8 Steps to Fitness: A Faith-Based, Behavior Change Physical Activity Intervention for African Americans

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Background: Physical activity (PA) participation offers many benefits especially among ethnic groups that experience health disparities. Partnering with faith-based organizations allows for a more culturally tailored approach to changing health behaviors. Methods: 8 Steps to Fitness was a faith-based behavior-change intervention promoting PA among members of African American churches. A quasi-experimental design was used to examine differences between the intervention group (n=72) and comparison group (n = 74). Health (resting blood pressure, body mass index, waist-hip ratio, fasting blood glucose), psychosocial (PA self-efficacy, social support, enjoyment, self-regulation, depression), and behavioral variables (PA, diet) were assessed at baseline, 3- and 6-months. Repeated measures ANCOVAs tested changes across time between groups. Results: At 3-months, the intervention group showed significantly more favorable changes in body mass index, waist circumference and social support than the control group. At 6-months, the intervention group showed significantly more favorable changes in hip circumference, waist to hip ratio, systolic blood pressure, and depressive symptoms. There was notable attrition from both the intervention (36%) and the comparison group (58%). Conclusions: This study was conducted in a real-world setting, and provided insight into how to deliver a culturally-tailored PA intervention program for African Americans with a potential for dissemination.

Keywords: ethnic minority, church, health disparities, culturally tailored

When compared with Caucasians, African Americans are disproportionately affected by most forms of cancer, diabetes, cardiovascular disease, hypertension, and stroke. Although regular physical activity (PA) participation can offer protection against these chronic diseases, only 40% of African Americans in the US are meeting the Centers for Disease Control and American College of Sports Medicine (CDC/ACSM) recommendations for PA participation, while 33% report no leisure time PA.

Although many effective PA interventions exist, relatively few programs have included African Americans as participants, and fewer still were designed specifically for African Americans. Two reviews of PA interventions targeting PA participation among African American participants reported moderate success in improving behavior. Several of the reviewed studies reported improvements in either PA participation or clinical outcomes, though many had methodological limitations or lacked long-term follow-up. The authors noted that a number of the studies made some reference to the degree of cultural tailoring or appropriateness.

Health behavior interventions targeting African Americans through faith-based organizations (FBOs) are becoming more popular. These organizations have been included as partners for health promotion programs because African Americans have high levels of religiosity, are more likely to attend church and use religion as a coping strategy, and indicate that religion or prayer contributes to their physical health. Furthermore, FBO’s often have resources available to support already established social support networks whose health promotion programs often coincide with the mission of the
church to foster the mental, physical and spiritual well-being of its members.\textsuperscript{7}

Health promotion programs partnering with African American FBOs have been moderately successful. These programs have targeted dietary habits, PA, smoking, chronic disease management, health screening, and risk factor management. Although interventions have included PA as a part of weight loss interventions,\textsuperscript{8,9} CVD risk factor modification,\textsuperscript{10} or reducing cancer risk,\textsuperscript{11,12} PA is not typically the major outcome of interest. An exception was Healthy Body/Healthy Spirit. This study compared a culturally tailored self-help intervention to standard behavioral materials and was successful in increasing PA behavior among participants in the culturally tailored intervention.\textsuperscript{13} Other recent studies have examined the feasibility of delivering a faith-based physical activity intervention.\textsuperscript{14} These and other studies indicate that faith-based interventions offer a possibility for a greater public health impact if they are designed to be sustainable and easily disseminated given the ability to reach underserved populations that may not be easily targeted with other settings or strategies.

The purpose of this study was to evaluate the effects of an 8-week behavior change intervention, “8 Steps to Fitness” (included as 1 program within a larger faith-based intervention), on PA behavior, psychological and health outcomes, and dietary measures relative to a comparison group.

\section*{Methods}
\subsection*{Description of the Health-e-AME Physical-e-Fit Program and 8 Steps to Fitness}

The Health-e-AME Physical-e-Fit program used a community-based participatory model to implement and evaluate a faith-based PA initiative among African Methodist Episcopal (AME) churches in South Carolina. The main goals of the Physical-e-Fit program were to increase members’ awareness of the importance of PA, members’ participation in PA programs, and the emphasis and promotion of PA by key church leaders. The program included a series of educational activities (fliers, announcements, displays, website) as well as action-oriented programs (walking programs, chair aerobics and praise aerobics) for engagement in PA. 8 Steps to Fitness was also an action-oriented program within the larger Physical-e-Fit program. The larger program is described in detail elsewhere.\textsuperscript{15,16}

\subsection*{Intervention}

The 8 Steps to Fitness program was designed to engage congregation members who were in contemplation or preparation stages of change, with a primary focus on increasing PA participation and a secondary focus on healthy eating. Focus groups and other formative research with church members and church leaders informed the design of the program. The formative research indicated that a class-based program would be well received and was desirable by many focus group participants, especially women. Additional details on the formative research as described elsewhere.\textsuperscript{17} Based on the social cognitive theory\textsuperscript{18} and the transtheoretical model,\textsuperscript{19} the goal of this program was to help members develop behavioral skills to make positive lifestyle changes. The program used some of the processes of change to help participants make changes to their PA and healthy eating, including consciousness raising, self-liberation, self-reevaluation, and counterconditioning. Other constructs targeted from the theories included self-regulation behaviors, enhancing self-efficacy and enlisting social support.

A volunteer facilitator from each church was trained to use 8 Steps to Fitness and given a manual that included tips for advertising the program and facilitating the sessions, guidelines for leading group discussion, screening forms for PA participation, and technical assistance information. Each weekly session was outlined and included 20 to 30 minutes of PA, scripture related to the week’s topic, suggested questions for discussion, participant handouts, and a homework assignment based on the weekly topic (see Table 1). The facilitator was responsible for recruiting participants, delivering the 8 Steps to Fitness program and communicating with the research team. Facilitators were instructed to use a modified Physical Activity Readiness Questionnaire (PAR-Q)\textsuperscript{20} to screen participants and sign a Program Expectations & Contract Form that outlined basic program expectations. Safety tip sheets were provided to distribute to participants with hypertension or diabetes.

\subsection*{Process Evaluation}

\textbf{Treatment Fidelity and Attendance.} The Health-e-AME project staff developed core principles for the 8 Steps to Fitness intervention. Treatment fidelity was measured by having facilitators for 8 Steps to Fitness complete weekly checklists of the core principles. The facilitator also kept attendance records.

\textbf{Assessment of Church Activities.} The facilitators at the intervention and comparison churches were interviewed at baseline and 3 and 6 months to assess what other activities the church offered. To examine if additional program offerings would impact the results, participants were asked if they participated in any other PA programs at their church.

\subsection*{Design}

A quasi-experimental design was used for this study, with a pretest and posttest to assess differences between the intervention and comparison groups.
Table 1  Summary of 8 Steps to Fitness Topics

<table>
<thead>
<tr>
<th>Week</th>
<th>Topics covered</th>
</tr>
</thead>
</table>
| 1    | Spirituality and health  
      | Past physical activity experiences  
      | The benefits and basics of physical activity  
      | The basics of physical activity  
      | Physical activity in our daily lives  
      | Body mass index |
| 2    | Food Guide Pyramid  
      | Planning healthy meals  
      | Serving sizes  
      | Modifying recipes  
      | Reading food labels |
| 3    | Pros and cons of physical activity and health eating  
      | Self-monitoring |
| 4    | Goal setting  
      | Self-reward |
| 5    | Barriers to physical activity and healthy eating  
      | Strategies for overcoming barriers |
| 6    | Importance of support for physical activity and healthy eating  
      | Sources of social support  
      | Stress reduction |
| 7    | Building physical activity into your day at home  
      | Building physical activity into your day at work  
      | Creating a healthy environment |
| 8    | Relapse prevention  
      | High risk situations  
      | Lapses and relapses  
      | Planned lapses  
      | Review of materials |

Recruitment

Participants. Intervention participants (n = 72) were adult AME members recruited by the church facilitator from 1 large and 2 medium churches who were participating in the Physical-e-Fit program and implementing the 8 Steps to Fitness program. Control participants (n = 74) were recruited from 1 large and 2 small churches not trained in the Physical-e-Fit or 8 Steps to Fitness programs.

Screening. Potential intervention and comparison participants were screened by a research technician and completed the Behavioral Risk Factor Surveillance System (BRFSS) PA module4 to assess their current level of PA participation, and only those who were underactive or sedentary according to CDC/ACSM recommendations5 were included for the purposes of this study. Participants signed an informed consent form approved by the University of South Carolina Institutional Review Board.

Procedure

Baseline Assessment. All participants completed an assessment of health-related variables, demographic and psychosocial measures, a self-report PA measure and dietary assessment during an in-person visit. All participants were given a pedometer and a log to record their steps for 1 week. Intervention participants kept their pedometers, but to avoid reactivity with the pedometer, comparison participants returned their pedometers after the 1-week measurement and were given $10 for their assessment. The baseline assessments were conducted between January and May 2005, during the third year of the larger Health-e-AME Physical-e-Fit project.

Three- and 6-Month Assessments. All participants were mailed the self-report measures 2 weeks before their 3- and 6-month assessment. This packet also included a pedometer (for comparison participants) with a 1-week log. In a face-to-face session, the research staff retrieved the surveys and log and collected objective health-related assessments. Participants from both groups were given $5 upon completion of the 3-month assessment. At 6-months, intervention participants received $10 while comparison participants kept their pedometer. Participants who missed assessment sessions were contacted for alternative assessment sessions and provided envelopes to return surveys. Despite the best efforts of the assessment team, there was notable attrition from both groups.

Measures

Demographic and Self-Report Medical History. Participants reported their gender, education and income level, marital and employment status and age. Participants also reported any chronic health conditions and rated their health on a 5-point scale (1 = excellent to 5 = poor).

Health Measures. All measures were taken by a trained research technician not involved with the delivery of the intervention. Height to the nearest 0.5 inch was taken using a cloth measuring tape. A portable scale measured the participant’s weight to the nearest 0.1 pound (Lifesource, Milpitis, CA). Body Mass Index (BMI) was calculated as kg/m² based on criteria established by the ACSM.21 Waist and hip measurements to the nearest centimeter were made based on criteria established by the ACSM.21 Fasting blood glucose (FBG), recorded in ml/dl, was assessed after the participant had fasted for 8 to 12 hours overnight with a glucometer (Accu-chek, Roche Diagnostics, Indianapolis, IN). Resting systolic and diastolic blood pressure was assessed with a calibrated aneroid sphygmomanometer after the participant sat quietly in a chair for 5 minutes, using procedures established by the ACSM.21

Psychosocial Measures. Social support. Social support for PA from friends, family, and church members was assessed with a commonly used 15-item measure developed by Sallis and colleagues.22 Participants rated how often family, friends and church members engaged in acts that were supportive of PA in the past 3 months,
Table 2  Baseline Demographic and Medical Characteristics of the Sample

<table>
<thead>
<tr>
<th></th>
<th>Intervention (n = 72)</th>
<th>Comparison (n = 74)</th>
</tr>
</thead>
<tbody>
<tr>
<td>% female</td>
<td>79</td>
<td>81</td>
</tr>
<tr>
<td>Age, mean years (SD)</td>
<td>52.5 (13.8)</td>
<td>52.0 (12.7)</td>
</tr>
<tr>
<td>Education (% HS or greater)</td>
<td>92.6</td>
<td>90.3</td>
</tr>
<tr>
<td>Income (% &gt;$25K/year)</td>
<td>64.5</td>
<td>77.4</td>
</tr>
<tr>
<td>% employed*</td>
<td>73.8</td>
<td>53.6</td>
</tr>
<tr>
<td>% married</td>
<td>60.3</td>
<td>58.1</td>
</tr>
<tr>
<td># of chronic health conditions, mean (SD)</td>
<td>1.8 (1.4)</td>
<td>1.9 (1.6)</td>
</tr>
<tr>
<td>Self reported general health, mean rating (SD)</td>
<td>3.6 (2.5)</td>
<td>4.1 (3.5)</td>
</tr>
</tbody>
</table>

Abbreviations: HS = high school.
Note: * P < .05

from (1) none to (5) very often. Scores were averaged across items separately for family, friends, and church members and higher scores indicate greater support. In previous studies with African Americans, this measure has been found to be an adequate assessment of social support for PA (Kappa = 0.40; α=0.70). In the current study, this measure was found to have excellent reliability (α=0.88 to 0.91).

Self-efficacy: Self-efficacy for PA was measured with a 14-item scale developed at Stanford University. Participants were asked to indicate how confident they were that they could exercise when faced with common barriers from 0% (not at all confident) to 100% (absolutely confident). The summary score is the average of these ratings, and higher scores indicate greater self-efficacy. This measure has been used in a diverse population of men and women and found to have high internal consistency (α=0.90 to 0.94). Good reliability was exhibited in this study (α=0.80).

Enjoyment: The Physical Activity Enjoyment Scale is an 18-item measure which asks participants to indicate their enjoyment of PA using 2 contrasting statements (eg, I enjoy it/I hate it) on a 7-point Likert scale. A summary score was obtained from summing the responses, and higher scores indicate greater enjoyment. This scale has high internal consistency (α=0.96) and test-retest reliability (r = .99). Although this measure has not been used extensively in an African American population, the reliability in this study was good (α=0.86).

Depressive symptoms: The 10-item Center for Epidemiological Studies Depressive Inventory (CES-D) asks participants to rate how often they experienced feelings associated with depression during the past week on a 4-point scale, from rarely or none of the time (less than 1 day) to most or all of the time (5-7 days). Responses are summed, and higher scores indicate greater depressive symptoms. This measure has been shown to have good reliability in an African American population (α=0.86) consistent with the current study (α=0.70).

Physical Activity: Self-report: A modified, 28-item version of the Community Healthy Activities Model Program for Seniors (CHAMPS), similar to that used by Resnicow et al., was used for this project. Social and recreational/hobby activities that were not from the original CHAMPS were removed and praise dancing was added. Reliability for the original CHAMPS has been reported as 0.62 for total PA and 0.76 for moderate intensity PA and are positively correlated with measures of physical functioning, fitness, and caloric expenditure.

The frequency of each CHAMPS activity is assessed as the number of times per week, and duration is assessed with a 6-item range from less than 1 hour a week to 9 or more hours a week. Energy expenditures are calculated for low (<3.0 METs), moderate (3.0 to 4.9 METs) and vigorous (≥5.0 METs) activities as outlined in the Compendium of Physical Activities, with adjustments as recommended by Resnicow et al (2003). The composite of kcals/week from all activities was used as the PA measure in this study.

Pedometer: Participants were given a Walk 4 Life pedometer and asked to use a 1-week log to record their steps. This brand of pedometer has good accuracy at various walking speeds, recording 92 to 101% of actual steps taken, and adequate reliability (ICC= 0.81).

Nutrition. The Dietary Risk Assessment, designed for an African American population in the Southeast US, asks participants to report frequency of food consumption and details regarding food preparation. The tool provides an assessment of dietary fat and cholesterol intake, and has been found to be correlated (r = .60) with the Keys score. Items are summed and lower scores indicate diets lower in fat and cholesterol.

Statistical Analyses

Basic frequencies were conducted to examine the distributions of study variables for violations in assumptions for statistical testing. T-tests and χ² analyses examined the differences between intervention and comparison participants in health measures, sociodemographic and psychosocial outcomes, PA behavior as measured by the CHAMPS survey kcal/week and 1-week step logs), and diet at baseline. Outliers (values of 4 or more standard deviations from the mean) were excluded from analysis of the effects of the intervention across time to ensure normal distribution. Using these criteria, 3 weekly step counts from the pedometer, 1 CHAMPS kcal/week score, and 1 fasting blood glucose were eliminated in the 6-month dataset.

A repeated measures ANCOVA assessed changes across time (baseline, 3- and 6-months) between the intervention and comparison groups for health measures (covariates: age, education), psychosocial outcomes (covariates: age, BMI, education), PA behavior...
baseline, there were no group differences for any
variables. The covariates were chosen as they have been found to be consistent influences on PA and diet, in an attempt to understand the possible relationship these variables could have had with the outcomes. Given the small sample size, effect sizes for all health, psychosocial and behavioral variables were calculated to understand the magnitude of effects. Only individuals who completed 1 or both of the follow-up measurement sessions were included in the analyses.

Results

Demographic Characteristics

Demographic characteristics of the sample are shown in Table 2. Intervention participants were recruited from 1 large (n = 54) and 2 small (n = 12, n = 6) churches. Comparison participants were recruited from 1 large (n = 51) and 2 small (n = 13, n = 11) churches, different from the intervention churches. Women comprised the majority of the sample in both groups and the mean age of the sample was 52 years. The majority of participants were married, had household incomes greater than $25,000/year and had a high school diploma or greater. The intervention group was more likely to be employed than the comparison group, χ²(1, N = 117) = 5.18, P = .03. No other differences were found between intervention and comparison groups. The rate of attrition for the 3- and 6-month follow up visits was higher for the comparison group (53% at 3 months, 58% at 6 months) compared with the intervention group (17% at 3 months, 36% at 6 months). Attrition rates were not different by church. For either the intervention or the comparison condition, there were no demographic differences between those who participated in the follow-up and those who did not.

Only significant effects (Time x Group interactions) from the repeated measures ANCOVA are reported below and in Table 4.

Health Variables

Baseline and 3- and 6-month health values are shown in Table 3. The intervention group had significantly lower systolic blood pressure values than the comparison group at baseline, t(101)=2.11, P = .03. There were no other group differences at baseline for the health variables.

Three-Month Outcomes. The repeated measures ANCOVA indicated a significant Time X Group interaction (P < .001) for BMI, with the intervention group showing greater decreases in BMI over time compared with the comparison group (Table 4). No other significant results were found for health variables at 3-months. A small effect size for systolic blood pressure was observed (0.21) but opposite to the hypothesized direction, and a small effect size (0.23) was seen for diastolic blood pressure in the hypothesized direction. Effect sizes for other variables were close to zero.

Six-Month Outcomes. The repeated measures ANCOVA indicated a Time X Group interaction for hip circumference (P = .0004) and systolic blood pressure (P = .01), and the interaction approached significance (P = .07) for waist circumference (Table 4). In each interaction, the intervention group showed greater improvements over time compared with the comparison group. No other significant results were seen with the health variables at 6-months. A small effect size for hip circumference (0.27) and systolic blood pressure (0.40) in the hypothesized direction, and medium effects for waist circumference (0.50) and waist to hip ratio (0.49), both in the hypothesized direction, were observed. The effect sizes for the remaining health variables were close to zero.

Psychosocial Variables

Baseline, 3- and 6-month psychosocial scores are shown in Table 3. There were no baseline differences between groups for the psychosocial variables.

Three-Month Outcomes. As shown in Table 4, the repeated measures ANCOVA showed a significant effect for the Time X Group interaction for social support from church members (P = .03), with greater increases in social support for the intervention group. No other significant Time X Group interactions were found for the psychosocial variables. A small effect size in the hypothesized direction was observed for social support from friends and family (0.28). A medium effect size in the hypothesized direction was observed for enjoyment (0.51) while the medium sized effect for depression (0.63) was in the opposite direction. A large effect size for social support from church members was seen in the hypothesized direction (0.92). Effect sizes for other variables were close to zero.

Six-Month Outcomes. A significant interaction (Time X Group) for depressive symptoms was found (P = .03), with the intervention group reporting a greater reduction in depressive symptoms than the comparison group. No other significant Time X Group interactions were found for the psychosocial variables. A small effect size was observed for PA enjoyment (0.28; hypothesized direction) and social support from friends (0.27) and self-efficacy (0.20; opposite direction), and a medium effect (0.59; hypothesized direction) for social support from church members. The effect sizes for other psychosocial variables were close to zero.

Behavioral Variables

Baseline, 3- and 6-month values for PA (CHAMPS kcal/week, 1-week step count) and diet are shown in Table 3. The results of the repeated measures ANCOVA for the psychosocial variables are found in Table 4. At baseline, there were no group differences for any
one-third (27.8%) of participants attended 7 to 8 of the weekly sessions, 20.8% attended 5 to 6 sessions, and 51.4% of participants attended 4 or less sessions. Participants who were less likely to attend were employed ($P = .02$) and reported less social support for PA from friends ($P = .01$). Analyses revealed that there were no differences for PA at 3- and 6-months based on level of attendance.

**Treatment Fidelity and Other Ongoing Church Activities.** Facilitators from the 3 intervention churches completed checklists assessing core program principles (80% to 100%; mean = 91%). They reported that the sessions ranged from 45 to 90 minutes in length, and reported using at least 1 additional PA program (chair aerobics, walking programs or praise aerobics), and educational activities. The largest intervention church offered 3 other PA programs (walking programs, praise and chair aerobics) and had strong pastor and church leader support. The 2 smaller churches only reported offering walking programs. Despite the Health-e-AME Physical-e-Fit program offerings, the majority of intervention participants (63%) indicated that they did not participate in any activities at church and 22% reported involvement in walking programs. None of the comparison churches reported ongoing PA programs or any educational activities targeting PA.

### Table 3  Baseline, 3-, and 6-Month Scores for Health, Behavioral, and Psychosocial Variables (SD)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Baseline I (n = 72)</th>
<th>Baseline C (n = 74)</th>
<th>3 month I (n = 60)</th>
<th>3 month C (n = 35)</th>
<th>6 month I (n = 46)</th>
<th>6 month C (n = 31)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Psychosocial</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SE for PA</td>
<td>52.8 (23.2)</td>
<td>56.1 (28.3)</td>
<td>51.9 (19.3)</td>
<td>48.5 (27.0)</td>
<td>48.9 (23.1)</td>
<td>45.4 (24.1)</td>
</tr>
<tr>
<td>SS—family</td>
<td>2.4 (0.8)</td>
<td>2.3 (0.8)</td>
<td>2.4 (0.8)</td>
<td>2.3 (0.9)</td>
<td>2.5 (0.8)</td>
<td>2.4 (0.9)</td>
</tr>
<tr>
<td>SS—friends</td>
<td>2.3 (0.7)</td>
<td>2.3 (0.8)</td>
<td>2.4 (0.8)</td>
<td>2.3 (1.0)</td>
<td>2.2 (0.8)</td>
<td>2.4 (0.7)</td>
</tr>
<tr>
<td>SS—church</td>
<td>2.2 (0.7)</td>
<td>2.0 (0.6)</td>
<td><strong>2.9 (0.9)</strong></td>
<td><strong>2.0 (0.8)</strong></td>
<td>2.8 (0.8)</td>
<td>2.2 (1.0)</td>
</tr>
<tr>
<td>PAE</td>
<td>88.6 (16.7)</td>
<td>89.3 (21.0)</td>
<td>91.1 (16.3)</td>
<td>87.4 (16.7)</td>
<td>90.1 (20.7)</td>
<td>85.0 (15.1)</td>
</tr>
<tr>
<td>Depression</td>
<td>3.9 (3.4)</td>
<td>4.4 (3.7)</td>
<td>4.1 (4.2)</td>
<td>4.0 (4.0)</td>
<td><strong>3.1 (3.2)</strong></td>
<td><strong>5.0 (3.5)</strong></td>
</tr>
<tr>
<td><strong>Behavioral</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PA (kcal/wk)</td>
<td>2,571 (2164)</td>
<td>2,390 (1,746)</td>
<td>2,926 (1,713)</td>
<td>2,026 (2,145)</td>
<td>3,046 (2,647)</td>
<td>2,101 (1,230)</td>
</tr>
<tr>
<td>1-week step count</td>
<td>34,311 (20,487)</td>
<td>33,013 (18,196)</td>
<td>41,877 (21,350)</td>
<td>34,672 (20,870)</td>
<td>42,043 (18,861)</td>
<td>29,625 (16,799)</td>
</tr>
<tr>
<td>Diet measure</td>
<td>30.6 (8.8)</td>
<td>30.4 (10.4)</td>
<td>25.8 (9.9)</td>
<td>26.0 (10.3)</td>
<td>25.2 (11.23)</td>
<td>26.5 (8.8)</td>
</tr>
<tr>
<td><strong>Health</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>33.2 (7.8)</td>
<td>28.3 (13.5)</td>
<td><strong>31.3 (7.8)</strong></td>
<td><strong>30.3 (8.2)</strong></td>
<td>33.1 (8.6)</td>
<td>30.1 (7.2)</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>92.3 (22.9)</td>
<td>79.2 (38.5)</td>
<td>86.9 (22.8)</td>
<td>82.3 (21.3)</td>
<td>91.2 (21.6)</td>
<td>80.7 (17.4)</td>
</tr>
<tr>
<td>Waist (cm)</td>
<td>100.6 (18.0)</td>
<td>83.5 (37.6)</td>
<td>95.5 (17.5)</td>
<td>94.5 (16.7)</td>
<td>96.5 (17.7)</td>
<td>97.0 (15.3)</td>
</tr>
<tr>
<td>Hip (cm)</td>
<td>117.9 (16.6)</td>
<td>113.0 (17.35)</td>
<td>114.2 (20.9)</td>
<td>112.7 (18.7)</td>
<td><strong>115.3 (15.6)</strong></td>
<td><strong>112.4 (14.5)</strong></td>
</tr>
<tr>
<td>WHR</td>
<td>0.85 (0.1)</td>
<td>0.84 (0.1)</td>
<td>0.84 (0.1)</td>
<td>0.84 (0.1)</td>
<td>0.83 (0.1)</td>
<td>0.86 (0.1)</td>
</tr>
<tr>
<td>SBP (mm Hg)</td>
<td>136.5 (16.7)</td>
<td><strong>131.7 (13.6)</strong></td>
<td>134.8 (19.0)</td>
<td>126.2 (12.1)</td>
<td><strong>125.3 (15.3)</strong></td>
<td><strong>131.9 (11.4)</strong></td>
</tr>
<tr>
<td>DBP (mm Hg)</td>
<td>85.4 (10.7)</td>
<td>81.8 (9.0)</td>
<td>83.5 (9.3)</td>
<td>78.9 (7.3)</td>
<td>80.7 (11.4)</td>
<td>80.7 (5.7)</td>
</tr>
<tr>
<td>FBG (ml/dl)</td>
<td>86.5 (11.1)</td>
<td>90.8 (16.1)</td>
<td>87.7 (12.9)</td>
<td>93.0 (14.6)</td>
<td>94.5 (20.5)</td>
<td>97.4 (16.9)</td>
</tr>
</tbody>
</table>

**Abbreviations:** SE = self-efficacy, SS = social support, PAE = PA enjoyment, BMI = Body Mass Index, WHR = waist to hip ratio, SBP = Systolic blood pressure, DBP = diastolic blood pressure, FBG = fasting blood glucose.

**Note.** Boldface indicates differences between groups, $P < .05$. Differences at baseline were assessed with $t$ tests; differences at 3 and 6 months were assessed with a significant Group X Time interaction with repeated measures ANCOVA.

behavioral variables. The data for PA (kcal/week) was normally distributed and similarly distributed to other studies with African Americans using the CHAMPS.29

**Three-Month Outcomes.** The Time x Group interaction for PA (kcal/week) approached statistical significance in the repeated measures ANCOVA ($P = .06$). No significant main effects were seen for the pedometer step count or dietary measure. A medium effect size (0.45) for PA behavior (kcal/week) was observed in the hypothesized direction. The effect sizes for other variables were close to zero.

**Six-Month Outcomes.** There were no significant Time X Group interactions for any behavioral variables at the 6-month follow-up. A medium effect size (0.58) was observed for 1 PA behavioral variable (steps/week) and a small effect size (0.37) for the other PA variable (kcal/wk), both in the hypothesized direction. The effect size for diet was close to zero.

**Process Data**

**Attendance.** Weekly attendance is reported in Figure 1. The mean percent attendance for the weekly sessions was 47.1% (± 14.9%). Participation was highest in week 1 (73.6%) and lowest in week 7 (26.4%). Just under one-third (27.8%) of participants attended 7 to 8 of the weekly sessions, 20.8% attended 5 to 6 sessions, and 51.4% of participants attended 4 or less sessions. Participants who were less likely to attend were employed ($P = .02$) and reported less social support for PA from friends ($P = .01$). Analyses revealed that there were no differences for PA at 3- and 6-months based on level of attendance.

**Treatment Fidelity and Other Ongoing Church Activities.** Facilitators from the 3 intervention churches completed checklists assessing core program principles (80% to 100%; mean = 91%). They reported that the sessions ranged from 45 to 90 minutes in length, and reported using at least 1 additional PA program (chair aerobics, walking programs or praise aerobics), and educational activities. The largest intervention church offered 3 other PA programs (walking programs, praise and chair aerobics) and had strong pastor and church leader support. The 2 smaller churches only reported offering walking programs. Despite the Health-e-AME Physical-e-Fit program offerings, the majority of intervention participants (63%) indicated that they did not participate in any activities at church and 22% reported involvement in walking programs. None of the comparison churches reported ongoing PA programs or any educational activities targeting PA.
Discussion

The 8 Steps to Fitness faith-based, behavior change PA intervention had several promising outcomes. The results suggest that this faith-based intervention could be effective for enhancing the likelihood of behavior change, potentially impacting health outcomes and health disparities among African Americans. Relative to the comparison group, the 8 Steps to Fitness participants showed improvements in psychosocial variables (eg, depression, PA enjoyment) as well as blood pressure and body composition, positively impacting the risk of chronic disease. Although significant outcomes were not seen for many variables, several variables had medium effect sizes at the end of the study (waist circumference, waist to hip ratio, steps/week, social support from church members) and others had small effect sizes (systolic blood pressure, kcal/week, hip, PA enjoyment), though 1 was in the opposite direction (social support from friends).

This was an effectiveness study in its truest form: the intervention was conducted in a real world setting with volunteers compared with a laboratory setting with trained intervention staff members. The lay leaders were successful in delivering an intervention with a moderately high degree of fidelity to the original program protocol. Delivering this intervention in a tightly controlled setting to test the efficacy of the program would have been difficult and strayed from the core program principles of basing it within the church and delivering it with trained church members. Literature has indicated the need for designing interventions with dissemination in mind, and this study contributes to the limited research addressing this concern. Furthermore, our study provides useful information for future faith-based interventions that address the complicated issues of dissemination and sustainability regarding pastor and congregation
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baseline, though the amount of change in total kcal/wk from baseline to 6 months in this study (about 800 kcal/wk) in the intervention group is very similar to absolute changes in total kcal/wk observed in 3 other studies. Further study is needed to examine the sensitivity of the CHAMPS measure for detecting small changes in PA behavior in a population of African Americans. An 8-week intervention may be too short to produce changes given the low baseline PA levels, as similar studies have seen results, but have lasted 6 to 12 months. In addition to these possible measurement caveats, there were very large standard deviations for the behavioral variables, limiting the ability to detect significant differences.

Although the intervention yielded some significant findings, there were a number of limitations of the study. The most notable limitation was the attrition from both the intervention and comparison group. Having more participants return would have enhanced our ability to detect significant changes. Although there were differential rates of attrition between groups, those who did not return for assessments did not differ from those who were retained. Another limitation was the use of a quasi-experimental design, which limits our ability to make causal inferences, compared with the gold standard of a true experimental design. A randomized control design, however, was not viewed as acceptable by church leaders. The intervention and follow-up period was relatively short in duration, and therefore the long-term effects of the program remain unknown. Low attendance buy-in and volunteer training and commitment. The train-the-trainer model of delivery is very economical: facilitators from individual churches were trained to deliver the program to interested congregation members. The program could be offered several times a year, potentially impacting a large portion of the church. The facilitator could also train other members of the church to deliver the program, increasing reach even further. This program could easily be disseminated to other faith communities; however additional formative research would be needed to adjust the curriculum to ensure it is appropriately tailored to the population. Details are not known about the sustainability of the 8 Steps to Fitness program after this study ended, however maintenance challenges with the entire Health-e-AME Physical-e-Fit program are addressed elsewhere.

Although statistically significant between-group results were not evident for PA behavior, this outcome demonstrated medium effect sizes in the hypothesized direction at both 3 and 6 months. There was almost a 600 total kcal/wk increase in the intervention group seen from baseline to 6-months, and the group mean differences between intervention and comparison groups were 900 kcal/wk and 12,000 steps per week, though not statistically significant, are promising, given they were sustained through 6-months. The baseline PA levels of weekly caloric expenditure were somewhat low compared with studies with similar samples and showed improvements across time. This may indicate that the participants were particularly sedentary at baseline, though the amount of change in total kcal/wk from baseline to 6 months in this study (about 800 kcal/wk) in the intervention group is very similar to absolute changes in total kcal/wk observed in 3 other studies. Further study is needed to examine the sensitivity of the CHAMPS measure for detecting small changes in PA behavior in a population of African Americans. An 8-week intervention may be too short to produce changes given the low baseline PA levels, as similar studies have seen results, but have lasted 6 to 12 months. In addition to these possible measurement caveats, there were very large standard deviations for the behavioral variables, limiting the ability to detect significant differences.

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![Attendance by Week](image_url)

**Figure 1** — Mean attendance at 8 Steps to Fitness sessions, by week.
rates indicated that participants were not receiving the planned dose of the intervention, though there were no differences in outcomes between those who were regular or irregular attendees. Finally, other activities were conducted in the churches in addition to the 8 Steps to Fitness program. For example, 1 of the intervention churches was very active in the Physical-e-Fit program providing an environment supportive of PA and health possibly different from the other church environments.

Another limitation to the interpretation of our results was the analysis design. Although individuals were nested within groups, there were several factors that made the utilization of a nested design difficult; there was no random assignment either at the church or individual level, there were substantially unequal group sizes from each of the churches and notable attrition. The combination of these factors would lead to very small, unbalanced cell sizes and prevent us from being able to determine the variance components necessary to detect significance.

Future assessments of the efficacy and/or effectiveness of the 8 Steps to Fitness program should use a nested design.

Despite these limitations, there were significant outcomes as well as several promising trends. Furthermore, because of the ability for this type of program to be disseminated across churches, there is the potential for increased reach into a traditionally underserved population. Staying true to the community-based participatory model, the intervention design was informed by feedback from church members, conducted by the church health director to foster social support, group cohesion and fellowship, and remains in the hands of the church to deliver in the future. Despite the above mentioned caveats, these results with a volunteer-led intervention combined with the potential for dissemination showcase the potential for faith-based PA interventions to have a moderate public health impact among an underserved population.

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References


