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Effectiveness, Efficiency, Durations, and Costs of Recruiting for an African American Women's Lifestyle Physical Activity Program

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Abstract

This article reports the planning and implementation of recruitment for a 48-week African American women's lifestyle physical activity controlled trial and analyzes recruitment effectiveness, efficiency, durations, and costs. Social networking was the most effective approach for inviting women to the trial. Of the 609 who responded to invitations, 514 completed telephone screening; of these, 409 (80%) were found eligible. The health assessment screening was completed by 337 women; of these, 297 (88.13%) were found eligible. The mean number of days from completion of the telephone and health assessment screenings to beginning the intervention was 23.01 and cost \$74.57 per person. Results suggest that study provision of health assessment screening is effective for minimizing attrition and also might be cost-effective.

Fewer African American women meet the 2008 National Physical Activity Guidelines for Americans compared to White American women (11.2% vs. 19.1%) (Roger et al., 2012). Many African American women reside in minority communities, where residents often have lower socioeconomic status, poorer health care coverage, and thus greater risks for disease and disease burden (Liao et al., 2011). These greater risks are exemplified in African American women, who have a higher prevalence than White American women with hypertension (45.7% vs. 31.3%), cardiovascular disease (47.3% vs. 33.8%), and diabetes (14.3% vs. 6.5%) (Roger et al., 2012). These disparities underline the urgent importance of developing interventions to broadly and effectively reduce risks and promote health in African American women. It is well established that living a physically active lifestyle reduces risk for these health problems (American Diabetes Association, 2012; Diabetes Prevention Program Research Group, 2002; Wannamethee & Shaper, 2001; Yamanouchi et

al., 1995) and that interventions aimed to increase women's physical activity may also benefit their families and communities (Madsen, McCulloch, & Crawford, 2009).

Critical to adequate testing of physical activity interventions is successful recruitment of appropriate samples of populations most in need of health promotion. Historically, African American women were largely missing from physical activity controlled trials (Krummel et al., 2001). In response to the National Institutes of Health Revitalization Act of 1993, Public Law 103-43 mandating the inclusion of diverse populations (Harden & McFarland, 2000), this began to slowly change. Increasing numbers of physical activity integrated reviews of controlled trials are demonstrating ethnic and socioeconomic diversity (Banks-Wallace & Conn, 200; Whitt-Glover & Kumanyika, 2009) and providing evidence about the barriers to and facilitators for inclusion of African American women (Carroll et al., 2011).

Foremost to successful recruitment is establishing a trusting relationship among community members, potential participants, and study recruiters and reducing participant burden. Trust has been established by ethnically, culturally, and linguistically matching recruiters with participants; incorporating recruiters and participants input into recruitment methods and materials; and by partnering with key community leaders and organizations (Carroll et al., 2011). Recruitment efficiency is strongly influenced by screening requirements that impose substantial hurdles to potential volunteers, e.g., inconvenient time and location for screening (Yancey, Ortega, & Kumanyika, 2006), Reducing burden lessens attrition and controls recruitment time and cost (Paskett et al., 2008). Offering flexible times, assuring efficiency to minimize time required, and locating screening sites convenient to where women live and work are useful strategies for reducing burden (Carroll et al., 2011; Foster et al., 2011).

Despite progress toward representation of at-risk populations in physical activity interventions, barriers remain (Foster et al., 2011). For example, most studies targeting those who are at higher risk for cardiovascular health problems, such as midlife and older African American women, require a medical release from each participant's health care provider prior to starting a physical activity intervention (Sharp, Fitzgibbon, & Schiffer, 2008). This can result in delays in starting the intervention while women obtain the required releases. It also raises barriers, since the women being recruited may be either uninsured or unable to afford the additional cost of a co-pay for an office visit. In one prior study, 35% of midlife urban African American women screened as potentially eligible became ineligible because they did not return a health care provider release (Sharp et al., 2008). Wilbur et al. (2006) did provide health assessments, but two visits were necessary to qualify for the intervention, requiring additional time and effort on the part of participants. There is a need to provide streamlined health assessments for entry into physical activity programs while assuring safety.

Recruitment can be a time consuming and expensive part of physical activity trials, especially with the careful attention needed to facilitate the inclusion of those participants who could benefit the most. CONSORT guidelines call for dates defining the periods of recruitment, but they provide no guidance for specifying how long recruitment should take (Schulz, Altman, Moher, & CONSORT Group, 2010). Foster and colleagues (Foster et al., 2011) presented a recruitment conceptual framework for controlled trials that addresses the role of the researchers and participants in planning and implementing phases. During planning, the population and setting are identified, recruitment materials are developed, and a timeline is identified. The plan is put into action during implementation, which includes offering the invitation to potential participants and monitoring response rates; screening and establishing eligibility; and offering the study start date and consenting participants. Recruitment ends at delivery, when the intervention actually begins.

Although studies are now reporting the total duration of recruitment using CONSORT guidelines (Schulz et al., 2010), to date we know of no physical activity intervention trials that have reported the durations required for or within each phase of recruitment or analyzed durations and costs per participant once potential participants have responded to an invitation. Precise tracking and analyses can help to identify which strategies save time, decrease attrition, and control costs. This will not only advance the science of recruitment, but also further the development of interventions that can be translated for use in clinical practice.

We conducted a 48-week lifestyle physical activity controlled trial for community-based midlife African American women. The purposes of this article are to: 1) report attrition, ineligibility, and eligibility during recruitment implementation to the start of the intervention; 2) describe the effectiveness and efficiency of different recruitment invitation approaches used to introduce the intervention during recruitment implementation; and 3) identify the durations of recruitment planning and implementation and costs for recruitment implementation.

Methods

Study Design

The parent Women's Lifestyle Physical Activity Program was a 48-week physical activity controlled trial testing three study conditions designed to increase adherence to lifestyle physical activity and improve cardiovascular health in midlife African American women. All three conditions included a lifestyle physical activity prescription with an accelerometer for self-feedback and monitoring as well as small group meetings (group visits) targeted to increase lifestyle physical activity. Group visits were held every 5 weeks during a 24-week adoption period (total 5), with 1 booster group visit held during the subsequent 24-week maintenance period. Between group visits, women in a person-administered telephone contact condition received 11 motivational telephone calls, while women in an automated computer-linked telephone contact condition received 11 motivational messages. Women in a third condition received no telephone contact as the control condition.

Recruitment Planning

Identifying participants and recruitment goals—Inclusion criteria were: (1) African American female, (2) sedentary, (3) aged 40 to 65 years, (4) able to commit to attending the study group visits, (5) had a telephone, and (6) without disabilities that would prevent regular participation in physical activity such as walking. Sedentary was defined as no participation in regular planned (3 or more times a week) moderate (e.g., walking) or vigorous (e.g., jogging, speed walking) physical activity in the preceding six months and without any disabilities preventing physical activity such as routine walking. Exclusion criteria were: (1) major signs or symptoms suggestive of pulmonary or cardiovascular disease (American College of Sports Medicine, 2010), (2) self-reported history of myocardial infarction or stroke; (3) hemoglobin A1c (HbA1c) $\geq 9\%$ (done on those with known diabetes and all volunteers with a fasting fingerstick glucose ≥ 200 mg/dL), (4) blood pressure $\geq 160/100$ mmHg (Chobanian et al., 2003), (5) or electrocardiographic (ECG) evidence of a prior myocardial infarction or cardiac disease.

Based on Wilbur et al.'s (2008) prior 48-week walking adherence study and assuming that dropouts had a zero percent adherence rate in terms of numbers of weeks walked and minutes walked per week, we obtained an effect size between a walking intervention treatment group and standard care treatment for adherence of $d = .67$ (Cohen et al., 2000). Statistical power was estimated using the Optimal Design for Longitudinal and Multilevel

Research software (Spybrook, Raudenbush, Liu, Congdon, & Martinex, 2008). We assumed a two-tailed $\alpha = .05$, a conservative $d = .60$, 18 cohorts, and an intraclass correlation of .07. With these assumptions, we obtained a power of .85, assuming a final sample of 201. To be conservative, we assumed a 30% loss of participants during the course of the intervention. After correcting for this potential 30% loss, our goal was to recruit 288 women.

Identifying recruitment settings—Recruitment was conducted within the community areas where the study sites were to be located and within a two-mile radius of each site. The sites were situated within three community health care centers and two community hospitals located in five predominantly African American (90%) community areas on Chicago's South and West Sides. On average, 30% of the residents in these communities have household incomes below the poverty level (Kouvelis, Harper, & Thomas, 2004). A sixth site was in a community hospital located in a collar suburb of Chicago that is 22% African American and borders a predominantly low-income African American community area on Chicago's West Side.

Recruiters and recruitment materials—Recruiters included four socially engaging African American staff members who all lived in Chicago and had ties to the communities served by the study sites. Most of the recruiters were members of key community boards and had extensive experience recruiting participants in prior community-based studies. They partnered with and mentored staff members new to recruitment until the new personnel were proficient. Recruiters were instrumental in designing the study invitations (flyer and brochure) with feedback from African American women in the community. Invitations included a brief description of the program, featured photographs of midlife African American women demonstrating what to expect during screening and the trial, provided key eligibility criteria including age and race, and listed the location of the area's study site and contact information for the study. The Community Engagement Board of the Center for Clinical and Translational Science at the University of Illinois at Chicago advised on the appropriateness of the recruitment materials and approaches.

Developing the timeline—Before recruitment began, a detailed recruitment implementation timeline was set to recruit 288 eligible women in the first 2.5 years of the five-year study. Treatment conditions were to be administered in the three waves across the six community health settings, with sites receiving a new condition with each subsequent wave. Each wave was planned to last 78 weeks and to have six cohorts of group visits across the six sites. The plan for each cohort at a study site was to take approximately five weeks for the screening health assessment. This was followed by the 48-week physical activity intervention for a total of 53 weeks per cohort. Screening health assessments for the next study site was planned to begin every 5 weeks: that is, immediately after the prior cohort had started the intervention. Recruitment for an entire wave from response to the invitation for the first of the six cohorts to completion of the screening health assessment for the last cohort in the wave was planned to last approximately 36 weeks or nine months. For the four months that all six cohorts were running in a wave, no recruitment occurred. The study waves were planned to overlap (approximately 96 women at each wave).

Screening health assessments were scheduled at the sites in late afternoons, early evenings, and Saturdays to accommodate working midlife women. Two to three sessions, four hours each, were scheduled for health assessments each week for the five weeks of recruitment at each study site, with an average of three to five women scheduled per session.

Recruitment Implementation

Inviting participants to the controlled trial—Indirect recruitment involved approaches that prompted potential participants to call study recruiters without having had direct contact with the study previously (Foster et al., 2011). Recruiters dropped in or made appointments with key contacts in the identified recruitment locations within each targeted community area. These key contacts were encouraged to spread the word about the program among their network. Only after explaining the study to and engaging at least one key contact at the location were recruitment materials left for distribution. These locations included churches (20), social service and health care facilities (12), community organizations (8), beauty/nail salons (5), schools (5), a grocery store, and a park district. In some instances, the key contact asked for an electronic flyer so it could be (for example) placed in a church bulletin or distributed to constituents via e-mail or newspaper. Most key contacts were revisited at the start of recruitment for each wave and recruitment materials replenished. Further, all women recruited to the program were encouraged to spread the word about the program among their own personal networks within the community.

Direct recruitment brought the recruiters into face-to-face contact with potential participants (Foster et al., 2011). When leaving recruitment materials at recruitment locations, the recruiters handed them to women present, provided a brief explanation of the program, and answered questions. Recruiters attended community health fairs (5), gave presentations at community gatherings such as a community watch group (5), and approached women at a reunion picnic and a work picnic (2). In most instances, recruiters did not screen during these direct encounters due to the length of screening. However, women could sign a release to be called later, at a time convenient for them, or they could take a flyer and contact the program at a later date by telephone. Women attending these events also passed recruitment flyers and information on to their personal networks later, so that direct recruitment then led to indirect recruitment downstream.

Screening, consenting, and establishing eligibility—Screening procedures focused on applying study inclusion criteria and identifying risk factors or symptoms that could be aggravated by physical activity. We used a two-staged screening process that began with a telephone screening followed by an in-person health assessment.

Stage 1 - telephone screening: Women responding to the study invitation were asked how they heard about the study and given a brief introductory overview. If they were interested and gave verbal consent, they were screened for age, race, level of physical activity, and use of an assistive device to walk. The Physical Activity Readiness Questionnaire (American College of Sports Medicine, 2010) then was used to screen for signs and symptoms of cardiovascular disease and history of cardiovascular or metabolic disease. Women who met the telephone screening eligibility criteria were scheduled to come to their respective study sites for a screening health assessment. For follow-up purposes, potential participants were asked to provide multiple contact sources, including home and e-mail addresses; home, work, and cell phone numbers; their ability to accept text messages; and the telephone number of two other persons who would know how to reach them.

A letter detailing what to expect at the health assessment and the health assessment date and time was mailed to each woman's home. Up to three reminder calls were made the week of the assessment (seven days, three days, and the day prior). However, if a woman was reached seven days before the assessment and confirmed attendance at that time, only the reminder telephone call on the day prior was made. Voice or text messages were used if no one answered the telephone.

Stage 2 - health assessment: The multi-racial screening health assessment team included a research assistant, registered nurse (RN), and advanced practice nurse (APN). Women were usually met at the study site by the person they had talked to when they were recruited. Prior to the start of the health assessment, the study was explained further, the consent form was read to the woman (unless she asked to read it herself), and written consent was obtained to undergo health assessment screening and, if found eligible, to participate in the study.

The health assessment included the critical measures to determine eligibility for the study: health history, physical examination, blood pressure (BP), a resting 12-lead ECG, and point of care fasting finger stick for lipoproteins and glucose, and when indicated, HbA1c. Due to the low to moderate intensity nature of the physical activity and in accordance with the American College of Sports Medicine guidelines for persons at low (asymptomatic and < 2 risk factors) or moderate (asymptomatic and 2 risk factors) risk for adverse cardiovascular events related to exercise, a maximal aerobic fitness test was not done (American College of Sports Medicine, 2010).

Women received \$15 for the health assessment and were given the results with normal values for comparison. When ECG findings were abnormal or inconclusive, the woman's record and ECG were reviewed by the cardiologist investigator to assess eligibility prior to referral to her health care provider. Those with total cholesterol levels 200 mg/dL or other lipid abnormalities were referred for follow-up but were not deemed ineligible on this alone. Hypertensive women who were able bring their BP under control were admitted to the study later. However, women with suspected or known diabetes with a HbA1c level 9% were advised of the findings, deemed ineligible, and referred to their health care provider for follow-up.

Estimating Durations and Costs

The web-based tracking system data were used for duration calculations. The duration of the telephone screening was estimated from self-report by study staff members completing the calls. The hourly wage rate for a research assistant was used to convert telephone screening time into dollars. Time studies for the health assessment were conducted using a sample of six to ten assessments in each wave (total 21). Times for measuring height and weight, waist circumference, and blood pressure were collected by the RN; times required for the health history, physical examination, electrocardiogram, and blood tests were collected by the APN. The average hourly wage rates for RNs and APNs were used to convert time into dollars (ADVANCE for NPs and PAs, 2012; Bureau of Labor Statistics, 2013). Supply costs were collected from study financial records.

The cost of obtaining a medical approval from a healthcare provider was estimated to compare with the cost of having study staff perform the health assessment. We estimated the cost of the health assessment using the 2012 Medicare National Fee Schedule for an established office visit (Current Procedural Terminology Code 99213) (Centers for Medicare and Medicaid Services, 2012). The costs of the ECG and lipoprotein, glucose and HbA1c blood tests were also included in these estimates. Since the initial telephone screening would still be done by study staff members, we assumed those per-person costs would remain the same.

Results

Attrition, Eligibility, and Ineligibility during Recruitment Implementation

Figure 1 shows attrition, eligibility, and ineligibility during recruitment implementation. A total of 609 invited women responded to invitations by contacting our program offices by

telephone or e-mail or provided their telephone contact information on a sign-up sheet indicating they were interested. The women who actively dropped out at the time of the telephone screening ($n = 44$) met the age and race eligibility criteria but let us know they were not interested after hearing details about the program. The primary reason provided for not being interested was that the site for the health screening and group visits was inconvenient to their home or work location (17/44, 38.6%). We were unable to reach an additional 51 women for telephone screening, although they had initially indicated their interest in the study. As a result, they passively dropped out. Of the 105 women who were found ineligible during telephone screening, the primary reason was that they were already too active (55/105, 52.4%). A total of 409 women were identified as eligible and interested in the program at the telephone screening.

Of the 409 women scheduled for a health assessment screening, 72 dropped out and did not have a health assessment. The 29 who actively dropped out at the time of the health assessment were women we had contact with at that time. Of this 29, 18 failed to show for the health assessment but later notified us that they were no longer interested in the program, with the most common reason being time conflicts. The other 11 canceled their appointments, giving a new health problem as the most common reason. Passive attrition was attributed to the 43 women who failed to show for their health assessment appointment. No further contact occurred.

Of the 337 women who had health assessments, 297 were found eligible and 40 were ineligible. Of the 40, 23 were deemed ineligible by the APN, primarily due to elevated blood pressure (18/40, 45%). Another 67 had health findings at the health assessment requiring review by the study cardiologist, of whom 17 were deemed ineligible.

Overall, of the 609 women who responded to the invitation to participate in the program, 297 women (49%) were deemed eligible and were scheduled to enroll for the first group visit. Nine of these eligible women (3%) dropped out prior to the start of the intervention. Of the nine, six dropped out due to various reasons (see Fig. 1) and 3 could not be reached for follow-up. Thus, we met the recruitment goal of 288 women who were eligible and began the Women's Lifestyle Physical Activity Program.

Effectiveness and Efficiency of Recruitment Implementation Strategies

Indirect recruitment strategies were the most effective in terms of generating telephone calls to the program office (469/609; 77.0%). These strategies were also the most efficient, yielding 244 eligible women who started (244/469; 52.0%) (Table 1). Social networking reached the most women, whether it was networking among community members who told potential participants about the study and gave them flyers or networking with other participants already enrolled in the study (285/609; 46.7%). Flyers were effective indirect strategies as well (184/609; 30.2%). Direct recruitment strategies were less effective in generating volunteer inquiries (88/609; 14.4%), however, they yielded another 44 eligible women who accepted. Overall, each known recruitment strategy had an efficiency ratio of approximately 50% accepted (40%-54.8%). How women learned about the study was not available for 52 women.

Recruitment Durations

The planning phase took four months, occurring between October 2009 and January 2010. The women were recruited and began the program over the 2.8 years between February 2010 and October 2012. As planned, each of the three study waves had nine months devoted to inviting and screening potential participants for a total of 27 months of recruitment implementation.

Within the recruitment implementation phase, examination of the durations for the 288 women who began the intervention revealed that 274 women completed within one wave. The distribution of the number of days these women took for recruitment implementation (responded to the invitation to the start of the intervention) showed a cut point of 80 days, with 207 taking less than 80 days and 67 taking 80 days or longer (Table 2). Indeed, for most women entering the study (207, 72%), the duration for recruitment implementation was a mean of 38 days.

The durations for completing the telephone screening and health assessment were much longer for two other groups of women. We looked closely at the 67 women who completed recruitment implementation within one wave, but for whom it took 80 or more days. Of these, 61 women were delayed until recruitment started at a site closer to their home. The other 6 women were delayed due to findings during the screening health assessment that required further evaluation before they were deemed eligible. Another 14 women took more than one wave to complete recruitment implementation. Of these, the majority ($n = 12$) responded to the invitation in one wave, but the cohort they requested was filled, requiring them to wait until recruitment began for the next wave. The other 2 women had health problems and they waited until recruitment began the next year. In general, we deferred the health assessment screening to a time when we could assure study entry. Using this strategy, women in all three groups on average were able to begin the intervention within five weeks of completing the health assessment, with the mean being 23.01 days.

Cost of Recruitment Implementation

The telephone screening took approximately 10 minutes and was performed by a staff member at a cost of \$2.80 per person (Table 3). The screening health assessment had a median duration of 52.9 minutes, with the majority of the assessment tasks performed by the APN (46.9 minutes) compared to the RN (6 minutes). The cost of the health assessment components related to study inclusion was estimated at \$59.46 including supplies, bringing the total cost of all tasks including telephone screening to an estimated \$62.26 per person screened.

Table 4 compares the cost of recruitment screening for the study with the costs that would have been incurred if the health assessment was performed by the participants' healthcare providers. Based on prior literature (Sharp et al., 2008), we assumed that 35% of individuals who completed the telephone screening would not have returned their medical approval had they been required to obtain it from their healthcare provider ($n = 143$). As a result, 752 women would have been needed in order to meet the recruitment goal compared to the 609 women who responded in our study. As a conservative evaluation, we estimated the cost of the health assessment with the individual's healthcare provider at the Medicare reimbursement rate of \$108.97 compared to \$59.46 when performed by study health assessment team. Including the costs of telephone screening and health assessment for both women found eligible and those found ineligible, we calculate that the final cost of recruitment was \$74.57 per participant for the 288 women starting the intervention compared to \$133.64 per participant if a release had been required from the participant's health care provider.

Discussion

Of the 609 women who responded to an invitation to participate in the Women's Lifestyle Physical Activity Program, we were able to reach 514 for complete telephone screening, 57.7% of whom were found eligible to enroll (297/514). This is substantially better than the number of African American women screened eligible for two earlier physical activity interventions in the same urban environment with similar recruitment goals: 281/579 (48%)

(Wilbur et al., 2006) and 213/690 (31%) (Sharp et al., 2008). We attribute these results to thorough planning, effective and efficient invitation approaches, and carefully minimized durations while women were completing the telephone and health assessment screenings.

Using a variety of recruitment approaches to introduce the program and invite women yielded responses from interested women in all of the community health study sites. Similar to an earlier study with African American women (Wilbur et al., 2006), the highest percentage of women were reached through indirect recruitment approaches. These approaches included social networking among community members and with other participants already in the study as well as the wide distribution of attractive, informative flyers featuring midlife African American women. The response to social networking was at least in part due to our engaging recruiters, who had multiple links to the targeted communities. The recruiters spent time within each community, where they introduced the program to key community members to increase awareness. These key community members then told others throughout the community about the study.

We postulate that several more factors augmented social networking. Each staff member doing telephone screening usually met in person to administer the study consent when the women they had screened came in for their health assessment. This procedure provided continuity throughout the recruitment screening process. Then women spent time with the APN, who made referrals if needed for additional health care at affordable, nearby providers. Women commented on how much they valued the thorough assessment and individualized attention. Consistent with other studies that have included low-income and multiethnic women (Banks-Wallace, Enyart, & Johnson, 2004; Barnett, Aguilar, Brittner, & Bonuck, 2012), strong study staff rapport with potential participants during recruitment screening motivated the women to spread the word to others like themselves.

We found that indirect recruitment strategies through social networking and flyers often spread study information beyond the originally planned two-mile radius of the various study sites. This occasionally resulted in attrition of potential participants due to inconvenience of the study location. Nonetheless, only 44 of the 288 women who enrolled in the program did so after coming into direct contact with a recruiter. It may be most effective in terms of time and resources to have recruiters tap into community social networks and to distribute appealing flyers where women are likely to encounter them, even if word sometimes spreads beyond the targeted communities.

Careful use and monitoring of time throughout recruitment implementation controlled durations and may have lessened attrition. The health assessment was accomplished in one visit by streamlining measures according to best current evidence. We did not require a maximal aerobic fitness test. Using the highly accurate point-of-care blood assays now available gave screeners the information needed to guide immediate eligibility decisions. Most women completed the health assessment knowing whether they qualified for the study and when their start date would be.

Providing screening health assessments as part of the trial, rather than requiring clearance from the woman's provider, eliminated a common barrier to participation for women who are uninsured or unable to afford a co-pay for an office visit. Extrapolating from the experience of Sharp et al. (2008), if we had not provided health assessments and instead required initially eligible women to obtain a release from their health care provider, an additional 143 potential participants would have been needed to meet our study recruitment goal. Given our staffing, this would have extended recruitment by approximately 8 months and possibly skewed recruitment toward women who had readily accessible health care providers, thereby missing an important part of our target population of low income African

American women. In designing interventions, researchers should look beyond any apparent cost savings of using outside providers for health assessments to the additional implications, such as the need for increased numbers of volunteers and recruitment time.

Also, on average we were able to schedule 72% of the women for their health assessment visit within 15 days of screening them on the telephone. In contrast, the appointment lag for new patients in primary care has been shown to be 45 days or longer (Centers for Medicare and Medicaid Services, 2012; Massachusetts Medical Society, August 8, 2012). Among established patients seeking a return visit, African Americans often have a longer appointment lag than other ethnic groups (Ly & Glied, 2010). Thus, when a screening health assessment is not part of the trial not only is there additional attrition, but also there is the potential for delay of the start of intervention delivery as participants wait for a screening health assessment from an outside provider.

In this study there was only 3% attrition between the end of screening (deemed eligible) and start of the intervention. In Carroll and colleagues' (2011) review of recruitment of underserved populations to physical activity interventions, eight studies with African American women reported the number of eligible women who dropped out between screening and the start of intervention delivery (Escobar-Chaves, Tortolero, Masse, Watson, & Fulton, 2002; Hines-Martin, Speck, Stetson, & Looney, 2009; Parra-Medina et al., 2004; Parra-Medina et al., 2010; Sharp et al., 2008; Staffileno & Coke, 2006; Staffileno, Minnick, Coke, & Hollenberg, 2007; Wilbur et al., 2006; Yancey et al., 2001). The percent of women who dropped out ranged from 0 to 56% ($M = 29\%$). We attribute our success to the ability to have a cohort of women (including women with delays in the early recruitment process) ready to begin on average 23 days after completing the screening health assessment. These efforts to consolidate time were facilitated by establishing a realistic, tight timeline for recruitment implementation. We find that the closer screening is to the start of the intervention, the less time participants have to lose interest and for barriers to arise.

An economic analysis was done for the screening phase of the study. While the cost of providing health assessment screenings by study personnel may be perceived as financially unviable by some researchers, our results suggest that providing these screenings is an effective strategy for minimizing pre-assessment attrition and also might be cost-effective from a societal perspective. The cost of a physician's assessment, including the ECG and blood work, would have been substantially higher compared to the same assessment when performed by a team of APNs and RNs. Even though these costs would have been borne by health insurers or the women rather than the study, they represent potentially avoidable and unnecessary costs to the healthcare system overall.

In summary, we were successful in meeting our recruitment goal in the time frame that was set for implementing recruitment. This was greatly facilitated by robust use of social networking and by study provision of the screening health assessment necessary to assure women's safe participation in a physical activity intervention. A major strength of this paper was delineation of four important metrics for reporting recruitment: effectiveness, efficiency, durations, and costs. Our analysis of the duration and economics of recruitment suggests that study-provided health assessments may be cost-effective for assuring the inclusion of community-based African American women. The added benefits of providing health assessments are removing barriers and strengthening engagement during screening, which in turn can foster further recruitment by the participants themselves. This information is relevant for researchers planning a randomized controlled trial with community-based minority populations.

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Figure 1.

Table 1

Invitation Outcomes During Recruitment Implementation (Responded to Invitation, Effectiveness, Started Intervention, and Efficiency) by Invitation Approach

Invitation approach	Invitation outcome			
	Responded (n = 609)	Effectiveness ^a (%)	Started (n = 288)	Efficiency ^b (%)
Indirect				
Social networking among community members	144	23.6	77	53.5
Social networking with another participant	141	23.1	74	52.4
Flyer clinic, community Hospital	62	10.2	34	54.8
Church flyers/notices	58	9.5	28	48.3
Flyer other	64	10.5	31	48.4
Total	469	76.9	244	52.0
Direct				
Social networking directly with staff	63	10.3	34	54.0
Health fair	25	4.1	10	40.0
Total	88	14.4	44	50.0
Source unknown	52	-	0	-

^aDefined as number responded/609.

^bDefined as number started/number responded.

Table 2

Durations of Recruitment Implementation in Days for Women Who Started the Intervention

Implementation component	Completed in one wave		Completed in more than one wave	Total
	On time ^a	Delayed ^b		
	(n = 207)	(n = 67)	(n = 14)	(n = 288)
	M(SD)	M(SD)	M(SD)	M(SD)
Respond to invitation to telephone screen	3.62(8.30)	27.16(37.69)	203.29(185.61)	18.80(61.48)
Telephone screen to health Assessment	14.57(13.38)	64.10(39.94)	114.21(124.44)	30.94(44.56)
Health assessment to start of Intervention	19.43(10.97)	33.49(19.87)	25.71(15.06)	23.01(14.93)
Respond to invitation to start of intervention	37.54(17.98)	124.76(39.34)	343.21(148.22)	72.69(81.71)

^aDefined as taking less 80 days to complete recruitment implementation.^bDefined as taking 80 days or more to complete recruitment implementation.

Table 3

Time and Cost per Study Inclusion Screening Task Required during Recruitment Implementation

Screening variable	Minutes (median)	Cost ^a		
		Labor	Supply	Total
Telephone screening	10	2.80	--	2.80
Health assessment ^b				
Blood pressure	6	3.11	--	3.11
Health history	18.9	13.72	--	13.72
Physical examination	10	7.25	--	7.25
Electrocardiogram	10	7.25	0.84	8.09
Laboratory tests (lipid panel, glucose, HbA1c)	8	5.80	21.49	27.29
Subtotal	52.9	37.13	22.33	59.46
Screening total costs	62.9	39.93	22.33	62.26

Note: Additional assessments not required for study inclusion were height, weight, and waist circumference (3.7 minutes). These were measured by the RN at a cost of \$1.92.

^a In 2012 US dollars.

^b N= 21 observations.

Cost of Recruitment Implementation with Screening Health Assessment Conducted by Study versus Medical Approval Required from Primary Care Provider

Table 4

Implementation component	Cost of health assessment conducted by study		Estimated cost if medical approval required from primary care provider	
	Number	Cost per person	Number	Estimated cost per person
Responded to invitation	609		752 ^a	
Completed telephone screening	514	2.80	631	2.80
Completed health assessment				1,767
Eligible (offered intervention)	297	59.46	297	108.97
Not eligible	40	59.46	40	108.97
Total cost for screening	288	74.57 ¹⁰	288	133.64 ^d
				38,490

^aEstimated number of potential participants needed if approval required from health care provider, based on 35% attrition due to not having a study-conducted health assessment.

^bCost not incurred by study.

^cTotal cost for eligible and ineligible screenings (\$21,477) divided by total number of participants starting the study (288).

^dTotal cost for telephone screening and eligible and ineligible screening from primary care provider (\$38,490) divided by total number of participants starting the study (288).