

Rural Neighborhood Walkability: Implications for Assessment

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Background: Physical activity levels, including walking, are lower in the southern U.S., particularly in rural areas. This study investigated the concept of rural neighborhood walkability to aid in developing tools for assessing walkability and to identify intervention targets in rural communities. **Methods:** Semi-structured interviews were conducted with physically active adults ($n = 29$) in rural Georgia. Mean age of participants was 55.9 years; 66% were male, 76% were white, and 24% were African American. Participants drew maps of their neighborhoods and discussed the relevance of typical domains of walkability to their decisions to exercise. Comparative analyses were conducted to identify major themes. **Results:** The majority felt the concept of neighborhood was applicable and viewed their neighborhood as small geographically (less than 0.5 square miles). Sidewalks were not viewed as essential for neighborhood-based physical activity and typical destinations for walking were largely absent. Destinations within walking distance included neighbors' homes and bodies of water. Views were mixed on whether shade, safety, dogs, and aesthetics affected decisions to exercise in their neighborhoods. **Conclusions:** Measures of neighborhood walkability in rural areas should acknowledge the small size of self-defined neighborhoods, that walking in rural areas is likely for leisure time exercise, and that some domains may not be relevant.

Keywords: built environment, measurement, qualitative, physical activity, walking

Many Americans walk regularly, most often for shopping, transportation and exercise.¹ CDC recently documented that 62% of U.S. adults reported walking for leisure or transport in the past week.² With increased efforts to promote physical activity in the last decade, both applied research and intervention strategies have focused on environmental factors that influence walking behavior.³⁻⁷ Given that rural residents, particularly in the south, have relatively low rates of physical activity,⁸ understanding rural walkability and how best to measure it is an important next step in addressing physical activity in this priority population.

Most objective assessments of neighborhood walkability have focused on urban and suburban living and assume walking motivations that are typical for urban dwellers, with an emphasis on destinations (eg, parks, transit stops), as well as detailed assessments of traffic features such as cross-walks and sidewalk width.^{7,9-12} Even recent efforts to focus on rural areas emphasize town centers rather than neighborhoods per se.¹³ Additionally, many measures of neighborhood walkability require an explicit definition of neighborhood, particularly with respect to neighborhood boundaries (eg, zip codes or 1-mile buffers).^{6,9,13-19} Yet, few studies have investigated if researcher-imposed definitions of neighborhood are congruent with those of residents in varying types of communities such as rural areas.^{15,18}

The purpose of this paper is to explore the concept of neighborhood walkability in rural areas. Research questions include

1. Does the concept of neighborhood resonate with residents of rural areas?
2. How do rural residents define their neighborhoods spatially?
3. What are the priority domains for neighborhood walkability in a rural area?

Methods

Study Participants

Participants ($n = 29$) were recruited from a larger study that examined environmental determinants of physical activity, nutrition and tobacco use in rural southwest Georgia.²⁰ Eligible participants for the current study lived outside of town limits in 1 of 4 rural counties and met physical activity guidelines or reported at least some leisure-time physical activity. We purposively recruited "positive deviants" who were successful in maintaining an active lifestyle to gain their unique perspective on whether and how rural neighborhoods could influence physical activity.^{21,22} The study was designed through a community-based participatory research process that involved the Emory Prevention Research Center (EPRC) and its Community Advisory Board (CAB) in rural southwest Georgia. The study protocol was reviewed and approved by the Emory University Institutional Review Board. Written informed consent was obtained from all participants.

Semi-Structured Interviews

The interview guide was developed collaboratively with the EPRC's CAB. Specific questions included in the analyses reported here covered 3 broad topics: the definition of a neighborhood, neighborhood size and boundaries, and domains of walkability. Interviews averaged 60 minutes, were audio-recorded, and transcribed verbatim.

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The definition of a neighborhood was explored by asking: Would you consider the area around your home as a neighborhood? If yes, what kinds of things make it a neighborhood? If no, why is it not a neighborhood? Neighborhood size and boundaries were assessed by asking participants to draw a map of their neighborhoods on a blank sheet of paper, including its boundaries, the location of their home within the neighborhood, and some of the places important to them within the neighborhood.^{23–25} To learn about walking destinations in rural neighborhoods, participants described the places they considered within walking distance of where they lived. They were also asked how long it would take them to walk to a convenience store, a restaurant, a place of worship, a public park, and a recreational facility. To examine the domains of walkability such as safety, traffic and sidewalks, participants were asked whether that feature was present or absent, and then to talk about whether it affected their decision to exercise in their neighborhood. Participants were reminded to consider all kinds of exercise and physical activity in answering these questions. However, we know that walking is the predominant form of physical activity in this population, followed by yard work.²¹

Data Analysis

A codebook was developed to capture major themes for each topic covered in the interview guide. The research team coded the first

several transcripts collectively until members were coding consistently. Two coders then coded each transcript independently and resolved discrepancies through consensus. NVivo 8 was used for qualitative analysis. Comparative analysis was performed to identify the full range of responses for each major code.²²

Neighborhood size and boundaries were analyzed through a map analysis that involved several steps. The first step was to locate the participants' homes by geocoding them. Second, the interviewer drew the neighborhood area on a Google map of the participant home and the surrounding area based on the interview transcript and participants' drawings. Third, 2 coders used this information in addition to the participants' maps and the transcripts to draw neighborhood areas for each participant using Google Earth. The size of each was then measured in square miles. The final step was to average the 2 estimates.

Results

Description of Study Participants

The majority of participants were male (66%), with a mean age of 55.9 years (SD = 6.34), white (76%), and married (76%). Typical household size was 2 persons (55%) (Table 1). Almost one-half of the participants had a high school (48%) or college (45%) degree

Table 1 Description of Study Participants

Demographic characteristic	Total (n = 29)
Gender, n (%)	
Men	19 (65.5)
Women	10 (34.5)
Race, n (%)	
White	22 (75.9)
African American	7 (24.1)
Age, mean (SD)	55.9 (6.34)
Marital status, n (%)	
Married	22 (75.9)
Separated/divorced	5 (17.2)
Widowed/single	2 (6.8)
Household size, n (%)	
1	2 (6.9)
2	16 (55.2)
3	6 (20.7)
≥ 4	5 (17.2)
Education, n (%)	
< High school	2 (6.9)
High school/some college	14 (48.3)
College degree	13 (44.8)
Household income, n (%)	
< 10,000	1 (3.4)
10,000–25,000	3 (10.3)
25,001–50,000	11 (37.9)
≥ 50,000	12 (41.4)
Refused	2 (6.9)

and 52% had annual household incomes of less than \$50,000. Roughly two-thirds reported walking for exercise within their neighborhoods.

Neighborhood Definition

Twenty-six of the twenty-nine participants considered the area that they lived in a neighborhood. When asked what made it a neighborhood, they discussed feelings of closeness and personal connections with their neighbors, knowing they could seek and receive help from the people living near them. The proximity of other houses and shared surroundings and resources also contributed to the sense of neighborhood. The 3 participants who felt they did not live in a neighborhood described having no nearby houses and having little in common with those living closest to them.

Neighborhood Size and Boundaries

Figure 1 presents 3 representative neighborhood maps drawn by participants. Destinations are largely limited to other houses, ponds and fields, and bigger roads, often a highway. Houses were often configured along 1 road rather than a cluster of connected streets as typical in urban areas. Interestingly, the maps included many natural features, such as forests, creeks, ponds and pastures. Neighborhood sizes ranged from less than a hundredth of a square mile (0.009 mi²) to more than 16 square miles (16.4 mi²) (Table 2). The vast majority of participants (n = 22) drew neighborhood boundaries that were smaller than 0.5 square mile. Furthermore, 15 (54%) neighborhoods were smaller than 0.25 square mile and 12 (43%) of them were less than a tenth of a square mile in size. Only 6 (21%) of the maps had an area larger than 1 square mile.

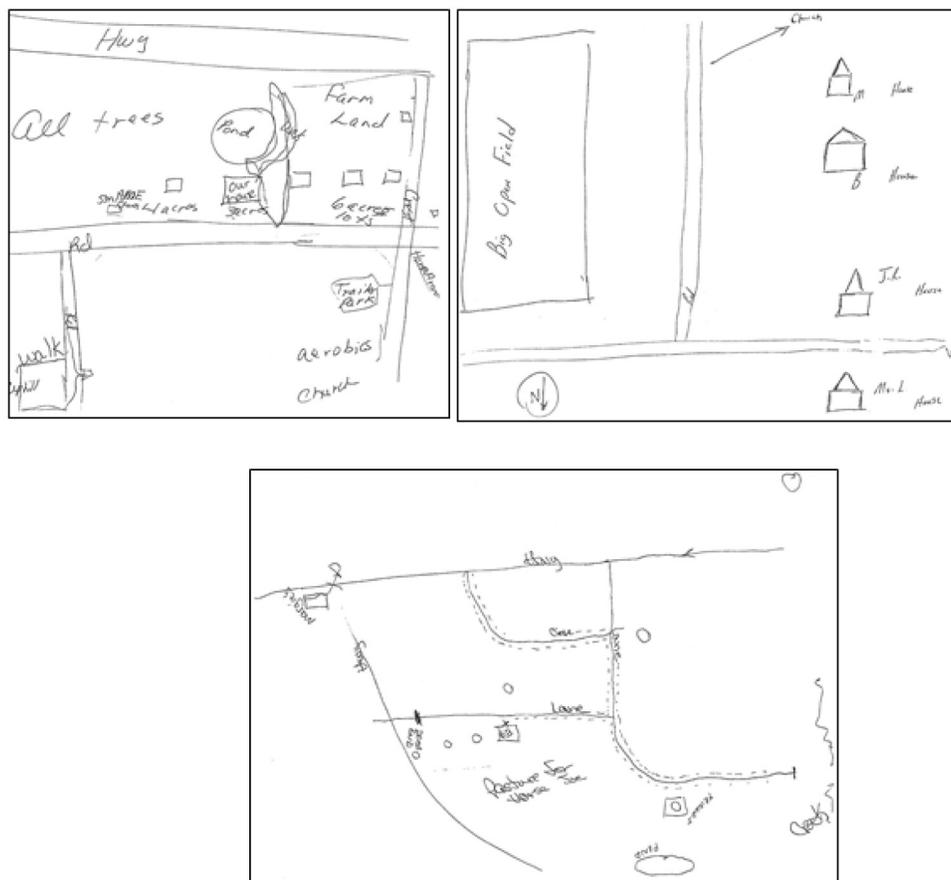


Figure 1 — Selected neighborhood maps drawn by participants.

Table 2 Neighborhood Sizes as Indicated on Participant's Maps (N = 28)

Size of the neighborhood	N	%
Neighborhood size > 1 mi ²	6	21.4%
0.5 mi ² < neighborhood size < 1 mi ²	0	0%
0.25 mi ² < neighborhood size < 0.5 mi ²	7	25.0%
0.1 mi ² < neighborhood size < 0.25 mi ²	3	10.7%
Neighborhood size < 0.1 mi ²	12	42.9%

Domains of Neighborhood Walkability

Destinations. When asked about places within walking distance, participants most commonly mentioned a neighbor's house or a body of water. Stores, churches, barns/farms and a specific road or highway were also mentioned by a few. Participants were asked about several common destinations and how long it would take to walk to them. The vast majority reported that none were within walking distance. About one-third noted that a place of worship, a recreational facility (ball field, tennis court) or a convenience store were within walking distance. Two or fewer participants reported parks, restaurants or supermarkets as within walking distance.

Sidewalks. Participants were asked about the presence of sidewalks, where people generally walk, and whether having or not having sidewalks plays a role in their decision to exercise (Table 3). Nearly all of the participants stated not having sidewalks available in their neighborhood and reported that people generally walk on their property or on parts of the road. Although a few participants felt that sidewalks would facilitate exercise, most believed that sidewalks were irrelevant to their decision to exercise in the neighborhood. Reasons for not needing sidewalks were light traffic, being able to exercise on their property, and finding ways to walk regardless of the availability of sidewalks.

Shade. Participants were also asked about shade in their neighborhood and its impact on their decisions to exercise in their neighborhood. Almost all of the participants described trees as the main source of shade. About two-thirds of participants felt they had a fair amount of shade, on either their property or within the neighborhood in general. The participants were mixed in their feelings toward the effect of shade on exercise. Some participants felt that shade provided relief from the heat, while others commented that they enjoyed being out in the sun or found ways to accommodate exercising in the heat.

Safety. Over half reported their neighborhoods were safe. The others felt their neighborhoods were generally safe, but listed at least 1 unsafe feature such as traffic, drugs/crime, loose dogs, and snakes. When asked what facilitated a feeling of safety in their neighborhoods, knowing people and a sense of cohesion was mentioned most often, followed by low traffic volume and owning a personal weapon. Views were mixed on whether safety affected their decision to exercise in the neighborhood or not, with some reporting it enabled their exercise and others reporting that safety concerns restricted their exercise in the neighborhood.

Traffic. About half of the participants described traffic as light or slow. Others noted that traffic varied by time of day, that some roads were fine and others were more dangerous, or that the only issue was a few fast drivers. About a third felt traffic negatively affected their ability to exercise in the neighborhood. Strategies for coping with the traffic include exercising on one's own property, not walking during peak traffic hours, and to avoid the highway.

Dogs and Insects. Nearly all of the participants mentioned having loose dogs in their neighborhood, though only a few considered loose dogs to be a serious issue. Some participants responded that loose dogs limited their ability to exercise in the neighborhood, and would have to find alternative routes to avoid certain dogs, often because of fear of being chased and bitten by one. Other participants thought that dogs had no impact on their exercise, and a couple commented that they enjoyed and even benefited from having loose dogs in the neighborhood.

The most commonly mentioned insects were mosquitoes and gnats, followed by various types of flies. Participants were also split on whether the insects affected their decision to exercise. Many felt that the insects were a nuisance while in season, but that using insect repellent and exercising at certain times of day were effective strategies to ameliorate the problem. Others mentioned that mosquitoes and gnats prevented them from going outside to exercise.

Table 3 Selected Quotes Related to Influence of Walkability Domains on Exercising in the Neighborhood

Domain	Related quote
Sidewalks	It's not necessary [referring to sidewalks]. I mean, you don't, you don't feel threatened by walking on the, you don't feel concerned about walking on the street due to the slow traffic and the light traffic.
Shade	I have a hat. A hat, sunglasses, and you know, I've, I've learned that you won't exercise as long at 1:00 in the afternoon as you would if you were in the morning or in the evening.
Safety	The safety, the feeling, the sense of feeling safe and lack of violence lends it so that people can get out and walk.
Traffic	But up in here, it ain't too bad. Uh huh. And, especially on [street name], it ain't too bad. Because most of the people that be coming to and forth are the ones that live in the neighborhood.
Dogs	There's a couple of places I know where I wouldn't ride my bike because of dogs. You just learn where to ride to avoid them. Like, I know I cannot ride my bike right here because they raise guard dogs and if any of those guard dogs are out, I mean, I don't know what they would do. But they'll chase you, I ride really fast or I don't go in their way.
Insects	Well, if it's hot and I want to walk and I got to fight the gnats, I'm, I, I just won't go.
Aesthetics	It's a positive experience, it's an enjoyable experience, you're out walking and you can look at all the beautiful nature around you.
People seen exercising	People working in the yards, and like, whether it's pruning or working flowers or a garden, or raking areas or pickup up pine cones or cutting grass or whatever. Now see, that's the kind of stuff, mostly, mostly physical work, not necessarily heavy, but physical maintenance, yard, home maintenance activity as opposed to exercising in the athletic sense.

Aesthetics. Almost all of the participants considered their neighborhood to be aesthetically pleasing. Among the top explanations included well-maintained properties, the attractive country scenery, and beautiful foliage. The participants were split, however, on whether the aesthetics had an impact on their decision to exercise. Some of the participants expressed that an attractive environment made the exercising experience more enjoyable overall, that it provided a sense of safety and comfort, and that it encouraged families to exercise together. Others felt that the aesthetics did not affect their ability to exercise and that inner motivation was the main facilitator of their exercise behaviors.

Physical Activity Seen in the Neighborhood. Participants were asked what types of exercise they typically see people perform in their neighborhoods. Walking and yard work were mentioned most frequently, followed by biking, playing ball, gardening, fishing, and jogging. Other activities such as livestock feeding, swimming, skateboarding, hunting, and horseback riding were each reported by a couple of respondents.

Discussion

To identify implications for measuring walkability in rural areas, we examined definitions of neighborhood, along with views about the importance of specific neighborhood features on decisions to exercise, among a sample of active adults living in the rural South. One of the important findings from this study is that participants, despite living in rural areas outside of town limits, felt comfortable with the term “neighborhood” to describe where they lived. When describing why they considered the area where they live a neighborhood, they mentioned social relationships, structural features and shared resources. These attributes are commonly noted in the literature on urban neighborhoods.^{11,18,23–26} Thus, our findings suggest the concept of neighborhood is relevant even in the more sparsely populated rural areas outside of the small towns that characterize the rural South.

A second area of exploration focused on whether the size and boundaries of self-defined neighborhoods corresponded with measures used in neighborhood walkability research. Objective measures of neighborhood walkability often use boundaries based on administrative units or a specified distance from home.¹⁸ Most of the participants in our study drew neighborhood boundaries that were smaller than those typically used in physical activity research. This result is consistent with other studies conducted in urban areas.^{11,15} Similar to our study, when researchers in England asked urban dwellers to draw neighborhood boundaries on maps provided to them, neighborhood sizes varied greatly, with some including only a single street to others including the local town center.¹⁵ On average, however, the areas were fairly small. In addition, many of the walking destinations identified by their participants were outside the area they considered their neighborhood. To our knowledge, our study is the first to examine similar issues in rural areas within the U.S. Our findings, combined with others, suggest that researchers should carefully consider the language used in surveys that measure walkability.^{11,15} Leaving “neighborhood” self-defined could mean that respondents are using a very small geographic area as their frame of reference. Using language such as “a 20-minute walk from your home” may cause respondents to think of a geographic area well beyond their own neighborhoods.

In a review of published studies on rural walkability, Frost and colleagues reported mixed results for associations between physical activity levels and most of the domains they assessed across stud-

ies, with the exception of pleasant aesthetics.²⁷ Our study differs from the Frost et al review in that we defined rural to exclude town centers whereas they included a wide range of rural definitions. Despite this difference, we also had mixed results when asking how each walkability domain affected our participants’ decisions to exercise in their neighborhoods or not. Although more than half of the participants described traffic in their neighborhood as generally light or slow, about one-third of participants noted that they believed traffic on the roads and streets negatively affected their decision to walk. Many of the participants found ways to reduce the risk of injury by exercising on their own property or by not exercising on the roads and streets during peak hours. Of note, our participants did not think the absence of sidewalks made a difference in whether they walked in their neighborhood. Participants were not consistent in their views of whether shade influenced their decision to exercise outdoors—some appreciated the availability of shade trees to get relief from heat, while others preferred being exposed to the sun while exercising. This suggests additional research should be done to assess which aspects of the “functional domain” are most relevant to walking in rural areas. For example, are shoulder widths more important than sidewalks?

The majority of study participants were not concerned about crime, and over half said their neighborhoods were safe. However, many noted at least 1 unsafe feature, such as traffic, loose dogs and snakes. This suggests that safety concerns may center less on crime than on other issues such as animals. Other research has confirmed the concern about loose dogs.²⁸ Considering that the majority of participants in our study were male, the influence of safety requires further exploration, particularly among women.

Also of note was the relatively small number and limited types of destinations within these neighborhoods. The most common destinations within walking distance were a neighbor’s house or a body of water, instead of grocery stores, markets and restaurants often described as destinations in urban communities.¹¹ This also suggests that walking in these neighborhoods is for leisure-time exercise more so than for transportation (eg, walking to a store or a bus stop).

The map analysis highlighted several issues relevant for measuring rural neighborhood walkability. For example, determining where to place boundaries when streets do not provide logical neighborhood demarcations is challenging. Many of the maps drawn by participants included forests or pastures without a clear indication of whether these should be included in the neighborhood boundaries completely, partially or not at all. Typically, neighborhood boundaries are indicated by streets or, less commonly, bodies of water. In neighborhoods with a few houses dotted along 1 street or highway, it is difficult to determine geographic boundaries and/or neighborhood size.

This study has 3 notable limitations. First, because our study population was physically active, it did not fully reflect all types of residents in these communities. Our study population included a larger percentage of men and those with higher incomes and educational levels than the average resident. Neighborhood features not viewed as deterrents to our physically active participants, may still serve as barriers for less motivated, sedentary residents. Second, our population was from the rural South, which has a qualitatively different physical environment from other parts of the rural U.S. in terms of summer heat, mild winters and land use. This limits the potential applicability of our findings to similar rural regions. Third, in assessing domains of walkability, we asked about exercise and physical activity in the neighborhood, rather than walking *per se*.

However, given that the majority of participants walked for exercise, this likely had minimal impact on our findings.

Our study makes several important contributions to the existing literature examining walkability. Our focus on the rural environment domains specific to walking and the emphasis on neighborhoods outside of town centers contributes to what is currently known about how the environment affects physical activity among rural residents. Second, our findings have implications for measuring walkability, namely that the concept of neighborhood applies to rural areas, that self-defined neighborhoods are smaller than expected, and most of the domains of walkability are relevant, with the possible exceptions of sidewalks and destinations. Results from this study can be useful for researchers and practitioners interested in measuring walkability of rural neighborhoods and encouraging rural residents to be more active.

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