
8. Boardman JD, et al. Race differentials in obesity: the impact of place. *J Health Soc Behav*. 2005; 46(3):229–43. [PubMed: 16259146]
9. Chang VW. Racial residential segregation and weight status among US adults. *Soc Sci Med*. 2006; 63(5):1289–303. [PubMed: 16707199]
10. Chang VW, Hillier AE, Mehta NK. Neighborhood racial isolation. Disorder and obesity. *Soc Forces*. 2009; 87(4):2063–92. [PubMed: 20179775]
11. Do DP, et al. Neighborhood context and ethnicity differences in body mass index: A multilevel analysis using the NHANES III survey (1988–1994). *Econ Human Biol*. 2007; 5(2):179–203. [PubMed: 17507298]
12. Lara M, et al. Acculturation and Latino health in the United States: a review of the literature and its sociopolitical context. *Annu Rev Public Health*. 2005; 26:367–97. [PubMed: 15760294]
13. Osypuk TL, et al. Are immigrant enclaves healthy places to live? The multi-ethnic study of atherosclerosis. *Soc Sci Med*. 2009; 69(1):110–20. [PubMed: 19427731]
14. Wen M, Browning CR, Cagney KA. Poverty, affluence and income inequality: neighborhood economic structure and its implications for self-rated health. *Soc Sci Med*. 2003; 57:843–60. [PubMed: 12850110]
15. Lee RE, Cubbin C. Neighborhood context and youth cardiovascular health behaviors. *Am J Public Health*. 2002; 92:428–36. [PubMed: 11867325]
16. Wen M, Zhang X. Contextual effects of built and social environments of urban neighborhoods on exercise: a multilevel study in Chicago. *Am J Health Promot*. 2009; 23(4):247–54. [PubMed: 19288846]
17. Jencks, C.; Mayer, SE. The social consequences of growing up in a poor neighborhood. In: Lynn, LE.; McGeary, MGH., editors. *Inner city poverty in the United States*. Washington, DC: National Academy; 1990.
18. Cagney KC, Browning CR, Wen M. Racial disparities in self-rated health at older ages and the dangers of obfuscating neighborhood effects research? *J Gerontol Soc Sci*. 2005; 60B(4):S193–4.
19. Do DP, et al. Does place explain racial health disparities? Quantifying the contribution of residential context to the Black/white health gap in the United States. *Soc Sci Med*. 2008; 67(8):1258–68. [PubMed: 18649984]
20. Crane J. The epidemic theory of ghettos and neighborhood effects on dropping out and teenage childbearing. *Am J Sociol*. 1991; 96:1226–59.
21. Stewart, J.; Jameson, K. Driving in a new immigrant destination: migrant rights and state-level policy. In: Maloney, TN.; Korinek, K., editors. *Migration in the 21st century: rights, outcomes, and policy*. New York: Routledge; 2010. p. 205–225.
22. Smith KR, et al. Walkability and body mass index—density, design, and new diversity measures. *Am J Prev Med*. 2008; 35(3):237–44. [PubMed: 18692736]
23. Robert SA, Reither EN. A multilevel analysis of race, community disadvantage, and body mass index among adults in the US. *Soc Sci Med*. 2004; 59(12):2421–34. [PubMed: 15474198]
24. Ross CE. Walking, exercising, and smoking: does neighborhood matter? *Soc Sci Med*. 2000; 51(2):265–74. [PubMed: 10832573]
25. Wen M, Kandula N, Lauderdale DS. Leisure-time walking in a multiethnic population: what difference does the neighborhood make? *J Gen Intern Med*. 2007; 22(12):1674–80. [PubMed: 17932724]
26. Harman, HH. *Modern factor analysis*. 3. Chicago: University of Chicago Press; 1976. p. 487
27. Weisberg, S. *Applied linear regression*. New York: Wiley; 1980.
28. Hao L, Kim JJH. Immigration and the American obesity epidemic. *Int Migrat Rev*. 2009; 43(2):237–62.

29. Booth KM, Pinkston MM. Obesity and the built environment. *J Am Diet Assoc.* 2005; 105:S110–17. [PubMed: 15867906]
30. Merrill RM. Life expectancy among LDS and non-LDS in Utah. *Demographic Res.* 2004; 10:61–82.

Table 1

Sample statistics

	Male	Female
<i>Individual-level variables</i>		
Age	40	40
US-born Whites	88.0%	90.3%
US-born Latinos	3.5%	4.0%
Foreign-born Latinos	8.5%	5.7%
Percentage of being obese	22.6%	17.9%
<i>Tract-level variables</i>		
Percentage of Latino residents (Latino residential isolation)	9.3%	8.9%
Immigrant concentration		
Percent recent 5-year immigrants	2.8%	2.6%
Percent linguistically isolated households	2.6%	2.4%
Neighborhood socioeconomic status (SES)		
Percent households with annual income \$75,000 or over	23.8%	24.1%
Percent residents in poverty	8.8%	8.5%
Percent college educated residents	34.2%	34.6%
Percent homeowners	74.2%	74.6%
Neighborhood built environment		
Neighborhood greenness ^a	17.6%	17.7%
Distance to local parks ^b (miles)	6.1	5.9
Percent long-commuting residents ^c	4.5%	4.6%
Prevalence of obesity	18.6%	18.5%
<i>Sample size</i>	376,192	359,783

^aNeighborhood greenness is represented as the percentage of area covered by tree canopy within each 30 m pixel

^bAccess to parks is measured by weighted distance (in miles) from the neighborhood centroid to the nearest seven parks

^cPercent long-commuting residents is captured by percentage of residents spending an hour or more commuting to work every day

Table 2

Odds ratio of multilevel logistic regression models of risk of obesity for males

	(1)	(2)	(3)	(4)	(5)
<i>Individual variables</i>					
Age	1.08** (1.07–1.08)	1.08** (1.07–1.08)	1.08** (1.07–1.08)	1.08** (1.07–1.08)	1.08** (1.07–1.08)
Age-squared	1.00** (1.00–1.00)	1.00** (1.00–1.00)	1.00** (1.00–1.00)	1.00** (1.00–1.00)	1.00** (1.00–1.00)
US-born Latinos	1.26** (1.21–1.31)	1.25** (1.21–1.30)	1.25** (1.20–1.30)	1.25** (1.20–1.30)	1.25** (1.20–1.30)
Foreign-born Latinos	0.75** (0.72–0.79)	0.75** (0.72–0.78)	0.75** (0.72–0.78)	0.75** (0.72–0.78)	0.75** (0.72–0.78)
<i>Neighborhood variables</i>					
Latino residential isolation		1.08** (1.06–1.11)	1.27** (1.21–1.33)	1.16** (1.12–1.20)	1.14** (1.09–1.20)
Immigrant concentration ^d			0.83** (0.79–0.87)	0.85** (0.82–0.89)	0.86** (0.83–0.89)
Neighborhood SES ^b				0.90** (0.88–0.93)	0.90** (0.87–0.93)
Neighborhood greenness ^c				0.89** (0.88–0.91)	0.89** (0.88–0.91)
Distance to parks ^d				0.99 (0.97–1.01)	0.99 (0.97–1.01)
Percent long-commuting residents ^e				1.03** (1.01–1.05)	1.03** (1.01–1.05)
Prevalence of obesity					1.01 (0.99–1.04)

Sample size: 376,192 individuals living in 477 neighborhoods (census tracts) 95% confidence intervals in parentheses;

* significant at 5%;

** significant at 1%

^a Immigrant concentration is measured by a scale of two items: percentage of recent 5-year immigrants and percentage of linguistically isolated households. Alpha coefficient of this scale is 0.95^b Neighborhood SES is a measured by a scale of four items: percentage of households with annual income \$75,000 or over, percentage of residents in poverty, percentage of college educated residents, and percentage of homeowners. Alpha coefficient of this scale is 0.76^c Neighborhood greenness is represented as the percentage of area covered by tree canopy within each 30 m pixel^d Access to parks is measured by weighted distance (in miles) from the neighborhood centroid to the nearest seven parks^e Percent long-commuting residents is captured by percentage of residents spending an hour or more commuting to work every day

Table 3

Odds ratio of multilevel logistic regression models of risk of obesity for females

	(1)	(2)	(3)	(4)	(5)
<i>Individual variables</i>					
Age	1.06** (1.05–1.07)	1.06** (1.05–1.07)	1.06** (1.05–1.07)	1.06** (1.06–1.07)	1.06** (1.05–1.07)
Age-squared	1.00** (1.00–1.00)	1.00** (1.00–1.00)	1.00** (1.00–1.00)	1.00** (1.00–1.00)	1.00** (1.00–1.00)
US-born Latinas	1.29** (1.24–1.34)	1.28** (1.23–1.33)	1.27** (1.22–1.33)	1.28** (1.23–1.33)	1.27** (1.22–1.33)
Foreign-born Latinas	0.90** (0.86–0.95)	0.89** (0.85–0.94)	0.89** (0.85–0.94)	0.89** (0.85–0.94)	0.90** (0.85–0.94)
<i>Neighborhood variables</i>					
Latino residential isolation		1.29** (1.25–1.34)	1.58** (1.48–1.69)	1.35** (1.29–1.42)	1.21** (1.14–1.28)
Immigrant concentration ^d			0.79** (0.74–0.84)	0.80** (0.76–0.84)	0.82** (0.78–0.86)
Neighborhood SES ^b				0.80** (0.77–0.82)	0.72** (0.69–0.75)
Neighborhood greenness ^c				0.88** (0.85–0.90)	0.89** (0.87–0.91)
Distance to parks ^d				1.00 (0.97–1.02)	0.96** (0.94–0.99)
Percent long-commuting residents ^e				1.03** (1.01–1.06)	1.01 (0.98–1.03)
Prevalence of obesity					1.12** (1.08–1.15)

Sample size: 359,783 individuals living in 477 neighborhoods (census tracts)

95% confidence intervals in parentheses;

* significant at 5%;

** significant at 1%

^a Immigrant concentration is measured by a scale of two items: percentage of recent 5-year immigrants and percentage of linguistically isolated households. Alpha coefficient of this scale is 0.95

^b Neighborhood SES is a measured by a scale of four items: percentage of households with annual income \$75,000 or over, percentage of residents in poverty, percentage of college educated residents, and percentage of homeowners. Alpha coefficient of this scale is 0.76

^c Neighborhood greenness is represented as the percentage of area covered by tree canopy within each 30 m pixel

^d Access to parks is measured by weighted distance (in miles) from the neighborhood centroid to the nearest seven parks

^e Percent long-commuting residents is captured by percentage of residents spending an hour or more commuting to work every day