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ORIGINAL ARTICLES
Economic Evaluation

The Cost of Increasing Physical Activity and Maintaining Weight for Midlife Sedentary African American Women

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ABSTRACT

Objective: To evaluate the marginal costs of increasing physical activity and maintaining weight for a lifestyle physical activity program targeting sedentary African American women. **Methods:** Outcomes included change in minutes of total moderate to vigorous physical activity, leisure-time moderate to vigorous physical activity and walking per week, and weight stability between baseline and maintenance at 48 weeks. Marginal cost-effectiveness ratios (MCERs) were calculated for each outcome, and 95% confidence intervals (CIs) were computed using a bootstrap method. The analysis was carried out from the societal perspective and calculated in 2013 US dollars. **Results:** For the 260 participants in the analysis, program costs were $165 ± $19, and participant costs were $164 ± $35, for a total cost of $329 ± $49. The MCER for change in walking was $1.50/min/wk (95% CI 1.28–1.87), for change in moderate to vigorous physical activity was $1.73/min/wk (95% CI 1.41–2.18), and for leisure-time moderate to vigorous physical activity was $1.94/min/wk (95% CI 1.58–2.40). The MCER for steps based on the accelerometer was $0.46 per step (95% CI 0.30-0.85) and weight stability was $412 (95% CI 399–456). **Conclusions:** The Women's Lifestyle Physical Activity Program is a relatively low-cost strategy for increasing physical activity. The marginal cost of increasing physical activity is lower than for weight stability. The participant costs related to time in the program were nearly half the total costs, suggesting that practitioners and policymakers should consider the participant cost when disseminating a lifestyle physical activity program into practice.

Keywords: African American women, economic evaluation, marginal cost-effectiveness, physical activity, weight stability.

Introduction

Physical activity is a well-established health behavior for preventing heart attacks and strokes [1]; managing hypertension [2], diabetes [3], hypercholesterolemia [4], and obesity [5]; and reducing depressive symptoms [6]. Regular physical activity is a priority for African American women who, compared with white women, have a higher prevalence of hypertension (42.9% vs. 27.7%), diabetes (14.6% vs. 6.1%), obesity (57.5% vs. 32.5%) [7], and depressive symptoms (27.4% vs 22.4%) [8]. In 2012, only 35.5% of African American women, compared with 50.9% of white women, met the 2008 physical activity guidelines for adults of engaging in at least 150 minutes of moderate or 75 minutes of vigorous aerobic physical activity per week [9]. Lower socioeconomic status among African American women, associated with poor health insurance coverage, contributes to these health disparities [10]. These findings highlight the importance of physical activity interventions to reduce risks and promote health in African American women that are not only cost-effective but also low cost to garner sustained participation.

Despite the importance of physical activity interventions to promote health in African American women, cost-effectiveness studies of physical activity interventions vary dramatically. Many of these studies are either disease-specific interventions or one-on-one primary care interventions [11–13], rather than group interventions to promote physical activity. None has focused specifically on African American women. Most evaluations of lifestyle physical activity interventions have focused on program costs [14–17]. A 2009 systematic review of the cost-effectiveness of physical activity interventions found only eight studies targeting healthy adults [17]. Only one study was conducted from the societal perspective, taking into account both the program and participant costs [17]. Participant costs, such as out-of-pocket expenditures and opportunity costs (i.e., the value of the participant's time to participate in the intervention), are rarely included in the analyses. A more complete understanding of the societal costs of these interventions, including the participant costs, is needed.

The Women's Lifestyle Physical Activity Program is a 48-week walking program for sedentary midlife African American women, which includes six group meetings with behavioral strategies.

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The program has been successful in increasing physical activity. Furthermore, it has been successful in promoting weight stability [18], defined as post-treatment weight within 3% of baseline weight [19]. This is consistent with a recent review of physical activity interventions and their effect on body composition, which demonstrated that most of the women maintained their weight or lost only small amounts of weight [20,21]. The cost to improve these outcomes has not been evaluated. The program collected detailed information about the resources and costs to implement the program, as well as participants' opportunity costs of participation. The purpose of this study was to evaluate the cost-effectiveness of this program from a societal perspective, including both program and participant costs.

Methods

The 48-week Women's Lifestyle Physical Activity Program [18] was a randomized clinical trial to test the effectiveness of three intervention conditions on the adoption and maintenance of physical activity and weight stability among African American women [18]. The three intervention conditions were 1) group meetings alone, 2) group meetings supplemented by personal calls, and 3) group meetings supplemented by automated calls. The cluster-randomized, Latin-square design used in this study counterbalanced the order of administering the three conditions over six community health care sites. Each site received all three conditions, but no two sites received the conditions in the same order. The cost-effectiveness analysis was conducted from the societal perspective, including both the program and participant costs.

Participants

As described elsewhere [18,22], inclusion criteria were as follows: 1) African American female; 2) sedentary (no regular, planned moderate to vigorous physical activity [MVPA] three or more times per week in the preceding 6 months); 3) ages 40 to 65 years; 4) able to attend the group meetings; and 5) had a telephone. Exclusion criteria were as follows: 1) major signs or symptoms of pulmonary or cardiovascular disease; 2) disability preventing unassisted physical activity; 3) history of myocardial infarction or stroke; 4) blood pressure reading of 160/100 mm Hg or more [23]; and 5) in women with diabetes, a hemoglobin A_{1c} level of more than 9% [24]. Recruitment was conducted within a 2-mile radius of each of the three community health centers and three community hospitals where the study was conducted. The health care settings were all in or bordering predominantly low-income (30% below poverty level) African American (>90%) communities in Chicago [25].

Of the 609 women who responded to the invitation to participate in the program, 297 were deemed eligible [22]. Nine of the eligible women dropped out before the start of the intervention, and 28 did not complete any of the 48-week assessments, leaving 260 participants in this analysis. At baseline, the mean age of participants was 53 years (range 40–65 years) (Table 1). Our previous work has demonstrated that there is no evidence of systematic bias in the characteristics of individuals who did not complete outcomes measurement [18]. About one-third were married (38.9%). About half of the women had a college degree (49.2%). Three-fourths of the women were employed (74.2%), and 60.9% had a family income under $60,000. The vast majority of women were overweight or obese (93.9%). All women signed an informed consent form, and the study was approved by the institutional review board at two universities.

Table 1 – Participants' demographic characteristics at baseline (N = 260).

Characteristic	Value
Age (y), mean ± SD	53.5 ± 6.5
Married or living with partner, n (%)	101 (38.9)
College graduate or higher, n (%)*	128 (49.2)
Full-time or part-time employment, n (%)*	193 (74.2)
Income ($), n (%)*	
<20,000	30 (12.1)
20,000–39,999	68 (27.4)
40,000–59,999	55 (22.2)
≥60,000	97 (39.1)
Weight (kg)	205.8 ± 45.3
Body composition	
BMI (kg/m^2), mean ± SD	35.3 ± 7.5
Overweight and obesity (≥25), n (%)	244 (93.9)
Obesity (≥30), n (%)	194 (74.6)

* N = 248.

Intervention

The Women's Lifestyle Physical Activity Program has been explained in detail elsewhere [18]. Briefly, the intervention included a 24-week adoption phase and a 24-week maintenance phase. All three study conditions received six 2-hour group meetings. The first five group meetings were held on Saturdays every 5 weeks during the 24-week adoption period. One final "booster" meeting was held in the middle of the maintenance period. Groups were designed for an average of 15 participants (range 13–18). Each meeting consisted of brief individual time with a program nurse followed by a group discussion led predominately by a nurse facilitator of the same ethnicity as the participants. In a review of physical activity interventions for underserved populations, the importance of having ethnically matched study team members was emphasized as a key retention strategy [26]. Social cognitive strategies were applied systematically throughout, including behavioral capability, self-regulation, behavioral rehearsal, and vicarious experience [27]. The goal was to increase physical activity above each woman's baseline steps by a minimum of 3000 steps per day, an increase that approximates 30 minutes of physical activity [28]. Women in all three conditions were given an accelerometer/pedometer to monitor their steps and asked to enter their steps weekly into an automated telephone computer-linked system, which then generated individualized reports shared with each woman during her brief individual time at the group meetings. When using the automated system to enter their steps, participants in all three conditions could also respond to brief automated questions on health symptoms and accelerometer/pedometer problems and leave voicemails for program staff. They received a return call from a program nurse practitioner if symptoms were uncommon or urgent. If they did not enter their steps for 2 weeks, they received an automated reminder call. Women in the group-alone condition received only the intervention components described above. With the exception of reminder calls for the upcoming group meetings and reminder automated calls to report their steps in the automated telephone computer-linked system, no therapeutic contact was made with women who received the group-alone condition.

Women in the "group plus personal calls" condition received brief personal calls from their nurse group facilitator twice between each group meeting during adoption and once before and after the booster group meeting during maintenance. Motivational interviewing was used to help participants explore and resolve ambivalence about increasing their physical activity [29] and designed to address each woman's needs, experiences, barriers, motivation, and confidence [30].

Women in the "group plus automated calls" condition received automated calls that were initiated by the telephone