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A Physical Activity Intervention for African American Women in Public Housing

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Abstract

The age adjusted rate of cardiovascular disease (CVD) is 72% higher for African American women than for white women. Historically, minority women have had limited access to health care resources. The June 2009 report on health care disparities in women published by the Kaiser Family Foundation identified Alabama as one of the thirteen states that scored worse than average on the health status of women. Promoting activity and wellness was identified in Healthy People 2010 as key in eliminating disparities in CVD for ethnic and racial minorities. The purpose of this quasi-experimental, pre-test/post-test study was to evaluate the impact of an individualized exercise program offered through an accessible gym for underserved African American women in an Alabama housing authority. Two cohorts (n = 25) of African American women had a complete physical and fitness assessment at baseline and 6 months after participating in an exercise program. The women experienced health and fitness gains after the exercise program; notably, oxygen consumption rates and treadmill time increased significantly ($p < .001$) and post exercise heart rates decreased ($p = 0.03$). This project can thus serve as a model for exercise programs in housing authorities.

Keywords: Cardiovascular disease, health disparities, minority groups

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Introduction

Cardiovascular disease (CVD) is the number one killer in the United States (US), and African American women are particularly at risk for CVD, with an age-adjusted rate of CVD 72% higher than for white women. African American women aged 55-64 are twice as likely as white women to have a heart attack.¹ However, African American women's awareness of CVD as the leading cause of death in women is lower than white women's (31% vs. 68%).²

African American women in rural Alabama are at greater risk of dying from CVD than white women or African American and white men.³ Yet a recent study in a southeastern rural county in Alabama found that only 30% of women identified CVD as the leading cause of death in women.⁴ The June, 2009 report on health care disparities in women published by the Kaiser Family Foundation identified in Alabama as one of the 13 states that scored worse than average on the health status of women.⁵ The Kaiser Foundation also reported that 35% of African American women in Alabama lived in poverty compared to 16% of all women in the US. Historically, minority women have had limited access to health care resources, and evidence of racial and ethnic disparities in health care are found throughout the spectrum of care, i.e., health access, utilization, and health care insurance.⁶ Disparity of cardiovascular health for Southern African American women is clearly a significant problem. Physical inactivity and overweight/obesity are two significant risk factors for CVD in African American women. Fifty-seven percent of these women report no leisure time activity, and 43% are either overweight or obese.^{5,7}

African American women with limited economic resources have unique barriers engaging healthy lifestyles. Research suggests that at least a third of public housing residents do not participate in any physical activity in a year's time.⁸ Barriers to participation in physical activity reported specifically by rural African American women include lack of time, lack of knowledge about exercise and exercise equipment, safety issues, expense and "feeling out of place" in exercise facilities outside of their neighborhoods.⁹⁻¹¹ African American women have reported more physical activity when they saw people in their neighborhoods exercising or knew people who exercised and when recreation facilities were available in their community.⁹ Promoting activity and wellness was identified in Healthy People 2010 as key to eliminating disparities in CVD for ethnic and racial groups.¹² Important health behavior goals are to engage in 30 minutes of moderate intensity physical activity on most days of the week and maintain a body mass index (BMI) of 18.5 to 24.9 kg/m².¹³

This study, therefore, evaluated the impact of a 6-month individualized exercise program specifically designed for underserved African American women and offered through an accessible gym in a Housing Authority Community (HAC). Specifically, the study evaluated impact on body weight and body composition (body weight, body fat and BMI); blood lipids (triglycerides, total cholesterol, LDL cholesterol and total cholesterol/HDL cholesterol ratio); and cardiovascular fitness (maximum O₂ consumption, total exercise time, exercise tolerance as measured by heart rate recovery at 5 minutes).

Methods

Setting

The Housing Authority Complex (HAC) encompasses 322 units of low income public housing in five different sites and serves over 1000 residents. The School of Nursing operates nursing care clinics with the HAC, supervised by a nurse practitioner faculty member. Residents of the HAC are 97% African American, with an average family income of \$7,082 per year, far below the national poverty threshold. Women comprise 64% of this population; 34% of households have children under 11, and 17% have children ages 11 to 18. Focus groups held with HAC women in 2007 identified an interest in physical activity, preferred types of activity, barriers to physical activity, and suggestions for planning and implementation of an exercise project within the HAC. With the support of the University Office of Outreach, the City, and the staff and administration of the HAC, a completely furnished gym was set up in a community center within the HAC and adjacent to housing authority apartments and one of the School of Nursing's Nursing Care Clinics. The exercise facility is equipped with treadmills, light free weights, elliptical machines, and a universal type weight machine. The project coordinators, a SON faculty member and an exercise physiology faculty member, oversee staffing of the gym for 20 hours a week by nursing and exercise physiology students.

Participants and Design

Participants for this quasi-experimental pre-test, post test study were recruited from two cohorts, one cohort of women who began the exercise program in 2007 and a second cohort who began in 2008. Potential volunteers were made aware of the physical activity program when they attended nursing care clinics and by posted flyers and announcements in churches throughout the city and the surrounding areas. The volunteers were interviewed individually by the project coordinators and informed of the program requirements and their rights as a participant. All volunteers were interviewed to screen them for inclusion criteria: 30 to 75 years of age; free of known cardiovascular, metabolic or pulmonary disease, or cleared by their physician to participate and having the disease under control, and free of musculoskeletal or neurological conditions that were contraindicated for exercise. All volunteers meeting these initial requirements and agreeing to participate signed an institutionally approved consent document prior to their involvement in the program. Approximately 30 women volunteered to participate in the first cohort; however, enrollment was limited to 15 women who were the first to respond to our announcements and met entry criteria. The second cohort of women was recruited primarily through word of mouth from the first cohort of participants. Again, enrollment was capped at fifteen from a potential pool of 30 due to limited funding, facility space, and equipment availability.

Measures

Health history and physical assessment. All women completed a health and fitness assessment prior to initiating the exercise program and again after 6 months of participation. The fitness assessment served two primary objectives: 1) identify underlying health issues that either precluded exercise or needed further evaluation and treatment prior to beginning the exercise program, and 2) to establish a “baseline” fitness profile for developing individualized exercise prescriptions and tracking program efficacy. All assessment procedures were monitored by a physician, National Athletic Training Association-certified athletic trainers, and an American College of Sports Medicine Certified Clinical Exercise Specialists.

Participants completed a health history questionnaire that addressed previously diagnosed cardiovascular, metabolic and pulmonary disease, signs or symptoms suggestive of underlying disease, cardiovascular and metabolic disease risk factors, current medications, orthopedic issues, and any other special conditions or characteristics that can affect the safety and efficacy of exercise participation. The health history information was reviewed and clarified by a physician as part of a personal interview with each participant.

The assessment procedure included vital signs, height, weight, a physical exam by a physician, and body composition and bone density measures via Dual Energy X-Ray Absorptiometry (DXA). Pulmonary function was measured by open-loop spirometry. Blood samples were collected and analyzed for blood lipids. Participants were given a maximal symptom-limited graded exercise test on a motor-driven treadmill to determine hemodynamic responses to exercise and maximal cardiovascular function (an indicator of cardiovascular fitness). Heart rate was assessed using 12-lead electrocardiography (CardioControl, Welch Allyn, Skaneateles Falls, NY), blood pressure was determined manually at the end of each stage, and respiratory gas exchange (VO₂ and VCO₂) was measured continuously (Cardio2 Gas Analysis System, MedGraphics, St. Paul, MN). The initial assessment was used to construct an exercise program based on the participant’s current health and their specific physiological and/or musculoskeletal conditions. The entire assessment was administered at baseline and at 6 months to identify changes in parameters of health and physical fitness.

Intervention

Exercise prescription, monitoring, and progression. The initial exercise prescription targeted specific goals that participants listed as part of their pre-exercise health appraisal and was based on individual results from their health and

fitness assessment. In general, cardiorespiratory fitness was addressed using exercises that incorporated large muscle groups and dynamic, rhythmic movements (e.g., walking, stationary and recumbent cycling, elliptical walking, stair-stepping, rowing). Participants were encouraged to try a variety of different exercise modes and to perform at least 30 minutes of moderate-intensity exercise each day, either in one session or in accumulated 10-minute bouts. Exercise duration or intensity, or a combination of both was increased gradually based on participants fitness goals and comfort and published guidelines.¹⁴⁻¹⁶

Resistance exercises were prescribed for two or three sessions per week and included free weights, machines, and resistance bands. Eight to ten exercises were introduced, each addressing a different major muscle group. Participants selected a resistance sufficient to complete eight repetitions without compromising proper form. When individuals were able to complete twelve repetitions, the resistance was increased and repetitions reduced.¹⁷ Most of the resistance training was done as a group exercise in circuit-training format. The exercise sets were increased and rest intervals between sets were reduced as participants became accustomed to the resistance routine.

Lifestyle Modification Teaching

Project coordinators posted and periodically updated educational materials related to dietary and nutrient intake, rest, stress management, physical activity, and other health promotion topics. Short presentations on these topics were scheduled periodically, and brochures and handouts were also made available. In addition, student monitors developed and implemented activities designed to foster personal and social enjoyment as well as promote exercise adherence and health.¹⁸ For example, pedometers were distributed and participants were encouraged to achieve 10,000 steps a day outside of their regular exercise routine. The monitors worked with participants to keep track of progress. Those meeting the targeted number of steps over a monthly period were given a participant designed t-shirt. Similar incentives for miles covered during physical activity routines were also included.

Results

Participants

A total of 30 women were enrolled in two cohorts of 15 women each during the program's first (2007) and second (2008) years of operation. One participant from the initial cohort withdrew from the study due to a family issue. Four women

withdrew from the second cohort: one moved out of the area and three withdrew because of changes in their work status that required them to work during our facility's hours of operation. Thus, a total of 25 women (59 ± 11 years of age) completed the 6-month exercise and education program (14 women from the first year cohort and 11 women from the second year cohort). [Table 1](#) summarizes the physiological characteristics of participants by cohort at entry into the program and at 6 months.

Body Weight, Body Fat and BMI

Body weight and body composition did not change in the first-year cohort. Average body weight was lower in the second year cohort and also decreased by 4% over the 6 month program ($p = .009$). Body fat initially did not differ between the groups. Body fat, however, decreased by 2% in the second year cohort after the 6-month program ($p = .048$). Similarly, while there was no difference in BMI initially between the groups, the second cohort exhibited a significant reduction in BMI after 6 months ($p = .007$).

Blood Parameters

Triglyceride concentrations were significantly lower in the first-year cohort at initial assessment and the group concentrations increased over the 6-month fitness program. Triglyceride concentrations decreased significantly (14.5%) in the second-year cohort ($p = 0.018$). The total cholesterol-to HDL-cholesterol ratio did not differ between the cohorts. The second-year cohort exhibited a decrease (10%) in the ratio; no change in this ratio was observed in the first-year cohort ($p = 0.0266$). There were no differences between cohorts in HDL cholesterol and LDL cholesterol initially or after the 6-month program.

Cardiovascular Health and Fitness Parameters

The second-year cohort initially exhibited greater walk duration (treadmill times; $p < 0.01$) and maximum O₂ consumption (VO₂ peak values; $p < 0.01$) versus the first-year cohort. After the 6-month program, however, all participants had better oxygen consumption rates and could walk longer during the graded exercise test ($p < 0.01$). Cohort 1 demonstrated a 16% improvement in walk duration and Cohort 2 a 12 % improvement. Oxygen consumption was estimated from the maximal treadmill time and was improved ($p < 0.01$) by 17.6% in the first cohort and 21% in the second. As part of active cool down following exercise, both groups experienced a decrease in 5-minute post-exercise heart rates (first cohort 9%,

second cohort 8%; $p < .01$) and rate pressure product (first cohort = 11%, second cohort = 12%; $p < .01$) after the 6-month exercise program (see Figure 1).

Discussion

This study evaluated the impact of an individualized exercise program that was offered through an accessible gym in a HAC for underserved African American women. All of the women experienced cardiovascular fitness gains after the exercise program, notably improvements in walk duration, oxygen consumption and post-exercise recovery.

These findings are fairly consistent with the findings of other studies. [8,9,14,15,18-20](#) Interestingly, Cohort 1 did not experience body composition improvements (weight loss, etc.) or improvements in blood lipids, although they did experience improvement in cardiovascular fitness parameters. Since Cohort 1 entered the program with a more adverse CVD risk profile, they may have taken longer to achieve levels that result in fitness and body composition benefits. There may also have been differences between the cohorts in motivation for seeking information and/or adhering to the dietary information made available through the program.

Overall, outcomes were more positive for Cohort 2 than Cohort 1. The second cohort's cardiovascular fitness initially was greater, as measured by walk duration and oxygen consumption and their gains after the fitness program were more significant. Likewise, improvements in BMI, body fat percentage and body weight were noted in Cohort 2 that were not noted in the first cohort. The second year cohort also achieved significantly lower triglycerides and a decrease in the total cholesterol to HDL cholesterol ratio that was not observed in Cohort 1. Although there were differences in benefits achieved between the two cohorts in this small study, both groups did improve in cardiovascular fitness. This finding is encouraging and suggests that a community based exercise program to engage underserved African American women in regular physical activity can be effective.

Limitations and Recommendations for Further Research

This was a quasi-experimental study with a small, non-probability sample. A larger sample in a randomized controlled trial is needed to fully test the intervention. The second cohort in this study began with a significantly lower body weight and on average they were 3 years younger. These initial differences in the two groups may have explained in part the second cohort's more positive outcomes.

While the exercise intervention was tailored to participants, certain aspects of the exercise may have varied based on the student staffing the gym. The risk factor modification program was not standardized, and the lifestyle modification program consisted primarily of handouts for participants to take as they desired and for participants to read at their convenience. Occasional lectures on health promotion topics such as heart healthy diet, smoking cessation techniques, and stress reduction were given by nursing students. The impact of the health promotion teaching on the results is unknown and should be more carefully examined in the future. Furthermore, more detailed attendance records are needed for both educational and exercise sessions.

Summary and Future Directions

This project can serve as a model for other housing authority leaders who want to promote health and fitness in their community. The idea of any healthy lifestyle choice is that individuals will come to see the value of the choice and continue the lifestyle. We have seen this change take place in the women who participated in this exercise project.

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Figure 1. Cardiovascular Fitness Parameter Changes



