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Perceived Environmental Church Support and Physical Activity among African American Church Members

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Abstract

Background: Churches are an appealing setting for implementing health-related behavior change programs.

Purpose: To examine the relationship between perceived environmental church support for physical activity (PA) and PA behaviors.

Methods: African American church members from South Carolina ($n=309$) wore an Actigraph accelerometer prior to the initiation of an intervention. Relationships between moderate to vigorous PA (MVPA; counts 1952), light PA (LPA; counts 100–1951), sedentary behavior (counts <100), and perceived environmental church support for PA (total, spoken informational, written informational, instrumental) were examined. Support $\times$ Gender interactions examined whether relationships differed by gender.

Results: The mean age was 54.0 ± 12.3 and mean BMI 32.9 ± 7.2 . On average, participants engaged in 14.4 ± 13.7 min/day of MVPA, 289.8 ± 82.4 min/day of LPA, and were sedentary 548.9 ± 102.2 min/day. Total, spoken informational, and written informational church support were significantly related to higher levels of LPA and lower levels of sedentary behavior in men, but not women. The relationship between written informational support and MVPA approached significance for men but not women. Instrumental church support was not associated with PA behaviors.

Conclusion: The church environment may have an important influence on African American church member's PA behavior, particularly men's, and thus should be targeted in interventions.

Keywords

physical activity; faith-based; church support; accelerometer; church environment

Introduction

The most recent physical activity (PA) recommendations state that to confer substantial health benefits, every American adult should accumulate at least 150 minutes of moderate intensity PA, 75 minutes of vigorous intensity PA or an equivalent combination of moderate to vigorous PA (MVPA) per week (U.S. Department of Health and Human Services, 2008). A large percentage of adults in the United States do not engage in the recommended amounts of PA necessary to promote and maintain health (Centers for Disease Control and Prevention, 2009). African Americans are less likely to report engaging in regular PA as compared to whites (Centers for Disease Control and Prevention, 2009), likely contributing to the disparities in chronic diseases such as cardiovascular disease, stroke, high blood pressure, cancer, diabetes, and obesity (Roger et al., 2012).

Developing and implementing effective PA interventions should be a top priority, given the potential public health impact that increases in PA could have on preventing disease and premature death (U.S. Department of Health and Human Services, 2008). A critical part in developing effective interventions that can successfully increase population levels of PA includes understanding which factors influence PA participation. Although PA research has traditionally focused on how individual-level factors influence PA (e.g. self-efficacy, social support), there is also strong evidence supporting the importance of the environment, particularly the built environment, in influencing health behaviors such as PA (Sallis, Floyd, Rodriguez, & Saelens, 2012). Ecological models recognize that behavior is influenced by both the individual and the environment in which the individual lives (Cohen, Scribner, & Farley, 2000; McLeroy, Bibeau, Steckler, & Glanz, 1988). For example, the structural ecological model (Cohen, et al., 2000) posits that behavior is influenced by the availability and accessibility of products, physical structures, social structures and policies, and media and cultural messages. A closer examination of these types of structural factors may provide insight into more effective ways to influence and change targeted behaviors (e.g. PA, diet).

The church plays a significant role in the lives of African Americans and has traditionally been an important source of support (Giger, Appel, Davidhizar, & Davis, 2008; Kim & McKenry, 1998; Taylor & Chatters, 1986). Historically, the church is a place where African Americans can feel safe, even during the hardest of times (Giger, et al., 2008). Furthermore, the church has been the setting for health-related education and the provision of health care services (Giger, et al., 2008). Thus, the church may be a promising setting for implementing health-related behavior change programs. Pastors, health directors, and other church leaders can create a supportive environment and develop policies that encourage and promote a healthy lifestyle.

More recently, studies have examined how the environment and policies of particular settings (e.g. schools, child care settings) influence PA. For example, studies have shown that the environment and policies of child care centers are associated with physical activity

levels of preschool-aged children (Dowda et al., 2009; Trost, Ward, & Senso, 2010). The environment and policies of churches, particularly in the African American community, may influence the PA levels of its members in a similar manner. Despite the significant role of the church in the African American community, very few studies have examined the relationship between the church environment and PA levels of its members. Further exploration of the role of the church environment in promoting PA behavior in African Americans is needed, as the church could potentially be an important partner in reducing disease risk in African Americans. The purpose of this study was to examine the relationship between perceived environmental church support for PA and objectively measured PA, and to examine if these relationships differed by gender.

Methods

The Faith, Activity, and Nutrition (FAN) program is a 5-year PA and nutrition intervention implemented in African Methodist Episcopal (AME) churches. FAN uses a community-based participatory research approach to increase MVPA and fruit and vegetable consumption, and to improve blood pressure in AME churches (Wilcox et al., 2010). The intervention targets are guided by the structural ecologic model (Cohen, et al., 2000). This study uses baseline data only (prior to the initiation of the intervention) that were collected from 2007–2009.

Church Recruitment & Measurement Sessions

More details on the methods and design of FAN have been reported elsewhere (Wilcox, et al., 2010). Briefly, letters introducing the FAN program from the Presiding Elders of four geographically-defined districts in South Carolina were mailed to pastors within their districts. Pastors typically asked the health director or another church member (FAN coordinator) to act as the liaison between the church and the FAN program staff to schedule and coordinate measurement sessions. The liaisons from interested churches were asked to recruit members of their congregation to take part in a measurement session. At each measurement session, participants completed an informed consent form that was approved by the Institutional Review Board at the University of South Carolina and by the FAN planning committee (University and church members). To be eligible, participants had to be at least 18 years of age, be free of serious medical conditions or disabilities that would make PA difficult, and attend worship services at least once a month.

Upon receiving a signed consent form from each participant, FAN staff administered physical assessments with each participant. In addition, participants were asked to complete a survey that assessed sociodemographic characteristics; PA, dietary, and other health-related practices; and psychosocial variables. A subsample of the participants taking part in the evaluation were randomly chosen to wear an ActiGraph accelerometer (ActiGraph, LLC, Fort Walton Beach, FL) during all waking hours for 5–7 days following the measurement session.

Measures

Sociodemographic and Health-related Variables: Participants were asked to self-report their age, gender, race, marital status, and highest grade or years of education completed. Participants also rated their general health status on a scale from 1 (excellent) to 5 (poor).

Physical Activity: The ActiGraph accelerometer (GT1M model, ActiGraph, LLC, Fort Walton Beach, FL) was used to objectively measure PA. Participants were instructed to wear the ActiGraph on their right hip during all waking hours (except in water) for 5–7 consecutive days. A 60-second epoch was used. As recommended by Trost, McIver, & Pate, (2005) ActiGraph data were only included in analyses if participants wore the monitor for a minimum of three days (at least one week day and one weekend day) and for at least 10 hours per day. ActiGraph data recording zeros consecutively for 60 minutes or more were removed from the analyses; we assumed the monitor was not being worn during this time (Masse et al., 2005; Matthews et al., 2008).

Freedson, Melanson, & Sirad's (1998) cutpoints were used to convert the count data into mean minutes of PA per day. Counts 1952–5724 per minute were considered MVPA and counts 5725 per minute were considered vigorous intensity PA. As defined by Matthews et al. (2008), sedentary behavior was considered counts <100 per minute. Therefore counts of 100–1951 per minute were considered LPA. Mean minutes of MVPA, LPA, and sedentary behavior were used in this study. The percentage of participants meeting PA recommendations (i.e. 150 minutes of MVPA in 10 minute bouts) (U.S. Department of Health and Human Services, 2008) was also calculated.

Freedson et al. (1998) assessed the validity of the CSA (ActiGraph) Model 7164 in a sample of adults, across three speeds on the treadmill (slow walk, fast walk, jog). They found that activity counts were highly correlated with energy expenditure ($r = 0.93$) across all speeds.

Perceived Environmental Church Support for Physical Activity: Because an existing church support scale was not available in the literature, we developed 7 items, using a four point response scale ranging from 1 (rarely or never) to 4 (most or all of the time), that assessed support for PA over the past 12 months. Items that had face validity were developed to capture important types and sources of support in church settings based on experiences from a previous faith-based project (Wilcox, Laken, Anderson, et al., 2007; Wilcox, Laken, Bopp, et al., 2007), input from church leaders and lay members, and the guiding theory for our intervention (Cohen, et al., 2000).

Exploratory factor analysis in our sample revealed acceptable factor loadings for scales that were named instrumental (two items), spoken informational (two items), written informational (3 items) and total (seven items) church support. See Table 1 for a list of all items used to assess perceived environmental church support and the factor loadings for each scale. Instrumental support assessed opportunities for PA at church or church-related events. Spoken informational support assessed the provision of verbal messages targeting PA by church leaders. Written information support assessed written media messages targeting PA. Total church support was an overall assessment of church support and was the average of all

items. Internal consistency was high for the instrumental support ($\alpha=0.77$), spoken informational support ($\alpha=0.69$), written informational support ($\alpha=0.88$), and total church support ($\alpha=0.83$) scales. A mean score for each type of support was calculated by adding scores from each item included in the scale and dividing by the number of items included.

Body Mass Index (BMI): Height to the nearest quarter inch and weight to the nearest 1/10 kilogram were obtained by trained staff. Body mass index (BMI) was calculated as kg/m^2 using standard procedures.

Statistical Analyses—A square-root transformation corrected skewness in the measure of MVPA. Basic descriptive statistics (frequencies for categorical variables, means and standard deviations for numeric variables) were performed for key survey variables. Independent sample t-tests were used to examine differences in support measures and PA between men and women.

To account for the dependency among participants from the same church, associations between church support and PA were tested using multiple regression models using SAS PROC MIXED, with PA as the dependent variable. A separate model was conducted for each measure of church support and each type of PA, and all models controlled for gender, age, years of education, health rating, BMI, and monitor wear time. The support x Gender interaction was included to examine whether the association between church support and PA differed by gender; specific comparisons involving levels of support and gender were used to facilitate interpretation of interactions. Analyses were conducted in 2010.

Results

At baseline, 496 participants were randomly chosen to wear the Actigraph, and 436 agreed to wear the monitor. Of these, 30 participants did not return the monitor and 70 did not meet wear time requirements, leaving 336 participants with usable data. Of these, 27 participants did not have complete study data (e.g. covariates, support measures). As shown in Table 2, 309 participants from 61 churches were included in this study. The mean age was 54.0 ± 12.3 years and the mean BMI was $32.7 \pm 7.2 \text{ m/kg}^2$. A majority of participants were female (78%), had at least some college education (65%), and were overweight or obese according to his/her BMI (91%). On average, participants wore the monitor for 14.2 ± 1.6 hours/day and engaged in 14.4 ± 13.7 min/day of MVPA, 289.8 ± 82.4 min/day of LPA, and were sedentary 548.9 ± 102.2 min/day; only 3.9% of participants met PA recommendations. Men had a significantly higher BMI ($p=0.002$) and engaged in significantly more min/day of MVPA than women ($p=0.01$).

Table 2 shows the mean perceived environmental church support scores (total, instrumental, spoken informational, written informational) for the total sample and for men and women separately. Men reported significantly greater levels of total church support ($p=0.001$), instrumental church support ($p=0.01$), spoken informational support ($p=0.04$), and written informational church support ($p=0.01$) than women.

Relationship between Environmental Church Support and PA

Table 3 shows the estimates, standard errors, and p-values for each regression model examining the relationship between PA behaviors and perceived environmental church support. There was a significant Church support x Gender interaction for LPA ($p=0.03$) and sedentary behavior ($p=0.02$). Follow-up analyses for LPA indicated a significant, positive relationship for men ($p=0.04$), but no relationship for women ($p=0.47$). Follow-up analyses for sedentary behavior indicated a significant, negative relationship for men ($p=0.002$), but no relationship for women ($p=0.49$). There was no relationship between total church support and MVPA.

There was a significant Spoken Informational support x Gender interaction for LPA ($p=.02$) and sedentary behavior ($p=.02$). Follow-up analyses for LPA indicated a significant, positive relationship for men ($p=0.01$), but no relationship for women ($p=0.81$). Follow-up analyses for sedentary behavior indicated a significant, negative relationship for men ($p=0.01$), but no relationship for women ($p=0.83$). There was no relationship between total church support and MVPA.

There was a significant Written Informational support x Gender interaction for LPA ($p=0.01$) and sedentary behavior ($p=0.002$). Follow-up analyses for LPA indicated a significant, positive relationship for men ($p=0.001$), but no relationship for women ($p=0.68$). Follow-up analyses for sedentary behavior indicated a significant, negative relationship for men ($p=0.0002$), but no relationship for women ($p=0.71$). The written Informational support x Gender interaction approached significance for MVPA ($p=0.06$). Although not significant, it is suggestive that the relationship between LPA and written information support may vary by gender. Follow-up analyses were conducted to more closely examine the relationship and indicated a significant, positive relationship for men ($p=0.02$), but no relationship for women ($p=0.71$).

No relationship between instrumental church support and MVPA, LPA, or sedentary behavior was found.

Discussion

The importance of the church to African Americans, combined with the significant amount of time dedicated to the church by many members, makes the church a fitting target for interventions focusing on changing health behaviors. A considerable proportion of South Carolinian African Americans are affiliated with the AME church, making it a powerful means of reaching a large proportion of an at risk population within state. Interventions aimed at changing the physical and social environments, as well as policy, are an appealing approach for increasing PA, as all individuals exposed to the intervention can benefit, and interventions can be delivered in a culturally relevant manner (e.g. using scripture, gospel music). This study examined the relationship between perceived environmental church support and objectively measured PA in a sample of African American adults. Results from this study demonstrate the potential importance of a supportive church environment for more favorable PA behaviors among African American men.

We were surprised to find that the relationship between various types of church support existed for men but not women. Creating a church environment conducive to PA targets the entire congregation, exposing individuals who may not seek out support or individuals who tend not to ask for support. Church support for PA may be more important for men because they may have a more difficult time asking for support when needed (Krause, Ellison, & Marcum., 2002). The church, and the leaders within the church, may offer support in a manner that is more comfortable or acceptable to them (Krause, et al., 2002). Support for PA can be integrated into the organization of the church and its associated activities (e.g. sermons, Bible study, worship bulletins), making it unnecessary to explicitly ask for individualized support. It is also possible that women get support for PA outside of the church (e.g. from friends, family, co-workers) and thus do not need or rely on support for PA from the church. Perhaps these other sources of support are more important for women. Additional studies are needed to further explore possible gender differences in the church support – PA relationship.

African American men attending churches with supportive PA environments engaged in greater amounts of LPA and less sedentary behavior, supporting the idea that targeting the church environment may be a way to change certain PA behaviors in this population. The paucity of findings for MVPA, with the exception of written informational support which approached significance, could be explained in part by the exceptionally low levels, and thus restricted range, of MVPA in our population. Our sample engaged in a mean of 14 minutes of MVPA per day and only 4% of our sample met PA recommendations (U.S. Department of Health and Human Services, 2008). Although MVPA is indisputably important, studies have found that LPA (Healy et al., 2007) and sedentary behavior (Katzmarzyk, 2010), independent of MVPA levels, are also associated with health outcomes. Promoting LPA and less sedentary behavior, which can be beneficial to health, may be a more realistic starting point in a very sedentary population such as this one.

Pastors are the guiding force in African American churches (Demark-Wahnefried et al., 2000), and because they are viewed as respected gatekeepers, they are well-suited for organizing and invigorating health behavior change (e.g. PA) (Clay, Newlin, & Leeks, 2005). Pastors believe they have influence over their congregation when it comes to issues related to health and wellness, and most want to be a role model to their congregants. Studies have shown that faith leaders' own PA behaviors and their beliefs about PA are related to environmental church factors such as offering health/wellness activities and using health messages at church (Bopp & Fallon, 2011; Williams, Glanz, Kegler, & Davis, 2012). Encouraging pastors, health directors, and other church leaders to engage in healthy behaviors themselves, and to create an environment that supports PA may be an effective way of increasing PA levels among its members. Our findings suggest that pastors may have an even greater influence over men when it comes to PA behaviors.

Written and spoken informational support were associated with higher levels of LPA and lower levels of sedentary behavior for men but not women, whereas written informational support approached significance for MVPA for men but not women. Church leaders (Williams, et al., 2012) and church members (Kegler et al., 2010) believe it is appropriate for church leaders to discuss PA with their congregation; despite this, church members report

that pastors rarely discuss it in sermons and messages. Making PA-related information available (e.g. amount of PA recommended, benefits of PA, intensity, examples of exercises to do, risks associated with sedentary behavior) may encourage church members to participate in PA. Churches can provide informational support for PA in a number of ways. They can post information on the church bulletin board, encourage church leaders to preach about the importance of PA from the pulpit, place inserts about PA in the church bulletin, or have additional handouts about PA available for church members. These types of informational support activities can reach a large number of people, and furthermore, people who may be less open or receptive to participating in PA interventions may be inadvertently exposed to PA messages if they are incorporated into existing church practices.

To our surprise, instrumental church support was not associated with physical activity behaviors for men or women. Time is a major barrier to PA among all adults, including African Americans (Bopp et al., 2006; Eyler et al., 2002; Nies, Vollman, & Cook, 1999; Walcott-McQuigg & Prohaska, 2001; Wilcox, Richter, Henderson, Greaney, & Ainsworth, 2002). Both men and women participating in our study are busy with work, family, and other obligations. Therefore, it seemed logical that offering opportunities to be active at church would be associated with higher levels of PA. However, time at church services and events (and thus opportunities for PA) likely account for a relatively small portion of 'leisure' or non-work time by our participants. Furthermore, unique barriers may discourage participants from wanting to be physically active during church services or events (e.g. sweating in church clothes, messing up hair). Finally, there was not much variability in the instrumental church support measure, which may make it difficult to detect a relationship. A majority of participants reported that opportunities for PA at church services or church events were rarely offered. Therefore, the potential importance of instrumental support should not necessarily be discounted. Opportunities for PA at church or church events is a target of our intervention so we will be able to examine whether we are able to increase opportunities, and whether that translates into PA changes.

Very few studies have examined the influence of the church environment on PA levels. Kanu, Baker, & Brownson (2008) found no association between church-based informational (e.g. "does your church ever include health messages about PA in the church bulletin distributed during weekly services?") or instrumental (e.g. "which if any, of these programs does your church sponsor?") support and meeting PA recommendations. However they did find that certain forms of church-based instrumental support were associated with performing "some" versus "no" PA. The lower percentage of African Americans in their sample (39%) versus ours could explain differences in findings. Wilcox et al. (2007) found that African American church members who reported pastor support of PA participated in significantly higher amounts of moderate PA. Bopp et al. (2009) found that African American church members who reported PA programs in their church were more likely to meet PA recommendations than those who reported no programs. However, there was no relationship between the pastor participating in the programs or the health director talking about PA and meeting PA recommendations (Bopp, et al., 2009). Unfortunately, none of these studies examined gender differences.

This study was unique in several ways, including its objective measure of PA. Second, very few studies have examined the importance of the church environment in being conducive to and encouraging PA, and no studies have examined gender differences, which may be important. We were able to examine the relationship between PA and specific *types* of perceived environmental church support, for men and women separately. Given the importance of the church in the African American population, the church may be an important avenue for PA support and needs to be assessed regularly.

We also recognize study limitations. First, this study was cross sectional in nature, thus we cannot imply that greater amounts of church support caused higher levels of PA. Second, this study included a volunteer sample; it is possible that those who volunteered to participate were more active than those opting not to participate. The PA levels of our sample may actually be higher relative to the PA levels of the population from which our sample was taken, further substantiating the need for public health efforts aimed at increasing PA in this population. Third, men were underrepresented in our sample. This is common in many intervention studies, and may be particularly common in faith-based studies, as women are more likely than men to attend church. Despite the underrepresentation from men, significant relationships still existed, perhaps pointing to the strength of these relationships. Fourth, due to study timelines and other logistics, it was not feasible to validate the church support measure used in this study. Although results from the factor analysis and test for internal consistency support the construct validity and reliability of the measure used in this study, future studies are needed to validate this or other environmental church support measures. Fifth, our sample was older, more educated, and more overweight/obese compared to the African American population in South Carolina (South Carolina Department of Health and Environmental Control, 2009) which may limit the generalizability of our findings. Finally, as with any measure of PA, there are some inherent limitations of using accelerometers including participant non-compliance, the inability to capture particular types of PA (e.g., swimming, resistance training), and the inability to capture contextual information. These limitations should be considered when interpreting the findings from this study.

Implications for Practice

A unique strength of the African American community is the importance of the church and faith. Over half of African Americans (53%) report attending religious services one or more times a week (Pew Research Center, 2008); the large potential reach, including the reach of those who may not be interested in health-related activities but may be exposed inadvertently, make churches an appealing setting for delivering health promotion programs to the African American community. Churches can implement programs and activities that are culturally relevant, spiritually tailored, and appropriate according to the wants and needs of their particular congregation. Our findings suggest that future studies should encourage churches to provide an environment that is supportive of and conducive to being active. Simple, low-cost, and low-burden activities, such as providing information about PA, asking the pastor to talk about PA from the pulpit, or incorporating PA into church services/activities may be an effective means of promoting PA, and thus the health, of its members,

particularly men. Being mindful of the many demands pastors and other church leaders face, these types of activities can be incorporated into existing church events or activities.

Conclusions

The findings from this study offer preliminary evidence pointing to the potential importance of the social and physical church environments in promoting PA in its members, particularly men. A novel approach to increasing PA may be modifying the church environment in a way so that it provides opportunities, information, encouragement, and policies for PA for its members. However, additional studies examining the relationship between the church environment and PA, including studies examining gender differences, are warranted in an effort to better understand which types of church support may be most useful. Collectively, findings from such studies can be used to inform future faith-based interventions guided by ecological models.

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References

- Bopp M, & Fallon EA (2011). Individual and institutional influences on faith-based health and wellness programming. *Health Education Research*, 26, 1107–1119. [PubMed: 21984225]
- Bopp M, Wilcox S, Laken M, Butler K, Carter RE, McClorin L, & Yancey A (2006). Factors associated with physical activity among African-American men and women. *American Journal of Preventive Medicine*, 30, 340–346. [PubMed: 16530622]
- Bopp M, Wilcox S, Laken M, & McClorin L (2009). Physical activity participation in African American churches. *Journal of Cultural Diversity*, 16, 26–31. [PubMed: 20669400]
- Centers for Disease Control and Prevention. (2009). Behavioral Risk Factor Surveillance System Survey Data Atlanta, Georgia: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention.
- Clay KS, Newlin K, & Leeks KD (2005). Pastors’ wives as partners: An appropriate model for church-based health promotion. *Cancer Control*, 12, 111–115.
- Cohen DA, Scribner RA, & Farley TA (2000). A structural model of health behavior: a pragmatic approach to explain and influence health behaviors at the population level. *Preventive Medicine*, 30, 146–154. [PubMed: 10656842]
- Demark-Wahnefried W, McClelland JW, Jackson B, Campbell MK, Cowan A, Hoben K, & Rimer BK (2000). Partnering with African American churches to achieve better health: lessons learned during the Black Churches United for Better Health 5 a Day project. *Journal of Cancer Education*, 15, 164–167. [PubMed: 11019765]

- Dowda M, Brown WH, McIver KL, Pfeiffer KA, O'Neill JR, Addy CL, & Pate RR (2009). Policies and characteristics of the preschool environment and physical activity of young children. *Pediatrics*, 123, e261–266. [PubMed: 19171578]
- Eyler AA, Matson-Koffman D, Vest JR, Evenson KR, Sanderson B, Thompson JL, ... Young DR (2002). Environmental, policy, and cultural factors related to physical activity in a diverse sample of women: The Women's Cardiovascular Health Network Project--summary and discussion. *Women and Health*, 36, 123–134. [PubMed: 12487145]
- Freedson PS, Melanson E, Sirard J (1998). Calibration of the Computer Science and Applications, Inc. Accelerometer. *Medicine and Science in Sports and Exercise*, 30, 777–781. [PubMed: 9588623]
- Giger JN, Appel SJ, Davidhizar R, & Davis C (2008). Church and spirituality in the lives of the African American community. *Journal of Transcultural Nursing*, 19, 375–383. [PubMed: 18650398]
- Healy GN, Dunstan DW, Salmon J, Cerin E, Shaw JE, Zimmet PZ, & Owen N (2007). Objectively measured light-intensity physical activity is independently associated with 2-h plasma glucose. *Diabetes Care*, 30, 1384–1389. [PubMed: 17473059]
- Kanu M, Baker E, & Brownson RC (2008). Exploring associations between church-based social support and physical activity. *Journal of Physical Activity and Health*, 5, 504–515. [PubMed: 18648116]
- Katzmarzyk PT (2010). Physical activity, sedentary behavior, and health: paradigm paralysis or paradigm shift? *Diabetes*, 59, 2717–2725. [PubMed: 20980470]
- Kegler MC, Escoffery C, Alcantara IC, Hinman J, Addison A, & Glanz K (2010). Perceptions of Social and Environmental Support for Healthy Eating and Physical Activity in Rural Southern Churches. *Journal of Religion and Health*
- Kim HK, & McKenry PC (1998). Social networks and support: a comparison of African Americans, Asian Americans, Caucasians, and Hispanics. *Journal of Comparative Family Studies*, 29, 313.
- Krause N, Ellison CG, & Marcum JP (2002). The effects of church-based emotional support on health: Do they vary by gender? *Sociology of Religion*, 63, 21–47.
- Masse LC, Fuemmeler BF, Anderson CB, Matthews CE, Trost SG, Catellier DJ, & Treuth M (2005). Accelerometer data reduction: a comparison of four reduction algorithms on select outcome variables. *Medicine and Science in Sports and Exercise*, 37, S544–S554. [PubMed: 16294117]
- Matthews CE, Chen KY, Freedson PS, Buchowski MS, Beech BM, Pate RR, & Troiano RP (2008). Amount of time spent in sedentary behaviors in the United States, 2003–2004. *American Journal of Epidemiology*, 167, 875–881. [PubMed: 18303006]
- McLeroy KR, Bibeau D, Steckler A, & Glanz K (1988). An ecological perspective on health promotion programs. *Health Education Quarterly*, 15, 351–377. [PubMed: 3068205]
- Nies MA, Vollman M, & Cook T (1999). African American women's experiences with physical activity in their daily lives. *Public Health Nursing*, 16, 23–31. [PubMed: 10074819]
- Pew Research Center. (2008). U.S. Religious Landscape Survey. Religious Beliefs and Practices: Diverse and Politically Relevant Washington DC: Pew Forum on Religion & Public Life.
- Prochaska JO, DiClemente CC, & Norcross JC (1992). In search of how people change. Applications to addictive behaviors. *American Psychologist*, 47, 1102–1114. [PubMed: 1329589]
- Roger VL, Go AS, Lloyd-Jones DM, Benjamin EJ, Berry JD, Borden WB, ... Turner MB (2012). Heart disease and stroke statistics—2012 update: a report from the American Heart Association. *Circulation*, 125, e2–e220. [PubMed: 22179539]
- Sallis JF, Floyd MF, Rodriguez DA, & Saelens BE (2012). Role of built environments in physical activity, obesity, and cardiovascular disease. *Circulation*, 125, 729–737. [PubMed: 22311885]
- South Carolina Department of Health and Environmental Control. (2009). South Carolina Behavioral Risk Factor Surveillance System Columbia, SC.
- Taylor RJ, & Chatters LM (1986). Patterns of informal support to elderly black adults: Family, friends, and church members. *Social Work*, 31, 432–438.
- Trost SG, McIver KL, & Pate RR (2005). Conducting accelerometer-based activity assessments in field-based research. *Medicine and Science in Sports and Exercise*, 37, S531–S543. [PubMed: 16294116]

- Trost SG, Ward DS, & Senso M (2010). Effects of child care policy and environment on physical activity. *Medicine and Science in Sports and Exercise*, 42, 520–525. [PubMed: 20068496]
- U.S. Department of Health and Human Services. (2008). 2008 Physical Activity Guidelines for Americans (ODPHP Publication No. U0036). Retrieved from <http://www.health.gov/paguidelines/pdf/paguide/pdf>
- Walcott-McQuigg JA, & Prohaska TR (2001). Factors influencing participation of African American elders in exercise behavior. *Public Health Nursing*, 18, 194–203. [PubMed: 11359621]
- Wilcox S, Laken M, Anderson T, Bopp M, Bryant D, Carter R, ... Yancey A (2007). The health-e-AME faith-based physical activity initiative: Description and baseline findings. *Health Promotion Practice*, 8, 69–78. [PubMed: 16885511]
- Wilcox S, Laken M, Bopp M, Gethers O, Huang P, McClorin L, ... Yancey A (2007). Increasing physical activity among church members: community-based participatory research. *American Journal of Preventive Medicine*, 32, 131–138. [PubMed: 17234487]
- Wilcox S, Laken M, Parrott AW, Condrasky M, Saunders R, Addy CL, ... Samuel M (2010). The faith, activity, and nutrition (FAN) program: design of a participatory research intervention to increase physical activity and improve dietary habits in African American churches. *Contemporary Clinical Trials*, 31, 323–335. [PubMed: 20359549]
- Wilcox S, Richter DL, Henderson KA, Greaney ML, & Ainsworth BE (2002). Perceptions of physical activity and personal barriers and enablers in African-American women. *Ethnicity & Disease*, 12, 353–362. [PubMed: 12148706]
- Williams RM, Glanz K, Kegler MC, & Davis E, Jr. (2012). A study of rural church health promotion environments: leaders' and members' perspectives. *Journal of Religion and Health*, 51, 148–160. [PubMed: 19960262]

Table 1.

Environmental Church Support Items and Factor Loadings for each Scale

Item	Total	Instrumental	Spoken Informational	Written Informational
1. How often has physical activity been included before, during, or right after worship service?	0.42	0.71		
2. How often has physical activity been included before, during, or right after a church meeting or event (other than worship services)?	0.44	0.71		
3. How often has your Pastor spoken about physical activity during worship services?	0.58		0.63	
4. How often has the Health Director or someone other than the Pastor spoken about physical activity during worship services?	0.70		0.63	
5. How often has your church included written information about physical activity in the Sunday bulletin?	0.76			0.82
6. How often has your church provided written handouts or brochures about physical activity?	0.78			0.81
7. How often have you seen information on your church bulletin board about physical activity?	0.77			0.81

Note: All items were scored on a 4 point response scale.

Response items: Rarely or never, Sometimes, Often, Most or all of the time

Table 2.

Demographic and Health-related Variables of Participants

	Total Sample (N=309)			Men (N=67)			Women (N=242)		
	n	% or Mean (SD)	n	% or Mean (SD)	n	% or Mean (SD)			
Age, years	309	54.0 (12.3)	67	54.9 (12.8)	242	53.7 (12.2)			
Education									
Less than HS graduate	29	9.4	8	11.9	21	8.7			
HS grad or GED	78	25.2	19	28.4	59	24.4			
Some college (1–3 years)	105	34.0	21	31.3	84	34.7			
College graduate (4+ years)	97	31.4	19	28.4	78	32.2			
Marital status									
Married	168	54.4	42	62.7	126	52.1			
Not married	141	45.6	25	37.3	116	47.9			
BMI, kg/m ² **	309	32.7 (7.2)	67	30.3 (6.3)	242	33.4 (7.3)			
Weight status **									
Normal weight (BMI<25)	29	9.4	9	13.4	20	8.3			
Overweight (25 BMI<30)	95	30.7	31	46.3	64	26.5			
Obese (BMI ≥30)	185	59.9	27	40.3	158	65.3			
Physical Activity Recommendations									
Met PA Recommendations	12	3.9	3	4.5	9	3.7			
Did not Meet Recommendations	297	96.1	64	95.5	233	96.3			
MVPA (min/day) **	309	14.4 (13.7)	67	18.3 (17.4)	242	13.4 (12.3)			
Light PA (min/day)	309	289.8 (82.4)	67	288.6 (93.1)	242	290.2 (79.3)			
Sedentary Behavior (min/day)	309	548.9 (102.2)	67	565.9 (123.1)	242	544.2 (95.3)			
Church **	309	1.9 (0.6)	67	2.1 (0.7)	242	1.9 (0.6)			
Instrumental **	309	1.5 (0.7)	67	1.7 (1.0)	242	1.4 (0.6)			
Spoken Informational **	309	2.3 (0.9)	67	2.5 (0.8)	242	2.3 (0.9)			
Written Informational **	309	2.0 (0.8)	67	2.2 (0.9)	242	1.9 (0.8)			

Note: Support scores range from 1 (rarely or never) to 4 (most or all of the time)
** Significant gender difference $p < .05$

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Table 3.

Relationship between Perceived Environmental Church Support and Physical Activity

Support Variable	*MVPA		Light PA		Sedentary	
	Estimate (SE)	p-value	Estimate (SE)	p-value	Estimate (SE)	p-value
Church	0.10 (0.17)	0.13	5.76 (7.99)	0.005	-6.04 (8.66)	0.004
Total x Gender	0.30 (0.33)	0.35	32.09 (14.99)	0.03	-36.91 (16.26)	0.02
Spoken Info	0.04 (0.12)	0.49	1.31 (5.60)	0.01	-1.31 (6.08)	0.01
Spoken Informational x Gender	0.12 (0.26)	0.66	28.87 (12.11)	0.02	-31.22 (13.16)	0.02
Written Info	0.05 (0.13)	0.03	2.50 (6.09)	0.002	-2.41 (6.59)	0.001
Written Informational x Gender	0.47 (0.25)	0.06	32.83 (11.62)	0.01	-38.95 (12.58)	0.002
Instrumental	1.38 (1.34)	0.48	11.63 (7.47)	0.21	-13.04 (8.11)	0.20
Instrumental x Gender	-1.17 (2.18)	0.59	-7.66 (12.12)	0.53	8.88 (13.16)	0.50

* Square-root transformed value was used.

SE, standard error

Note: all models controlled for gender, age, years of education, health rating, and body mass index (BMI)