Changes in Functional Health Status of Older Women With Heart Disease: Evaluation of a Program Based on Self-Regulation

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Objectives. This study involving 570 women aged 60 years or older with heart disease, assessed the effects of a disease management program on physical functioning, symptom experience, and psychosocial status.

Methods. Women were randomly assigned to control or program groups. Six to eight women met weekly with a health educator and peer leader over 4 weeks to learn self-regulation skills with physical activity as the focus. Evaluative data were collected through telephone interviews, physical assessments, and medical records at baseline and 4 and 12 months post baseline.

Results. At 12 months, compared with controls, program women were less symptomatic (p < .01), scored better on the physical dimension of the Sickness Impact Profile (SIP; p < 0.05), had improved ambulation as measured by the 6-minute walk (p < 0.01), and lost more body weight (p < .001). No differences related to psychosocial factors as measured by the SIP were noted.

Conclusion. A self-regulation-based program that was provided to older women with heart disease and that focused on physical activity and disease management problems salient to them, improved their physical functioning and symptom experience. Psychosocial benefit was not evident and may be a result of measurement error or due to insufficient program time spent on psychosocial aspects of functioning.

Although rates of death from heart disease have declined in recent years, the condition continues to be the leading cause of mortality in the U.S. (National Center for Health Statistics, 1991). Whereas the prevalence of coronary heart disease (CHD) is greater in men at all ages, the occurrence of heart disease after age 65 is higher in women (Becker & Corrao, 1990; Stokes, Kannel, Wolf, Cupples, & D’Agostino, 1987). Furthermore, mortality from heart disease continues to rise in women until age 70, but in men the rate is constant after age 60 (Becker & Corrao, 1990). It has been suggested that women are more at risk for diminished functional capacity than men, though their survival rates are higher. This extended survival has been described as an increased burden of disablement in the aged population (Nickel & Chirikos, 1990). Increasingly, initiation and maintenance of physical activity is regarded as an important factor in the prevention and management of heart disease in people of all ages (Blair et al., 1996; NIH Consensus Conference, 1996). This clinical recommendation is particularly important in light of the tendency toward a more sedentary lifestyle that often accompanies aging. Older adults have been shown to benefit from increased physical activity (Buchner, Beresford, Larson, LaCroix, & Wagner, 1992; Jette & Downing, 1996); however, women of all ages consistently have lower rates of physical activity than men (Caspersen & Merrit, 1995; Centers for Disease Control and Prevention, 1993; Dishman & Sallis, 1994). Men are more likely than are women to engage regularly in vigorous exercise and sports (Pate et al., 1995), and women over 65 have been shown to have the lowest rates of aerobic activity of any sociodemographic group (Caspersen & Merrit, 1995; Lee, 1993). Survey data from the New York Behavioral Risk Factor Surveillance System found that 56% of women over 65 were sedentary (Eaton, Nafziger, Strogatz, & Pearson, 1994). LaCroix (1987) reported that 62% of women aged 75–84 in the National Center for Health Statistics data set said they never walked a mile without resting.

As a result of evaluating a heart disease management program for older men and women, we noted that female participants failed to reap the same benefits related to physical functioning as male participants, whereas both genders realized improvements in psychosocial functioning and symptom experience (Clark, Janz, Becker et al., 1992; Clark et al., 1997). It was decided that an adapted program for women only, focused more on aspects of physical activity salient for them, may produce better physical functioning outcomes. Subsequently, we assessed the adapted intervention tailored to the needs of older women with heart disease (Clark, Janz, Dodge, & Garrity, 1994). The results of this evaluation are presented here. The program, “Women take PRIDE,” was designed to assist women in managing their clinical regimens, especially those related to physical activi-
ity, by teaching them to be more self-regulating. It was hypothesized that compared with controls, participants would experience reduced impact of their disease on their physical functioning and experience fewer and less-troublesome symptoms.

Heart disease has been linked to problems in aspects of psychosocial functioning including depression (Jette & Downing, 1996; Loose & Fernhall, 1995) and changes in emotions (Badger, 1992; Fowers, 1994; Mosca, McGillen, & Rubenfire, 1998). Further, studies have suggested that depression in younger populations is influenced by amount of exercise (Byrne & Byrne, 1993; Weyerer & Kupfer, 1994) and level of physical activity, and this association has been hypothesized for older adults as well (Emery & Blumenthal, 1991). Decreases in perceptions of social support (Yates, Skaggs, & Parker, 1994) have also been noted in individuals with heart disease. Social support was thought to be relevant to the intervention for two reasons. First, the interaction of women within the program might enhance the feeling that social support was available. Second, the availability of social support might encourage women to be more physically active and/or feel more psychosocially adjusted. Therefore, by focusing on these aspects of functioning, the program was also expected to reduce the impact of the disease on psychosocial health. Each of the outcomes—improved physical functioning, better symptom experience, and enhanced psychosocial functioning—if realized, would comprise evidence of less burdensome heart disease and more robust functioning.

Methods

Sample and Study Design

Potential participants were identified through physician practices affiliated with six medical centers in Southeastern Michigan and met the following study criteria: aged 60 years or older, diagnosed with cardiac disease treated daily by at least one medication, and seen by a physician approximately every 6 months. Cardiac disease was defined as any condition directly involving the heart (e.g., arrhythmia, angina, myocardial infarction, and valvular disease). Participants were excluded if hypertension was the only diagnosis, because it is often asymptomatic. Participants were also excluded if their physicians felt they would not be able to benefit fully from the program due to other medical reasons (e.g., terminal illness and significant hearing loss).

Figure 1 provides a flow chart of sample recruitment processes. Potential participants received an introductory letter explaining the research followed by a telephone call describing the study in more detail. All potential participants were told that the purpose of the study was to learn more about what it is like for older women to live with a heart condition and to evaluate the effectiveness of a disease management program. They were told that half of the participants would be randomly selected to attend the “Women take PRIDE” education program. Further, they were told that if they did not receive the program initially, they would have an opportunity to receive it at the end of the study if they were interested and if the program was shown to be beneficial. A total of 570 (48%) of the women contacted agreed to participate (including attending the program if randomized to the treatment group) and completed the baseline interview. The participation of approximately half of the older women invited to take part in the program evaluation reported here is consistent with other investigators of older populations (for example, see Carter, Elward, Malmgren, Martin, & Larson, 1991). The primary reasons for declining participation were time constraints and difficulties in traveling to the program site.

As soon as she agreed to participate in the study, a woman was assigned, by use of a random-numbers table, either to the PRIDE program or a “usual care” control group. As involvement in the educational program would make more demands on a woman’s time and energy, we expected greater drop out (10%) among participants. To ensure sufficient and comparable numbers in each group at end point, we randomized more women to the program group than the control group using a 55 to 45 ratio. “Usual care” meant that control group members saw their physicians at the intervals specified by the particular physician and received any information or communications that would be provided as part of routine care in that setting. In an effort to assure similar care to both the program and control groups, no feedback about individual participants was provided to medical or nursing personnel at the sites by the research staff. Unless a participant happened to mention the study during the course of a visit, the clinic staff had no knowledge of which patients had agreed to participate in the research. In addition to usual care, those participants randomized to the intervention group also received the PRIDE education program.

Intervention

The goal of the intervention was to enhance overall management of the heart condition by helping older women to be more self-regulating. As noted, it was adapted from an initial version of a program designed for both men and women (Clark, Janz, Becker, et al., 1992; Clark et al., 1997). The revised version was developed with data regarding women’s unique concerns (Clark et al., 1994) and differed from the original in several ways. It placed more explicit emphasis on the role and importance of women’s physical activity levels, provided specific information related to heart disease in women, recognized women’s gender roles related to household and family management as factors in following the clinical regimen, and utilized female peer leaders to provide ongoing support and encouragement to participants. The theoretical underpinnings of the program were principles of self-regulation as encapsulated in the PRIDE problem-solving process: Problem identification, Researching one’s routine, Identifying a management goal, Developing a plan to reach it, Expressing one’s reactions, and Establishing rewards for making progress. The theoretical assumptions guiding program development have been discussed elsewhere (Clark & Dodge, 1999: Clark, Janz, Dodge, & Sharpe, 1992; Clark & Zimmerman, 1990; Dodge, Clark, Janz, & Liang, 1993; Dodge, Janz, & Clark, 1994).

Basing choices on the heart regimen prescribed by their physicians, participants selected an area of management that was problematic (e.g., exercise, medicine taking, diet). The adapted program differed significantly from the original in...
OLDER WOMEN WITH HEART DISEASE

Potential participants
(Chart review)
N = 1494

Unable to contact: N = 232 (15%)
Telephone contact made: N = 1266 (85%)

Did not fit study criteria: N = 86 (7%)
Met study criteria: N = 1180 (93%)

Agreed to participate: N = 571* (48%)
No: N = 609 (32%)

Intervention: N = 309
Control: N = 262

Figure 1. Flowchart of Recruitment for the "Women take PRIDE" Self-Management Study. *55 to 45 ratio assignment.

this regard. Women were given the latitude to choose any type of management problem to resolve. In general, the program recommended a comprehensive approach to managing the heart condition, that is, using medicines as prescribed, following dietary recommendations, and obtaining adequate exercise. However, emphasis in the adaptation was placed on increasing physical activity in ways salient to women, and physical activity was used as the modal problem for learning the PRIDE process. Every program participant was provided information (e.g., signs and symptoms of heart disease, effective communication with the physician) and assistance to be more self-evaluating and active; for example, each used a pedometer to log physical activity and each was provided an exercise tape designed especially for older female heart patients.

Groups of six to eight women met for 2 to 2.5 hours on a weekly basis for 4 weeks. During the intervening days, women used a workbook at home as a guide to carrying out the PRIDE steps. In the intervention period, 49 sessions of four classes each were held at six sites in or near participating hospitals. Trained health educators using standardized educational protocols facilitated classes. Health educators received training on the program content and process and were supervised by a lead health educator. Peer leaders were selected graduates of the program who had received additional training. A variety of instructional materials tailored to women’s interests were utilized in the program in addition to the workbook, including handouts summarizing class discussions and daily self-monitoring logs for observing one’s own activities over the 4 weeks of the program. Either a health educator or peer leader made weekly motivational telephone calls to each woman over the program implementation period. Three months following the program, participants were sent a motivational letter and additional monitoring logs. Six months following the program, women received a motivational phone call from a peer leader.

Measures
Several measures were used to assess the effect of the program on women’s functioning and symptoms. The choice of measures was based on their relevance to the study hypotheses, appropriateness to an older population, and track record in the literature for reliability and validity.

Physical Functioning
To provide an indication of physical functioning, three measures were selected: (a) the Sickness Impact Profile (SIP) physical functioning dimension score, (b) a 6-minute walk test to assess general ambulation and mobility, and (c) body weight as evidence of weight loss that may have been associated with increased activity and adherence to dietary recommendations.

Sickness Impact Profile (SIP).—The SIP is a comprehensive generic instrument that assesses functional health status. It has been shown to discriminate in expected directions among different populations at different age levels and for different degrees of disease severity (Patrick, 1990; Patrick & Deyo, 1989). Its psychometric properties have been examined extensively (Bergner, 1985; Bergner, Bobbitt, Carter, & Gilson, 1981; Pollard, Bobbitt, Bergner, Martin, & Gilson, 1976). Test–retest reliability of the measure has been found to be .97 and have a Cronbach’s alpha coefficient level of .94. In validity trials comparing SIP scores on functioning with clinical assessments of physical limitation made by physicians, correlation results were .50 (McDowell & Newell, 1987).

The full SIP was administered in this evaluation. It contains 136 items and provides a total score and two dimension scores: physical and psychosocial. The latter were the primary outcome measures for this study. The physical dimension comprises the categories of ambulation, mobility, and body care and movement (see paragraphs below regarding the psychosocial dimension). Scores are derived by adding the values for the items with predetermined weights for each item within that category and dividing the sum by the maximum possible dysfunction score for that dimension or category. The scores range from 0 to 100, with higher scores representing greater dysfunction. It was hypothesized that participants in the “Women take PRIDE” program would experience less impact of heart disease on their func-
tioning and, therefore, would have lower SIP scores. The SIP includes many items relevant to patients at terminal stages of illness or experiencing significant disability (i.e., homebound or bedridden). A ceiling effect in the scores for more mobile populations, such as the one studied here, is expected. As a result, changes attributable to an intervention for such a group are more difficult to measure, and findings in the population meeting criteria for this research are likely to be conservative.

**Mobility and ambulation evaluations**.— To further determine the impact of changes related to physical functioning, two objective measures were added to provide independent assessment of women’s physical status to support the self-reported data. The objective measures were selected on the basis of the following additional criteria: They (a) provided valid, reproducible data on physical mobility, (b) were appropriate for women over 60 years of age with heart disease, (c) entailed minimal risk to participants, (d) did not place unreasonable demands on professional staff at the hospital sites, and (e) were relatively low in cost. The objective measures chosen were the 6-minute walking test (Guyatt et al., 1985; Langenfeld et al., 1990) and measurement of body weight. For the 6-minute walk, participants proceeded with the walk at their own pace, and if desired, ended the assessment at any time before the 6 minutes elapsed. The walk was conducted at the relevant study site by a trained registered nurse or physical therapist. The outcome measured was the distance the subject walked. Body weight and height were also measured at each of the mobility evaluations to determine body weight changes over the study period.

**Symptom experience**

Symptom experience can be an important determinant of physical functioning and general well-being and, thus, comprised an important outcome variable. Several heart-specific instruments addressing symptoms were considered for use such as Rose’s (1965) Chest Pain Questionnaire and the Rand Shortness of Breath Battery (Rosenthal, Lohr, Rubenstein, Goldberg, & Brook, 1982). However, these instruments did not uniformly apply because of the diversity of cardiac conditions and symptoms in our target population. Therefore, symptom experience was calculated using the Symptom and Health Problem Chart that was used by the investigators in the previous “take PRIDE” evaluation. The symptoms and categories they comprise were generated by clinical cardiologists on our research team.

Symptom experience was determined by asking about the presence, frequency, and level of bother caused by 10 symptoms: chest pain, waking with shortness of breath, feeling blue, tense or stressed, worried, trouble falling asleep, trouble sleeping through the night, dizziness, pain other than chest, and numbness or cramping in legs. Data were collected regarding these symptoms in the 7 days prior to each interview. Symptom frequency and bother were assessed across a 5-point Likert Scale, with higher scores representing greater symptom experience. Total symptom frequency and bothersomeness scores were calculated for each subject ranging from 0 to 70. Higher mean scores reflected increased frequency of and bother with symptoms. The Symptom and Health Problem Chart has a mean test–retest reliability score of .79 (Clark et al., 1997; Sharpe, Clark, & Janz, 1991).

**Psychosocial Functioning**

To assess psychosocial functioning three tools were employed: The SIP Psychosocial Dimension, the Center for Epidemiologic Studies-Depression Scale (CES-D), and the Medical Outcome Study (MOS) Social Support Scale. The CES-D is a well-established measure of depression. The MOS Social Support Scale is a measure of extent and availability of social support. Details regarding each of these measures are provided in the following paragraphs.

**Sickness Impact Profile (SIP)**.— The SIP psychosocial dimension score (see Physical Functioning section for a description of the SIP) is derived from four categories of items: social interaction, communication, emotional behavior, and alertness.

**Center for Epidemiologic Studies-Depression Scale (CES-D).—** The CES-D is a general measure of relatively brief length, with recognized validity and reliability (Hertzog, Van Alstine, Usala, Hultsch, & Dixon, 1990; Radloff, 1977). The version of the CES-D used was an eight-item short form that includes four items each from the cognitive and somatic domains (Krause, 1995). Scores for the CES-D range from 0 to 32.

**The Medical Outcomes Study (MOS) Social Support Survey**.— The MOS Social Support Survey was also included to determine if the availability of social support influenced intervention effectiveness. This scale is a 19-item measure of functional social support tapping four dimensions: emotional/informational, tangible, affectionate, and positive social interaction. Each item was scored from 1 to 5 resulting in a range of scores from 19 to 95. Sherbourne and Stewart (1991) have reported the developmental and psychometric properties.

Demographic information collected included age, race, marital status, number of children, number of persons living in the household, employment status, and educational level. In addition, data were collected regarding the type of cardiac diagnosis and the presence of comorbidities.

**Data Collection**

Data were collected at baseline and the 4- and 12-month subsequent time periods. Study participants completed telephone interviews, averaging 50 min in length. Although the option of dividing interviews into two segments was offered to reduce respondent burden, most participants completed them in one telephone call. All interviewers were required to complete an extensive and in-depth training program that focused on standardizing the manner in which questions were asked, data recorded, and subject responses clarified. Ongoing supervision and supplemental training sessions were provided and interviewers were blind to women’s participation in the program. The direct observations of the women’s body weight and ambulation were also made at the same three time points.
Data Analysis

To account for loss to follow-up due to withdrawal and death, two different phases of analyses were completed. First, an analysis of all women randomized to control or program groups was conducted (N = 570). The next step in this phase of analysis was to analyze data from all control women and from all program women who attended one or more program sessions (N = 519). Fifty-one women randomized at baseline to the program did not attend any classes. There were no statistically significant differences between the intervention women who did not attend any classes and those who did attend one or more classes. Differences between program and control groups were at the same levels of significance on all variables in both types of comparisons (i.e., including and excluding the 51 women who did not attend classes), with two exceptions. In the repeated measures analysis with all women randomized, findings regarding the SIP physical dimension score were not significantly different for the program versus control group (M = 7.13 and 7.67, respectively, p = .072), whereas in the same analysis, when the 51 women randomized to the program group and not exposed to the intervention (that is, did not attend any sessions) were removed, differences were significant (M = 7.09 and 7.66, respectively, p = .05). In the analysis of covariance (ANCOVA) that included all women as randomized, findings regarding the frequency of symptoms at baseline were not significantly different between program and control groups (M = 15.29 and 13.41, respectively, p = .059), whereas in the same analysis, removing the 51 women differences were significant (M = 15.48 and 13.41, respectively, p = .02). The direction of the findings on these two variables in comparisons both including and excluding the 51 women were in favor of outcomes hypothesized for program participation.

Our intention was to test effectiveness (vs. efficacy) in this particular study. Therefore, we elected to present the analyses excluding the program women who did not attend one or more program session. Attending one or more session was deemed to be the minimum definition of participation and to comprise a fair test of the intervention. A very small percentage (5%) of program women attended only one class. Over 73% attended all four classes, 19% attended three classes, and 3% attended two classes. Phase 1 analysis included control women and attendees even if they were missing data at some follow-up time point. Phase 2 analysis (N = 460) included only control women and attendees who responded at both baseline and the 12-month follow-up time point.

In the Phase 1 analysis, we computed a repeated measures ANCOVA for all continuous variables, using the mixed model procedure in SAS that appropriately accounts for the “missingness” encountered in the data. The baseline measurement as a covariate to adjust for possible effects of baseline measures of follow-up values and a group indicator were included in all models. Also included in these initial models were an indicator of (a) the time of follow-up measure (i.e., at 4 months or 12 months follow-up) and (b) the interactions between this time indicator and group, baseline measure and group, and baseline measure and time. The inclusion of the baseline measure and interactions with the baseline measure were of particular importance because of some differences between groups at baseline. In particular, the inclusion of the Baseline × Group interaction permits a test of whether the effect of group is different depending on the baseline value. If any interactions were not significant at p < .10, they were removed from the model, and a final (reduced) model including baseline, group, time, and the remaining significant (p < .10) interactions was computed.

In the Phase 2 analysis, we computed a separate ANCOVA at each follow-up to compare the mean difference score for each group after adjusting for the baseline value. At each time point, the corresponding baseline measurement, a group indicator, and the interaction between the baseline measurement and group were included in the model. The interaction was subsequently removed if not significant at the p < .10 level.

To meet the distributional assumptions of the models in both phases of analysis, we used square-root transformations for all symptom variables, all SIP scores, and the distance walked in 6 minutes. Similarly, the natural log transformation for body weight and the MOS Social Support Survey and CES-D scores were employed. We also computed standard regression diagnostics to examine the performance of the models.

Results

Descriptive Results

A total of 570 women entered the study and completed the baseline telephone interview. The mean age of the study sample at baseline was 71.9 years with a range from 60 to 93 years of age. Eighty-seven percent of the sample was Caucasian, 12% were African American, and 1% represented other minorities. Approximately 51% were married at the time of the study, whereas 35% said they were living alone. The majority (78.8%) had graduated from high school; however, 5% had less than an eighth-grade education. Most of the women were retired from work outside the home, although 10.8% were still employed full or part-time. The heart conditions reported by women in the study included arrhythmias (59%), angina (45%), myocardial infarction (39%), congestive heart failure (22%), and valvular disease (25%). The length of time since the initial cardiac diagnosis ranged from 6 months to over 20 years. In terms of surgical procedures, 26% had undergone coronary artery bypass, 29% angioplasty, 8% valve replacements, and 9% had pacemakers. There were no significant differences with regard to the types of heart disease diagnoses or procedures between the intervention and control groups. About 60% of the women considered their heart condition to be their primary health problem. When some other condition was named as the primary health problem, arthritis was mentioned most often (21.2%), followed by diabetes (14.6%) and hypertension (14.6%).

After baseline data collection, we randomly assigned women to a group to receive the program and to a “usual care” control group, as noted, using a 55 to 45 ratio. The anticipated additional dropout in the program group was not realized; therefore, by the 12-month follow-up period, complete data were available on 260 women in the intervention group and 225 in the control group. Figure 2 presents a flow chart of sample retention processes. There were no differ-
ferences in the death or dropout rates over the study period between the intervention and control groups ($p = .659$). Women who died tended to be older ($p = .0001$), had higher CES-D scores ($p = .004$), and had a greater number, frequency, and bothersomeness of symptoms ($p < .01$, $p = .001$, and $p = .003$, respectively). Those who withdrew from the study tended to be older ($p < .001$), nonwhite ($p = .001$), and had no more than a high school education ($p = .019$). We speculate that the greater dropout in non-White women may be due to a greater number of competing demands. African American women (the largest group of non-White women in this study) were also those most likely to be living in the inner city. It may also be that, despite our effort to make the program culturally appropriate, these women did not benefit from or enjoy the program as much as others did.

At baseline, a few differences between the program and control groups were evident. When program participants and control group members who had data at baseline and data at the 12-month follow-up were compared, the intervention group at baseline had significantly greater number, frequency, and bothersomeness of symptoms ($p = .015$, $p = .018$, and $p = .030$, respectively), and weighed significantly more ($p = .005$) than did the control group members.

Phase 1 Analysis

Table 1 provides findings of longitudinal effects of the intervention on physical functioning and psychosocial well-being of the participants. Data demonstrate that women in the program group had more positive change in their SIP dimension scores related to physical functioning at the 12-month evaluation point than did women in the control group ($p = .05$). They reported significantly less impact of their health on their physical functioning. Program women also experienced a significantly greater increase from baseline to the 12-month evaluation point in the distance that they could walk over a 6-minute time period ($p = .013$). Further, program women, who as a group weighed more than did control women at baseline, lost more body weight from baseline to the 12-month assessment point than did women in the control group ($p = .001$), although on average as a group they continued to weigh 10 pounds more. Table 1 also presents symptom data from the first phase of analysis using the mixed model analysis for repeated measures. Over time, from baseline to the 12-month postprogram data point, women in the program group experienced positive change in their symptom experience. They had greater decline in the total number of their symptoms ($p = .0003$), experienced symptoms less frequently ($p = .003$), and expressed less bother or trouble resulting from their symptoms ($p = .006$) than did women in the control group. There was no significant impact on psychosocial functioning as measured by the SIP. Similarly, the CES-D scores of program and control group women did not differ at the 12-month evaluation point, and women in the program group perceived that they had no more social support, as measured by the MOS Social Support Survey, available to them than did women in the control group.

Phase 2 Analysis

Table 2 confirms findings of Phase 1 analysis and presents difference score findings related to women’s physical functioning. As measured by the SIP, physical functioning was not different at 4 months or at the 12-month end point between program and control group women. However, findings at 12 months, although not statistically significant, were in the desired direction ($p = .09$). Findings for the distance walked in a 6-minute time period were not significant at 4 months ($p = .09$), but were again in the right direction. Statistically significant and positive gains in distance walked for program women versus controls were seen at the 12-month time period ($p = .008$). Differences in body weight loss for program women were significant at both time periods, with intervention women losing more weight ($p = .004$ and $p = .02$, respectively). Regarding symptoms at the 4- and 12-month evaluation points, the reports of number ($p = .01$), frequency ($p = .01$), and bothersomeness ($p = .02$) of symptoms declined significantly more from baseline to the 12-month assessment points in the program group compared with the control group. Phase 2 analysis also showed no program effect on women’s psychosocial functioning.

Discussion

The findings from this study make a unique contribution to efforts to assess the “take PRIDE” approach to heart disease management (Clark, Janz, Beck, et al., 1992; Clark et al., 1997). Data suggest that women who participate in a program designed solely for them and focused on enhancing their physical activity and functioning can reap significant benefits from their participation. Previous evaluations of a version of “take PRIDE” without female-salient adaptations that was offered to men and women together did not improve women’s physical status.
The results of the present study are encouraging in several ways. First, the program women improved their physical profile more than did the control group women. They walked greater distances, lost body weight, and scored better on the SIP physical dimension assessment. It should be remembered that the SIP physical dimension score difference, although significant for the repeated measures efficacy evaluation, was not significant when women who did not attend any classes were excluded from the analysis. Nonetheless, a strong trend in the right direction was evi-

Table 1. Outcomes Related to Physical Functioning, Symptom Experience, and Psychosocial Functioning: “Women take PRIDE” Program Participants and Control Group (N = 519) Baseline Analysis of Variance and Repeated Measures Analysis of Covariance

<table>
<thead>
<tr>
<th>Outcome measure</th>
<th>Baseline means</th>
<th>Repeated measures least squares means</th>
<th>p value for group effect</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Program (n = 258)</td>
<td>Control (n = 261)</td>
<td>p value</td>
</tr>
<tr>
<td>Physical functioning</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>SIP physical dimension score</td>
<td>7.78</td>
<td>8.57</td>
<td>0.650</td>
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<tr>
<td>6-minute walk distance in feet</td>
<td>863</td>
<td>905</td>
<td>0.370</td>
</tr>
<tr>
<td>Body weight in pounds</td>
<td>163</td>
<td>154</td>
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<tr>
<td>Symptom Experience</td>
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<tr>
<td>Number of symptoms</td>
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<tr>
<td>Frequency score</td>
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<td>Bothersomeness score</td>
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<tr>
<td>Psychosocial functioning</td>
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<tr>
<td>SIP Psychosocial Dimension score</td>
<td>7.04</td>
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<tr>
<td>CES-D score</td>
<td>3.97</td>
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<td>0.660</td>
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<tr>
<td>MOS Social Support score</td>
<td>76.09</td>
<td>74.94</td>
<td>0.340</td>
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</table>

Notes: SIP = Sickness Impact Profile; CES-D = Center for Epidemiologic Studies-Depression; MOS = Medical Outcome Study.

The first model always included baseline, group, time, and all possible two-way interactions as covariates. If any interactions were not significant at p < .10, they were removed from the model and a final (reduced) model including baseline, group, time, and the remaining significant (p < .10) interactions was computed.

The repeated measures means are the adjusted means from the final models described above. In all final models, the baseline covariate was significant (p < .05). Change over time was significant (p < .05) for only the 6-minute walk distance. The interaction between baseline and time was the only two-way interaction that was ever significant (p < .10); it was significant for the 6-minute walk distance.

If significant (p < .05), all are in the desired direction (i.e., in favor of the intervention).  

Table 2. Outcomes Related to Physical Functioning, Symptom Experience, and Psychosocial Functioning: Baseline Analysis of Variance and Difference Score Analysis of Covariance Over Time (N = 460)

<table>
<thead>
<tr>
<th>Outcome measure</th>
<th>Baseline means</th>
<th>4-month difference scores</th>
<th>12-month difference scores</th>
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<tbody>
<tr>
<td></td>
<td>Program (n = 235)</td>
<td>Control (n = 225)</td>
<td>Program (n = 231)</td>
</tr>
<tr>
<td>Physical functioning</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SIP physical dimension score</td>
<td>7.64</td>
<td>7.65</td>
<td>.770</td>
</tr>
<tr>
<td>Six-minute walk distance in feet</td>
<td>873.1</td>
<td>922.5</td>
<td>.270</td>
</tr>
<tr>
<td>Body weight in pounds</td>
<td>163.8</td>
<td>154.4</td>
<td>.005</td>
</tr>
<tr>
<td>Symptom experience</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of symptoms</td>
<td>4.89</td>
<td>4.28</td>
<td>.020</td>
</tr>
<tr>
<td>Frequency score</td>
<td>15.48</td>
<td>13.41</td>
<td>.020</td>
</tr>
<tr>
<td>Bothersomeness score</td>
<td>16.22</td>
<td>13.85</td>
<td>.030</td>
</tr>
<tr>
<td>Psychosocial functioning</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SIP Psychosocial Dimension score</td>
<td>6.75</td>
<td>6.26</td>
<td>.560</td>
</tr>
<tr>
<td>CES-Depression score</td>
<td>3.87</td>
<td>3.31</td>
<td>.580</td>
</tr>
<tr>
<td>MOS Social Support score</td>
<td>76.66</td>
<td>75.19</td>
<td>.230</td>
</tr>
</tbody>
</table>

Notes: SIP = Sickness Impact Profile; CES-D = Center for Epidemiologic Studies-Depression; MOS = Medical Outcome Study.

Includes all women who completed the 12-month interview. Difference score analysis of covariance (ANCOVA) included the corresponding baseline value of each variable, group, and the interaction between baseline and group. No interactions were significant at the p < 0.10 level.

Difference score = follow-up score subtracted form the baseline score. A positive difference score is desirable for all but the 6-minute walk measure, in which negative difference score is desirable. Although the significance levels (p values) correspond to the analysis adjusting for baseline values, the difference scores shown are the unadjusted values.
dent. Regarding both their 6-minute walk performance and body weight loss, program women had modest but positive net gains in outcome, whereas control women lost ground on both measures. These findings may suggest that for older women a benefit of such interventions may be their potential for retarding gradual declines generally believed to accompany age and chronic disease.

Some outcomes of the program were evident by the 4-month evaluation and were sustained through the 12-month point (e.g., symptom experience and body weight loss). Some, although not evident at the first follow-up, emerged by 12 months, specifically the 6-minute walk score and an improved SIP physical dimension score. It may require different lengths of time for some improvements to become evident. For example, the capacity for greater ambulation and physical exertion may follow improvements in symptoms and some initial body weight loss. Such a possibility indicates that longer-term evaluations may be required to more fully assess the effects of disease management interventions.

The second encouraging finding is that symptom experience, however measured (number, frequency, and bothersomeness), was significantly attenuated for women participating in the intervention. Although symptom patterns improved for both groups over time, the gains experienced by program women were significantly greater. For example, program women had a mean reduction of 1.15 symptoms compared with control women’s mean reduction of .36 symptoms. In other words, usual care resulted in slight improvement in symptom experience, but was significantly enhanced by the disease management program.

The absence of psychosocial findings for program women seen in preliminary research (Clark, Janz, Becker, et al., 1992; Clark et al., 1997) may have resulted from the intentional shifts in the revised program to emphasize physical activity. The revisions to the education may not have allowed for the same level of consideration and learning regarding emotional and social well-being as occurred in the initial version. In the process evaluation conducted as part of the study, women participants voiced interest in a program of longer duration. Lengthening the program may afford additional opportunity for focus on psychosocial aspects of disease management apparently lost with the current emphasis on physical functioning. However, the lack of psychosocial findings may reflect a measurement problem. The SIP, CES-D, and MOS Social Support Survey may not be sensitive to changes in women’s self-confidence or self-image, which were areas incorporated into the revised program. In the process evaluation, which was completed at the end of program participation, women expressed increased positive feelings related to their self-confidence, which they associated with their involvement in the intervention. Different measures may have more effectively captured such psychological or emotional effects of the program. For example, a generic measure such as Rosenberg’s (1965) Self-Esteem Scale or a disease specific measure such as the Quality of Life after Myocardial Infarction Questionnaire (Valenti, Lim, Heller, & Knapp, 1996) may have better tapped these elements of the program.

Psychological improvements including less depression and a sense of well-being have been associated with physical activity in younger populations (Camacho, Roberts, Lanzarzs, Kaplan, & Cohen, 1991; Weyerer & Kupfer, 1994). Findings from at least one study (King, Taylor, & Haskell, 1993) suggested that in older adults there is also an association, whereas in other research (Blumenthal et al., 1991; Emery & Blumenthal, 1991) no correlation was observed. It may be that over a longer time frame, concurrent increases in physical capacity and decreases in depression attributable to the intervention would emerge, but none were observed in the 12-month follow-up period used in this research. Perhaps if the intensity of women’s physical activity had been greater, an association would have been evident. The intensity of program participants’ physical activity was geared to their physicians’ recommendations and varied greatly. Each woman’s exercise plan was individualized. At baseline, 23% of women said they exercised regularly, and at 4- and 12-month time points program women were significantly more likely than were control group members to report regular exercise. Although we do not know the mean levels, we assume from previous studies (Eaton et al., 1994; LaCroix, 1987) that the intensity among women of this age would be low to moderate. Further, gains in physical activity seen in this study were modest in comparison to those that may be expected in younger populations, although similar to previous work with older adults. As a group, mature women with heart disease, generally, are not expected to dramatically increase their levels of physical activity. Some have opined that the goal with such a population should be to prevent the expected decline rather than assume significant gains can be realized (Unger, Johnson, & Marks, 1997). Nonetheless, although the program exhibited significant improvements in the area of physical functioning, the relative increases may not have been large enough to affect psychological functioning if this association, in fact, can be demonstrated in older women.

Although the program provided women with social support in the form of encouragement received from the health educator, peer leader, and other participants, an effect of this added assistance was not evident as measured by the social support survey used in this study. This standardized measure primarily assesses support provided by relatives, friends, and significant figures in the women’s social environment. It might not have tapped the form of social support provided in the program by group members and educators.

The general benefits to be derived from exercise have led to recommendations across all age groups to maintain adequate levels of physical activity. In older women with heart disease an assumption has been that interventions may help retard declines in physical functioning observed with aging. Although cardiac rehabilitation programs (i.e., treadmills, aerobic exercise) are evident in most hospitals, few specialized programs are available for older women who, in general, are less able or motivated to participate in the conventional ones. The intervention evaluated in this study yielded clear benefits for participating women related to physical functioning as assessed by a standardized interview measure (the SIP) and to ambulation as assessed through observation (6-minute walk), and it also enabled them to lose body weight.

It would appear that the comprehensive nature of the program, combining skills and information targeted at helping
women to use medicines effectively, follow dietary recommendations, reduce stress, and maintain adequate levels of physical activity, through self-regulatory processes produced the observed outcomes. However, it is possible that one or two of these program elements were most responsible for changes noted.

An interesting question for future research is whether outcomes associated with physical functioning in this population are also associated with other measures of health status. For example, are increased functioning and ambulation associated with less use of clinical services, including hospitalization and emergency department use?

The findings of the present study suggest that mature female patients with heart disease can be less symptomatic, can lose body weight, and can improve their physical functioning by participating in a disease management program that is based on principles of self-regulation and that focuses on the unique concerns of older women.

Acknowledgments

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