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Investigating Socioeconomic Disparities in the Potential Healthy Eating and Physical Activity Environments of Churches

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Abstract

Faith-based settings have the potential to improve health in under resourced communities, but little research has quantified and compared health-promoting elements in church environments. This study examines the number of potential indoor and outdoor physical activity opportunities, healthy eating opportunities, healthy living media, and total environmental resources present in churches (n=54) in a rural, southeastern U.S. county and the relationship between these resources and neighborhood income. In our sample, most churches offered potential indoor and outdoor opportunities for physical activity and healthy eating opportunities, with more variability in the number of healthy living media items on display compared to other environmental components. Common potential opportunities present in churches for physical activity included a fellowship hall and green/open space, while potential opportunities for healthy eating frequently included a refrigerator and sink. Compared to those in medium- and high-income neighborhoods, churches in low-income neighborhoods scored higher on measures of potential outdoor physical activity opportunities and lower on measures of total potential environment resources, healthy eating opportunities, healthy living media, and indoor physical activity opportunities, though only indoor

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This research did not involve the participation of any human subjects.

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physical activity opportunities reached statistical significance. Potential opportunities for using existing resources in and around churches for health promotion should be investigated further, particularly in rural areas.

Keywords

church; environment; physical activity; healthy eating; disparities

Introduction

More than one-third of adults living in the United States are obese (Ogden, Carroll, Kit, & Flegal, 2013). Behaviors such as consistent physical activity (PA) and healthy eating (HE) have been shown to reduce the risk of obesity and other preventable chronic health conditions (Fitzgerald, Morgan, & Slawson, 2013; Physical Activity Guidelines Advisory Committee, 2008; Warburton, Nicol, & Bredin, 2006). However, external factors such as the availability, accessibility, and acceptability of goods and services may influence decisions and abilities to make healthy behavior changes and may prohibit adults from participating in these behaviors (Brownson, Boehmer, & Luke, 2005; Kamphuis et al., 2006). People in rural areas report lower PA levels (Martin et al., 2005; Parks, Housemann, & Brownson, 2003), poorer health outcomes (Fan, Wen, & Kowaleski-Jones, 2014), and increased rates of obesity (Befort, Nazir, & Perri, 2012). Rural communities often exist in “food deserts” (Morton, Bitto, Oakland, & Sand, 2005), where they lack access to grocery stores and other food markets, making it difficult to make HE choices (Sharkey & Horel, 2008). Further, these communities may have limited access to environmental resources and opportunities to be physically active (Eberhardt & Pamuk, 2004; Sallis et al., 2011). Consequently, researchers and health promotion practitioners face challenges in working with rural populations to improve health.

Researchers have previously investigated and identified the built environment as a primary determinant influencing PA and HE behaviors (Durand, Andalib, Dunton, Wolch, & Pentz, 2011; Kamphuis et al., 2006; Seguin, Connor, Nelson, LaCroix, & Eldridge, 2014). Specific resources in the built environment affecting healthy living behaviors include grocery stores and markets for purchasing healthy foods (Morland, Wing, Diez Roux, & Poole, 2002), kitchens and equipment for storing and preparing healthy meals (Huang et al., 2013), parks and recreation centers for exercise (Kaczynski & Henderson, 2007), and sidewalks, bike lanes, and public lighting for active transportation (Jacob Arriola et al., 2016).

Churches are another environmental resource that serve as community organizations with broad reach in terms of age, race, and sociodemographic factors (Campbell et al., 2007). Thus, churches may provide an outlet to influence the health of populations normally underrepresented in health promotion programs (Campbell et al., 2007). Many previous health promotion programs in churches focused on individual-level needs rather than incorporating an ecological approach addressing environmental, policy, or organizational-level changes (Bopp, Peterson, & Webb, 2012; Tristão Parra, Porfírio, Arredondo, & Atallah, 2017). An ecological approach may prove useful as many churches have access to

open spaces, parks, exercise equipment, or offer weekly exercise programs to increase PA. Churches may also have kitchen environments conducive for preparing and storing healthy foods to provide meals for regular occurring events such as worship services and weekly classes. Indeed, previous studies have highlighted the relationship between church environments and the health behaviors of attendees (Baruth & Wilcox, 2013; Jacob Arriola et al., 2016; Kegler et al., 2012; Williams, Glanz, Kegler, & Davis, 2012). For example, many churches have kitchen staff and equipment which may increase opportunities for HE (Baruth et al., 2013) and offer familiar and comfortable settings for PA (Tristão Parra et al., 2017). Church environments also function as an information network and could use various forms of media communication to provide members with announcements and updates for healthy living (Harmon, Blake, Thrasher, & Hébert, 2014; Harmon, Chock, Brantley, Wirth, & Hébert, 2016; Harmon, Kim, Blake, & Hébert, 2014).

In the southern United States, high rates of church attendance are reported (Lipka & Wormald, 2016). Due to a church's frequent contact with members of the community, the health promoting environment of the church could play an influential role in supporting members' decisions to make healthy lifestyle choices (Baruth & Wilcox, 2013; Campbell et al., 2007; Lumpkins, Greiner, Daley, Mabachi, & Neuhaus, 2013). However, the distribution of churches across rural or urban and low- or high-income areas may impact the types of resources churches are able to provide. Given documented inequalities across income levels for other environmental resources related to healthy living (Noyes et al., 2014; Sallis et al., 2011; Sharkey & Horel, 2008), there may be similar disparities in church environments by neighborhood income that warrant investigation.

In summary, physical resources inside and outside the church may significantly impact health behaviors, but few studies have quantified the potential PA and HE opportunities in churches (Jacob Arriola et al., 2016). Ample previous research has examined socioeconomic disparities in the healthfulness of other neighborhood and community settings (Edwards, Theriault, Shores, & Melton, 2014; Hughey et al., 2016; Sallis et al., 2011). For example, Vaughan and colleagues (2013) reported that lower income areas in Kansas City had a significantly greater number of parks, but detailed environmental audits revealed that parks in higher income areas had more playgrounds and fewer quality concerns per park. Similarly, Engelberg and colleagues (2016) found significant negative associations between neighborhood income and sports quality scores, PA facilities, and overall amenities. Another study by Taylor and colleagues (2012) assessed relationships among income levels of neighborhoods on physical activity environments. They found significant negative relationships between land use diversity and income and between physical incivilities and income. These and other studies highlight an issue of 'deprivation amplification' where individuals or neighborhoods with fewer *personal* resources also tend to live in areas afflicted with poorer *environmental* opportunities (Macintyre, 2007). Documenting environmental justice issues is vital to improve understanding of how environmental and policy strategies may promote health to decrease poorer health behaviors and outcomes and additional strategies that might eliminate or mitigate inequalities (Taylor, Poston, Jones, & Kraft, 2006). However, to date, these potential socioeconomic disparities and health environments in churches have not been examined. Therefore, the purpose of this study was two-fold: 1) to describe the potential indoor PA, outdoor PA, HE, and healthy living media

environments from a sample of churches in a rural county in South Carolina participating in a faith-based PA and HE intervention, and 2) to investigate the relationship between neighborhood income and the potential PA, HE, and healthy living media environments of churches.

Methods

Study Design and Sample

This study was part of a larger faith-based PA and HE dissemination and implementation project that has been described elsewhere (Wilcox et al., 2018). Briefly, churches in a rural South Carolina county participated in a group-randomized trial where representatives from each church attended interactive training sessions led by two qualified community health advisors who lived and worked in the community. Churches (N=59) were randomly assigned to one of two groups, and 54 took part in evaluations – 35 (65%) received the intervention in the first year and 19 (35%) served as controls and were part of the delayed intervention group one year later. As part of the evaluation activities, two trained auditors visited and audited all churches between June 2016 and October 2016 (8–12 months after training of early intervention churches but before training of delayed churches). Data collectors visited churches on their day of worship (primarily Sundays) and were escorted by a church staff member, often the one responsible for leading the FAN program at the church, to respect privacy areas within the church as well as gain access to all areas of the facility to conduct assessments. Audits took an average of 19 minutes to complete. Inter-rater reliability analyses of the tool showed percent agreement greater than 80% for most items (Kaczynski et al., 2018).

Measures

At the time of the primary study, few tools to objectively assess the entire potential PA and HE environment specific to churches existed. Harmon and colleagues (2014) previously developed an instrument to assess diet and PA messaging in churches and other research has relied on qualitative data to assess health information and programming (Baruth et al., 2013; Baruth, Wilcox, Laken, Bopp, & Saunders, 2008). As a result, a more comprehensive and objective Church Environment Audit Tool was developed, refined, and tested in the first phase of the primary study (Kaczynski et al., 2018). The Church Environment Audit Tool was developed based on previous observation instruments, including the Community Park Audit Tool (Kaczynski, Wilhelm Stanis, & Besenyi, 2012), the Congregational Health Index (Ecumenical Ministries of Oregon, 2010), the Healthy Vending Toolkit (Martin & Griswold, 2009), and questions used in a previous faith-based intervention (Wilcox et al., 2010). The tool included sections to assess potential indoor PA opportunities, potential outdoor PA opportunities, potential HE opportunities, kitchen type, availability and sale of food and beverages, and media displays of PA and HE throughout the church. The audit tool is available at no cost and can downloaded after providing contact information at http://prevention.sph.sc.edu/Resources/church-health-environmental-audit-tool.htm.

A scoring protocol for the Church Environment Audit Tool was developed to objectively assess the potential for health promotion within a church considering its indoor PA, outdoor

PA, HE, and healthy living media environments. The lists of potential PA, HE, and media opportunities items assessed in churches are shown in Tables 3 and 4. Examples of items for potential indoor PA opportunities included sports equipment, stairwells, and free weights (n=14 total), while examples of items for potential outdoor PA opportunities included playgrounds, green/open space, and sports fields (n=9 total). Examples of items for potential HE opportunities included ovens, stovetops, and refrigerators (n=15 total). To calculate the scores for indoor PA, outdoor PA, and HE opportunities, a score of 1 was assigned to items present in the church. Next, if the item was present, the item received an additional score for the following two questions: "Is it usable?" [everything necessary for use is present (e.g., appropriate pieces, electrical connection) and nothing prevents use (e.g., equipment is functioning as it should, items are accessible to members)] and "Is it in good condition?" [looks clean and maintained (e.g., fully functioning parts, minimal rust)]. If the answer to the follow-up ratings was "yes," a score of 0.5 was assigned. If the answer was "no," a score of −0.5 was assigned. Salt shakers and deep fat fryers were reverse scored (−1.0) if present. Examples of items to assess healthy living media in churches included having a bulletin board or table displaying PA or HE information (n=4 total). To calculate a score for the healthy living media environment, a score of 1 was assigned to items present in the church. Finally, combining items present and subsequent follow-up condition questions, there are summary scores for potential indoor PA opportunities (maximum=28), outdoor PA opportunities (maximum=18), HE opportunities (maximum=26), and healthy living media (maximum=4). These four categories were then summed to create a total church environment score (maximum=76).

To determine income group for the neighborhood surrounding each church, we identified the location of each church and overlaid layers of census block groups (n=18) using the interactive online United States Census map (available at https://tigerweb.geo.census.gov/tigerweb/). Churches were assigned their census block group median household or neighborhood income using the 2014 American Community Survey 5-year estimates (U.S. Census Bureau, 2016). Neighborhood income levels ranged from $22,156 to $70,625. Low neighborhood income was categorized as a median household income of <$30,000 per year, medium income was categorized as $30,000-$44,999 per year, and high income was categorized as ≥$45,000 per year. In total, 21 churches were classified as low neighborhood income, 17 as medium, and 16 as high.

Data Analysis

To address our first purpose, descriptive statistics were used to describe the type and number of indoor PA opportunities, outdoor PA opportunities, HE opportunities, and healthy living media present in churches. To address our second purpose, five ANOVA models compared scores for the total church environment, indoor PA opportunities, outdoor PA opportunities, HE opportunities, and healthy living media across neighborhood income levels (low/medium/high). The models accounted for clustering of churches within census tracts and were adjusted for average worship service attendance, block group education level, a dichotomous WalkScore rating (https://www.walkscore.com/), block group urban-rural classification, and intervention group. WalkScore provides a numerical score between 0 and 100 assessing a community environment's walkability characteristics (e.g., distance to

amenities, population density). Scores are also provided to assess proximity to public transit and overall bikeability. Each church's address was entered into WalkScore to provide an additional environmental covariate related to the potential for PA.

Results

Results of the number of indoor PA opportunities, outdoor PA opportunities, HE opportunities, and healthy living media in the churches (n=54) are shown in Table 1. Half of the churches (n=27, 50%) had 4 to 7 out of a possible 14 indoor PA opportunities and more than half of the churches (n=35, 64.8%) had 2 or 3 out of a possible 9 outdoor PA opportunities. Almost all churches (n=48, 88.9%) had 7 to 9 HE opportunities out of a possible 13. Over one-third of churches (n=19, 35.2%) had 0 healthy living media items present out of a possible 4 and only 11 churches (20.4%) had all 4 healthy living media items present.

Tables 2 and 3 show the individual items present in the churches where Table 2 lists potential indoor and outdoor PA opportunities assessed in the churches and Table 3 describes the available potential HE opportunities and healthy living media. In terms of potential indoor PA opportunities, as shown in Table 3, most churches had a fellowship hall/room that could be used for PA (n=51, 94.4%), a stereo/sound system (n=48, 88.9%), and a TV and DVD player or VCR (n=40, 74.1%), but less than half of churches had any additional potential indoor PA opportunities. For potential outdoor PA opportunities, most churches had green/open space (n=48, 88.9%) or vacant land/lot on property (paved, graveled, potential for play; n=42, 77.8%), but less than one quarter of churches had any additional potential outdoor PA opportunities. With respect to potential HE opportunities, as shown in Table 3, all or most churches had a refrigerator (n=54, 100%), sink (n=53, 98.1%), oven (n=52, 96.3%), stovetop (n=52, 96.3%), counter tops (n=51, 94.4%), microwave (n=50, 95.6%), and freezer (n=49, 90.7%). The majority of churches (n=41, 75.9%) also had salt shakers or large salt containers (e.g., for cooking). In terms of healthy living media (lower half of Table 4), over half of churches had a bulletin board displaying HE information (n=31, 57.4%) and a bulletin board displaying PA information (n=30, 55.6%).

Results of the total environment scores for all churches are provided in Table 4. Scores for potential indoor PA opportunities ranged from 2.0–24.0 (M=7.89, SD=3.99), potential outdoor PA opportunities ranged from 0.0–16.0 (M=4.60, SD=2.55), and potential HE opportunities ranged from 5.0–19.0 (M=14.02, SD=2.37). Healthy living media scores ranged from 0.0 to 4.0 (M=1.61, SD=1.50). Out of a maximum possible score of 76, total scores ranged from 18.0 to 52.0 (M=28.12, SD=7.11).

To address our second purpose, Table 5 displays church environment scores across low-, medium-, and high-income neighborhood groups. Although only marginally significant (F=2.94, p=0.06), post hoc analyses suggested that churches in low-income groups (M=7.10, SD=2.84) scored lower for having potential indoor PA opportunities than churches in medium-income (M=8.59, SD=4.36) and high-income (M=8.19, SD=4.87) groups. Indeed, when the medium- and high-income groups with similar potential indoor PA opportunities scores were combined, additional analyses (not shown) revealed that churches in low-

income groups scored significantly (1.29 points) lower (t=−2.39, p=0.02) for potential indoor PA opportunities than their higher income counterparts. Overall, churches in low-income groups had lower absolute scores for potential indoor PA opportunities, HE opportunities, healthy living media, and total scores, and scored higher for potential outdoor PA opportunities compared to churches in high- and medium-income groups (Table 5). However, results of the ANOVA models indicated no statistically significant differences between low-, medium-, and high-income block groups for potential indoor PA opportunities (F=2.94, p=0.06), potential outdoor PA opportunities (F=0.64, p=0.53), potential HE opportunities (F=0.28, p=0.75), healthy living media (F=0.25, p=0.78), or total environment (F=0.54, p=0.58).

Discussion

This study aimed to fill an important gap in the literature addressing the connection between the built environment and health (Jacob Arriola et al., 2016), particularly in faith-based settings. We examined the prevalence of diverse potential PA, HE, and healthy living media items using the Church Environment Audit Tool and analyzed differences in the availability of these potential opportunities across low-, medium-, and high-neighborhood income areas. The findings from this analysis offer insights for tailoring and developing healthy living interventions focused on increasing physical activity and healthy eating based on available resources inside and outside of the church.

The first purpose of this study was to examine the potential healthy living environments of churches in a rural South Carolina county. Overall, most churches had multiple potential indoor and outdoor PA opportunities, HE opportunities, and healthy living media on display that could facilitate health promotion activities and practices. Nearly all churches had a fellowship hall/room, green/open space, and/or vacant land/lot on church property. A fellowship hall/room can facilitate a variety of structured indoor exercise programs for church members or others in the community, while the presence of green/open space and a vacant land/lot on the property can provide a setting for both structured outdoor programs or unstructured activities and play. These resources are important to consider as places to promote health and PA in rural communities where access to exercise facilities may be limited (Fan et al., 2014). In addition, nearly all churches had a combination of kitchen appliances (e.g., refrigerator, oven, freezer.), suggesting the potential for preparing, serving, and storing healthy foods. One study found that rural, Appalachian residents recommended offering educational workshops, cooking classes, or gardens to promote HE (Schoenberg, Howell, Swanson, Grosh, & Bardach, 2013). Therefore, churches with these HE resources may have the ability to prepare healthful foods as well as provide cooking demonstrations and educational sessions. Finally, bulletin boards displaying PA and HE information were the most commonly found healthy living media items found in churches, in part perhaps because this was a required element of the parent intervention. Bulletin boards are a relatively inexpensive addition compared to larger church-level environment changes and can provide easily accessible information and handouts promoting healthy living. In contrast, certain resources within churches may also promote unhealthy eating behaviors; for example, one study found that church bulletins occasionally contained unhealthy diet

messages, potentially promoting unhealthy eating habits in church members (Harmon, Blake, et al., 2014).

The second purpose of this study was to examine the relationship between church environment scores and Census-level neighborhood income. Although not significant, churches within low-income block groups had lower scores for indoor PA opportunities, HE opportunities, healthy living media, and overall environment scores compared to churches from high- or medium-income groups. Previous studies have reported disparities in the quality and access to recreation facilities and parks in low-income areas (Hughey et al., 2017; Sallis et al., 2011). Further, research has suggested that limited environmental resources, particularly in rural areas, may constrain the ability to make healthy living changes (Befort et al., 2012; Cleland et al., 2014; Parks et al., 2003; Richter, Wilcox, Greaney, Henderson, & Ainsworth, 2002). Similarly, such disparities in rural environments may also manifest specifically in differences in the health environments of churches. Consequently, it remains important for practitioners and researchers to consider and understand the socioeconomic milieu of the contexts in which they work when developing healthy living programs.

Further, churches in low-income neighborhoods scored significantly lower for indoor PA opportunities when churches in medium- and high-income areas were combined. Although past research suggests low-income areas have lesser access to and lower quality recreational resources for PA (Hughey et al., 2017; Sallis et al., 2011; Turrell, Haynes, Wilson, & Giles-Corti, 2013), meaningful steps can be taken to improve the disparity revealed in this study. For example, similar to shared or joint use agreements that are growing in number and perceived value (Everett Jones & Wendel, 2015; Omura et al., 2017), future efforts may focus on helping to develop partnerships and programs between churches and other community organizations to share access to resources and opportunities for PA (Hardison-Moody et al., 2017). Additional strategies may include a search for lower-cost, but still high-quality exercise equipment, repurposing and renovating indoor facilities as funds permit, and focusing on other available outdoor resources that can encourage PA among church members.

In contrast, churches in low-income neighborhoods scored slightly higher in potential outdoor PA opportunities compared to high- and medium-income groups. This difference appears counterintuitive compared to previously described comparisons. One possible explanation for the inverse findings in potential outdoor PA opportunities may be that low-income churches are located further from developed city and town centers. Thus, these churches may have been more likely to have green space or vacant land adjacent to the church property (Wen, Zhang, Harris, Holt, & Croft, 2013). If this space is owned by the churches, it may have the potential for providing a place for PA. If not owned by the churches, churches may seek to enact joint-use agreements to share facilities and resources to promote PA (Hardison-Moody et al., 2017). Future research in these rural areas could focus on additional strategies to increase use of nearby, existing areas. As such, understanding these types of differences in the health promotion environments of churches will be beneficial when developing future interventions where particular physical resources may be available or lacking.

This study had several limitations. Our sample of churches came from a predominantly African-American, rural, and low-income county, and thus our findings may not be generalizable to counties with greater variability in race/ethnicity, income, or urbanicity. Likewise, neighborhood income for each church was assigned based on its corresponding Census block group, whereas future studies may wish to investigate the relationship between the household income of church members with church environment scores. Other limitations of this study relate to the audit tool employed to evaluate church environments. For example, while the tool does assess health media within the church for disseminating information to attendees, it does not capture the church's online presence for promoting PA and HE. Due to increased usage of social media and websites for information retrieval and sharing, future additions to the tool may wish to assess online presence and any associated disparities by income. In addition, this newly-developed tool has yet to be applied in other church settings to fully establish its relevance and utility. In addition, while the PA and HE resources contained qualitative follow-up measures, there was no content evaluation or appearance of healthy living media present in the church. Also, with its focus on environmental factors, the tool does not capture actual health behaviors of church members, such as food consumed or the use of physical resources for physical activity or church member interaction with healthy living media on display throughout the church.

Despite these limitations, this study had several notable strengths. First, the study population of churches consisted of predominantly African American congregations. Previous research has determined that African Americans may experience cultural barriers to healthy living (Belza et al., 2004; Bopp et al., 2007; Bopp, Wilcox, Oberrecht, Kammermann, & McElmurray, 2004) possibly contributing to more health disparities. This study reemphasized the unique opportunity of partnering with churches for health promotion efforts as churches can provide contexts for tailored activities connecting religion and faith to the importance of holistic health (Campbell et al., 2007). Second, the study used a newly developed, tested, and reliable tool to objectively assess the healthy living environments of a relatively large number of churches in the understudied context of rural, primarily African American communities (Kaczynski et al., 2018)). This tool can be used in future studies assessing and comparing environments for planning individual and church-level changes for promoting health behaviors. Third, findings of this study will advance knowledge about the influence of the built environment on health by contributing an examination of the physical environment of churches. Finally, we conducted one of the first investigations examining socioeconomic disparities in church environments and the resultant potential for promoting health-related environmental justice.

Future research should investigate ways to assist churches in identifying possible strategies for using existing environmental resources and ameliorating PA and HE inequities, particularly in rural areas. This may include previously-mentioned joint-use agreements as well as pursuing grant programs and partnerships with other local service providers and community coalitions (e.g., health care, education, private business). Also, an updated version of the Church Environment Audit Tool may wish to add follow-up evaluations for the healthy living media in the church (e.g., appearance, number of bulletin boards or tables with PA or HE resources and information). In addition, subsequent studies should test the Church Environment Audit Tool in a more heterogeneous sample of churches. Also, further

identification of average household income for church members (versus block group income of churches) may reveal additional insights about the relationship between income levels and scores on church environments. Furthermore, future studies may investigate additional influences on enhancing the health of church environments, particularly in rural areas. Overall, partnering with faith-based institutions, especially via an ecological approach focused on policies and environmental modifications, has the potential to affect significantly underserved populations in improving individual and community health.

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Compliance With Ethical Standards

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Table 1.

Summary of Items Present in Churches (n=54)

Church Environment Component	Number of Churches	Percent of Sample (%)
Potential Indoor PA Opportunities		
0 – 3	24	44.4
4 – 7	27	50.0
8 – 11	2	3.7
12 – 14	1	1.9
Potential Outdoor PA Opportunities		
0 – 1	11	20.4
2 – 3	35	64.8
4 – 9	8	14.8
Potential HE Opportunities		
0 – 3	0	0.0
4 – 6	4	7.4
7 – 9	48	88.9
10 – 13	2	3.7
Healthy Living Media		
0	19	35.2
1	6	11.1
2	17	31.5
3	1	1.8
4	11	20.4

Table 2.

Potential Indoor and Outdoor Physical Activity Opportunities in Churches (n=54)

Potential Indoor Physical Activity Opportunities	n	%
Fellowship Hall/Room that could be used for physical activity	51	94.4
Stereo/sound system (e.g., CD player, speakers)	48	88.9
TV and DVD player or VCR (i.e., for viewing exercise videos)	40	74.1
Sports sets/equipment (e.g., basketball, volleyball, badminton)	24	44.4
Stairwells or staircases	19	35.2
Activity/aerobic equipment (e.g., hula hoops, jump ropes, Frisbees)	11	20.4
Free weights (e.g., hand weights, dumbbells)	8	14.8
Rubber bands for stretching (e.g., dynabands)	5	9.3
Exercise videos (e.g., Zumba; not Gospel Lift-Off CD)	5	9.3
Yoga mats (e.g., foam or rubber mats for stretching)	3	5.6
Stationary exercise machines (e.g., treadmills, stair steppers)	2	3.7
Bicycles/tricycles/rollerskates/scooters/skateboards	1	1.9
Signs encouraging use of stairs	1	1.9
Active gaming equipment (e.g., Wii Fit)	0	0
Potential Outdoor Physical Activity Opportunities	**n**	**%**
Green/open space	48	88.9
Vacant land/lot on property (paved, graveled, potential for play)	42	77.8
Outdoor sports courts (e.g., tennis, basketball, hopscotch)	13	24.1
Pedestrian scale lighting along sidewalks or walking paths	12	22.2
Walking/bike track or trail (includes marked path on parking lot)	6	11.1
Playground (e.g., swing sets, fixed play equipment)	5	9.3
Active garden space for congregation and/or community	3	5.6
Sports field (e.g., track, soccer, softball)	3	5.6
Bicycle rack parking or shelter	0	0.0

Table 3.

Potential Healthy Eating Opportunities and Media Assessment in Churches (n=54)

Potential Healthy Eating Opportunities	n	%
Refrigerator	54	100.0
Sink	53	98.1
Oven	52	96.3
Stovetop	52	96.3
Counter tops	51	94.4
Microwave	50	95.6
Freezer	49	90.7
Salt shakers or large salt container (e.g., for cooking)	41	75.9
Serving station	24	44.4
Outdoor grill	10	18.5
Deep fat fryer	5	9.3
Healthy cookbooks (e.g., low-fat, healthy, light, or diet on book cover)	5	9.3
Dishwasher	2	3.7
Indoor flat top grill (stationary or portable)	2	3.7
Vegetable, herb, or fruit garden	2	3.7
Healthy Living Media	**n**	**%**
Is there a bulletin board(s) displaying healthy eating information at the church?	31	57.4
Is there a bulletin board(s) displaying physical activity information at the church?	30	55.6
Is there a table(s) displaying healthy eating information at the church?	15	27.8
Is there a table(s) displaying physical activity information at the church?	12	22.2

Table 4.

Church Environment Scores

	Min.	Max.	Mean (SD)
Potential Indoor Physical Activity Opportunities	2.0	24.0	7.89 (3.99)
Potential Outdoor Physical Activity Opportunities	0.0	16.0	4.60 (2.55)
Potential Healthy Eating Opportunities	5.0	19.0	14.02 (2.37)
Healthy Living Media	0.0	4.0	1.61 (1.50)
Total Church Environment	18.0	52.0	28.12 (7.11)

[1]Total maximum possible score for Potential Indoor Physical Activity Opportunities is 28

[2]Total maximum possible score for Potential Outdoor Physical Activity Opportunities is 18

[3]Total maximum possible score for Potential Healthy Eating Opportunities is 26

[4]Total maximum possible score for Healthy Living Media is 4

[5]Total maximum possible score for Total Church Environment is 76

Table 5.

Church Environment Scores Across Neighborhood Income Groups[1]

	Potential Indoor PA[2] Opportunities M (SD)	Potential Outdoor PA[2] Opportunities M (SD)	Potential HE[3] Opportunities M (SD)	Healthy Living Media M (SD)	Total M (SD)
High[4] (n=16)	8.19 (4.87)	4.06 (1.88)	14.44 (1.67)	1.81, (1.56)	28.50 (7.29)
Medium[5] (n=17)	8.59 (4.36)	4.65 (3.50)	13.94 (2.86)	1.82, (1.38)	29.00 (8.27)
Low[6] (n=21)	7.10 (2.84)	4.98 (2.10)	13.76 (2.44)	1.29 (1.55)	27.12 (6.12)
ANOVA					
F	2.94	0.64	0.28	0.25	0.54
p	0.06	0.53	0.75	0.78	0.58

[1] Income determined using American Community Survey 5-year estimates

[2] Physical Activity

[3] Healthy Eating

[4] Median household income ≥$45,000/year

[5] Median household income $30,000-$44,999/year

[6] Median household income <$30,000/year