



Assessing the Walkability Environments of Churches in a Rural Southeastern County of the United States

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Abstract

Context: Churches can serve as important health promotion partners, especially in rural areas. However, little is known about the built environment surrounding churches in rural areas, including how these environments may impact opportunities for physical activity (PA) and may differ by neighborhood income levels.

Objective: This study described walkability around churches in a rural county and examined differences in church walkability between high-, medium-, and low-income neighborhoods.

Design: As part of the Faith, Activity, and Nutrition study, trained data collectors conducted a windshield survey of adjacent street segments within a half-mile of churches.

Setting: Churches (N=54) in a rural, southeastern county in the United States.

Main Outcome Measure: A summary walkability score (e.g., presence of sidewalks, safety features, low traffic volume, etc.) was created with a possible range from 0–7. ANOVA was used to assess differences in walkability of churches by neighborhood income levels.

Results: Walkability scores ranged from 0–6 (M=2.31, SD=1.23). Few churches had sidewalks, shoulders or buffers, or amenities nearby. In contrast, most churches had low traffic volume and no environmental incivilities. While not statistically significant, churches in low-income neighborhoods scored higher for walkability compared to churches in medium- and high-income neighborhoods.

Conclusions: This study used low-cost environmental audits to analyze walkability in a sample of churches in a rural area and examined differences by neighborhood income. While churches may improve reach of people living in underserved and rural communities, a lack of environmental

supports may limit effective PA promotion activities. Partnerships focused on improving existing areas or providing alternative PA opportunities for church and community members may be needed, especially in African American communities.

Keywords

Physical Activity; Church; Built Environment; Walkability; Disparity

Introduction

Although the health benefits of physical activity (PA) are well-established,¹ many do not regularly engage in PA or meet PA guidelines.^{2,3} Due to environmental disparities throughout communities, people living in rural or low-income areas may have limited access to high-quality resources and opportunities for PA such as parks and recreational facilities.^{4,5} Therefore, physical activity promotion in rural areas proves challenging, especially where additional socioeconomic disparities such as a lack of pedestrian/bicycle facilities, less access to recreation facilities, and safety concerns may exist.^{6,7} In addition, lower quality resources and fewer facilities providing opportunities for PA may negatively impact residents' perceived safety of the neighborhood environment. This is especially important given previous research has identified safety as an important indicator of residents' willingness to spend time outside and engage in PA.^{8,9}

These socioeconomic and environmental factors may explain lower levels of PA among rural residents compared to those living in urban areas.^{10,11} According to data from the 2017 Behavioral Risk Factor Surveillance System, 42.9% of individuals reporting annual household incomes of less than \$25,000 met aerobic guidelines for PA compared to 52.1% of individuals with incomes greater than \$50,000 and 58.8% of individuals with incomes of \$75,000 or more.¹² Further, 25.3% of urban residents reportedly met PA guidelines compared to only 19.6% of rural residents.¹³ Even more, adults living in the southern and southeastern United States reported lower likelihood of meeting PA guidelines compared to adults living in other regions of the United States.¹¹ Therefore, ecological approaches addressing multiple levels of influence to increase PA behaviors in rural areas may be needed, particularly those focusing on the built environment.^{14,15}

When considering the built environment, macro-scale factors (e.g., weather, connectivity and overall design, density of landmarks, density of intersections) and micro-scale factors (e.g., upkeep, safety) may affect walkability and ability to engage in PA. For example, Bosdriesz and colleagues¹⁶ found that macro factors of climate, economic development, and culture significantly influenced PA levels. They found that higher temperatures were associated with less PA and higher levels of urbanization were associated with less moderate and vigorous PA. Mertens and colleagues¹⁷ assessed adults' perceptions of micro factors for engaging in cycling as a method of active transportation and found that evenness of cycle paths significantly impacted adults' willingness to actively commute by bicycle. The ability to address and advocate for changes in these macro- and micro-scale factors may be limited by a community's socioeconomic status, making the ability to advocate for positive environmental changes to promote PA difficult.

One way to overcome macro- and micro-scale factors for PA is through partnering with churches, particularly in the South where religious involvement and church attendance are markedly higher than other regions of the United States.¹⁸ High levels of religious involvement in the southeast suggest churches may serve their communities by offering physical resources that could help to increase reach of health promotion activities and promotion of PA, particularly in rural and underserved areas.¹⁹ For example, churches often provide a common meeting place for community members, as well as equipment, facilities, and other resources for public use.²⁰⁻²² In addition, compared to other organizations sharing messages to promote health, faith-based settings often appeal to members' values and beliefs by cultural and spiritual tailoring aspects of physical health to spiritual health. These characteristics have contributed to researchers successfully partnering with churches to develop and implement effective interventions focused on improving health behaviors, including PA, among members.^{23,24} However, little is known about environmental disparities that may exist for churches, such as proximity to low resource neighborhoods, leading to additional barriers for PA programming.²⁰

Several studies have examined the relationships of neighborhood income disparities on PA promotion and programs in other settings. For example, in a study examining neighborhood income and parks, parks in low- and medium-income areas had more environmental incivilities (e.g., litter, vandalism) and parks in low-income neighborhoods were five times more likely to have a moderate density of unhealthy eating establishments compared to those in high-income neighborhoods.²⁵ In another study, schools located in higher poverty neighborhoods had shorter distances to walk to the schools; however, amenities, maintenance, and safety in these neighborhoods were lower compared to schools in lower poverty neighborhoods.²⁶ Because churches are often a common meeting place for people in the community, particularly in the southeast United States,¹⁸ opportunities to gather for PA before and/or after regularly scheduled activities presents a high reach window of opportunity to promote PA. Understanding how similar environmental socioeconomic disparities persist in faith-based settings may improve the ability to effectively promote and offer PA opportunities and programs in a community.

Despite these documented neighborhood disparities around parks and schools, little similar research exists investigating neighborhood environments around churches. Of the few existing studies, findings have suggested that indoor or on-site elements of the church environment such as sharing messages and having exercise equipment and resources available may contribute to PA promotion in the church, but may differ based on the socioeconomic context of the church.^{20,27} However, more research is needed to objectively measure and describe nearby neighborhood environments of churches and to examine the presence of any socioeconomic disparities.

As well, more research is needed with rural and African American congregations, populations with marked health disparities.^{28,29} As the prevalence of partnerships with churches for health promotion increases,³⁰ understanding how to best use resources around churches and identify their impact on PA is important, especially in areas and for populations where known health disparities exist.²⁰ The purpose of this study was to

describe walkability environments surrounding churches in a rural, southeastern United States county and to examine differences in proximal walkability by neighborhood income.

Methods

Study Design and Sample

Data were collected from churches participating in the first phase of the two-phase Faith, Activity, and Nutrition (FAN) Dissemination and Implementation study, described previously.³¹ During the first phase, churches from a rural county in the southeast United States (pop. 23,960, 34.9 residents per square mile³²) were invited to participate in the FAN program. The FAN program trains churches to implement environment-level changes to promote PA and healthy eating by offering programs and opportunities, setting guidelines (policies), sharing messages, and engaging pastors. In the first phase, the FAN program was disseminated throughout a rural and medically underserved southeastern county. The study used a group randomized control trial where 59 churches agreed to join the study and be randomized. Churches randomized to the early intervention group (n=35, 65%) attended training during September to October 2015, and churches randomized to the delayed intervention group (n=19, 35%) attended training one year later during October to November 2016. FAN training was informed by Cohen's Structural Ecologic Model.³³ According to this model, four structural factors influence behaviors: (1) availability of products, (2) physical structures (or characteristics of products), (3) social structures and policies, and (4) media and cultural messages. Community health advisors led each training where church committees (usually 3 to 5 people from the church) learned how to make policy, systems, and environmental changes to impact PA and healthy eating at the church.^{31,34}

Data Collection

As part of the larger FAN study,³¹ data collection activities were conducted from June to October 2016, and included surveys of health behaviors and perceptions of attendees³¹ and audits of the on-site church environment.^{20,35} The current study reports on a third activity, windshield surveys of church neighborhood environments, completed from September to October 2016. Windshield surveys provide researchers and practitioners with a reliable and inexpensive method to assess the potential PA environments surrounding churches and other community resources.³⁶

As is described further below, a new windshield survey tool was developed along with an accompanying codebook that provided step-by-step instructions. The codebook included examples to explain possible ratings for features listed in each section to ensure valid data collection. As part of training prior to field assessment, data collectors conducted a practice survey of a nearby, half-mile street segment adjacent to a church.

All windshield surveys were conducted within a half-mile on all street segments adjacent to the study churches. Over the course of four trips, two data collectors traveled to all churches. One data collector slowly drove each half-mile segment around the church multiple times while the second data collector, also the primary data recorder on all trips due to previous

experience conducting windshield surveys and environmental audits, focused on recording available features and attributes. As necessary, both data collectors engaged in active dialogue noting the presence or absence of the neighborhood features.³⁶

Measures

A windshield survey tool specific to church or other faith-based settings was created for this study. The tool adapted measures from the Rural Active Living Assessment tool³⁷ and the Active Neighborhood Checklist³⁸ and included additional items created by the research team with expertise in faith-based settings and built environment research related to PA.

A meeting between FAN research investigators and staff was held to discuss the initial draft of the tool. The tool was shared with community advisors for feedback. Following these meetings, edits and suggestions were made to the tool which was then pilot-tested for two churches by two researchers prior to data collection training. After the pilot test, final edits were made to the tool and were shared with the research team. The finalized tool included four sections: (1) Land Use/Terrain (e.g., presence of commercial, civic, and residential land uses), (2) Walkability (e.g., presence of sidewalks, buffers, safety features), (3) Quality of Environment/General Conditions (e.g., amenities, graffiti, litter), and (4) Subjective Assessment (e.g., Is the segment walkable? Is the segment aesthetically pleasing?).

In the present study, a new scoring protocol was developed to calculate a neighborhood walkability score for each church (n=54). This score was created from items in the Walkability and Quality of Environment/General Conditions sections. Churches received a score of 1 based on the presence of each of the following seven features: (1) sidewalks, (2) buffers and shoulders, (3) safety features (e.g., stop signs), (4) posted speed limit of 25 mph or less, (5) low traffic volume, (6) amenities (e.g., bench, drinking fountain), and (7) absence of environmental incivilities (e.g., litter, graffiti). All items were weighted equally and total scores for church neighborhood walkability ranged from 0 to 7.

Church neighborhood income was determined using the median household income of the census block group in which the church was located using 5-year estimates (2009–2014) from the American Community Survey.³⁹ Neighborhood income ranged from \$22,156 to \$70,625. Therefore, low neighborhood income was categorized as <\$30,000 per year, medium income as \$30,000-\$44,999 per year, and high income as \$45,000 per year. Twenty-one churches were classified as low neighborhood income, 17 as medium, and 16 as high.

Data Analysis

Data were double-entered and checked. Descriptive statistics were calculated to summarize the total number of churches in the sample with or without the seven church neighborhood walkability features. A single mixed multi-level model using SAS PROC MIXED compared church neighborhood walkability scores by neighborhood income level. The model accounted for clustering of churches within census tracts and yielded an intraclass correlation coefficient of 0.128. Average weekly church attendance, reported by a leader in the church, was used as a model covariate to account for differences in church facilities. In addition, due to known disparities between health and race, the model adjusted for primary

race of the congregation, also reported by a leader in the church. The third covariate in the model included intervention status (i.e., early or delayed) to control for possible environment-level changes in churches in the early intervention group. All analyses were completed using SAS v.9.4.

Results

Table 1 provides descriptive statistics for churches participating in this study. Most of the churches were in designated rural areas (n=47, 87.0%), primarily Black/African American congregations (n=51, 92.7%), and of Baptist denomination (n=25, 45.5%). In addition, church congregation sizes included those with less than 25 attendees (n=7, 12.7%), 25–49 attendees (n=22, 40.0%), 50–74 attendees (n=13, 23.6%), and greater than or equal to 75 attendees (n=13, 23.6%).

The descriptive statistics of the seven church neighborhood quality features used to calculate walkability appear in Table 2. Few churches in this rural county had adjacent sidewalks or footpaths (n=8, 15%), buffers and shoulders (n=14, 26%) present, or nearby amenities (n=3, 6%). In addition, few churches were located on street segments with a posted speed limit less than 25 mph (n=7, 13%), though most churches had safety features present (n=43, 79.6%) and low traffic volume (n=41, 76%). In addition, most churches had no environmental incivilities present (n=45, 83%). In total, walkability scores ranged from 0 to 6 (M=2.31, SD=1.23) out of 7.

Table 3 presents stratified frequencies of walkability features of churches in high-, medium-, and low-income neighborhoods. Of particular note, in high-income neighborhoods (16 churches), zero churches had sidewalks (n=0, 0.0%) and few churches had buffers and shoulders (n=3, 18.8%). Most had safety features (n=11, 68.86%), low traffic volume (n=12, 75.0%), and no environmental incivilities (n=13, 81.3%). In medium-income neighborhoods (17 churches), few churches had sidewalks (n=2, 11.8%), buffers and shoulders (n=4, 23.5%), or a posted speed limit less than 25 mph (n=2, 11.8%). In low-income neighborhoods (21 churches), zero churches had amenities (n=0, 0.0%) and more had sidewalks (n=6, 28.6%), buffers and shoulders (n=7, 33.3%), or a posted speed limit less than 25 mph (n=2, 9.5%).

Churches in low-income neighborhoods had higher neighborhood walkability scores (M=2.67, SD=1.24) than churches in medium (M=2.06, SD=1.03) or high income (M=2.13, SD=1.36) neighborhoods (Table 4). However, results of the mixed model revealed no statistically significant differences in church neighborhood walkability by income (F (2,44)=0.67, p=0.52). Majority race of the congregation was a significant predictor (F (1,44)=5.02, p=0.03) for walkability in that churches with primarily African American congregations had lower walkability scores compared to churches with primarily non-African American congregations. No other church-level characteristics were statistically significant.

Discussion

This study aimed to contribute to rural PA promotion in faith-based settings by considering the walkability potential of churches' neighborhood environments and related income disparities. The process of auditing church environments using windshield survey methodology, calculating a walkability score, and comparing scores across neighborhood income provides a novel approach to understanding environmental contexts when developing interventions for increasing PA among church members and the community, particularly in rural areas.

More than half of churches scored three points or lower in aggregate walkability, suggesting substantial room for improvement. Church neighborhoods were often reported to have low traffic volume; however, most church neighborhoods lacked sidewalks, road buffers and shoulders, and speed limits were often 55 miles per hour or not posted within the audited area around the church. These compounding factors may make outdoor opportunities for PA, particularly walking, difficult around the church. Many previous health promotion efforts in churches commonly incorporate walking activities to engage members in PA.²¹⁻²⁴ These neighborhood characteristics of higher speed limits and lack of sidewalks, buffers, or shoulders would make implementing walking programs challenging. Researchers and practitioners may wish to assist church leaders in efforts to overcome these issues, including through citizen advocacy as has been accomplished previously.^{9,38} Likewise, other avenues for PA around the church or in the community may be considered. For example, churches in rural areas may have more green space and vacant land that can be used as sports fields, community gardens, or walking trails.²⁰ Churches may also partner with their community and develop joint-use agreements for local facility or transportation resources.⁴⁰ Further, members may work or have connections with community organizations and may be able to help advocate for environmental changes.

When investigating socioeconomic differences of neighborhood walkability near churches, churches in low-income neighborhoods scored marginally higher for walkability than churches in high- and medium-income neighborhoods. These findings, while counterintuitive, align with a prior study of neighborhood walkability near schools in which low socioeconomic neighborhoods had shorter distances to schools and lower traffic volumes.²⁶ While low-income neighborhoods might be expected to have fewer walkability resources, churches in this sample may have gained more walkability points for attributes such as low traffic volume and a lack of environmental incivilities. In addition, our study found that differences in total walkability scores by neighborhood income were not significant. This finding suggests that socioeconomic differences in walkability environments of churches are minimal in rural areas, since walkability scores remain low across all neighborhood income levels. Therefore, public health initiatives should continue to better understand the specific needs of faith-based settings, community organizations, and individuals living in rural settings of varying socioeconomic status. Researchers and practitioners should continue viewing churches as valuable partners promoting health and PA, especially in rural areas where other resources and opportunities for healthy living may be limited.

We also found that race was a significant predictor of walkability, in that churches with primarily African American congregations had fewer walkability resources than their non-African American congregation counterparts. This is important given that African American populations face additional environmental barriers to walking,^{41,42} as well as higher rates of health disparities.⁴³ Previous research has identified the importance of social support in African Americans for PA;⁴⁴⁻⁴⁶ this finding may be particularly relevant when developing programs and interventions in faith-based settings where opportunities for PA or walking may be limited based on urban or rural locations and availability of resources and facilities.

This study had limitations. First, we were unable to compare neighborhood walkability of churches in this rural environment to a sample of churches located in more developed, urban settings. However, because barriers exist for PA in rural settings, such as distance to or lack of exercise facilities,⁴⁷ measuring available environmental factors in rural areas with predominately African American populations should remain a priority. Second, our study sample was limited to churches in a rural, southeastern county. Thus, the lesser variation in walkability scores may underestimate possible socioeconomic differences. Third, most of the data collection occurred during business hours, potentially increasing the frequency of observations of low traffic volume due to residents at work. In addition, the walkability measure created for this study did not account for the proximity of churches to residential neighborhoods; churches less proximal to residential neighborhoods may experience challenges justifying the installation of sidewalks or decreasing speed limits. Also, this study did not consider income levels of church attendees. This omission may have led to the misclassification of churches in high, medium, or low-income neighborhood block groups. Lastly, we were unable to assess associations of macro environment factors (e.g., intersection density and residents' perceived levels of safety) to actual walking or other PA behaviors in the neighborhood. Future studies may wish to account for these additional factors to better understand church neighborhood characteristics and opportunities for walking and other forms of PA. Overall, these findings can help researchers further understand barriers to PA promotion in faith-based and non-faith-based settings alike.

Conversely, this study had notable strengths. This is the first known study to assess socioeconomic disparities of walkability environments near churches, further expanding the literature on the importance and relevance of faith-based partnerships for health promotion. As well, churches in this study were primarily located in a rural, underserved county. Because rural communities often experience higher risk of adverse health outcomes, this sample provides insights into these high priority populations for public health. In addition, churches in the sample had predominantly African American membership, a population known to experience unique barriers to PA.^{45,46} Next, we also ensured reliable measurement by having one data collector attend all trips and completing all survey forms. A final strength is the use of windshield survey methodology. Little research currently reports using these relatively inexpensive and cost-efficient methods to identify priority areas across a large number of settings for developing interventions, proposing policy changes, and creating PA programming and materials.

Churches have been identified as successful partners in promoting PA and providing important facilities for PA promotion and programming.^{20,27} However, a lack of proximal

outdoor environmental supports may continue to limit PA participation by church members and those in the community. Future research may focus on developing partnerships between community agencies and churches to improve features in existing areas or providing alternative outdoor PA opportunities for churches lacking adequate outdoor environmental supports for PA.⁴⁰

Acknowledgements:

We wish to thank all of the participating churches for their commitment to the health of their members. We thank the Fairfield County School District for providing space to conduct trainings. We also appreciate the time and dedication of the community health advisors, the pastor health advisors, and the Fairfield Community Coordinating Council. Finally, we thank the staff at the University of South Carolina who contributed to the larger study and to those involved in conducting the windshield surveys.

Funding: This project was supported by Cooperative Agreement Number U48DP005000 from the Centers for Disease Control and Prevention. Its contents are solely the responsibility of the authors and do not necessarily represent the official views of the Centers for Disease Control and Prevention.

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Implications for Policy & Practice

- Churches are strong partners for health promotion activities. However, characteristics of the neighborhood built environment near churches may promote or limit opportunities for physical activity promotion.
- Data collection using windshield surveys provides a cost-effective and time-efficient method for collecting large amounts of data.
- Very few churches had sidewalks or low speed limits, which may negatively impact the ability to form walking groups or plan other outdoor activities.
- Churches in low-income neighborhoods scored higher for walkability than medium- and high-income neighborhoods. While this finding was not in the expected direction, more work may be needed examining available resources and opportunities in these areas.
- Due to overall low church neighborhood walkability scores, partnerships and joint-use agreements with nearby schools and community centers may prove useful.
- Future work and development of healthy living programs and interventions with churches should examine the broader built environment to highlight existing resources and also consider areas for improvement.

Table 1.

Characteristics of Churches (N=54) Participating in the FAN Study

Characteristic	%
Congregation size	
<25 attendees	12.7
25-49 attendees	40.0
50-74 attendees	23.6
75 attendees	23.6
Neighborhood income	
Low ¹	38.9
Medium ²	31.5
High ³	29.6
Urban-rural designation⁴	
Urban	13.0
Rural	87.0
Primary race of congregation	
Black/African American	92.7
Caucasian	5.5
Multiracial	1.8
Religious denomination	
Baptist	45.5
Non-denominational or independent	20.0
Other	34.5

¹Median household income <\$30,000/year

²Median household income \$30,000-\$44,999/year

³Median household income \$45,000/year

⁴Urban-rural was defined using U.S. Census designations

Table 2.

Church Neighborhood Walkability Features (N=54)

Neighborhood Walkability Features	N	% of sample
Sidewalks		
Present	8	14.8
Absent	46	85.2
Buffers and Shoulders		
Present	14	25.9
Absent	40	74.1
Safety Features (e.g., stop sign, crosswalk)		
Present	43	79.6
Absent	11	20.1
Speed Limit		
Less than 25 mph	7	13.0
Greater than 25 mph	47	87.0
Traffic Volume		
Low	41	75.9
Medium or High	13	24.1
Amenities (e.g., bench, drinking fountain)		
Present	3	5.6
Absent	51	94.4
Environmental Incivilities		
Present	9	16.7
Absent	45	83.3

Table 3.

Church Neighborhood Walkability Features by Income

Neighborhood Income Group	Neighborhood Features						
	Sidewalks	Buffers and Shoulders	Safety Features (e.g., stop sign, crosswalk)	Posted Speed Limit 25MPH	Low Traffic Volume	Amenities (e.g., bench, drinking fountain)	No Environmental Incivilities
High ¹ (n=16)	0, [0.0%]	3, [18.8%]	11, [68.8%]	3, [18.8%]	12, [75.0%]	2, [12.5%]	13, [81.2%]
Medium ² (n=17)	2, [11.8%]	4, [23.5%]	13, [76.5%]	2, [11.8%]	10, [58.8%]	1, [5.9%]	14, [82.4%]
Low ³ (n=21)	6, [28.6%]	7, [33.3%]	19, [90.5%]	2, [9.5%]	19, [90.5%]	0, [0.0%]	18, [85.7%]

¹Median household income \$45,000/year

²Median household income \$30,000-\$44,999/year

³Median household income \$30,000/year

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Table 4.

Comparisons of Church Neighborhood Walkability Scores by Income

Neighborhood Income Group	Walkability M (SD)
High ¹ (n=16)	2.13 (1.36)
Medium ² (n=17)	2.06 (1.03)
Low ³ (n=21)	2.67 (1.24)
ANOVA	
F	0.67
p	0.52

¹ Median household income \$45,000/year

² Median household income \$30,000-\$44,999/year

³ Median household income \$30,000/year

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