National Dissemination of StrongWomen–Healthy Hearts: A Community-Based Program to Reduce Risk of Cardiovascular Disease Among Midlife and Older Women

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Cardiovascular disease (CVD) is the leading cause of death for women in the United States, and heart disease, stroke, and hypertension are among the leading causes of disability.[1] CVD currently incurs costs of over $300 billion per year,[1] with continued increases expected as the US population ages. It has been clearly demonstrated that in older adults, the risk and progression of atherosclerotic CVD can be reduced through lifestyle change.[2–4]

One public health approach to reducing CVD risk for midlife and older women is to implement educational and behavioral programs through community organizations that have established mechanisms for outreach and recruitment, such as hospitals, recreation departments, or cooperative extension offices.[5] Such programs can be designed to adapt to the needs of unique populations and to physical locations[6] and can provide opportunities for social and peer support, which has a positive impact on short- and long-term behavior change.[7–9]

Several community-based lifestyle programs have been shown to promote behavior change to reduce CVD risk among women,[10–14] but very few have been widely disseminated. StrongWomen–Healthy Hearts is a 12-week, evidence-based community program developed to improve CVD risk factors in midlife and older women who are overweight or obese and currently sedentary. It is designed for implementation within the US National Institute of Food and Agriculture (cooperative extension) network of state, regional, and county offices. The effectiveness of the program was tested in a randomized, controlled trial conducted in Arkansas and Kansas.[15] Compared with the control group, the intervention group achieved significant decreases in body weight (> 4 lb in 12 weeks); a reduction in intake of overall calories, saturated fat, and

Objectives. We describe the national dissemination of an evidence-based community cardiovascular disease prevention program for midlife and older women using the RE-AIM (reach effectiveness adoption implementation maintenance) framework and share key lessons learned during translation.

Methods. In a 2010 to 2014 collaboration between the StrongWomen program and the National Extension Association of Family and Consumer Sciences, we assessed reach, adoption, implementation, and maintenance using survey methods, and we assessed effectiveness using a pretest–posttest within-participants design, with weight change as the primary outcome.

Results. Overall reach into the population was 15 per 10 000. Of 85 trained leaders, 41 (48%) adopted the program. During the 12-week intervention, weight decreased by 0.5 kilograms, fruit and vegetable intake increased by 2.1 servings per day, and physical activity increased by 1238 metabolic equivalent (MET)-minutes per week (all *P* < .001). Average fidelity score was 4.7 (out of possible 5). Eleven of 41 adopting leaders (27%) maintained the program.

Conclusions. The StrongWomen–Healthy Hearts program can be implemented with high fidelity in a variety of settings while remaining effective. These data provide direction for program modification to improve impact as dissemination continues. (*Am J Public Health.* 2015;105:2578–2585. doi:10.2105/AJPH.2015.302866)

cholesterol; and an increase in number of steps per day.

Effective dissemination is critical to reaching larger numbers of women. As a first step, we conducted a rigorous, prospective, mixed-methods program evaluation in Pennsylvania[16] using the RE-AIM framework.[17] RE-AIM encompasses 5 components: reach, effectiveness, adoption, implementation, and maintenance. Next, we used the RE-AIM components to optimize design as the program was disseminated nationally. In this article, we report findings related to each component of the RE-AIM framework during national dissemination and provide key lessons learned when translating an evidence-based intervention. We also describe the characteristics of the program's leaders, since previous studies have suggested that leaders' contributions help determine how well a program succeeds,[18–20] as

well as the resources available to leaders, including physical facilities, equipment, supplies, funding, and time.

METHODS

This dissemination study leveraged a long-term collaboration between the StrongWomen program and the National Extension Association of Family and Consumer Sciences (NEAFCS), a professional organization for cooperative extension educators. Cooperative extension is a national network of experts affiliated with land-grant universities who provide education, including health programming, to meet public needs at a local level.

To begin national dissemination, we conducted a training workshop in conjunction with the NEAFCS 2010 annual meeting. Extension educators were recruited through the NEAFCS

TABLE 1—Characteristics of Trained Leaders (n = 85): The StrongWomen–Healthy Hearts Program, United States, 2010

Characteristic	No. (%) or Mean ±SE
Self-efficacy: can recruit enough for class	
Not at all confident	3 (3.5)
Somewhat confident	9 (10.6)
Moderately confident	30 (35.3)
Very confident	35 (41.2)
Completely confident	8 (9.4)
Self-efficacy: can recruit low-income participants	
Not at all confident	10 (11.8)
Somewhat confident	23 (27.1)
Moderately confident	36 (42.4)
Very confident	11 (12.9)
Completely confident	5 (5.9)
Self-efficacy: can recruit minority participants	
Not at all confident	20 (23.5)
Somewhat confident	22 (25.9)
Moderately confident	25 (29.4)
Very confident	15 (17.7)
Completely confident	3 (3.5)
Hispanic origin	
Yes	1 (1.2)
No	82 (96.5)
Missing	2 (2.4)
Race	
White	81 (95.3)
Black or African American	3 (3.5)
American Indian/Alaska Native	1 (1.2)
Asian	0
Native Hawaiian/Pacific Islander	0
Education	
High school graduate	0
Some college or technical school	0
Bachelor's degree	13 (15.3)
Graduate or professional degree	72 (84.7)
Missing	0
Continuous characteristics	
Time in current position, y (median = 10.2; range = 40.7)	13.1 ±1.1
Age, y (median = 53.0; range = 45.0)	50.1 ±1.2
BMI, kg/m^2 (median = 26.5; range = 25.6)	28.1 ±0.7
Self-efficacy as a leader score[a] (median = 4.0; range = 2.7)	3.9 ±0.1

Note. BMI = body mass index. The overall study spanned the years 2010 through 2014. The data in this table were collected just prior to the leader training in 2010.
[a]Self-efficacy scale ranged from 1 (not at all confident) to 5 (completely confident).

network, and 85 extension educators from 30 states attended. The workshop consisted of a series of seminars on all aspects of the program. All attendees received a copy of the printed curriculum, which included a detailed class-by-class guide, and on-line access to these materials. Prior to this workshop, registered leaders attended a Webinar describing the dissemination research, including their role and the assessment methodology.

Participant Sample, Intervention, and Recruitment

Once trained, leaders who chose to adopt the StrongWomen–Healthy Hearts program recruited participants for their classes. The participant eligibility requirements were as follows: female, aged 40 years or older, sedentary (engaging in physical exercise less than once per week), without contraindications to exercise,[21] body mass index 24 or higher (BMI; defined as weight in kilograms divided by the square of height in meters), and not participating in another lifestyle change program.

The StrongWomen–Healthy Hearts program is designed to take place 2 days per week for 12 weeks. Thirty minutes of each 1-hour class includes aerobic dancing to a DVD created for the project or walking outside. The other 30 minutes includes leader-directed discussion and hands-on activities to improve dietary intake patterns, as well as weight control strategies. The eating pattern encouraged was designed to be consistent with American Heart Association guidelines[22] and the 2010 Dietary Guidelines for Americans.[23] The theoretical basis for the intervention is social cognitive theory.[24] Thorough formative research helped inform development of the curriculum.[25] The program is listed on the National Cancer Institute's Research-Tested Intervention Programs Web site.[26]

We provided template recruitment materials to leaders, including a newspaper article, flyer, trifold brochure, postcard, and a letter or e-mail. Responding to a monthly questionnaire, leaders documented their recruitment activities and the approximate number of participants reached by each method.

Measures

Leader and site characteristics. We measured leader and site characteristics using a questionnaire administered prior to the leader training workshop. It included basic demographic information, self-reported height and weight, length of time at current position, and 3 self-efficacy questions related to recruitment: confidence in being able to recruit (1) at least 10 to 15 women in the target population, (2) some women of low income, and (3) some women

TABLE 2—Characteristics of the Individual Study Sites as Reported by Trained Leaders (n = 85): The StrongWomen–Healthy Hearts Program, United States, 2010

Characteristic	No. (%) or Mean ±SE	Median (Range)
Competing priorities on leader's time[a]		
Present, and clearly noted	37 (61.7)	
Present, but program is priority	14 (23.3)	
None reported	5 (8.3)	
Vague response	4 (6.7)	
Continuous characteristics		
Space availability[b]	3.8 ±0.05	4.0 (1.0)
Estimated cost,[c] US$	263 ±42	20 (1070)
Likelihood to cover the costs[d]	3.2 ±0.1	3.3 (3.3)
Likelihood for costs to prevent the program[e]	1.0 ±0.1	1.0 (4.0)
Facility pleasantness[f]	8.0 ±0.2	8.3 (8.0)
Accessibility[g]	3.4 ±0.1	3.7 (2.5)
Equipment availability[h]	3.1 ±0.1	3.0 (2.0)
Time availability[i]	3.2 ±0.1	3.5 (3.0)

Note. The overall study spanned the years 2010 through 2014. The data in this table were collected just prior to the leader training in 2010.
[a]Leaders were asked an open-ended question about competing priority areas of their work that would serve as a barrier to running the program. Responses were coded into these categories by the study team.
[b]Sum of 4 binary indicators for sitting space, space for dancing, kitchen, and outside walking route.
[c]Sum of estimated rent and cost of foods.
[d]Average of three 5-level scales on abilities to cover rent, food costs, and printing; the range was 0 to 4, with 4 being highly likely.
[e]Average of two 5-level scales on likelihood of rent and food cost being prohibitive; the range was 0 to 4, with 4 being highly likely.
[f]Average of two 10-level scales on pleasantness of outside and inside of the facility; the range was 1 to 10, with 10 being most pleasant.
[g]Average of three 5-level scales on categorized distance from downtown, and accessibilities by public transport and by car; the range was 0 to 4, with 4 being most accessible.
[h]Sum of 4 binary indicators (availability of DVD, cooking equipment, pedometers, and storage place); the range was 0 to 4, with 4 being best equipped.
[i]Average of two 5-level indicators on likelihood of being able to devote 5 hours per week to preparation and likelihood of this amount of time impeding ability to adopt the program (reversed coding); the range was 0 to 4, with 4 representing having adequate time for preparation.

from ethnic or racial minority groups. It also included 4 self-efficacy questions related to running a class: confidence in overcoming challenges related to logistics, communications, social and interpersonal factors, and physical demands.[19] We averaged responses to create an overall value for self-efficacy for each leader. For all self-efficacy questions, we based the format on valid and reliable scales.[27–29]

To characterize site resources and characteristics, the leader questionnaire collected information about the physical facility, including space for group discussions and dancing, outdoor walking routes, kitchen facilities, outside and inside pleasantness, accessibility, and availability of equipment. We also asked extension educators about estimated financial and time costs related to running the program,

the likelihood of being able to cover costs, the likelihood that these costs would prevent them from running the program, and their ability to prioritize the program.

The questionnaire was pilot tested with 21 extension educators in Kansas and Arkansas. We calculated test–retest reliability on the basis of the questionnaire's readministration 2 weeks later. The reliability was 83% across all extension educators and questions.

RE-AIM components. We calculated reach in a target population by dividing the number of eligible women who began a program run by an adopting leader by the total number of women aged 40 years or older in that leader's county.[30] To determine representativeness, an aspect of reach, participants completed a basic demographic questionnaire (education,

income, race, marital status, and work status). We tested the proportions of each attribute against those of the same age and sex cohort in the US 2010 Census and the 2010 American Community Survey[30] of comparable geographic units (same county or state) using a χ^2 goodness of fit test. A score of 1 was given if the test concluded that the sample and population proportions were not different. By summing scores on the basis of the 5 demographic factors, we compiled a representativeness score ranging from 0 to 5 (0 indicating very little similarity and 5 representing high similarity).

Pre–post program change in body weight was the primary measure of effectiveness. Program leaders measured participants' weight in triplicate to the nearest 0.5 kilograms using a digital floor scale. Secondary measures were fruit and vegetable consumption, assessed with the validated 5 A Day for Better Health 7-item screener,[31] and physical activity, assessed with the International Physical Activity Questionnaire (IPAQ; short form).[32–34] We compiled fruit and vegetable intake scores according to National Cancer Institute criteria.[35] Metabolic equivalent (MET) scores, which we compiled according to the IPAQ's Guidelines for Data Processing and Analysis,[36] represent MET-minutes per week. We determined MET levels according to the Compendium of Physical Activities.[37]

We calculated the overall adoption rate as the percentage of trained extension educators who ran the program within 1 year of receiving institutional review board approval. To determine implementation, we asked extension educators who ran the program to complete a brief on-line survey monthly. They were asked about adherence to the overall class structure (twice per week for 1 hour), as well as to the physical activity, cooking, and nutrition education sections of the curriculum. Two research team members independently rated responses regarding these components on a 1-to-5 scale (with 5 representing the highest level of fidelity). We determined interrater reliability using Cohen κ, and we discussed items that scored lower than 0.8 until consensus was reached. We calculated the overall fidelity score by averaging ratings from all 4 components. Additionally, we asked class leaders to provide data on participant attendance and to estimate class preparation time

TABLE 3—Characteristics of Class Participants (n = 345): The StrongWomen–Healthy Hearts Program, United States, 2010–2014

Characteristic	No. (%) or Mean ±SE
Hispanic origin	
Yes	18 (5.2)
No	306 (88.7)
Missing	21 (6.1)
Race	
White	290 (84.1)
Black or African American	23 (6.7)
American Indian/Alaska Native	6 (1.7)
Asian	0
Native Hawaiian/Pacific Islander	0
Multirace	5 (1.5)
Other	3 (0.9)
Missing	18 (5.2)
Education	
Less than high school	7 (2.0)
High school graduate	54 (15.6)
Some college or technical school	93 (27.0)
Associate's degree	44 (12.8)
Bachelor's degree	70 (20.3)
Graduate or professional degree	58 (16.8)
Missing	19 (5.5)
Marital status	
Married	215 (62.3)
Widowed	36 (10.4)
Divorced	42 (12.2)
Separated	4 (1.2)
Never married	21 (6.1)
Member of an unmarried couple	6 (1.7)
Missing	21 (6.1)
Employment	
Employed for wages or self-employed	149 (43.2)
Out of work	19 (5.5)
Homemaker	25 (7.2)
Student	1 (0.3)
Retired	123 (35.7)
Unable to work	6 (1.7)
Missing	22 (6.4)
Household income, $	
< 25 000	67 (19.4)
25 000–74 999	163 (47.3)
75 000–149 999	66 (19.1)
> 150 000	6 (1.7)
Missing	43 (12.5)

Continued

and cost of the program. Cost is considered a significant determinant of program fidelity.[17] To improve the accuracy of the cost estimates, we prompted leaders to recall costs by specific categories: space rental, groceries, supplies, and equipment. We then summed these to achieve an overall estimate of cost.

We calculated maintenance of the program among adopters as the percentage of extension educators who ran the program for a second time within 1 year of their first program.

Analysis

To assess pre–post change in effectiveness outcomes, we first computed participant-level weight differences and then tested the mean against zero. However, because each leader could be linked to multiple participants, we adjusted descriptive statistics for leader-level clustering using a mixed-effects linear regression model, with leader's unique identifier included as a random intercept and compound symmetry as the covariance structure. Because we only estimated the adjusted mean, we specified that the model contained only the intercept and no other independent variable (PROC MIXED, SAS version 9.3; SAS Institute, Cary, NC). No dependent variables required transformation. Although MET-minutes per week was highly skewed at each cross-section, their difference across time points, which is what we included in the analysis, was reasonably symmetric; therefore, we opted for using the original scale. We assessed the other components of RE-AIM at the leader-level and analyzed them without adjustments.

We compared leader and site characteristics between adopting and nonadopting leaders. We used a χ^2 goodness of fit test to compare categorical characteristics. In the case of low expected cell counts, we used the Fisher exact test. We used an independent-samples t test to compare continuous characteristics and a Wilcoxon rank sum test to compare ordinal ones.

RESULTS

Evaluation of national dissemination included the 85 leaders trained in 2010 and the 345 women who enrolled in the ensuing StrongWomen–Healthy Hearts classes during the adoption phase between 2010 and 2013. Maintenance was monitored through 2014.

TABLE 3—*Continued*

Continuous characteristics	
Age, y (median = 60.0; range = 54.0)	60.2 ±0.5
BMI, kg/m² (median = 32.6; range = 29.9)	33.1 ±0.3
Baseline fruit and vegetable servings/day (median = 5.1; range = 25.1)	6.0 ±0.2
Baseline MET-min/wk (median = 330; range = 6453)	728 ±61

Note. BMI = body mass index; MET = metabolic equivalent. The overall study spanned the years 2010 through 2014. The adoption phase, when these data were collected, occurred between 2010 and 2013.

Leader and Site Characteristics

The majority of the trained leaders were White (95%) and had a graduate or professional degree (85%) (Table 1). On average, leaders were midlife (mean age = 50.1 years) and had been in their position for over a decade (mean = 13.1 years). Their mean BMI was 28.1; 28% were in the overweight or obese category. The majority (86%) were at least moderately confident in their ability to recruit 10 to 15 women for a class, although fewer expressed confidence in their ability to recruit either low-income women (61% were at least moderately confident) or minority women (51% were at least moderately confident). They had a fairly high level of overall leadership self-efficacy (mean = 3.9 on a 1–5 scale), although this was lower among nonadopters than adopters (median = 3.8 vs 4.0; $P = .02$). No other characteristics differed significantly between adopting and nonadopting leaders.

For site characteristics, trained leaders indicated that they had reasonably pleasant and accessible facilities available for exercising, cooking, and holding group discussions (Table 2). They generally had good equipment availability (mean score = 3.1 on a 0–4 scale). At baseline, leaders estimated that rent and food costs would be $263 for the 12 weeks. They indicated that they would likely be able to cover program costs (mean likelihood = 3.2 on a 0–4 scale) and that cost was unlikely to be a barrier to adoption (mean likelihood of costs being prohibitive = 1.0 on a 0–4 scale). More than half of the respondents (62%) indicated that competing job priorities might be a barrier to running the program; however, they also indicated that they would likely have enough time to prepare for classes (3.2 on a 0–4 scale). The median score for time availability was lower for nonadopting leaders than for adopters (3.0 vs 4.0; $P = .008$). No other

site characteristics were significantly different between adopting and nonadopting leaders.

RE-AIM Components

A total of 345 women (mean age = 60.2 years) in 22 states participated in StrongWomen–Healthy Hearts classes (Table 3). The majority were White (84.1%) and had at least a high school education (92.5%, with 37.1% completing at least a bachelor's degree). Most were either employed (43.2%) or retired (35.7%), and approximately half (47.3%) had an income between $25 000 and $74 999. Sixty-two percent were married. At baseline, their average BMI was 33.1.

Across all sites, reach, or the proportion of eligible women in the county's target population (i.e., women aged ≥ 40 years), was 0.15% (Table 4). The mean representativeness score was 3.7 out of 5. Participants' mean change in weight was −0.5 kilograms (SE = 0.07; $P < .001$). Mean increase in daily servings of fruits and vegetables was 2.1 (SE = 0.3; $P < .001$) and the mean increase in physical activity was 1238 MET-minutes per week (SE = 123; $P < .001$).

Of the 85 trained cooperative extension leaders, 41 ran a program, for an adoption rate of 48% (Table 4). We contacted nonadopting trained leaders to understand their reasons for nonadoption. Of the 24 that responded, commonly reported reasons included a change in job or retirement and running a program outside of the 1-year a priori definition of adoption. The average fidelity score at all adopting sites was 4.6 out of 5 at 4 weeks and 4.7 at 8 and 12 weeks (Table 4). All 4 components of the fidelity score (class structure, physical activity, cooking, and nutrition education) achieved an average of 4.5 or better across all time points, with class structure scoring slightly lower than the other components (average

score = 4.5 at 4 weeks and 4.6 at 8 and 12 weeks). Mean reported cost of running the 12-week program was $448 (range = $68–$3047). The greatest variance in cost was related to equipment purchases. Some leaders purchased pedometers for participants, small kitchen equipment, or a scale and stadiometer for assessments. On average, leaders reported that it required 7.3 hours per week to prepare for and run the program. Class attendance data were provided by 31 of the 41 adopting leaders. The overall attendance rate across sites was 73.4% (range = 55.1%–88.6%). Eleven of 41 adopting leaders (27%) maintained the program by running a second class within 1 year of running their first one (Table 4).

DISCUSSION

Overall, in this first wave of national dissemination, the StrongWomen–Healthy Hearts program was successfully disseminated in 22 states, reaching approximately 350 women. The RE-AIM framework allowed for the identification of strengths and areas needing improvement as national dissemination continues. It also helped identify relevant lessons for similar programs.

Overall reach into the population was low, at 15 in 10 000. Although the denominator included a large catchment area (the county), the numerator was bounded by class size limits, which leaders placed to ensure a meaningful class experience. Reach nationally was higher than in the Pennsylvania dissemination study,[16] possibly because the national training included a description of effective recruitment strategies used in Pennsylvania. Overall representativeness was moderate. A higher proportion of retirees were recruited, an appropriate target audience for the program. The goal to recruit and retain minority women was not reached and remains a challenge, indicating the possible need for culturally adapted versions of the program, or for recruiting leaders with demonstrated experience in recruiting minority women. To improve representativeness, it may be necessary during the leader trainings to provide feasible strategies for establishing connections within the community to reach different subpopulations of women, or to target community organizations with ties to those populations.

TABLE 4—Descriptive Statistics of the RE-AIM Indicators: The StrongWomen–Healthy Hearts Program, United States, 2010–2014

Characteristic	No.[a] (%)	Mean (SE)	Median (Range) or 95% CI
Reach			
Leader's reach, %	41	0.15 (0.03)	0.06 (0.82)
Leader's representativeness score	26	3.7 (0.2)	4.0 (3.0)
Effectiveness[b],*			
Participants' mean weight change, kg	323	–0.5 (0.1)	–0.7, –0.4
Participants' mean fruit and vegetable consumption change, serving	324	2.1 (0.3)	1.5, 2.7
Participants' mean physical activity change, MET-min/wk	266	1238 (123)	997, 1480
Adoption			
No. adopted/no. trained	41/85 (48.2)		
Implementation			
Average fidelity score			
4th wk	41	4.6 (0.1)	4.8 (1.5)
8th wk	40	4.7 (0.1)	4.8 (1.3)
12th wk	38	4.7 (0.1)	4.9 (1.0)
Maintenance			
No. maintained/no. adopted	11/41 (26.8)		

Note. CI = confidence interval; MET = metabolic equivalent.
[a]Number of leaders or participants.
[b]Means, SEs, and 95% CIs are adjusted for clustering at the leader level.
*$P < .05$ for pre–post change in all outcome measures.

The StrongWomen–Healthy program demonstrated effectiveness overall. Although weight change was modest, each kilogram of weight lost is associated with decreased blood pressure[38] and diabetes risk.[39] Furthermore, any weight loss counters strong secular trends toward weight gain through adulthood.[40] The program also significantly increased fruit and vegetable consumption, by 2 servings per day. A single additional daily serving has been associated with reductions in risk of ischemic heart disease and ischemic stroke.[41] The program led to an increase in physical activity of approximately 1200 MET-minutes per week, enough to net the health benefits associated with meeting public health guidelines.[42]

Adoption was moderate in this evaluation. Common reasons for nonadoption were related to changes in the job status of leaders. The main potential barrier to adoption noted on the pretraining survey was competing priorities on the leader's time, and nonadopters scored somewhat lower than adopters on time availability. On the other hand, leaders expressed few other barriers. They indicated confidence in being able to recruit for the program, good availability of an appropriate space, and an ability to cover the costs of the program (through small grants, extension funds, or charging a small fee for the class). Adoption may be considered an indicator of the organizational "fit" of a program. Taken together, these data suggest that the program was a reasonable fit, but that the time to run it may need to be reduced given the many priorities and expectations placed on extension educators. As a result, we are considering a model whereby the nutrition education section is presented in a short video format, requiring little or no preparation time for this aspect by leaders.

Implementation scores were high throughout the 12 weeks, which likely explains the preservation of effectiveness during this fairly broad dissemination. It also suggests that basic features of the training and the curriculum should be preserved in future iterations, as they were effective across leaders and settings. We observed slightly lower fidelity scores for the class structure component. In communicating with class leaders, this resulted mainly from altering the twice-per-week class schedule occasionally because of holidays and other special events; dated attendance sheets confirm these minor schedule adjustments. Although we did not systematically collect fidelity data when leaders ran the program a second or subsequent times (maintenance), our interactions with leaders suggest that a high level of fidelity was sustained. Participant adherence (attendance) was reasonably high on average, although there was variability among sites. At a number of sites, leaders indicated that attendance was affected by unusual weather patterns that took place in spring 2011.

Maintenance of the program was fairly low overall. Communications with leaders suggested that, as with adoption, job changes including retirement were responsible for failure to maintain the program. Additionally, feedback from leaders suggested that maintenance might have been related to the financial and time costs to run the program. Average cost per site for running the program, beyond compensation for the leader's time, totaled approximately $450 for the 12 weeks. Equipment represented the highest variability in cost. Although pedometers were optional, many leaders purchased them for participants. We provided information on how to obtain pedometers at low cost, as well as resources that may provide free ones; however, since pedometers are considered important by leaders and are well-liked by participants, it may enhance the program to identify a consistent source of low-cost pedometers. Grocery costs averaged $175 over the 12 weeks. To provide options to reduce both cost and preparation time, in addition to selecting among the recipes on the basis of resources and group preferences,[16] we have also created short videos demonstrating how to prepare recipes that may be used instead.

There were several limitations to this study. Height and weight were measured by program leaders, who had an interest in the success of their programs. However, weight was measured by digital scale, an objective measure. Diet and physical activity were measured by self-report, which is subject to recall and social desirability biases. However, we chose measures that have been previously validated and widely used. All measures were pre–post with

no comparison group, and outcomes might have changed as a result of external influences. Cost of running the program was estimated on the basis of leader self-report, rather than more objectively through the collection of sales receipts. Finally, because we lack data on long-term individual outcomes, maintenance at the individual level cannot be determined. It will be important to evaluate this in future studies.

In conclusion, the RE-AIM framework was valuable in evaluating dissemination and provided several key lessons learned. First, the examination of representativeness was critical since it identified an area in need of improvement if the program is to help alleviate rather than contribute to health disparities. We have been able to use these data both to implement strategies within program training and to obtain additional funding to learn how to best adapt the program for Black women, a group that faces the highest disparities in CVD outcomes.[1] Second, this study provides an example of a program that is a reasonably good fit within the culture of the disseminating organization; to improve adoption and maintenance, however, the cost and time required to run it will need to be minimized. These efforts must be balanced with the need to retain features that lead to effectiveness. Finally, these data suggest that our initial investment in robust formative research, which included input from leaders and women in the target population,[25] helped result in a curriculum that was implemented with high fidelity and that continued to demonstrate effectiveness when translated to a national program. ∎

About the Authors

At the time of the study, Sara C. Folta, Valerie Clark, Jeanne P. Goldberg, Eleanor Heidkamp-Young, and Miriam E. Nelson were with the Friedman School of Nutrition Science and Policy; Kenneth K. H. Chui was with the Department of Public Health and Community Medicine, School of Medicine; and Alice H. Lichtenstein was with the Human Nutrition Research Center on Aging, Tufts University, Boston, MA. Rebecca A. Seguin was with the Division of Nutritional Sciences, Cornell University, Ithaca, NY. Marilyn A. Corbin was with the Penn State Extension, University Park, PA. Nancy Wiker was with the Penn State Cooperative Extension, Lancaster, PA.

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Contributors

S. C. Folta led the article preparation and helped lead the study design, data collection, and data analysis and interpretation. R. A. Seguin, M. A. Corbin, J. P. Goldberg, A. H. Lichtenstein, and N. Wiker contributed substantially to the study design and interpretation of results. K. K. H. Chui led the data analysis. V. Clark and E. Heidkamp-Young contributed to all aspects of the study implementation. M. E. Nelson, the principal investigator, oversaw all stages of the study design, data collection, and data analysis.

Human Participant Protection

Study procedures were reviewed and approved by the institutional review boards of Tufts University and 26 land-grant universities that the trained leaders were affiliated with. Informed consent was provided by StrongWomen–Healthy Hearts class leaders and participants.

References

1. Mozaffarian D, Benjamin EJ, Go AS, et al. Heart disease and stroke statistics–2015 update: a report from the American Heart Association. *Circulation.* 2015;131(4): e29-e322.

2. Mozaffarian D, Fried L, Burke G, Fitzpatrick A, Siscovick D. Lifestyles of older adults: can we influence cardiovascular risk in older adults? *Am J Geriatr Cardiol.* 2004;13(3):153–160.

3. Fleg JL, Forman DE, Berra K, et al. Secondary prevention of atherosclerotic cardiovascular disease in older adults: a scientific statement from the American Heart Association. *Circulation.* 2013;128(22): 2422–2446.

4. Rivlin RS. Keeping the young-elderly healthy: is it too late to improve our health through nutrition? *Am J Clin Nutr.* 2007;86(5):1572S–1576S.

5. Bopp M, Fallon E. Community-based interventions to promote increased physical activity: a primer. *Appl Health Econ Health Policy.* 2008;6(4):173–187.

6. Haas BK, Kimmel G. Model for a community-based exercise program for cancer survivors: taking patient care to the next level. *J Oncol Pract.* 2011;7(4):252–256.

7. Fischer M, Fugate-Woods N, Wayne PM. Use of pragmatic community-based interventions to enhance recruitment and adherence in a randomized trial of tai chi for women with osteopenia: insights from a qualitative substudy. *Menopause.* 2014;21(11): 1181–1189.

8. Becofsky K, Baruth M, Wilcox S. Psychosocial mediators of two community-based physical activity programs. *Ann Behav Med.* 2014;48(1):125–129.

9. Buman MP, Giacobbi PR Jr, Dzierzewski JM, et al. Peer volunteers improve long-term maintenance of physical activity with older adults: a randomized controlled trial. *J Phys Act Health.* 2011;8(suppl 2): S257–S266.

10. Stoddard A, Palombo R, Troped P, Sorensen G, Will J. Cardiovascular disease risk reduction: the Massachusetts WISEWOMAN project. *J Womens Health (Larchmt).* 2004;13(5):539–546.

11. Khare MM, Koch A, Zimmermann K, Moehring PA, Geller SE. Heart Smart for Women: a community-based lifestyle change intervention to reduce cardiovascular risk in rural women. *J Rural Health.* 2014;30(4): 359–368.

12. Altman R, Nunez de Ybarra J, Villablanca AC. Community-based cardiovascular disease prevention to reduce cardiometabolic risk in Latina women: a pilot program. *J Womens Health (Larchmt).* 2014;23(4): 350–357.

13. Rodriguez F, Christopher L, Johnson CE, Wang Y, Foody JM. Love your heart: a pilot community-based intervention to improve the cardiovascular health of African American women. *Ethn Dis.* 2012;22(4): 416–421.

14. Yanek L, Becker D, Moy T, Gittelsohn J, Koffman D. Project Joy: faith based cardiovascular health promotion for African American women. *Public Health Rep.* 2001;116(suppl 1):68–81.

15. Folta S, Lichtenstein A, Seguin R, Goldberg J, Nelson M. The StrongWomen–Healthy Hearts program: reducing cardiovascular disease risk factors in rural sedentary, overweight, and obese midlife and older women. *Am J Public Health.* 2009;99(7):1271–1277.

16. Folta S, Lichtenstein A, Seguin R, et al. The StrongWomen–Healthy Hearts program in Pennsylvania: a RE-AIM analysis. *Transl Behav Med.* 2015;5(1):94–102.

17. Glasgow R, Vogt T, Boles S. Evaluating the public health impact of health promotion interventions: the RE-AIM framework. *Am J Public Health.* 1999;89 (9):1322–1327.

18. Estabrooks P, Munroe K, Fox E, et al. Leadership in physical activity groups for older adults: a qualitative analysis. *J Aging Phys Act.* 2004;12:232–245.

19. Seguin R, Palombo R, Economos C, Hyatt R, Kuder J, Nelson M. Factors related to leader implementation of a nationally disseminated community-based exercise program: a cross-sectional study. *Int J Behav Nutr Phys Act.* 2008;5:62.

20. Draper C, Kolbe-Alexander T, Lambert E. A retrospective evaluation of a community-based physical activity health promotion program. *J Phys Act Health.* 2009;6(5):578–588.

21. Thomas S, Reading J, Shephard R. Revision of the Physical Activity Readiness Questionnaire (PAR-Q). *Can J Sport Sci.* 1992;17(4):338–345.

22. Lichtenstein A, Appel L, Brands M, et al. Diet and lifestyle recommendations revision 2006: a scientific statement from the American Heart Association Nutrition Committee. *Circulation.* 2006;114(1):82–96.

23. *Dietary Guidelines for Americans, 2010.* Washington, DC: US Dept of Agriculture, US Dept of Health and Human Services; 2010.

24. Perry C, Baranowski T, Parcel G. How individuals, environments, and health behavior interact: social learning theory. In: Glanz K, Lewis F, Rimer B, eds. *Health Behavior and Health Education: Theory, Research and Practice.* San Francisco, CA: Jossey-Bass Publishers; 1997:161–186.

25. Folta S, Goldberg J, Lichtenstein A, Seguin R, Reed P, Nelson M. Factors related to cardiovascular risk reduction in midlife and older women: a qualitative study. *Prev Chronic Dis.* 2008;5(1):A06. Available at: http://www.cdc.gov/pcd/issues/2008/jan/2006_0156.htm. Accessed August 8, 2015.

26. National Cancer Institute's Research-Tested Intervention Programs. StrongWomen–Healthy Hearts. Available at: http://rtips.cancer.gov/rtips/programDetails.do?programId=1194691. Accessed August 8, 2015.

27. Burke L, Dunbar-Jacob J, Sereika S, Ewart C. Development and testing of the Cholesterol-Lowering Diet Self-Efficacy Scale. *Eur J Cardiovasc Nurs.* 2003;2(4):265–273.

28. Sallis J, Grossman R, Pinski R, Patterson T, Nader P. The development of scales to measure social support for diet and exercise behaviors. *Prev Med.* 1987;16(6):825–836.

29. Marcus B, Selby V, Niaura R, Rossi J. Self-efficacy and the stages of exercise behavior change. *Res Q Exerc Sport.* 1992;63(1):60–66.

30. US Census Bureau. American Factfinder (Census 2010). Available at: http://www.census.gov. Accessed October 2011.

31. Thompson F, Kipnis V, Subar A, et al. Evaluation of 2 brief instruments and a food-frequency questionnaire to estimate daily number of servings of fruit and vegetables. *Am J Clin Nutr.* 2000;71(6):1503–1510.

32. Craig C, Marshall A, Sjostrom M, et al. International Physical Activity Questionnaire: 12-country reliability and validity. *Med Sci Sports Exerc.* 2003;35(8):1381–1395.

33. Tehard B, Saris W, Astrup A, et al. Comparison of two physical activity questionnaires in obese subjects: the NUGENOB study. *Med Sci Sports Exerc.* 2005;37(9):1535–1541.

34. Wolin K, Heil D, Askew S, Matthews C, Bennett G. Validation of the International Physical Activity Questionnaire-Short among blacks. *J Phys Act Health.* 2008;5(5):746–760.

35. National Cancer Institute. Scoring the All-Day Screener. Available at: http://riskfactor.cancer.gov/diet/screeners/fruitveg/scoring/allday.html. Accessed March 15, 2015.

36. International Physical Activity Questionnaire. Guidelines for data processing and analysis of the International Physical Activity Questionnaire (IPAQ). Available at: http://www.institutferran.org/documentos/scoring_short_ipaq_april04.pdf. Accessed April 1, 2015.

37. Ainsworth BE, Haskell WL, Herrmann SD, et al. 2011 Compendium of Physical Activities: a second update of codes and MET values. *Med Sci Sports Exerc.* 2011;43(8):1575–1581.

38. Neter J, Stam B, Kok F, Grobbee D, Geleijnse J. Influence of weight reduction on blood pressure: a meta-analysis of randomized controlled trials. *Hypertension.* 2003;42(5):878–884.

39. Hamman R, Wing R, Edelstein S, et al. Effect of weight loss with lifestyle intervention on risk of diabetes. *Diabetes Care.* 2006;29(9):2102–2107.

40. Mozaffarian D, Hao T, Rimm EB, Willett WC, Hu FB. Changes in diet and lifestyle and long-term weight gain in women and men. *N Engl J Med.* 2011;364(25):2392–2404.

41. Lock K, Pomerleau J, Causer L, Altmann DR, McKee M. The global burden of disease attributable to low consumption of fruit and vegetables: implications for the global strategy on diet. *Bull World Health Organ.* 2005;83(2):100–108.

42. Physical Activity Guidelines Advisory Committee. *Physical Activity Guidelines Advisory Committee Report, 2008.* Washington, DC: US Dept of Health and Human Services; 2008.