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Neighborhood Green Land Cover and Neighborhood-Based Walking in U.S. Older Adults

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Abstract

Introduction: Greenspace exposure has been associated with physical activity, but few studies have investigated associations with physical activity in the residential neighborhood. This study investigates if greater amounts of neighborhood open space and forest are associated with neighborhood-based walking in older adults.

Methods: In 2020, cross-sectional analyses were conducted on those aged ≥65 years from the 2017 National Household Travel Survey. Minutes of neighborhood walking/day were derived from travel diaries. Green land cover measures from the 2011 National Land Cover Dataset were linked to respondent data by U.S. census tract. Adjusted linear regression models, using weights accounting for survey sampling, tested associations between percentage of green land cover in the neighborhood (open space, forest) and minutes of neighborhood walking/day. Adjusted models were stratified to examine if associations varied by individual- and neighborhood-level SES, sex, and race/ethnicity.

Results: Respondents (n=72,753) were aged 74 (SD=7) years on average. Greater percentage of open space was associated with more neighborhood walking in African Americans (estimate=0.069, 95% CI=0.005, 0.133). Greater percentage of forest was associated with more neighborhood walking in the overall sample (estimate=0.028, 95% CI=0.006, 0.050), women (estimate=: 0.025, 95% CI=0.005, 0.045), and Whites (estimate=0.034, 95% CI=0.004, 0.064).

Conclusions: Type of neighborhood green land cover (open space versus forest) may be differentially associated with neighborhood walking depending on race/ethnicity. This study suggests a possible association between greater neighborhood open space and greater walking among African Americans that must be confirmed in future studies.

INTRODUCTION

By 2030, >20% of the U.S. will consist of >65-year-olds[1] and by 2050, the U.S. population of >65-year-olds will be nearly 84 million.[1,2] Coupled with this population growth, >130 million U.S. adults (45.1%) will be diagnosed with cardiovascular or cerebrovascular disease

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(CVD) by 2035, including coronary heart disease, stroke, high blood pressure, heart failure, or arterial disease.[3] With the projected population rise and CVD burden among older adults, there is an increased need to determine community environments that promote healthy behaviors to prevent disease and support aging in place. Physical activity (PA) and cardiorespiratory fitness are essential to healthy aging and can contribute to the prevention of chronic diseases in older adults including CVD[3–6] and cognitive decline,[7] while also supporting psychological well-being.[8] Yet, studies have shown that adults aged ≥50 years have significantly lower PA levels than those aged <50 years.[9] U.S. recommendations call for ≥150 minutes/week of moderate/vigorous-intensity PA.[10] Older adults benefit from PA even if the time is significantly less than the recommended amount.[3] For instance, all-cause mortality in adults aged ≥60 years was significantly reduced with 15 minutes of daily moderate/vigorous PA.[11]

Built and natural environments may serve as population-level targets to influence PA among older adults. Growing evidence suggests that living in walkable neighborhoods reduces CVD risk factors and increases PA.[4,5,12,13] In addition, greenspaces including parks, open spaces, and greenery have been positively associated with older adults' total PA and total walking in multiple studies, although greenspace—PA associations seem to depend on the methods of measuring greenspace and PA (e.g., objective versus self-reported).[12,14–18] For instance, perceived measures of parks/open spaces were positively associated with total PA but not total walking.[12] Nonetheless, other studies found null or inverse associations between neighborhood greenspace and PA in older adults.[19–24]

Overall, evidence for associations between neighborhood greenspace and PA in older adults remains limited. Few studies have been based on nationally representative samples, few focused on neighborhood walking (versus total walking regardless of location), and few examined difference in associations depending on greenspace type (e.g., open space, forest). This study aims to address these gaps in the literature. A nationally representative sample of U.S. older adults is used to investigate: (1) if neighborhood open space and forest is associated with minutes of neighborhood-based walking/day and (2) whether associations vary depending on income, race/ethnicity, sex, or neighborhood socioeconomic disadvantage.

METHODS

Study Sample

Cross-sectional data were obtained from the 2017 National Household Travel Survey (NHTS),[25] a survey of personal and household travel patterns of Americans that collected household-, household member–, trip-, and vehicle-level data. Primary sampling units were based on household's metropolitan statistical area (MSA) size and rail availability: (1) MSA with heavy rail and >1 million people, (2) MSA without heavy rail but >1 million people, (3) MSA with <1 million people, and (4) not an MSA (rural/small town). Households were sampled randomly from these 4 categories and invited to participate via mail. Respondents completed surveys by phone or online and were randomly assigned a single travel diary day (Monday—Sunday) to record details including travel time, mode, and purpose. The overall

response rate was 30.4%, resulting in 264,234 respondents from 129,696 households. Florida Atlantic University's IRB deemed that this study did not involve human subjects.

Measures

Using travel diary data, minutes spent walking in the neighborhood during the assigned travel day were determined based on trips designated as home-based (home was origin or destination, including loop trips).

The U.S. Census tract IDs, obtained from the Federal Highway Administration, linked the publicly available NHTS data to 2011 tract-level National Land Cover Dataset (NLCD) data from the National Historic GIS website.[26] The NLCD is compiled by a consortium including the U.S. Geological Survey, the National Oceanic and Atmospheric Administration, and the U.S. Environmental Protection Agency.[27] The core NLCD data sets (2001, 2006, and 2011) were based on 30 meter Landsat-7 ETM+ satellite images. Decision tree analyses classified each image into 16 land cover types: open water, ice/snow, developed open space, low-intensity development, medium-intensity development, high-intensity development, deciduous forest, evergreen forest, mixed forest, shrub/scrub, grassland/herbaceous, pasture/hay, cultivated crops, woody wetlands, and emergent herbaceous wetlands. Multi-year normalized difference vegetation index values were used to correct for vegetation phenology and image quality. NLCD 2011 classifications have been found to be 82% accurate when compared to hand classified land cover using Google imagery.[28] Additional details on NLCD classification methods are found elsewhere.[27]

National Historic GIS processed the NLCD data using the ArcGIS, version 10.4.1 Zonal Statistics as Table Tool to determine the proportion of each census tract covered by each land cover type. This study used National Historic GIS measures of developed open space and forest. Developed open space included mostly vegetation/grasses (<20% impervious surfaces) typically seen in parks, planted vegetation for recreation or erosion control, golf courses, and large family lots. Variables for deciduous forest, evergreen forest, and mixed forest were combined to create a single forest variable, which included trees >5 meters tall that composed >20% of the vegetation cover.

Covariates included age (years), sex, education, respondent's annual household income (from NHTS), race/ethnicity, employment status, use of a medical device when walking, household vehicle count, household size, homeownership, neighborhood population density (people/square mile), Census region (regional differences in neighborhood walking in older adults previously observed[29]), travel day (weekday versus weekend), travel day season, and neighborhood area deprivation index (ADI). Census block group ADI data were downloaded from University of Wisconsin's Neighborhood Atlas.[30] The ADI ranks block groups by level of neighborhood socioeconomic disadvantage ranging from 1% (lowest) to 100% (highest disadvantage), and was derived from 2011–2015 American Community Survey estimates of income, education, housing, and employment. NHTS respondent ADI scores were determined using a simple average of ADI values for the block groups comprising the census tract.

Statistical Analysis

The analytic sample was restricted to adults aged ≥65 years (73,523 respondents from 52,408 households) with at least 1 available land cover measure (forest or open space; *n*=770 [1%] missing these variables). Analyses were conducted in 2020. Unadjusted and adjusted linear regression models (with the aforementioned covariates) tested associations between continuous open space and forest measures and minutes of neighborhood walking/day. Scatterplots and residual versus predicted plots confirmed linear associations between exposures and outcome. Using the SAS, version 9.4, Surveyreg procedure, NHTS person-level survey and replicate weights (constructed using Jackknife method) were used to produce unbiased estimates accounting for survey sampling methods. The "domain" statement provided estimates for the sample meeting the inclusion criteria (i.e., does not delete observations, allowing valid estimation using weights). Respondents with missing values were listwise deleted.

Adjusted models were stratified to assess if associations between open space/forest and walking varied by sex, race/ethnicity, income, or neighborhood ADI. The same adjusted models from the main analyses were repeated including interaction terms to test effect modification by these variables (e.g., open space × sex interaction term).

RESULTS

Respondents (*n*=72,753) were a mean age of 73.5 (SD=6.9) years (Figure 1). Forty-seven percent were male, 70% had at least some college education, and 68% had an annual household income of ≥$35,000 (Table 1). Four percent were Hispanic, 5% African American, 2% Asian, 2% other/mixed race, and 86% White. Almost all had at least 1 household vehicle (96%) and 73% lived in households with at least 1 other person. Approximately 13% had a medical condition requiring a medical device to walk (e.g., walker).

Thirty-four percent resided in low-density areas (<500 people/square mile) (Table 2). Twenty-five percent lived in the bottom ADI quartile (lowest deprivation: ADI<25th percentile) and 11% lived in the top quartile (highest deprivation: ADI>75th percentile). On average, participants lived in neighborhoods with 14% open space (SD=11%) and 11% forest (SD=15%). Appendix Table 1 presents differences in neighborhood percentage of open space and forest by respondents' income, sex, race/ethnicity, and neighborhood ADI. Respondents with higher incomes and living in neighborhoods of higher SES (less disadvantage) had greater neighborhood percentages open space and forest. Depending on the respondent's race/ethnicity, mean neighborhood percentage of open space ranged from 13.1% to 16.3% and mean neighborhood percentage of forest ranged from 7.2% to 13.4% (Appendix Table 1). Mean number of minutes of neighborhood walking/day was 4.3 (SD=15.2) minutes for all respondents combined, with some variation depending on the respondents' income, sex, race/ethnicity, and neighborhood ADI (Appendix Table 2).

Neighborhood percentage of open space was not associated with minutes of neighborhood walking/day in the unadjusted (Appendix Table 3) or adjusted analyses (Table 3). Stratifying the adjusted model showed a significant association for African Americans (estimate=0.069,

95% CI=0.005, 0.133) but not for Whites, Hispanics, Asians, or other races/ethnicities (Table 3). However, differences in associations by race/ethnicity were not significant based on interaction terms. The open space—neighborhood walking associations did not vary by individual income, sex, or neighborhood ADI.

Neighborhood percentage of forest was not associated with minutes of neighborhood walking/day in the unadjusted analysis (Appendix Table 3), but was in the adjusted analysis (estimate=0.028, 95% CI=0.006, 0.050) (Table 4). Stratified models demonstrated associations between percentage of forest and neighborhood walking among women (estimate=0.025, 95% CI=0.005, 0.045) and Whites (estimate=0.034, 95% CI=0.004, 0.064), but not other sex or racial/ethnic subgroups (Table 4). However, these differences were not significant based on interaction terms. No associations were observed when stratifying by individual income or neighborhood ADI. Post-hoc analyses showed that adjusted associations between open space and forest measures and neighborhood walking did not vary based on urbanicity (urban, suburban, rural).

DISCUSSION

A greater percentage of neighborhood open space was associated with more neighborhood walking among African Americans but not Whites in the stratified analysis (although the interaction term was not significant). No other associations were observed between neighborhood open space and walking in the overall sample or in the demographic subgroups. By contrast, a greater percentage of neighborhood forest was associated with greater neighborhood walking in the overall sample and among women and Whites.

An increase in neighborhood open space equivalent to the range observed in the NHTS sample (0% to 78%) was associated with 5.4 more minutes of neighborhood walking/day among African Americans. A greater amount of neighborhood open space may promote PA among African Americans, possibly due to the geographic and financial accessibility of neighborhood open spaces/parks for PA compared with gyms and recreational facilities.[31] Studies have indeed shown that open spaces and park improvements have been associated with PA in African Americans.[32,33] This is important in the context of the established health disparities between African Americans and Whites, including greater cardiovascular risk factors/disease among African Americans,[34] and the ever-pressing necessity for health equity. Although park use and improvements to promote health in socially disadvantaged populations is far from a new concept, this is the first known U.S. nationally representative study to suggest that PA levels among older African Americans may benefit from greater amounts of neighborhood open space including parks. Despite the suggestive results, more African Americans than Whites lived in urban areas (41% vs 26%) where there are typically more public park spaces, which could help explain the association for African Americans. In addition, although the stratified results for African Americans were significant, interaction terms comparing associations for African Americans to Whites were not statistically significant. This could be explained by the relatively small sample size of African Americans compared with Whites and the relatively small effect size. Future studies need to replicate and expand upon these findings to explain any observed differences in association by race/ethnicity.

By contrast, a greater percentage of neighborhood forest was positively associated with neighborhood walking for the entire sample and in Whites when stratified by race/ethnicity. An increase in neighborhood percentage of forest equivalent to the range observed in the NHTS sample (0% to 87%) was associated with 3 additional minutes of neighborhood walking/day among Whites. Similar associations were not observed for other racial/ethnic groups. However, greater neighborhood forests may be borderline associated with less neighborhood walking in Hispanics. When race and Hispanic ethnicity were entered as separate variables in the adjusted models (data not shown), greater neighborhood forest was associated with less neighborhood walking in Hispanics (estimate= −0.099, 95% CI= −0.188, −0.010). This could be explained by factors associated with perceived walkability. For instance, perceptions of neighborhood walkability were more often related to social cohesion and safety in predominantly Hispanic neighborhoods than in predominantly White neighborhoods in 1 study.[35] Ultimately, the race/ethnicity variables were combined to ease data interpretation, but the potentially inverse association may be worthwhile to explore in future studies to determine whether certain types of greenspaces discourage or are not preferred for neighborhood walking in older Hispanics.

An increase of 3–5 minutes of walking/day (35 minutes/week) by living in neighborhoods with more open space/forests may not be a clinically significant change in PA. However, this must be considered in the context of background levels of PA in which 35 minutes/week may be added as well as other benefits to walking outdoors. Getting outside the home and time in the neighborhood provides opportunities for social interactions with neighbors that can reduce social isolation, depression, and anxiety, which can be common in older adults.[36–39] In addition, greenspace exposure help restore attention and reduce mental fatigue, which may contribute to better quality of life and successful aging in place.[40]

Few known studies have examined associations between neighborhood greenspaces and neighborhood walking in older adults. Studies based in Portland, Oregon found that perceived presence of neighborhood parks was not associated with self-reported neighborhood walking,[20] but that objective measures of greater neighborhood green and open spaces were associated with more self-reported neighborhood walking.[14,15] A study in Boston, Massachusetts found that greater distance to the nearest public park was associated with lower odds of utilitarian walking but not with recreational walking.[19] Compared with the self-reported neighborhood walking measures used in those prior studies, this study is based on a quantification of minutes of neighborhood walking from travel diaries. Similarly, greenspace measures in the prior studies included parks, green, and open spaces, but each were measured differently (perceived versus objective measurement) and were based on different neighborhood boundaries (e.g., 0.5 miles surrounding home, U.S. Census block group, perceived neighborhood). Despite the methodological differences between the prior studies and the current study, they in combination with other related studies[16–18,21–24] suggest that greater access to neighborhood greenspaces may be associated with greater neighborhood-based PA. This study extends findings from prior studies by investigating associations with neighborhood open spaces and forests separately, examining differences in associations by individual demographics and neighborhood SES, and providing associations for U.S. older adults at the national level.

Study strengths include the large, nationally representative sample of older adults. Participant data were linked to objective neighborhood-level measures of green land cover to determine if green land cover types (open space or forest) are differentially associated with neighborhood-based walking in older adults. Travel diary data provided an improvement upon measures of self-reported total walking/day, allowing calculation of walking trip times and examination of walking trips specific to the residential neighborhood. In addition, important confounders were controlled for including the respondents' SES and neighborhood measures of population density and economic disadvantage.

Limitations

This study has limitations. U.S. Census tracts, which are based on administrative boundaries, may not best represent neighborhood areas where participants walk. Travel diary data, although useful and more detailed than questions of total walking/day, are still based on self-report. Objective measures of neighborhood walking from devices such as GPSs and accelerometers are needed to confirm associations between neighborhood open space and forest and neighborhood walking in older adults. The NHTS lacks these objective measures of overall level of PA as well as self-reported total minutes of PA. These data will be necessary in future studies to put greenspace—walking associations in context and to establish clinical relevance. In addition, the travel diaries only recorded details from a single travel day, which may not represent the participants' typical behavior. NHTS data on trip purpose did not allow accurate categorization of utilitarian and recreational walking (e.g., recreational trips to parks, museums, bars, and movies were combined). Thus, an assessment of greenspace associations depending on neighborhood walking purpose would be best addressed in future studies. Given the wide range in the percentages of neighborhood greenspace, additional work is needed to assess potential variation in associations in urban, suburban, and rural locales. The temporal mismatch between the 2011 NLCD greenspace data and the 2017 NHTS survey could have misclassified the greenspace measure and biased results toward the null. The NHTS lacks data that may be important confounders such as crime, safety, trust among neighbors, and social cohesion and data on potential effect modifiers such as depression and anxiety. Quality of the open spaces and forests were not discernable (e.g., types of parks, park amenities, walking paths), but these factors will be important to explore in future studies. As this study was cross-sectional, it provides correlations and cannot make conclusions about causality, as it is possible for individuals to self-select into "greener" neighborhoods because they prefer walking in those environments. Therefore, future work is needed to examine longitudinal associations and natural experiments in which long-term residents of a community experience changes to their neighborhood greenspaces to observe if there are resulting changes in neighborhood walking.

CONCLUSIONS

Positive associations were observed between greater amounts of neighborhood open space and forest and minutes of neighborhood walking/day. The results suggest that open spaces including parks may be associated with neighborhood walking among African Americans. By contrast, forests were positively associated with more neighborhood walking among

Whites. Findings from prior studies are extended to the national level in demonstrating differential associations between greenspace exposure and neighborhood-based walking depending on race/ethnicity. Nonetheless, longitudinal studies will be needed to confirm the observed associations. Neighborhood walking is important not only for achieving PA, but also for the potential social and mental health benefits. Plans, policies, and interventions that promote increased time spent in greenspaces and provision of more greenspaces tailored to the underlying neighborhood populations may provide population-level benefits to multiple aspects of health in older adults, help to reduce health disparities, and help achieve health equity.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Table 1.

Demographics of 2017 National Household Travel Survey Sample of ≥65 Year Olds

Characteristic[a]	n (%)
Sample, n	72,753
Age group, years	
65–69	26,573 (36.5)
70–74	19,301 (26.5)
75–79	12,531 (17.2)
≥80	14,348 (19.7)
Male	33,922 (46.6)
Education level	
Less than high school diploma	4,012 (5.5)
High school diploma/GED	17,833 (24.5)
Some college/Associate's degree	21,421 (29.4)
Bachelor's degree	13,851 (19.0)
Graduate/Professional degree	15,533 (21.4)
Annual household income, $	
0–34,999	22,352 (32.5)
35,000–74,999	23,794 (34.6)
75,000–125,000	14,773 (21.5)
>125,000	7,861 (11.4)
Race/Ethnicity	
Non-Hispanic White	62,307 (86.0)
African American	3,932 (5.4)
Hispanic	3,097 (4.3)
Asian	1,632 (2.3)
Other	1,504 (2.1)
Home ownership	
Own	63,880 (87.8)
Rent	8,333 (11.5)
Other	526 (0.7)
Employment status	
Retired	57,102 (78.5)
Working	8,889 (12.2)
Other	6,746 (9.3)
Household vehicles	
None	2,580 (3.6)
1	22,987 (31.6)
≥2	47,186 (64.9)
Household size	
1	19,291 (26.5)

Characteristic[a]	n (%)
2	46,384 (63.8)
3–4	6,119 (8.4)
≥5	959 (1.3)

[a]Missing data: income, n=3,973; education, n=103; race, n=305; Hispanic, n=114; home ownership, n=16; employment, n=16.

Table 2.

Travel and Neighborhood/Regional Characteristics of 2017 National Household Travel Survey Sample of ≥65 Year Olds

Characteristic[a]	n (%)
Travel day	
Weekday	43,678 (78.7)
Weekend	11,835 (21.3)
Season of assigned travel day	
Winter	19,920 (27.4)
Spring	15,106 (20.8)
Summer	18,494 (25.4)
Fall	19,233 (26.4)
Census region	
Northeast	11,743 (16.1)
Midwest	10,906 (15.0)
South	31,004 (42.6)
West	19,100 (26.3)
Neighborhood population density (people/mile^2)	
0–499	25,030 (34.4)
500–999	7,124 (9.8)
1,000–3,999	23,094 (31.8)
4,000–9,999	14,298 (19.7)
≥10,000	3,143 (4.3)
Neighborhood area deprivation index, mean (SD)	44.6% (23.5)
Neighborhood area deprivation index[b]	
1%–25%	17,819 (24.5)
26%–50%	24,330 (33.5)
51%–75%	22,438 (30.9)
76%–100%	8,130 (11.2)
Neighborhood percentage of open space,[c] mean (SD)	14.0 (11.3)
Neighborhood percentage of forest cover,[d] mean (SD)	11.0 (15.3)

[a] Missing data: population density, n=64; forest, n=14,675; area deprivation, n=36.

[b] 1%=ranked lowest disadvantage in U.S.; 100%=ranked highest disadvantage in U.S.

[c] Percentage of U.S. Census tract covered by open space (mostly vegetation in form of lawn grass, e.g., parks, large housing lots, golf courses, recreational/aesthetic plantings).

[d] Percentage of U.S. Census tract covered by deciduous, evergreen, or mixed forest.

Table 3.

Association Between Neighborhood Percentage of Open Space and Neighborhood Walking Minutes/Day

Model	Adjusted estimate (95% CI)[a,b]	*p*-value[c]
Full sample	−0.008 (−0.048, 0.033)	0.71
Individual income		
Low (<$35k/year)	0.025 (−0.052, 0.101)	0.52
High (≥$35k/year)	−0.024 (−0.065, 0.018)	0.26
Sex		
Male	−0.028 (−0.072, 0.016)	0.22
Female	0.009 (−0.052, 0.069)	0.77
Race/Ethnicity		
White	−0.030 (−0.072, 0.013)	0.17
African American	0.069 (0.005, 0.133)	**0.04**
Hispanic	0.082 (−0.116, 0.280)	0.41
Asian	−0.057 (−0.222, 0.108)	0.49
Other	−0.018 (−0.254, 0.217)	0.88
Neighborhood ADI		
>75%ile (high deprivation)	0.009 (−0.093, 0.110)	0.86
≤75%ile	−0.006 (−0.037, 0.026)	0.73

Note: Boldface indicates statistical significance ($p<0.05$).

[a]Controlling for age, sex, education, income, race/ethnicity, employment status, medical device for walking, household vehicle number, household size, homeownership, neighborhood population density, Census region, travel day, season, neighborhood SES/ADI.

[b]Reported regression estimates were weighted to account for survey sampling.

[c]Interaction term *p*-values: low income (vs high), $p=0.58$; female (vs male), $p=0.13$; African American (vs White), $p=0.12$; Hispanic (vs White), $p=0.34$; Asian (vs White), $p=0.05$; Other race/ethnicity (vs White), $p=0.12$; High neighborhood deprivation (vs lower), $p=0.58$.

ADI, area deprivation index.

Table 4.

Association Between Neighborhood Percentage of Forest and Neighborhood Walking Minutes/Day

Model	Adjusted estimate (95% CI)[a,b]	*p*-value[c]
Full sample	0.028 (0.006, 0.050)	**0.01**
Individual income		
Low (<$35k/year)	0.047 (−0.011, 0.106)	0.11
High (≥$35k/year)	0.013 (−0.022, 0.048)	0.47
Sex		
Male	0.031 (−0.001, 0.063)	0.06
Female	0.025 (0.005, 0.045)	**0.01**
Race		
White	0.034 (0.004, 0.064)	**0.03**
African American	0.014 (−0.079, 0.106)	0.77
Hispanic	−0.097 (−0.203, 0.008)	0.07
Asian	−0.230 (−0.488, 0.029)	0.08
Other	0.013 (−0.076, 0.102)	0.77
Neighborhood ADI		
>75%ile (high deprivation)	0.087 (−0.033, 0.206)	0.16
≤75%ile	0.019 (−0.004, 0.042)	0.10

Note: Boldface indicates statistical significance ($p < 0.05$).

[a]Controlling for age, sex, education, income, race/ethnicity, employment status, medical device for walking, household vehicle number, household size, homeownership, neighborhood population density, Census region, travel day, season, neighborhood SES/ADI.

[b]Reported regression estimates were weighted to account for survey sampling.

[c]Interaction term *p*-values: low income (vs high), $p=0.85$; female (vs male), $p=0.77$; African American (vs White), $p=0.38$; Hispanic (vs White), $p=0.16$; Asian (vs White), $p=0.08$; Other race/ethnicity (vs White), $p=0.86$; High neighborhood deprivation (vs lower), $p=0.32$.

ADI, area deprivation index.