HHS Public Access

Author manuscript

Prev Med. Author manuscript; available in PMC 2024 February 23.

Published in final edited form as:

Prev Med. 2019 June ; 123: 101–108. doi:10.1016/j.ypmed.2019.03.019.

National-Level Environmental Perceptions and Walking among Urban and Rural Residents: Informing Surveillance of Walkability

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Abstract

Built environments that provide activity-friendly routes (e.g., sidewalks) to everyday destinations (e.g., shops) can increase physical activity. Surveillance of supports and destinations is important, and identifying which are associated with walking could prioritize surveillance questions. Our purpose was to identify the significant associations between supports and destinations with walking among a nationally-representative sample of urban- and rural-dwelling adults.

Participants in the 2015 National Health Interview Survey, Cancer Control Supplement (n=29,925) reported the near-home presence of walkable supports (roads, sidewalks, paths, or trails; sidewalks on most streets), destinations (shops; transit; movies, libraries, or churches; relaxing places), and past-week walking for leisure or transportation. We used stepwise logistic regression to quantify associations between supports and destinations and walking, including by urban/rural residence. We calculated the prevalence of walking across counts of reported elements by urban/rural residence.

Among all participants, roads, sidewalks, paths, or trails and relaxing destinations were associated with leisure walking. Among urban residents, sidewalks on most streets and all four destination types were associated with transportation walking; among rural residents, roads, sidewalks, paths, or trails; movies, libraries, or churches; and relaxing destinations were associated with transportation walking. Walking was more common when more environmental elements were reported.

To improve efficiency, communities may match surveillance priorities to behavioral priorities (i.e., leisure versus transportation walking) and environmental context (i.e., urban/rural areas).

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Disclaimer

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors, and the authors declare no conflicts of interest

Surveillance of environments supporting leisure walking might focus on recreation-oriented spaces. Surveillance of environments supporting transportation walking might differ for urban and rural areas, and assessing destinations may be particularly important.

Introduction

Physical activity is an important health behavior (Physical Activity Guidelines Advisory Committee, 2008), and the environments in which people live, learn, work, and play can support or hinder an active lifestyle (Ewing and Cervero, 2010; Hirsch et al., 2014; Knuiman et al., 2014; McCormack and Shiell, 2011). The Guide to Community Preventive Services (Community Guide) recently recommended strategies to increase physical activity that combine improved pedestrian or bicycle transportation infrastructure with land use and environmental design interventions (Community Preventive Services Task Force, 2018), thus providing activity-friendly routes to everyday destinations. Examples of pedestrian or bicycle transportation systems can include sidewalks or trails for walking or bicycling, while land use and environmental design elements can include mixed-use development and decreased distances between residences and community destinations (Community Preventive Services Task Force, 2018).

Walking is the most common physical activity in the U.S. and is one way adults can begin and maintain an active lifestyle (Watson et al., 2015). The environmental supports recommended by the Community Guide (transportation infrastructure and land use) are components of walkable communities as defined in *Step it up! The Surgeon General's Call to Action to Promote Walking and Walkable Communities* (U.S. Department of Health and Human Services., 2015). There is evidence, however, that type of walking and community context matter in associations between the environment and walking. For example, environmental correlates of walking are different for transportation and leisure walking (Kang et al., 2017). Additionally, environmental correlates of walking and physical activity may differ in urban and rural areas, though research in rural areas is limited and often restricted to isolated geographies (Community Preventive Services Task Force, 2018; Doescher et al., 2014; Hansen et al., 2015; Parks et al., 2003). These contextual differences may influence the way communities implement the Community Guide recommendations and measure progress.

Despite their importance for walkability, no national surveillance system regularly assesses transportation supports and walkable land uses, making monitoring of progress difficult. Additionally, transportation agencies might benefit from assessment of these environmental supports to better position non-motorized transportation projects (Meehan and Whitfield, 2017). Expanding surveillance of environmental supports for walking is challenging. Questionnaire length and respondent burden likely contribute to falling response rates for both health and transportation surveys (Czajka and Beyler, 2016; National Center for health Statistics, 2017a), limiting addition of new topics.

A brief set of questions assessing environmental supports could help address length concerns. Because some supports and destinations might commonly occur together, identifying which elements are significantly associated with walking after accounting for the

presence of other elements could increase efficiency. Ideally, combinations would be tested in a geographically and demographically diverse sample of respondents. Because context matters in walkability, different questions might be needed to assess environmental supports of transportation or leisure walking in urban or rural areas. Additionally, barriers to safe walking (e.g., traffic, crime, animals) might change the association between environmental supports and walking (Foster et al., 2016; U.S. National Research Council, 2005) and may also require assessment.

The 2015 Cancer Control Supplement (CCS) to the National Health Interview Survey (NHIS) assessed self-reported transportation and leisure walking, two supportive walking infrastructure elements, four types of near-home walkable destinations, and three barriers to safe walking in a nationally-representative sample of U.S. adults. This provides an opportunity to identify important environmental elements for future monitoring. Our purpose was to inform future surveillance of environmental supports and destinations for walking by answering three questions. First, which perceived environmental supports and destinations remain significantly associated with transportation and leisure walking among urban and rural residents, after accounting for the presence of other supports and destinations? Second, is walking more common when more supports and destinations are reported? Third, does the presence of barriers to safe walking modify observed associations between supports and destinations and walking?

Methods

We obtained data from the 2015 NHIS CCS. Methods for the NHIS are published by the National Center for Health Statistics (NCHS) (National Center for health Statistics, 2017a). Briefly, NHIS uses multi-staged probability sampling to generate a representative sample of the non-institutionalized U.S. population. The CCS included one randomly selected adult from each NHIS household. All participants agreed to an informed consent, and the Research Ethics Review Board of NCHS approved all NHIS study activities. The sample adult response rate was 55.2%. All data were publicly available except urban/rural residence, which was accessed in the Research Data Center(National Center for health Statistics, 2017b).

The 2015 CCS included 33,672 adult participants aged 18 years or older. Among these, 2,735 were missing at least one response to a support, destination, or safety barrier. An additional 27 were missing information on leisure or transportation walking, and 126 additional respondents were missing information on education level. When compared by sex, age group, or race/ethnicity, respondents with non-missing data were not substantially different from the full CCS sample (<1% difference in all strata). Among those with complete data, we excluded 859 who reported being unable to walk, resulting in an analytic sample of 29,925 (88.9%).

Perceptions of near-home transportation infrastructure supports (supports) for walking were assessed by asking participants, “Where you live, are there roads, sidewalks, paths, or trails where you can walk?” and “Where you live, do most streets have sidewalks?” Perceptions of near-home destinations were also assessed: “Where you live…

- …are there shops, stores, or markets that you can walk to? (shopping)”
- …are there bus or transit stops that you can walk to?” (transit)
- …are there places like movies, libraries, or churches that you can walk to?”
- …are there places that you can walk to that help you relax, clear your mind, and reduce stress?” (relaxing places)

Perceptions of near-home barriers to safe walking were similarly assessed: “Where you live…

- …does traffic make it unsafe for you to walk?”
- …does crime make it unsafe for you to walk?”
- …do dogs or other animals make it unsafe for you to walk?”

Response options to all of these items included “yes” or “no”, and those who did not know or refused were treated as missing.

Past-week transportation walking was assessed by asking, “During the past 7 days, did you walk to get some place that took you at least 10 minutes?” Leisure walking was similarly assessed, “Sometimes you may walk for fun, relaxation, exercise, or to walk the dog. During the past 7 days, did you walk for at least 10 minutes for any of these reasons? Please do not include walking for transportation.” Respondents who answered “yes” were classified as walkers; transportation and leisure walking were analyzed separately.

Urban/rural residence was based on the 2010 Census urban/rural designation.(Ratcliffe et al., 2016; U.S. Census Bureau, 2011) Briefly, urban areas were identified as Census tracts or blocks with at least 1,000 people/mile^2 and adjacent tracts with at least 500 people/mile^2. Additionally, some nonresidential urban land uses (e.g., airports) and non-continuous urban developments are designated as urban. Areas not designated as urban were classified as rural. Information on demographic characteristics was collected in the in-home interview.

We stratified descriptive statistics for all study variables by urban and rural residence. Differences between urban and rural areas were assessed with chi square tests, adjusted for the survey design(Rao and Scott, 1981).

We used logistic regression to assess associations between supports and destinations and walking for leisure or transportation. Three types of models were created for each domain, beginning with unadjusted bivariate associations between walking and each support and destination. Next, we combined all six supports and destinations to assess associations while adjusting for the presence of other elements. Third, we built stepwise models to determine the most parsimonious combination of supports and destinations significantly associated with walking. Initial models were created for supports and destinations separately and began with the support or destination with the beta coefficient of largest absolute value in bivariate analyses. The support or destination with the next largest beta coefficient was added and retained if significantly associated with walking. For destinations, we repeated this until all four had been tested. The retained supports were combined with the retained destinations, and again the significantly associated variables were retained. Finally,

previously excluded variables were tested individually for significance in the combined (supports and destinations) model. This series of models was completed for the whole sample, and separately for urban and rural residents. In post-hoc analyses, adjustment for age, sex, race/ethnicity, and education did not alter the interpretation of our findings.

We created a variable that indicated the number of reported supports and destinations from the stepwise model for each participant (ranges: 0–2 for leisure walking, 0–5 for urban transportation walking, and 0–3 for rural transportation walking). The prevalence of walking was calculated for each level of these count variables, with a final stratification by the reported presence or absence of each barrier to safe walking. Pairwise testing of differences in the prevalence of walking were conducted with adjusted Wald tests with a Bonferroni correction for multiple comparisons.

All analyses were performed with Stata version 13 and utilized survey commands to account for the design of NHIS. Results were deemed statistically significant at $p<0.05$.

Results

When compared to residents of urban areas, residents of rural areas were more likely to be female, older, non-Hispanic white, and to have lower education levels (Table 1). The combination of roads, sidewalks, paths or trails was the most commonly reported support, relaxing places were the most commonly reported destinations, and traffic was the most commonly reported barrier to safe walking, regardless of urban or rural residence. However, both supports and all four destinations were less commonly reported by rural residents compared to urban residents, as was perceived crime as a barrier to safe walking. Only perceptions of traffic and animals as barriers were more common among rural residents. Both leisure and transportation walking were less common among rural residents compared to urban residents.

In bivariate analyses, all supports and destinations were significantly and directly associated with leisure walking in the combined sample and among urban and rural residents (Table 2). Roads, sidewalks, paths, or trails and relaxing destinations exhibited the strongest associations with leisure walking among both urban and rural residents. Bivariate associations with transportation walking were similar in the combined sample and among urban residents: all supports and destinations were associated with transportation walking, with the four destination types all having odds ratios greater than 2.00. Among rural residents, walkable transit stops were not associated with transportation walking, and odds ratios for other destination types were less pronounced than among urban residents.

After combining all supports and destinations in a full model (model 1), results for leisure walking were similar for the combined sample and for residents of urban and rural areas: only roads, sidewalks, paths, or trails and relaxing places remained significantly associated with leisure walking. For transportation walking, sidewalks on most streets and all destination types remained significantly associated with transportation walking in the combined sample and among urban residents. When repeated for rural residents, only roads,

sidewalks, paths, or trails; movies, libraries, or churches; and relaxing places remained significantly associated with transportation walking.

The supports and destinations that remained associated with walking in the reduced models (model 2) were similar to those significant in the full models (model 1). For leisure walking, roads, sidewalks, paths, or trails and relaxing places were the only variables to retain significance, and this was consistent in the combined sample, and among urban and rural residents. For transportation walking, sidewalks on most streets and all destination types remained significantly associated in the whole sample and among urban residents. Among rural residents, only roads, sidewalks, paths, or trails; movies, libraries, or churches; and relaxing places remained significant.

For the counts of supports and destinations associated with leisure walking, 71.1% of urban residents reported both roads, sidewalks, paths, or trails and relaxing destinations, compared to 46.0% of rural residents (Figure 1). For both groups, the prevalence of leisure walking was progressively higher for those reporting one or both of the supports and destinations in the reduced model ($p<0.05$ for all pairwise comparisons).

For transportation walking, over one-third of urban-dwelling respondents (35.4%) reported all five included supports and destinations, while only one-eighth of rural residents (12.5%) reported all three included supports and destinations (Figure 1). Among residents of both urban and rural areas, transportation walking tended to be more common with more reported supports and destinations, though there were some similarities between adjacent count levels in both groups ($p>0.05$ for urban: one versus two; rural: one versus two and two versus three).

Leisure walking was significantly lower among urban residents who perceived crime as a barrier to safe walking versus those who did not when one or both supports and destinations were also reported (Figure 2). Comparable estimates among rural residents were not possible because the low prevalence of perceived crime in rural areas yielded small sample sizes. Perceptions of traffic and animals did not impact the prevalence of leisure walking. Stratification by perceived barriers had little impact on the prevalence of transportation walking across counts of supports and destinations among residents of urban or rural areas (Figure 3). The only significant difference was for traffic among urban residents who reported four supports or destinations.

Discussion

These national-level analyses suggest communities may consider different priorities when monitoring infrastructure supports and destinations in different contexts (i.e., when prioritizing leisure versus transportation walking or in urban versus rural areas). Surveillance of environments that support leisure walking might be similar and brief in rural and urban areas, and focus on spaces for recreation or relaxation. Assessing perceptions of crime might also be important for environments that support leisure walking in urban areas. Surveillance of environments supportive of transportation walking might need different

questions for urban and rural areas, and assessment of walkable destinations may be particularly important.

Infrastructure supports

Roads, sidewalks, paths, and trails were associated with leisure walking among both urban and rural residents. This single item includes several components and contexts and was commonly reported. The consistent association with leisure walking could be partially attributable to inclusion of paths and trails, two features commonly found in parks or other recreation areas. Proximity and access to parks are consistently associated with leisure-time walking and other physical activities in previous research and reviews (Sugiyama et al., 2014; Sugiyama et al., 2012). These results suggest surveillance of recreation-oriented spaces is important for assessing supports of leisure time walking in both urban and rural settings. Additional work might also investigate the relative importance of each component for future surveillance efforts.

In addition to leisure walking, roads, sidewalks, paths, and trails were also associated with transportation walking among rural residents. A previous study in nine small U.S. towns also found higher transportation walking among respondents who reported a trail, path, or track near their home (Doescher et al., 2014). The importance of these types of infrastructure elements is echoed in The Small Town and Rural Multimodal Networks guide from the Federal Highway Administration (United States Federal Highway Administration, 2016), which includes illustrations and examples from rural communities. Infrastructure commonly associated with leisure walking may also be important for transportation walking in rural areas, and these results support the need for continued surveillance.

Reporting sidewalks on most streets was associated with transportation walking, but only among urban residents. This extends previous, similar findings from smaller studies that reached similar conclusions (Carlson et al., 2016; Sugiyama et al., 2012). The lack of an association with either type of walking among rural residents may be due to the low prevalence of sidewalks (12.3%) among rural residents, or sidewalks may be less important for supporting walking in rural compared to urban areas. Surveillance of sidewalks in urban areas is important, and may be improved using technological advances in roadway imaging and analysis (Griew et al., 2013; Smith et al., 2013).

Destinations

These analyses found significant associations between all four destination types and transportation walking among urban residents. This adds a nationally-representative estimate to previous literature that has consistently noted the importance of destinations in supporting transportation walking. In a 2012 review, Sugiyama and colleagues found significant associations between presence or proximity of utilitarian destinations (e.g., shops, services, and transit stops) and transportation walking in 24 of 30 (80%) relevant studies. (Sugiyama et al., 2012) The consistent associations between destinations and transportation walking in this and other studies (Kerr et al., 2016; Paul et al., 2016) suggest destinations are important components for surveillance of walkable land uses as recommended in the Community Guide (Community Preventive Services Task Force, 2018).

Among rural residents, only two of four destination types were associated with transportation walking. Long distances between locations may limit the importance of destinations in supporting transportation walking in rural places. A study comparing New York City to Forsyth County, North Carolina, found GIS-measured distance to destinations was associated with transportation walking only in New York City, not the more rural Forsyth County. (Hirsch et al., 2013) Previous national-level studies of destinations and walking for transportation among rural populations are sparse (Doescher et al., 2014; Frost et al., 2010; Parks et al., 2003), and these results suggest specific types of destinations may be important for surveillance of environments supportive of transportation walking in rural areas.

Relaxing destinations were associated with both types of walking among urban and rural residents. This may indicate the importance of recreation-oriented destinations in supporting both leisure and transportation walking and other activities. People may opt to walk to the relaxing place for additional activity if it is nearby. The potential for generating combined transportation and recreational trips reinforces the importance of these types of destinations in supporting all types of walking, and makes them a promising target of future surveillance efforts.

Counts

Respondents who reported more supports and destinations tended to report more walking than those who reported fewer. This simple additive scale is an example of what communities could do with surveillance data that assesses environmental supports for walking. A simple scale could rapidly identify areas or populations that may benefit from additional pedestrian infrastructure or diversified land uses. Further, the progressively higher prevalence of transportation walking among urban residents who reported three, four, or five supports and destinations reinforces the importance of diverse land uses that provide many different destination types for people to walk to, as recommended in the Community Guide (Community Preventive Services Task Force, 2018). Permissive zoning may be important to this end (Chriqui et al., 2018; Chriqui et al., 2016) and monitoring destination types might allow communities to identify areas that lack walkable destinations.

Barriers

Leisure walking among some urban residents was lower when crime was perceived as a barrier to safe walking. The same was not true for transportation walking. This difference may reflect the voluntary nature of leisure walking. Transportation walking may be necessary, even when crime is perceived to be a problem, while leisure walking could be deferred or relocated. This suggests assessments of perceived crime could complement assessments of supports and destinations, particularly in urban communities where supporting leisure walking is a goal. Conversely, perceptions of crime as a barrier to walking among rural residents were rare, suggesting crime may not be a priority for monitoring in rural communities.

Few other differences in walking were observed by presence or absence of barriers. This may be partially attributable to the wording of the barrier questions. Respondents were asked

if each barrier “makes it unsafe for you to walk.” Respondents who choose not to walk for other reasons (e.g., personal preference, weather) may answer “no” because the barrier is not a factor in their decision to walk. Qualitative research, including cognitive interviews, could indicate if alternative prompts might clarify the intended response, such as “If you were to walk in your neighborhood, would traffic make you feel unsafe?”

Limitations and strengths

This report is subject to several limitations. First, the NHIS is a cross-sectional survey, which prevents inferences of causality. Second, categorizing urban and rural as a dichotomous variable may introduce misclassification of areas with attributes of both urban and rural spaces, such as suburban areas. This bias could lead to smaller observed differences between urban and rural areas under the present Census classification. Third, direct observations of supports and destinations were not available for simultaneous comparison with perceptions, however perceptions of the environment are important correlates of activity (Kerr et al., 2016; Paul et al., 2016; Sugiyama et al., 2014). Fourth, a dichotomous walking indicator treats all walkers equally, regardless of frequency or duration of walking. Finally, using a complete case analysis could bias results if respondents with missing data were considerably different from those with complete data.

This study also has several strengths. First, the 2015 NHIS was the first nationally-representative public health survey to simultaneously assess perceived supports, destinations, and barriers for walking, together with walking behaviors. This provides a national perspective to a field that has primarily been informed by local studies. Second, leisure and transportation walking were assessed separately, allowing identification of correlates for each in a single, large sample. Third, we stratified by urban and rural residence using restricted data. Much of the previous research on the rural built environment and walking has been based on limited geographic diversity.

Conclusions

Focusing on perceived environmental characteristics that are significantly associated with walking could address concerns about limited resources and reduction of respondent burden. Urban and rural communities interested in monitoring environments that support leisure walking may wish to focus on supports and destinations that are associated with recreation, including trails, paths, parks, and places to relax; urban communities may consider assessing perceptions of crime as well. For environments that support transportation walking, urban communities may focus on sidewalks and a wide variety of destination types, while rural communities may focus on a variety of walkable transportation infrastructure elements (e.g., roads, sidewalks, paths, or trails) and a selected few destination types (e.g., movies, libraries, churches, or places to relax). A simple additive scale suggested walking of either type was more common when more supports and destinations were reported, and could be one example of what communities might do with this type of surveillance data. Continued surveillance of supports and destinations, and in certain contexts, barriers to safe walking, is needed to monitor progress as communities work to implement the strategies outlined in the Community Guide recommendations.

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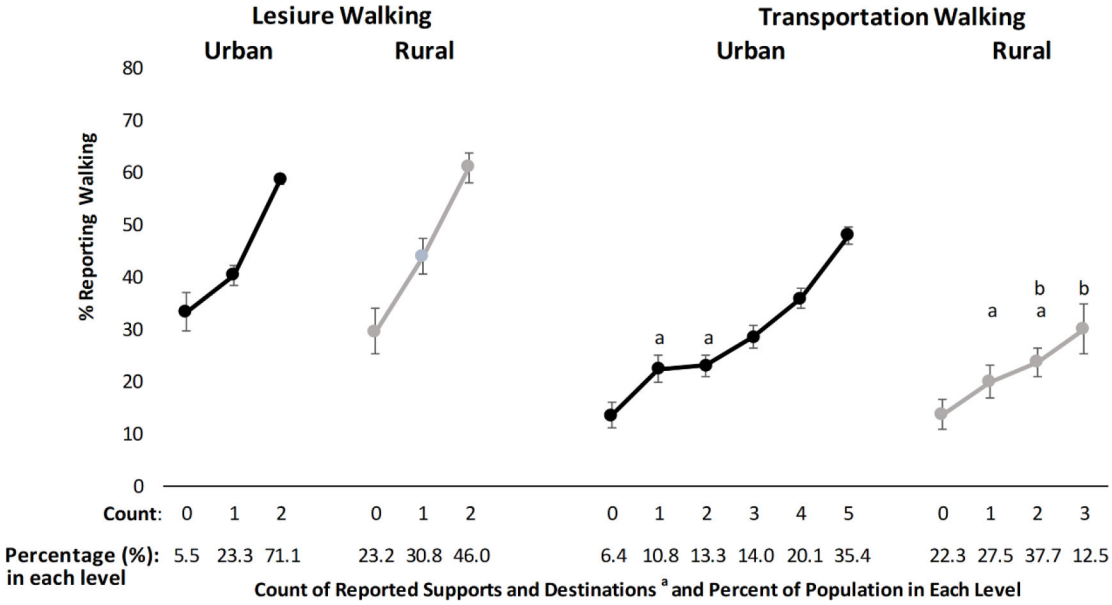

Figure 1:

Prevalence of leisure and transportation walking across counts of supports and destinations among U.S. adult residents of urban and rural areas, National Health Interview Survey Cancer Control Supplement, 2015

Error bars represent the lower and upper bounds of the 95% confidence interval

Values that share a letter superscript are not significantly different (Bonferroni-adjusted $p<0.05$)

[a] Leisure walking supports and destinations (both urban and rural): roads, sidewalks, paths or trails and relaxing destinations. Transporation walking supports and destinations (urban): sidewalks on most streets; shopping; transit; movies; libraries, or churches, and relaxing places; (rural): roads, sidewalks, paths or trails; movies, libraries, or churches; and relaxing places.

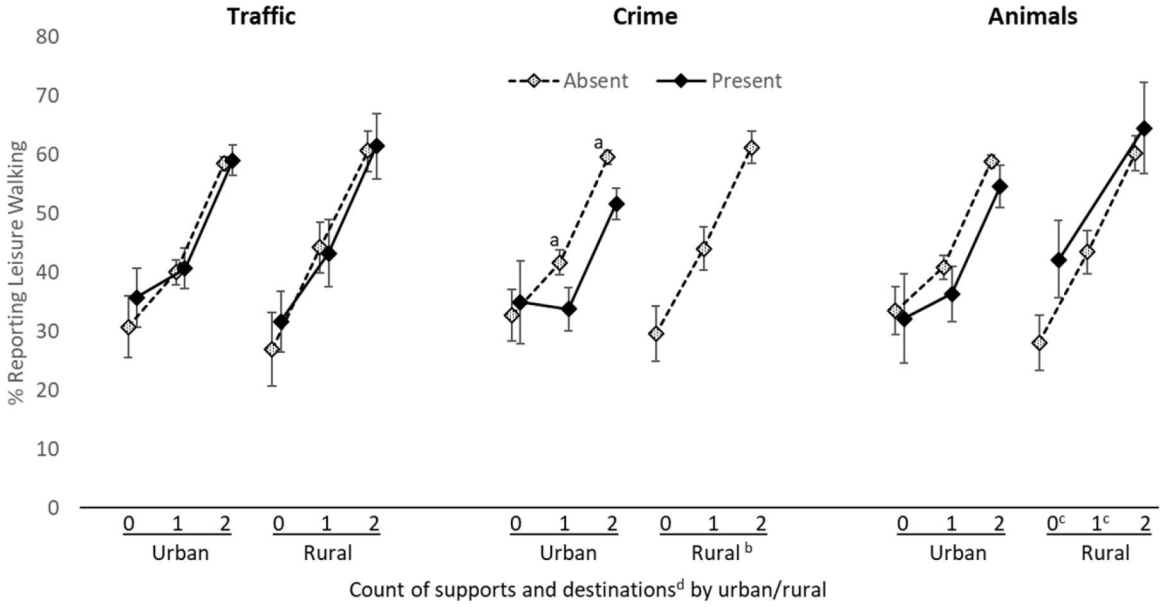

Figure 2:

Prevalence of leisure walking by the reduced count of supports and destinations, stratified by presence or absence of three safety barriers to walking and urban/rural residence, National Health Interview Survey 2015

Error bars represent the lower and upper bounds of the 95% confidence interval

[a] Signficantly different from the corresponding value when the barrier is absent (Bonferroni-adjusted $p<0.05$)

[b] Among rural residents, the prevalence of leisure walking when crime was perceived to be present is suppressed due to inadequate sample sizes across all three strata

[c] Rural residents who repored animals as a barrier to walking and either 0 or 1 support or destination were merged into a single category to meet minimum sample size requirements

[d] Reduced counts included roads, sidewalks, paths or trails and relaxing destinations for both urban- and rural-dwelling respondents.

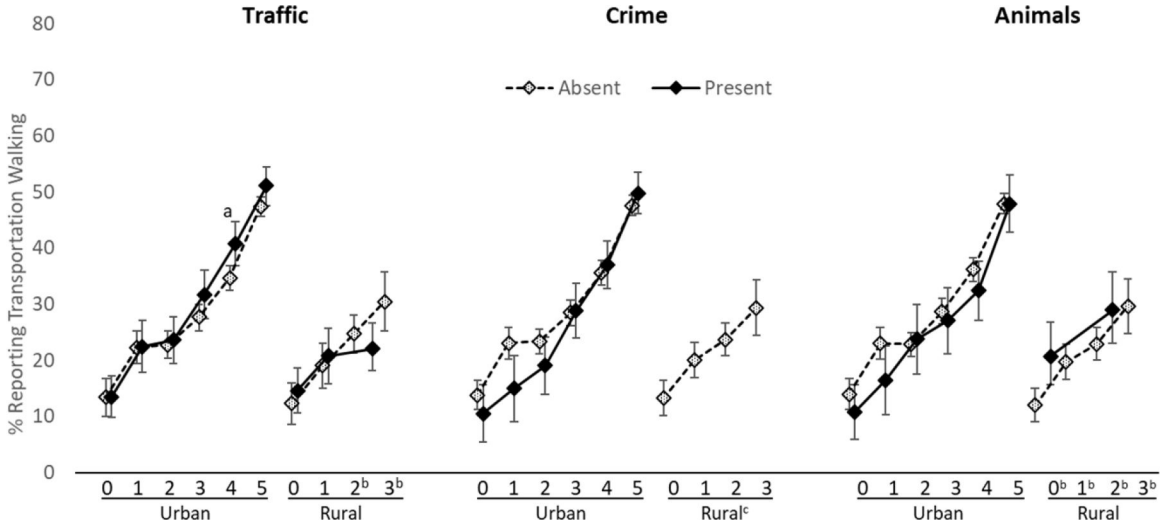

Figure 3:

Prevalence of transportation walking by the reduced count of supports and destinations, stratified by presence or absence of three safety barriers to walking and urban/rural residence, National Health Interview Survey 2015

Error bars represent the lower and upper bounds of the 95% confidence interval

[a] Signficantly different from the corresponding value when the barrier is absent (Bonferroni-adjusted $p<0.05$)

[b] Among rural residents who reported traffic or animals as barriers to walking, several adjacent categories of support and destinations have been merged to meet minimum sample size requirements

[c] Among rural residents, the prevalence of leisure walking when crime was perceived to be present is suppresseddue to inadequate sample sizes across all three strata

[d] Reduced count(urban) included sidewalks on most streets; transit; movies, libraries, or churches, and relaxing places. Reduced count (rural) included roads, sidewalks, paths or trails; movies, libraries or churches; and relaxing places

Table 1:

Descriptive characteristics, supports, destinations, and barriers to safe walking, and walking for leisure and transportation among U.S. adults, National Health Interview Survey Cancer Control Supplement, 2015

	Overall		Urban		Rural	
Characteristic	**N or %**	**95% CI**	**%**	**95% CI**	**%**	**95% CI**
N[a]	29925		--		--	
% (Weighted)	--		81.0	79.6–82.2	19.0	17.8–20.4
Sex (%)						
Male	48.6	47.8–49.4	49.2	48.3–50.1	46.2	44.3–48.1
Female	51.4	50.6–52.2	50.8	49.9–51.7	53.8	51.9–55.7
Age (%)						
18–24	12.7	12.0–13.5	13.7	12.9–14.5	8.6	7.5–9.9
25–34	17.7	17.1–18.4	18.6	17.9–19.3	14.0	12.4–15.7
35–44	16.7	16.1–17.3	17.2	16.5–17.8	14.8	13.6–16.1
45–64	34.3	33.5–35.0	33.1	32.2–33.9	39.3	37.3–41.3
65+	18.6	17.9–19.3	17.5	16.8–18.2	23.3	21.8–24.9
Race/ethnicity (%)						
White, non-Hispanic	65.5	64.6–66.5	60.2	59.2–61.2	88.2	86.4–89.8
Black, non-Hispanic	11.9	11.3–12.5	13.4	12.8–14.1	5.3	4.2–6.6
Hispanic	15.9	15.2–16.6	18.6	17.9–19.4	4.1	3.3–5.2
Other, non-Hispanic	6.7	6.3–7.1	7.7	7.2–8.3	2.4	1.7–3.3
Education (%)						
Less than high school	12.4	11.8–12.9	12.1	11.5–12.7	13.6	12.2–15.0
High school	24.7	23.9–25.4	23.1	22.3–24.0	31.2	29.5–32.9
Some college	31.2	30.4–32.0	30.6	29.8–31.5	33.5	31.7–35.4
College degree+	31.8	30.9–32.7	34.2	33.2–35.2	21.7	20.1–23.5
Supports (% Present)						
Roads, sidewalks, trails	85.2	84.3–86.1	90.2	89.5–90.9	64.1	61.3–67
Sidewalks on most streets	62.7	61.4–64.0	74.5	73.2–75.9	12.3	10–14.6
Destinations (% Present)						
Shopping	58.3	57.1–59.4	67.4	66.2–68.7	19.2	16.5–21.9
Transit stops	53.4	52.0–54.7	64.8	63.5–66.2	4.6	3.4–5.8
Movies, libraries, churches	47.6	46.5–48.8	54.7	53.4–56.0	17.7	15.1–20.3
Relaxing places	72.2	71.2–73.2	75.4	74.4–76.4	58.7	56–61.4
Barriers (% Present)						
Traffic	23.4	22.6–24.3	20.5	19.7–21.3	35.7	33.4–38.1
Crime	12.3	11.8–12.9	13.9	13.3–14.6	5.5	4.4–6.6
Animals	10.6	10.0–11.2	9.6	9.0–10.2	14.7	13–16.4
Leisure Walking	52.1	51.1–53.0	52.9	52.0–53.9	48.3	46.2–50.5
Transportation Walking	32.0	31.1–32.8	34.5	33.5–35.5	21.1	19.4–22.9

[a]Unweighted sample sizes are suppressed for urban/rural strata

Overall differences between urban and rural were significant ($p<.05$) for all variables

Table 2:

Associations between supports and destinations and walking for leisure or transportation among U.S. adults, by urban and rural residence, National Health Interview Survey Cancer Control Supplement, 2015

	Leisure Walking[a]						Transportation Walking[a]					
	Bivariate Association		Model 1 – Full Model[b]		Model 2 – Stepwise Model[b]		Bivariate Association		Model 1 – Full Model[b]		Model 2 – Stepwise Model[b]	
Overall	**OR**	**95% CI**	**AOR**	**95% CI**	**AOR**	**95% CI**	**OR**	**95% CI**	**AOR**	**95% CI**	**AOR**	**95% CI**
Supports												
Roads…trails[c]	1.90	1.71–2.10	1.47	1.31–1.65	1.41	1.27–1.57	1.93	1.72–2.17	1.03	0.90–1.17		
Sidewalks	1.27	1.18–1.36	0.91	0.84–1.00			2.05	1.88–2.23	1.20	1.09–1.32	1.21	1.10–1.33
Destinations												
Shopping	1.33	1.24–1.43	0.97	0.88–1.07			2.46	2.27–2.68	1.36	1.22–1.52	1.37	1.23–1.52
Transit stops	1.27	1.18–1.36	1.01	0.92–1.10			2.28	2.10–2.48	1.38	1.26–1.52	1.38	1.26–1.52
Movies…churches[d]	1.39	1.30–1.49	1.08	0.98–1.18			2.34	2.17–2.53	1.39	1.27–1.53	1.39	1.27–1.53
Relaxing places	2.45	2.26–2.65	2.26	2.08–2.45	2.26	2.09–2.45	2.26	2.06–2.47	1.57	1.42–1.73	1.57	1.43–1.73
Urban												
Supports												
Roads…trails[c]	1.73	1.51–1.97	1.37	1.19–1.58	1.31	1.15–1.50	1.65	1.42–1.91	0.91	0.78–1.08		
Sidewalks	1.20	1.10–1.30	0.90	0.82–0.99			1.87	1.70–2.07	1.25	1.12–1.39	1.22	1.1–1.36
Destinations												
Shopping	1.30	1.20–1.41	0.97	0.88–1.07			2.45	2.21–2.70	1.44	1.28–1.62	1.44	1.28–1.61
Transit stops	1.23	1.13–1.33	1.01	0.92–1.11			2.17	1.97–2.39	1.37	1.23–1.52	1.37	1.23–1.52
Movies…churches[d]	1.36	1.27–1.46	1.08	0.98–1.19			2.24	2.05–2.44	1.40	1.27–1.55	1.40	1.27–1.55
Relaxing places	2.37	2.18–2.59	2.26	2.06–2.48	2.27	2.08–2.48	2.28	2.06–2.51	1.61	1.45–1.79	1.60	1.44–1.77
Rural												
Supports												
Roads…trails[c]	2.18	1.82–2.60	1.61	1.34–1.95	1.65	1.38–1.99	1.62	1.30–2.01	1.37	1.08–1.74	1.37	1.08–1.74
Sidewalks	1.66	1.30–2.13	1.18	0.89–1.55			1.43	1.13–1.81	1.03	0.77–1.39		
Destinations												

	Leisure Walking[a]						Transportation Walking[a]					
	Bivariate Association		Model 1 – Full Model[b]		Model 2 – Stepwise Model[b]		Bivariate Association		Model 1 – Full Model[b]		Model 2 – Stepwise Model[b]	
Overall	**OR**	**95% CI**	**AOR**	**95% CI**	**AOR**	**95% CI**	**OR**	**95% CI**	**AOR**	**95% CI**	**AOR**	**95% CI**
Shopping	1.38	1.09–1.73	0.95	0.72–1.25			1.45	1.13–1.87	1.04	0.74–1.47		
Transit stops	1.64	1.11–2.43	1.18	0.80–1.76			1.16	0.80–1.68	0.87	0.59–1.26		
Movies…churches[d]	1.43	1.15–1.78	1.00	0.77–1.30			1.62	1.31–2.01	1.36	1.01–1.82	1.39	1.12–1.73
Relaxing places	2.65	2.23–3.16	2.24	1.87–2.69	2.26	1.89–2.70	1.60	1.30–1.96	1.36	1.09–1.70	1.36	1.09–1.70

OR: odds ratio, AOR: adjusted odds ratio, CI: Confidence Interval

[a] Leisure walking was assessed by asking “Sometimes you may walk for fun, relaxation, exercise, or to walk the dog. During the past 7 days, did you walk for at least 10 minutes for any of these reasons? Please do not include walking for transportation.” Transportation walking was assessed by asking “During the past 7 days, did you walk to get some place that took you at least 10 minutes?”

[b] Model 1 includes all supports and destinations simultaneously, model 2 includes only those variables that remained significant ($p<.05$) after stepwise modeling.

[c] This response option included “roads, sidewalks, paths or trails”

[d] This response option included “movies, libraries, or churches”