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Assessing demographics, the social environment, and walkability in rural South Carolina

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Abstract

The benefits of physical activity to health and obesity prevention are well established. However, attributes of the built environment influence participation in physical activity. The purpose of this study is to assess differences in perceptions of neighborhood walkability across demographic characteristics and social environment factors among rural residents. In a telephone survey, adult respondents (N=448) across nine rural counties in a southeastern state answered questions about perceived neighborhood walkability, demographic characteristics, and their neighborhood social environment. Study recruitment for a convenience sample occurred through collaborations with local community organizations. Prevalence of destinations and barriers were estimated according to demographic and neighborhood social environment characteristics. Multiple logistic regression models assessed the association of demographic and neighborhood social environment characteristics with neighborhood walkability and calculated adjusted prevalence. Relaxing places to walk were the most often reported destinations (62.0%), followed by retail destinations (45.7%), and communal destinations (42.6%). Traffic was the most reported barrier to safe walking (40.4%), followed by animals (37.5%), and crime (30.5%). Perceptions of retail and communal destinations varied by age and race. Perceptions of traffic and crime as barriers varied by race, weight status, and income. Community belonging and social cohesion were associated with lower perceptions of barriers. Study findings present demographic characteristics and social environment attributes as key factors that shape perceived neighborhood walkability. Findings can help inform programmatic efforts and environmental change strategies to improve walking in rural areas.

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Keywords

neighborhood walkability; rural health; built environment; social cohesion; social determinants of health; engaged data; HOP: High Obesity Program 1809

Introduction

The benefits of physical activity to health and obesity prevention are well established. However, the conditions in which people live, learn, work, play, and age—known as the social determinants of health (SDoH)—influence participation in physical activity. The neighborhood and built environment conditions are a SDOH domain that directly impacts physical activity. Built environment attributes that provide opportunities for physical activity and active living encompass walking and cycling infrastructure (e.g., sidewalks, pedestrian crossings, bicycle lanes, street lighting), public transportation, public-friendly destinations (e.g., schools, shops, grocery stores, parks, places of worship), and the extent these destinations contain infrastructure suitable for pedestrians and cyclists. The distribution of these attributes looks different in rural communities characterized by limited public transportation infrastructure, low population density, long distance between destinations, limited recreational facilities, and residential proximity to state highways, compared to urban and suburban communities (Chrisman et al., 2015; Hansen et al., 2015). It is well documented that rural adults are less active than urban adults (Carlson et al., 2018; Kegler et al., 2015; Whitfield et al., 2019). Evidence suggests that attributes of the built environment are an important, modifiable SDoH that contribute to urban-rural differences in physical activity (Carlson et al., 2018; Hansen et al., 2015; Whitfield, Carlson, Ussery, Watson, Adams, et al., 2018).

Research emphasizes the need to understand perceptions of built environment attributes that promote walking— conceptualized as neighborhood walkability— in urban, suburban, and rural contexts (Chrisman et al., 2015; Kegler et al., 2015; Whitfield et al., 2019). Measurements of neighborhood walkability perceptions have enhanced understandings of the ways people experience their environment (Tuckel & Milczarski, 2015; Whitfield et al., 2018). For example, studies have linked higher levels of physical activity and lower obesity prevalence to favorable perceptions of built environment attributes that promote walking and neighborhood safety (Carlson et al., 2020; Kegler et al., 2014; Murillo, Reesor-Oyer, Hernandez, et al., 2020). Studies also found that demographic characteristics, such as age, race, ethnicity, and social environment factors, such as social support and social cohesion, contributed to different perceptions of neighborhood walkability (Chrisman et al., 2015; Kegler et al., 2015; Murillo, Reesor-Oyer, Liu, et al., 2020; Whitfield, Carlson, Ussery, Watson, Brown, et al., 2018). However, findings relevant to rural communities are limited to national samples or qualitative assessments. There remains a need for quantitative studies that identify factors that influence neighborhood walkability perceptions among rural communities. These studies could offer a more complete, proximal picture of place-based factors that impact walkability perceptions and improvements in physical activity and rural health.

Ecological models have been utilized as multilevel approaches to promote activity in rural communities (Beck et al., 2019; Brownson et al., 2005; Hansen et al., 2015). This paper is guided by an ecological model focused on active living in communities, positing that physical activity is influenced by individual characteristics, perceptions of the environment, access to and characteristics of settings (where physical activity occurs), social and policy environments (Sallis et al., 2006). A distinct contribution of this model is its inclusion of individuals' perceptions of the built environment. This factor is posited to interact with individual characteristics (e.g., demographics) and the social environment in bidirectional ways to shape recreational physical activity and active transportation. In turn, this conceptual model has informed programmatic work for a Centers for Disease Control and Prevention (CDC) High Obesity Program (HOP) [http://www.cdc.gov/nccdphp/dnpao/state-local-programs/hop--1809/high-obesity-program-1809.html] across rural counties in a southeastern state with obesity prevalence ≥35% during the COVID-19 pandemic (O'Toole et al., 2022). It guided efforts to change the characteristics of settings where physical activity occurs, namely aesthetic enhancements to parks, neighborhoods, and schools. Additionally, this framework supported built environment and policy changes like pedestrian crosswalks and updated community use policies at recreation sites. Understanding residents' perceptions of supports and barriers to neighborhood walkability have been critical to our policy and environment change work.

The purpose of this study was to assess differences in perceptions of neighborhood walkability across demographic characteristics and social environment factors among rural residents in one southeastern state. This study addresses limitations in extant literature by framing perceived neighborhood walkability as an important determinant of physical activity in rural areas that are underrepresented in health promotion research and practices. Results inform CDC HOP work in rural, southeastern counties and provide insight on demographic and environmental characteristics to consider before implementing physical activity programs in other rural settings. Shifting the focus from physical activity behavior to environment perceptions may better inform intervention development for public health practitioners addressing physical activity in rural areas.

Method

A cross-sectional survey was developed to support ongoing programmatic work across nine rural counties in South Carolina (SC). Rural counties were defined by lack of urbanized areas (≥50,000 people) and urban clusters (≥2,500 and <50,000 people).

Recruitment

The study sample was a convenience sample of rural residents in SC counties. Recruitment occurred through collaborations with local community organizations such as food pantries, senior centers, Cooperative Extension, faith organizations, and community centers. Adults were eligible to participate if they resided in one of the nine counties, spoke English or Spanish, and provided a telephone number and mailing address to receive an incentive and printed copy of informed consent. Organization contacts promoted the survey (via group texts, social media, and flyer distributions), allowed interested individuals to sign-up to

take the survey, and provided contact information for these persons to the research team. The recruitment strategy yielded 1,115 potential respondents and 580 (52% response rate) completed the survey. Those who did not complete the survey declined to participate when contacted or could not be reached at the telephone number provided.

Data Collection

Trained university students administered the telephone survey from August 2020 to March 2021. Students spoke in the respondents' preferred language (English or Spanish), verbally obtained consent, read survey items, and recorded responses into Qualtrics software™. Upon survey completion, respondents were mailed a $10 incentive card and printed version of the verbal informed consent they affirmed before beginning the survey. Clemson University Institutional Review Board (IRB # 2020–188) approved this study.

Measures

Dependent variables addressed residents' perceptions of the environment. Perceived neighborhood walkability was conceptualized as walkable destinations and barriers to safe walking and was assessed using six questions from the National Health Interview Survey (NHIS) (National Center for Health Statistics, 2015; Whitfield et al., 2019). For walkable destinations, respondents were asked, "Are there…" and responded yes or no (1=yes; no=0) to: (1) "shops, stores, or markets that you can walk to;" (2) "places like movies, libraries, or churches that you can walk to;" and (3) "places that you can walk to that help you relax, clear your mind, and reduce stress." For barriers to safe walking, individuals responded yes or no (1=yes; no=0) to three questions of whether traffic, crime, or dogs or animals make it unsafe for walking in their neighborhood.

Independent variables represented individual characteristics and social environment categories. Demographic characteristics include gender (male or female), age (18–44, 45–64, ≥ 65 years), race (White, Black, Asian, Native American), Hispanic ethnicity, weight status (healthy or underweight, overweight, obesity), and income level (< $35,000, $35,000–75,000, > $75,000, and did not respond). Weight status was obtained from self-reported height and weight and categorized as healthy/underweight for body mass index (BMI) < 25.0; overweight for BMI 25–29.9; and obesity for BMI ≥ 30. The social environment category included two measures: community belonging and neighborhood social cohesion. To assess community belonging, respondents were asked, "How would you describe your sense of belonging to your local community?" Response options followed a 4-point Likert scale ("very strong" to "very weak") and then dichotomized as "strong" or "weak". This measure captured local social relations, neighborhood satisfaction, and place attachment (Schellenberg et al., 2018). Neighborhood social cohesion was assessed using a 5-item measure (Sampson, 1997). Items included people here are willing to help their neighbors, this is a close-knit neighborhood, people in this neighborhood can be trusted, people in this neighborhood don't get along with each other (reverse coded), and people in this neighborhood do not share the same values (reverse coded). Participants responded on a 4-point Likert scale ("strongly disagree" to "strongly agree"). Items were summed so higher scores indicated higher perceived social cohesion. Individuals with social cohesion scores above the sample average were considered to have high social cohesion.

Regarding covariates, to control for the potential impact of SARS-CoV-2 (COVID-19) on walking, participants were asked, “how often were you walking for transportation and leisure before the COVID-19 pandemic, as compared to now?” Response options included more often before COVID-19, about the same, and less often before COVID-19. Walking behavior was assessed using information on the number of days walked for transportation and leisure in the past seven days and average duration of each walk. Those who reported walking time was ≥ 10 minutes, on average, during the week were considered walkers while others were not (Carlson et al., 2018; Whitfield et al., 2019). Because rural communities were sampled across different regions of the state and impacts of COVID-19 were not uniform across these regions, these potential geographic confounders were accounted for. Regions of the state included Upstate, Midlands, Pee Dee, and Lowcountry. Each region contained at least two counties.

Data analysis

For each neighborhood walkability measure, the prevalence of “yes” responses was estimated overall and stratified by demographic and social environment variables. Prevalence differences were assessed with chi-square tests. Adjusted prevalence was estimated by adjusting for other independent variables and covariates. Multiple logistic regression analyses were used to examine the association between independent variables and each neighborhood walkability measure, after adjusting for other independent variables and covariates. Adjusted prevalence ratios (APR) and 95% confidence intervals (CI) were reported, with significance indicated by CI that do not include 1.00. All analyses were performed in STATA 16.1 (Stata Corp, 2020). Participants with missing information on any measure of neighborhood walkability (n=30) or height/weight (n=70) were excluded. Due to small sample sizes and to avoid creating a heterogeneous “other” category, respondents who self-reported race as Native American or Alaska Native, Asian, or multiracial (n=23) and Hispanic ethnicity (n=9) were omitted from this analysis. Non-Hispanic White (hereafter White) and non-Hispanic Black (hereafter Black) racial categories remained. The final analytic sample comprised 448 respondents.

Results

Table 1 presents sample characteristics and prevalence for perceived walkable destinations. Overall, most respondents were female (86.2%), aged 45 years or older (67.6%), Black (53.6%), had obesity (48.7%), with income less than $35,000 (54.2%), and had a strong sense of community belonging (78.8%). Additionally, most respondents (66.5%) reported walking at least 10 minutes in the past week and the COVID-19 pandemic did not change their walking behavior (60.5%). Relaxing destinations (i.e., places to relax, clear one’s mind, or reduce stress) were most perceived as walkable (62.0%) among respondents, followed by retail destinations (i.e., shops, stores, or markets) (45.7%), and communal destinations (i.e., movies, libraries, or churches) (42.6%). Black respondents reported a higher prevalence of retail and communal destinations, but lower prevalence of relaxing destinations, compared to White respondents. Respondents with a strong sense of community belonging more frequently reported retail destinations they could walk to. Lastly, those who walked in the past week more often reported they could walk to relaxing destinations. Differences

in perceived walkable destinations were not observed across age, weight, and income categories.

Table 2 presents prevalence of perceived barriers to safe walking. Overall, traffic was the most reported barrier (40.4%), followed by animals (37.5%), and crime (30.5%). White respondents reported a higher prevalence of traffic as a barrier, while Black respondents reported a higher prevalence of crime and animals as barriers. The prevalence of traffic as a barrier was higher among healthy/underweight respondents than those who were overweight or had obesity. The prevalence of reporting crime as a barrier was higher among those with incomes less than $35,000 than those with incomes of at least $35,000. The prevalence of reporting traffic and crime as barriers to walking was lowest among respondents with a strong sense of community belonging and high neighborhood social cohesion. There were no significant differences in the prevalence of perceived barriers to walking by age group and reported walking in past week.

Table 3 presents adjusted prevalence and adjusted prevalence ratios (APR) for all destination types in the study. Overall, perceived destinations did not significantly differ by gender, weight status, household income, sense of community belonging, or neighborhood social cohesion. After adjusting for other variables in the model, the prevalence of perceived retail and communal destinations was lower for respondents aged 65 and older compared to those aged 18–44 (APR retail=0.75, 95% CI: 0.54, 0.94; APR communal=0.68, 95% CI: 0.47, 0.88). The prevalence of perceived retail and communal destinations was higher among Black respondents than White respondents (APR retail=1.43, 95% CI: 1.09, 1.76; APR communal=1.36, 95% CI: 1.02,1.70), after controlling for covariates. Significant differences were not observed for perceived relaxing destinations.

Table 4 presents adjusted prevalence and APR for barriers to safe walking in the study. Overall, perceived barriers to safe walking did not significantly differ by gender or age. Race and weight status differences in traffic as a barrier were observed. Black respondents perceived this barrier less frequently than White respondents (APR=0.77, 95% CI: 0.58, 0.96). Respondents who had obesity perceived traffic and animals as barriers less frequently than healthy/underweight respondents. Respondents with incomes ≥ $35,000 reported crime as a barrier less frequently than respondents earning < $35,000. Additionally, respondents with a strong sense of community belonging reported crime and animals as barriers to safe walking less frequently than their respective referent groups (APR crime=0.63, 95% CI: 0.44,0.81; APR animals=0.77, 95% CI: 0.56, 0.97). High neighborhood social cohesion was associated with less frequent reports of traffic as a barrier (APR=0.71, 95% CI: 0.52, 0.89).

Discussion

In this study, authors assessed differences in perceived neighborhood walkability across demographic characteristics and social environment factors among rural residents. Perceptions of walkable destinations (retail and communal) varied across age and race. Perceived barriers to safe walking (traffic, crime, and animals) varied across race, weight status, and income.

Additionally, community belonging and social cohesion were associated with differences in perceived barriers. The study's guiding framework and findings uniquely contribute to limited empirical evidence on perceptions of the built environment among understudied, rural populations. Findings suggest demographic characteristics and social environment attributes are key factors that shape perceived neighborhood walkability that can inform programmatic efforts and environmental change strategies to improve walking in rural areas.

Study findings are not easily compared to the few existing studies on perceived neighborhood walkability among rural populations because study samples reflect different geographic scales. For example, samples from two studies used national-level data (Whitfield et al., 2018; Whitfield et al., 2019) and another used data from one rural county (Hooker et al., 2005) to understand perceptions of neighborhood walkability among rural residents. Of particular interest are the findings that revealed differences in perceived walkability (e.g., destinations and barriers) by demographic characteristics and social environment factors (i.e., community belonging and social cohesion). These associations support the need for continued research on the ways that individual characteristics and social interactions shape perceptions of neighborhood walkability (Hooker et al., 2005; Kegler et al., 2015; White et al., 2021).

In this study of rural and mostly low-income individuals, Black respondents perceived walkable destinations more favorably than White respondents. This is the opposite of past research in urban, low-income neighborhoods that found neighborhood walkability was high in majority White neighborhoods but low in majority Black neighborhoods (Conderino et al., 2021). This suggests the relationship between race, income, and built environment attributes is complex and differs across urban and rural geographies. Still, the extent that living near destinations promotes walking among socially disadvantaged groups in rural settings is understudied and warrants further research. Authors also observed life stage differences in perceived walkability to communal destinations. Older adults likely perceived routes to this destination type as less walkable than young adults. More research could help determine if perceptions of rural destinations influence age differences in walking behavior. A recent study demonstrated that different built environment attributes were associated with walking for younger and older adults in rural areas (Lee et al., 2021). Age differences in perceptions and attributes that support walking inform multilevel approaches to promote physical activity and changes in neighborhood infrastructure.

Study respondents who were White or with healthy weight were more likely to perceive traffic as a barrier for walking than respondents who were Black or overweight or with obesity. In contrast, a study found race differences in crime, but not traffic, as a barrier perceived among rural residents (Whitfield et al., 2018). Extant evidence pertaining to rural settings suggests that perceptions of traffic as a barrier may depend on how close individuals live to a downtown district or state highways with fast-moving traffic and commercial trucks (Chrisman et al., 2015; Hansen et al., 2015; Kegler et al., 2015). A possible explanation for our findings is that respondents who were White and with healthy weight may live closer to frequently traveled highways than their counterparts. This study also found that low-income respondents were more likely to perceive crime as a barrier compared to higher income respondents. This demonstrates the importance of income on differences

in neighborhood environment perceptions, as a previous study suggests (Adamus-Leach et al., 2012). Recent research identifies a relationship between neighborhood-level income and neighborhood safety (Conderino et al., 2021). Still, more research is needed to clarify the multilevel influences of income on neighborhood perceptions and if they impact physical activity. Lastly, this study showed that positive social environment factors were negatively associated with perceived barriers, but unrelated to perceived destinations. This is consistent with literature indicating the social environment shapes perceptions of rural built environments (Chrisman et al., 2015; Hooker et al., 2005; Kegler et al., 2015; Mazumdar et al., 2018). Social environments in rural neighborhoods may facilitate active living through decreased safety concerns. Future studies could explore whether social environment attributes moderate the relationship between neighborhood walkability walking. This study is subject to limitations. First, generalizability may be limited due to the study's convenience sample that is majority female and contains more older adults than present within the state's population. Nonetheless, findings have informed discussions and assessments to improve walkability in these locales. Second, walkability perceptions were self-reported and subject to social desirability. However, some research suggests moderate alignment between objective and perceived measures of walkability (Tuckel & Milczarski, 2015). Third, one destination type (walkable distance from bus or transit stops) from the NHIS walkability measure was omitted because most study counties lacked public transportation systems. Fewer than 15% of respondents reported they lived near bus or transit stops they could walk to (data not shown). This study also includes strengths. It documents nuanced demographic differences in perceived walkability that contribute to knowledge on rural built environments and health. Finally, our assessment of the relationship between social environment and perceived neighborhood walkability among rural residents is novel.

Implications For Practice

This study sought to address limitations in previous research regarding neighborhood walkability by using an ecological approach to center rural residents' perceptions and examining differences across demographic characteristics and social environment factors. This study provides an opportunity for CDC HOP to use data and findings in ways that promote action to achieve public health goals (Lavinghouze et al., 2014). Specifically, data on walkable destinations and safety barriers can inform the selection of sites for physical activity programs or infrastructure improvements. Public health professionals addressing physical activity in rural areas keenly understand the value of health-promoting resources in the neighborhood and built environment. Such data can complement built environment audits that advise environment changes. Sharing this information with residents can facilitate buy-in and support the sustainability of programs and initiatives that promote walking (Lavinghouze et al., 2014).

Implications For Policy

Increasing the proportion of adults who walk or bike to get to places is a national public health priority (DHHS, 2015). Policy factors, such as zoning codes, traffic regulations, and investments in pedestrian and cycling infrastructure, influence bicycle and pedestrian travel to get to places (Sallis et al., 2006). However, policy decisions often transpire without community input. Information on community perspectives may demonstrate needs that

require policies to effectively promote walking and walkable communities. This data may support individuals, offices, and organizations working to pass local policies that promote equitable access to physical activity resources and settings within rural neighborhoods. For example, Smart Growth America successfully centered local perspectives and equity to implement Complete Streets policies that enhance routes and destinations for pedestrians and cyclists in thirty-five states.

Conclusion

Previous research documents built environment attributes are a reason for why rural adults are less active than urban adults and the need to understand rural neighborhood walkability. Our findings suggest that perceptions of walkable destinations differed by demographic characteristics. Social cohesion and community belonging were associated with lower levels of perceived safety barriers to walking. Understanding these differences could inform strategies to meet national goals that promote walking and obesity prevention in rural areas.

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Table 1.

Sample characteristics and reported prevalence of walkable destinations (N=448)

	Sample characteristics % (n)	Shops, stores, markets (%)	p	Movies, libraries, churches (%)	p	Places to relax (%)	p
Overall	----	45.7		42.6		62.0	
Gender							
Male	13.8(62)	50.0		45.1		66.1	
Female	86.2(386)	45.0		42.2		61.4	
Age (years)							
18–44	32.4(145)	50.3		48.9		65.5	
45–64	36.1(162)	45.6		43.2		58.0	
≥ 65	31.5(141)	41.1		35.4		63.1	
Race			0.002		0.015		0.020
White	46.4(208)	37.9		36.5		67.7	
Black	53.6(240)	52.5		47.9		57.0	
Weight status							
Healthy/Underweight	21.9(98)	51.0		41.8		65.3	
Overweight	29.4(132)	45.4		45.4		62.8	
Obesity	48.7(218)	43.5		41.2		60.0	
Income							
< $35,000	54.2(243)	50.2		42.8		61.3	
$35,000-$75,000	22.8(102)	41.1		45.1		61.7	
> $75,000	13.6(61)	37.7		39.3		73.7	
Refused	9.4(42)	42.8		40.4		50.0	
Community belonging			0.028				
Weak	21.2(95)	35.7		35.7		54.7	
Strong	78.8(353)	48.4		44.4		64.0	
Social cohesion							
Low	58.5(262)	45.8		39.6		61.04	
High	41.5(186)	45.7		46.7		62.9	
Walked in past week							0.013
Yes	66.5(298)	48.6		44.3		66.1	
No	33.5(150)	40.0		39.3		54.0	
Covid-19 and walking							
More often	20.5(92)	46.7		44.5		56.5	
Equal amount	60.5(271)	46.8		42.0		63.4	
Less often	19.0(85)	41.1		42.3		63.5	
State region							
Upstate	32.1(144)	46.5		40.2		66.6	
Midlands	25.5(114)	37.7		38.6		58.7	
Pee Dee	20.1(90)	55.5		53.3		54.4	
Lowcountry	22.3(100)	45.5		41.0		66.0	

Chi-square tests were used to assess proportional differences among characteristics. Significant differences at $p \leq 0.05$ are presented. For each walkable destination, the prevalence of “yes” responses was estimated overall and stratified by sample characteristics that are displayed.

Table 2.

Reported prevalence of barriers to safe walking among sample (N=448)

	Traffic (%)	p	Crime (%)	p	Animals (%)	p
Overall	40.4		30.5		37.5	
Gender						
Male	37.1		20.9		27.4	
Female	40.9		32.1		39.1	
Age (years)						
18–44	43.4		28.9		33.1	
45–64	38.8		29.6		43.8	
≥ 65	39.0		33.3		34.7	
Race		0.054		0.048		0.006
White	45.1		25.9		30.7	
Black	36.2		34.5		43.3	
Weight status		0.023				
Healthy/Underweight	52.1		25.5		41.8	
Overweight	39.3		31.0		36.3	
Obesity	35.7		32.5		36.2	
Income				0.001		
< $35,000	41.5		37.8		38.6	
$35,000-$75,000	45.1		23.5		35.2	
> $75,000	34.4		14.7		36.0	
Refused	30.9		28.5		38.1	
Community belonging		0.023		0.001		
Weak	50.5		44.2		42.1	
Strong	37.6		26.9		36.2	
Social cohesion		0.002		0.004		
Low	46.5		35.8		36.6	
High	31.7		23.1		38.7	
Walked in past week						
Yes	41.2		29.5		38.2	
No	38.6		32.6		36.0	
Covid-19 and walking						
More often	42.3		32.6		44.5	
Equal amount	39.8		31.3		34.6	
Less often	40.0		25.8		38.8	
Upstate	41.6		20.1		25.6	
Midlands	41.2		35.9		40.3	
Pee Dee	38.8		42.2		43.3	
Lowcountry	39.0		29.0		46.0	

For each barrier, the prevalence of “yes” responses was estimated overall and stratified by sample characteristics. Chi-square tests were used to assess proportional differences among characteristics. Significant differences at $p \leq 0.05$ are presented.

Table 3.

Adjusted prevalence and prevalence ratios for walkable destination types.

	Shops, stores, markets [a]		Movies, libraries, churches [b]		Places to help relax [c]	
	% (95% CI)	APR (95% CI)	% (95% CI)	APR (95% CI)	% (95% CI)	APR (95% CI)
Gender						
Male	50.5 (38.5–62.5)	Referent	46.8 (34.6–59.0)	Referent	64.2 (52.0–76.3)	Referent
Female	45.0 (40.2–49.7)	0.89 (0.65–1.12)	42.0 (37.1–46.7)	0.90 (0.63–1.15)	61.7 (56.9–66.4)	0.96 (0.76–1.15)
Age (years)						
18–44	53.1 (44.9–61.2)	Referent	50.8 (42.5–58.9)	Referent	63.3 (55.1–71.3)	Referent
45–64	44.5 (36.8–52.1)	0.84 (0.64–1.02)	42.7 (34.9–50.3)	0.84 (0.63–1.04)	58.5 (50.7–66.1)	0.92 (0.75–1.09)
≥65	**39.7 (31.5–47.9)**	**0.75 (0.54–0.94)**	34.4 (26.0–42.6)	**0.68 (0.47–0.88)**	64.9 (57.1–72.6)	1.03 (0.83–1.21)
Race						
White	37.1 (30.3–43.9)	Referent	35.7 (28.8–42.6)	Referent	66.5 (59.6–73.3)	Referent
Black	53.2 (46.7–59.7)	**1.43 (1.09–1.76)**	48.6 (42.0–55.2)	**1.36 (1.02–1.70)**	58.3 (51.7–64.8)	0.88 (0.73–1.01)
Weight status						
Healthy weight*	53.3 (43.9–62.7)	Referent	43.8 (33.8–53.7)	Referent	63.0 (53.4–72.5)	Referent
Overweight	44.7 (36.4–52.9)	0.84 (0.62–1.05)	44.7 (36.2–53.1)	1.02 (0.71–1.32)	61.6 (53.1–70.1)	0.98 (0.77–1.18)
Obesity	43.0 (36.6–49.5)	0.81 (0.62–1.00)	40.8 (34.3–47.2)	0.93 (0.67–1.19)	61.9 (55.6–68.0)	0.98 (0.80–1.16)
Household income						
< $35,000	50.7 (44.1–57.2)	Referent	43.1 (36.7–49.4)	Referent	63.6 (57.4–69.8)	Referent
$35,000-$75,000	40.1 (30.9–49.2)	0.79 (0.57–1.00)	44.0 (34.2–53.6)	1.02 (0.74–1.30)	59.3 (49.6–69.0)	0.93 (0.74–1.11)
>$75,000	36.4 (23.3–49.5)	0.71 (0.43–1.00)	39.4 (26.1–52.7)	0.91 (0.56–1.26)	69.6 (56.9–82.2)	1.09 (0.85–1.32)
Did not respond	44.7 (30.6–58.7)	0.88 (0.58–1.17)	41.5 (26.6–56.2)	0.96 (0.59–1.33)	48.7 (33.4–64.0)	0.77 (0.51–1.01)
Community belonging						
Weak	36.2 (25.9–46.4)	Referent	37.2 (27.1–47.2)	Referent	55.6 (45.3–65.8)	Referent
Strong	48.3 (43.3–53.4)	1.34 (0.92–1.75)	44.1 (38.9–49.2)	1.18 (0.82–1.53)	63.8 (58.7–68.8)	1.15 (0.91–1.38)
Social cohesion						
Low	45.3 (39.4–51.2)	Referent	39.4 (33.4–45.3)	Referent	62.9 (57.0–68.7)	Referent
High	46.3 (39.1–53.5)	1.02 (0.80–1.23)	47.2 (39.8–54.4)	1.20 (0.93–1.46)	60.8 (53.5–68.0)	0.97 (0.81–1.11)

APR: adjusted prevalence ratio; CI: Confident interval. All prevalence and ratio estimates adjust for all other listed variables plus walking behavior and covariates. Bold APRs are statistically significant.

Table 4.

Adjusted prevalence and prevalence ratios for barriers to walking.

	Traffic		Crime		Animals	
	% (95% CI)	**APR (95% CI)**	**% (95% CI)**	**APR (95% CI)**	**% (95% CI)**	**APR (95% CI)**
Gender						
Male	36.0 (23.9–48.0)	Referent	22.9 (12.6–33.1)	Referent	32.0 (19.5–44.3)	Referent
Female	41.1 (36.3–45.8)	1.14 (0.73–1.54)	31.7 (27.2–36.1)	1.39 (0.73–2.03)	38.3 (33.6–42.9)	1.20 (0.71–1.68)
Age (years)						
18–44	41.4 (33.5–49.2)	Referent	31.5 (23.7–39.1)	Referent	34.2 (26.4–42.1)	Referent
45–64	39.2 (31.7–46.5)	0.95 (0.69–1.20)	29.0 (22.1–35.7)	0.92 (0.60–1.23)	43.4 (35.8–50.9)	1.27 (0.90–1.62)
≥65	40.8 (32.1–49.3)	0.99 (0.69–1.27)	31.6 (24.1–39.1)	1.00 (0.65–1.36)	34.0 (26.0–42.0)	0.99 (0.65–1.33)
Race						
White	46.1 (39.0–53.2)	Referent	31.0 (24.1–37.8)	Referent	31.8 (24.9–38.6)	Referent
Black	35.6 (29.4–41.8)	**0.77 (0.58–0.96)**	30.3 (24.8–35.7)	0.98 (0.68–1.27)	42.2 (35.8–48.4)	1.32 (0.96–1.69)
Weight status						
Healthy weight*	52.1 (42.5–61.6)	Referent	28.6 (19.7–37.4)	Referent	46.2 (36.1–56.3)	Referent
Overweight	39.3 (30.8–47.6)	**0.75 (0.54–0.96)**	32.0 (24.3–39.6)	1.12 (0.68–1.55)	36.8 (28.7–44.7)	0.80 (0.55–1.04)
Obesity	35.8 (29.5–42.0)	**0.69 (0.51–0.86)**	30.6 (24.6–36.5)	1.07 (0.67–1.46)	34.1 (28.0–40.3)	**0.74 (0.52–0.95)**
Household income						
< $35,000	42.5 (35.9–49.1)	Referent	35.8 (29.5–41.9)	Referent	36.6 (30.4–42.7)	Referent
$35,000-$75,000	44.0 (34.4–53.6)	1.04 (0.74–1.32)	24.4 (16.1–32.6)	**0.68 (0.41–0.95)**	36.7 (27.4–45.9)	1.00 (0.69–1.31)
>$75,000	32.4 (19.9–45.0)	0.76 (0.43–1.09)	20.1 (8.1–32.0)	**0.56 (0.19–0.92)**	44.2 (31.0–57.4)	1.20 (0.77–1.64)
Did not respond	30.8 (18.2–43.5)	0.73 (0.40–1.04)	27.1 (14.2–39.9)	0.75 (0.37–1.13)	35.9 (21.4–50.2)	0.98 (0.55–1.40)
Community belonging						
Weak	46.9 (36.3–57.3)	Referent	43.3 (33.2–53.3)	Referent	45.9 (35.6–56.2)	Referent
Strong	38.6 (33.6–43.6)	0.82 (0.60–1.04)	27.1 (22.5–31.6)	**0.63 (0.44–0.81)**	35.3 (30.4–40.1)	**0.77 (0.56–0.97)**
Social cohesion						
Low	45.9 (39.8–51.9)	Referent	33.2 (27.7–38.7)	Referent	36.1 (30.3–41.9)	Referent
High	32.6 (25.5–39.6)	**0.71 (0.52–0.89)**	26.5 (19.8–33.1)	0.80 (0.55–1.04)	39.4 (32.3–46.4)	1.09 (0.81–1.36)

APR: adjusted prevalence ratio; CI: Confident interval. All prevalence and ratio estimates adjust for all other listed variables plus walking behavior and covariates. Bold APRs are statistically significant.