Community Church-Based Intervention Reduces Obesity Indicators in African American Females

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Citation

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Abstract

Purpose: To examine the efficacy of a church-based community intervention in reducing obesity related outcomes in U.S. African American females. Methods: Participants (n=383) volunteered for the two-phase 24-week intervention. Phases were comprised of equivalent intervention components; one hour of physical activity, 1.5 hour nutrition education, cooking demonstrations, and social support. Phase I was led by the intervention staff, and phase II by lay congregation members. Measurement of body mass index (kg/m^2), waist-hip circumference, arterial blood pressure, non-fasting glucose and daily minutes of activity were obtained at baseline, 12-weeks and 24-weeks. Results: A significant main effect for time for BMI, activity, and systolic blood pressure was shown. No main effect for diastolic blood pressure or blood glucose was found. Interpretation & conclusions: Interventions within a church-based environment may reduce obesity and associated disease risk. Culturally relevant structured networks such as places of worship are important assets when designing healthy lifestyle interventions.

INTRODUCTION

The condition of being overweight comprises a body mass index (BMI) greater than 25 kg/$m^{2,}$ which includes obesity. Global prevalence of overweight is rising at alarming rates and represents a pressing public health issue. Worldwide one billion people are overweight as compared to 850 million underweight individuals (1). Within the United States (U.S.) overweight/obesity has reached epidemic levels. Age-adjusted prevalence among United States adults show that 67% of the population is overweight (BMI >25 kg/m^2), 34% is obese (BMI > 30 kg/m^2). Significant health issues are associated with obesity, as evidenced by the co-morbidities which include but are not limited to metabolic syndrome, coronary heart disease, hypertension hypercholestermia and diabetes mellitus (2-4). Overweight/obesity has been attributed to unhealthy dietary habits, physical inactivity or sedentary behavior (5,6).

Within the U.S. risk factors for overweight/obesity include older age, African American race, family history, lifestyle behaviors, lower socioeconomic status, and presence of co-morbid diseases such as hypertension, depression, Type 2 diabetes mellitus, heart disease, and osteoarthritis. Generally, the poor are more obese than the affluent, women are more obese than men, and persons of color are more obese than whites (7-9). The prevalence of overweight and obesity in non-Hispanic African American women is higher than all other U.S. demographic groups, with 80% overweight/obese, of these 52% are obese (11-14).

Employing culturally sensitive community-based interventions to reduce the incidence and prevalence of obesity in high-risk populations is a globally accepted public health principle (16-18). Despite this evidence, sustainable risk reduction for the African American female population has not occurred (11-15). The pervasiveness of cardiac and diabetes risk factors in African American females elucidates the value of conducting effective interventions. Sustainable interventions include approaches that integrate salient and culturally appropriate factors specific to an at risk population. Previous community-based intervention findings in African American female samples have identified a church-based approach as effective and salient in this population. Employing a church-based approach has been found to significantly reduce the barriers that exist in the adoption of healthy dietary patterns and physical activity. This effect has been reported in at risk populations including African American females. (16, 19, 20).

The center of life for many African Americans females is

their religion and by extension their church. The literature in this area suggests that religion/spirituality is prominent and therefore particularly meaningful in African American culture. The importance of church life has the potential to positively effect health decisions and overall health outcomes in this population (21-24). Therefore, the purpose of this study was to examine the efficacy of a church-based community intervention designed to reduce obesity related outcomes in African American females.

METHODS

STUDY DESIGN

The Body and Soul Health Initiative employed a 24-week intervention consisting of church members who were enrolled serially during the three-year study. The Institutional Review Board approved the research protocol. Each participant volunteered and provided written consent prior to participating in the intervention.

Of the fifty African Methodist Episcopal (AME) Ministerial Alliance churches in the region, fifteen volunteered to participate in the intervention. AME churches historically include memberships that are a majority of African Americans. In addition, six Baptist churches, one Church of Christ and 3 non-denominational churches volunteered to participate in the intervention. Enrollment was voluntary and included the first twenty-four churches agreeing to participate. Each church was labeled a "Health Improvement Group" (HIGs). Each HIG was composed of fifteen to twenty-five church members, and one church has two separate HIGs. During the three-year period the intervention included a total of 447 participants. A Health Coordinator was recruited for each HIG from among the participants whose responsibilities included assisting church leadership in recruiting volunteer participants, meeting scheduling and recording data. Each HIG was given a monetary incentive for participating – one-half at the end of phase I (12 weeks) and the remainder at completion of the 24-week intervention.

SUBJECTS

The total sample included males and females (n =447). For purposes of the current analyses, only females (n = 383) were included due to the high prevalence of obesity reported within the African American female population. Inclusion criteria included African American females over 18 years of age wishing to lose weight with no stated physical limitations that would prevent moderate exercise.

INTERVENTION

All intervention components were conducted at each HIG church facilities. The intervention consisted of two phases: Phase I included structured meetings for 12-weeks at each HIG led by the staff which included an African American Registered Dietitian, an Exercise Consultant and Chef. Components of the intervention included one hour of physical activity, one and one half hours of nutrition education, cooking demonstrations, and group social support to facilitate weight loss and improved health indicators. Topics for these meetings are found in Figure 1.

Figure 1

Figure 1. Intervention Session Topics Phase 1 (12 week) and Phase 2 (12 week)

Session 1: Getting Started Activities: Overview, completion of assessment, screening tools, review of individual scores, preliminary diet plans, games, exercise.
Session 2: Do or Diet? Activities: Finalize weight loss, diet, physical activity goals; plan walking route; discuss importance of hydration, good nutrition; menu planning, games and exercise.
Session 3: Healthy Eating at Home Activities: Check-in, cooking demonstration of healthy home meal; menu ideas, games, exercise, group discussion.
Session 4: Snacking Activities: Check-in, cooking/food demonstration on healthy snack alternatives; snacks for children; menu planning, exercise, games, group discussion.
Session 5: Eating on the Run Activities: Check-in, healthy eating in restaurants; cooking demonstration of quick meals; menu ideas, games, exercise, group discussion.
Session 6: Portion Distortion Activities: Check-in, cooking demonstration focusing on serving size; meal planning, games, exercise, group discussion.
Session 7: Stress Eating Activities: Check-in, cooking demonstration; group discussion on eating triggers; coping mechanisms; exercise, menu planning, games.
Session 8: Fight Fat in Foods Activities: Check-in, cooking demonstration on low fat cooking; menu planning, exercise, games, group discussion, review of group progress toward goals.
Session 9: Dealing with Your Sweet Tooth Activities: Check-in, cooking demonstration on desserts, snacks; alcohol consumption, games, exercise, group discussion.
Session 10: High Fiber Foods Activities: Check-in; cooking demonstration focusing on high fiber foods; menu planning, games, exercise, group discussion.
Session 11: Let's Go Shopping! Activities: Check-in, field trip to neighborhood food store, reading labels; menu planning, exercise, games, group discussion.
Session 12: Celebrate! Activities: Cooking demonstration planned and implemented by participants; review of group progress, exercise, games; preparation for Phase II.

Phase II included meetings for an additional 12-weeks at each HIG. Meetings during Phase II consisted of the same intervention components; however these were more informally led by the African American Health Coordinator and/or other program participants. The purpose of the study design was to deliver a culturally appropriate intervention for African Americans. Therefore, the churches, peer leaders and at least one African American program staff helped to ensure culturally sensitivity.

ATTRITION ANALYSES

Bi-annual process and outcome evaluation reports were completed by the UNF researchers for the three year duration of the intervention. The evaluation research showed

accurate intervention delivery and fidelity. Attrition analyses following completion of 9 HIGs, revealed retention rates at 12 weeks of 60.5% and 57.0% at 24 weeks.

INSTRUMENTATION

Demographics: data collected included self-reported ethnicity, gender and age at baseline.

Anthropometric Measurements: Weight (lbs.), height (inches), and waist circumference (inches) were measured. Height was assessed by means of a stadiometer, weight was obtained using a calibrated balance beam scale; subjects removed their shoes and emptied their pockets of any extra weight-bearing items. Body Mass Index (BMI kg/m^2) was calculated by converting the patient's weight and height into the metric units of kilograms and meters. Waist and hip circumference were measured using a fabric tape measure and recorded in inches. The ratio of waist to hip in inches was then calculated to determine waist-hip ratio.

Health Indicator Measurement: Arterial blood pressure (mm Hg) was measured with a sphygmomanometer and casual glucose was obtained by finger stick measured using a glucometer.

Activity Measurement: Self-recorded daily minutes of exercise was collected from participants at and entered as total minutes of activity at baseline, 12-weeks, and 24-weeks.

STATISTICAL ANALYSIS

Analyses of data were performed using the Statistical Package for the Social Sciences (version 15.0, 2006, SPSS, Inc, Chicago, IL). All values are expressed as mean ± standard error of the mean. Descriptive statistics of mean, standard error and range were analyzed at the three points in time (baseline, 12-weeks, and 24-weeks). A one factor analysis of variance with repeated measures was used to test the main effect of time for each dependent outcome measure: weight, BMI, systolic and diastolic blood pressure, blood glucose, and physical activity in minutes. To prevent type II errors when the assumption of sphericity was not met, the Huynh-Feldt correction was applied to the analyses and the adjusted statistics used to report results. Post-hoc comparisons were performed using the Bonferroni adjustment for multiple comparisons. An level of 0.05 was used to determine statistical significance.

RESULTS

BASELINE CHARACTERISTICS

Presented in Table 1 are the mean baseline measurements. Notable characteristics of the sample include a mean body weight in pounds of 206.89 and BMI of 34.84, both indicators of obesity. The mean waist-hip ratio (0.85) represents moderate risk for CVD in females. Health risk parameters showed the mean systolic and diastolic blood pressure and blood glucose level were above normal range 131.10 mmHg, 81.12 mmHg and 110.51 mg/dl respectively.

Figure 2

Table 1. Subject Characteristics at Baseline (n = 383)

Parameter	Range	Mean	SEM[1]
Age (y)	18-76	45.44	0.54
Weight (lb)	94-409	206.89	2.58
BMI (kg/m^2)	20-69	34.84	0.43
Waist/Hip Ratio	0.65-1.11	0.85	0.00
Glucose (mg/dl)	42-539	110.51	2.77
Systolic BP (mmHg)	85-200	131.10	0.97
Diastolic BP (mmHg)	45-117	81.12	0.65
Exercise (minutes/week)	0-580	64.36	6.08

[1]SEM = standard error of the mean.

OUTCOMES

Study outcome measures were analyzed in an analysis of variance with time of measurement (baseline vs. 12-week follow-up vs. 24-week follow-up) as a within-subject factor. Means, standard errors and multiple comparison results are presented in Table 2.

There was a main effect for time with regard to obesity indicators. Weight $F(1.80, 382) = 11.09$, $p < .000$, BMI $F(1.77, 380) = 20.74$, $p < .000$, and waist-hip ratio $F(1.87, 370) = 13.52$, $p < .000$. Weight and BMI were significantly different between participants for time of measurement, with levels decreasing from baseline to 12-week baseline to 12 week and twenty four week observations. Mean measures of waist-hip ratio were significantly different between baseline and weeks 12 and 24 but did not reach significance from 12 to 24 week observations. Results for the health indicators blood glucose and blood pressure showed a significant main effect for time with regard to systolic blood pressure, $F(1.95, 353) = 6.36$, $p = .002$ with 24 weeks significantly lower than baseline or 12-weeks. The main effect for time with regard to blood glucose, $F(1.75, 312) = .83$, $p = .424$ and diastolic blood pressure $F(1.96, 352) = 1.01$, $p = .364$ was not significant . The indicator for activity level included mean exercise in minutes with a main effect of time of measurement minutes $F(2, 293) = 73.09$, $p < .000$ being significant. Exercise in minutes was significantly higher from baseline to 12-weeks and 24 weeks but not significantly different between the 12-week and 24-weeks observations.

Figure 3

Table 2. Outcome Indicators at Baseline, Phase I (12-Week) and Phase II (24-Week)

Parameter	Baseline	Phase I 12-Week	Phase II 24-Week
	Mean ± SEM[1]		
Obesity Indicators			
Weight (lb)	206.89±2.58[a]	204.33±2.34[b]	200.98±2.11[c]
BMI (kg/m^2)	34.84±.43[a]	34.21±.39[b]	33.44±.34[c]
Waist/Hip Ratio	.85±.004[a]	.84±.003[b]	.83±.004[bc]
Health Indicators			
Glucose (mg/dl)	110.51±2.77[a]	113.71±1.84[a]	112.11±1.68[a]
Systolic BP (mmHg)	131.10±.97[a]	129.28±.77[a]	127.79±.76[b]
Diastolic BP (mmHg)	81.12±.65[a]	80.23±.53[a]	80.95±.46[a]
Activity Indicator			
Exercise (minutes/week)	64.37±6.08[a]	157.95±9.09[b]	169.19±8.45[bc]

Note: Means with different superscripts are significantly different at $p \leq .05$
Note: Baseline to 12 Week = Phase I; 12 Week to 24 Week = Phase II
[1]SEM = standard error of the mean.

DISCUSSION

The aim of the present study was to examine the effectiveness of a faith based community intervention designed to reduce obesity related outcomes in African American females. The two-phase intervention was successfully implemented in twenty-five churches and associated with changes in obesity, health parameters and minutes exercised over a 6-month period. Changes in weight, BMI, waist-hip ratio, systolic blood pressure and minutes exercised were observed over the duration of the intervention. Levels of glucose and diastolic blood pressure were at or very close to normal levels at baseline and did not change significantly.

Obesity measures and physical activity significantly improved during phase I. These improvements were either sustained or improved during phase II of the 24 week intervention. Previous research employing comparable dietary counseling and education topics reported weight loss and body mass index losses within the first three months which remained stable at six months (25). In comparison, this study found weight loss and BMI index significantly improved at each observation, thus weight loss was not only stabilized but continued to improve. In addition, minutes of exercise were significantly improved at each observation. At twelve weeks, the mean exercise in minutes increased two and a half fold partially due to the 60 minutes of exercise that was built into the intervention each week. At twenty four weeks participant reported, minutes of exercise continued to improve but were not significant different at among the three time periods of the twenty-four week intervention.

The findings for the current study found that the mean systolic blood pressure was significantly reduced (3.3 mm/Hg) during phase II (24 weeks). Similar findings reported have shown a reduction in systolic blood pressure in an intervention using the Dietary Approaches to Stop Hypertension (DASH) diet at the twenty-four week interval of 4 mm/Hg (26). Unlike the present study, the DASH intervention also found significant decreases in diastolic blood pressure whereas the current study did not. Failure to show a significant change in the mean diastolic blood pressure may have been due to the essentially normal levels reported at baseline in the present study.

The present intervention employed fundamental disease risk reducing components which include a therapeutic lifestyle change (TLC) i.e., nutrition education and physical activity which have been well-documented (27). In the African American female population, the design of culturally specific interventions to deliver nutrition education and physical activity has been found effective (28). In comparing a primary care weight loss group with a church-based component versus primary care alone, one study found a non-significant improvement in weight and BMI in the church-based enhanced group. The church-based group lost an average of 3.5% body weight in the 12-week program and BMI decreased 1.3% (29). In comparison, the current study findings showed a 1.2 % weight loss at 12-weeks and 2.9% at 24 weeks, and a BMI reduction of 1.8% (12-weeks), and 4.0% (24-weeks). These results suggest that primary care interventions may be more efficacious over the short term whereas the faith based approach may be at least as effective but require more time to see clinically significant improvements. This pattern is consistent with that reported for long term weight loss in that periods of weight loss are followed by plateaus followed by further weight loss (30).

The current study suggests that even in the absence of a clinical component, the faith based approach may be an effective approach in the African American female population. The findings from this study resulted in weight loss which was still significantly different from baseline at 3 and 6 months. Potential for sustainability of achieved weight loss and the possibility for further loss are enhanced when the intervention allows enough time for this. To expand on previous findings, this study implemented a culturally appropriate TLC intervention in the church-based setting which previous evidence suggests is effective in the African American females.

Efficacy of a church-based approach may in part be due to the importance of church life in the African American population (21-24). Social support in African American females has previously been found to be significantly

associated with health improvements such as cardiovascular and diabetes risk reduction (31). In addition, the built-in social support and structured networking that exists within established groups of church members may increase participation and commitment thereby resulting in longer intervention effect. In the current study, all but one of the staff shared the cultural identity and faith based membership of the study population. Therefore, the shared cultural experience and commitment of the staff may have contributed to retention rates of 80% and 72% for phases one and two respectively. These findings are similar to that found in previous studies and may also be due to the structured network that existed prior to the intervention and the choice of culturally sensitive peer leaders (28).

LIMITATIONS

The single group design prevented establishing whether these changes were due to the intervention, to additional factors, or occurred by chance alone. Further, selection bias may be present as recruitment strategies at the participant level included those agreeing to participate. These individuals may be significantly different from those that did not participate. In addition, the recruitment at the church level was limited to the first 24 churches agreeing to participate within the specific geographical region; therefore the results cannot be generalized to other areas.

CONCLUSIONS AND APPLICATIONS

Culturally appropriate and community-based interventions have the potential to change health indicators and behaviors in populations that are at risk for obesity and its associated co-morbidities. Further, the addition of the faith based approach in a population at risk and highly involved in their church community as done in this study suggests effectiveness at a level at least as good as that found in clinical settings. However, the faith based setting offers the opportunity for longer and more established support networks with retention of positive outcomes even after the end of the intervention. In this study, weight and BMI further improved after the 12-week intervention. Systolic blood pressure was improved after 24 weeks but not after 12 however neither measurement was elevated within the range diagnostic for high blood pressure but fell in the range of pre-hypertension. It was also notable in this study that 19 of the 25 HIG groups (76%) were still meeting weekly up to three years after the end of their interventions. The need exists for future experimental longitudinal studies to monitor participants over a longer period of time and provide a control group to determine cause and effect of the intervention components on disease risk parameters. Based on the present study results, the intrinsic support network found within African American church congregations and regularly scheduled meetings provided the structure and environment which resulted in fidelity and successful delivery of the intervention. It is suggested that dietitians working in the development, implementation and delivery of community interventions identify preexisting culturally appropriate support systems such as faith based settings to obtain sustainable health risk reduction outcomes.

FINANCIAL DISCLOSURE

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