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Effectiveness of two Arthritis Foundation programs: Walk With Ease, and YOU Can Break the Pain Cycle

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Objective: To evaluate the effectiveness of two Arthritis Foundation programs: Walk With Ease (WWE) and YOU Can Break The Pain Cycle (PC).

Design: Quasi-experimental, repeated measures design. Retested at six weeks and four months.

Setting: Community based intervention.

Participants: Volunteer sample of 163 adults with arthritis recruited through mailings, newspapers, and flyers.

Interventions: Subjects participated in a 90 minute seminar (PC, Group A), a six-week walking program (WWE, Group B), or both programs (Group C).

Main outcome measures: Survey assessment of arthritis knowledge, general health, self-management activities, confidence, physical abilities, depression, health distress, and how arthritis affects their life. A Squat Test, a Six Minute Walk test, and a Timed Functional Walk Test were also administered.

Results: Subjects in Group B were more confident, less depressed, had less health distress, and less pain than subjects in Group A. Scores of Group C were between Group A and B scores. Differences in groups over time indicated that the WWE resulted in increased confidence, physical abilities, time spent in self-management activities and decreased pain and fatigue. All groups increased in walking endurance at six weeks, and increased in health distress at four months.

Conclusion: Subjects in different programs differed on impact of arthritis. These programs provide effective arthritis management opportunities.

Keywords: arthritis, self care, patient education, exercise

Introduction

Arthritis is the leading cause of disability among adults in the US, with 47.8 million people reporting doctor-diagnosed arthritis in 2005 and an anticipated increase to 67 million by 2030 (Hootman and Helmick 2006). *Healthy People 2010* highlights the widespread economic impact of arthritis: "Arthritis is the source of at least 44 million arthritis-related visits to healthcare providers, 744 000 hospitalizations, and 4 million days of hospital care per year" (DHHS 2000). As health-related expenditures continue to rise and access to care decreases, there is an increasing need to develop, implement, and promote efficacious and cost effective arthritis self-management interventions (AF et al 1999).

Arthritis self-management is an intervention strategy that aims to reduce pain and disability, increase a person's sense of control, and improve quality of life (AF et al 1999). Numerous studies have shown that self-management programs, including community-based programs, with elements of physical activity, or health education, or both are helpful in managing symptoms while reducing hospitalization and other medical expenditures (Kovar et al 1992; Lorig et al 1993; Ettinger et al 1997; Lindroth

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et al 1997; Kruger et al 1998). Such interventions frequently offer benefits that include low or no participant costs, local access, and access to social-support networks (Kovar et al 1992; AF et al 1999; Rizzo 1999).

The benefits of arthritis health education programs on health behavior and health status have been identified in mixed populations of patients with varying forms of arthritis (Brus et al 1997; Lorig et al 1999). Content of these programs typically includes information about arthritis etiology, exercise, medication effects, and treatment of arthritis, joint protection, nutrition, evaluation of non-traditional management techniques, physician–patient communications, and relaxation techniques (Lorig et al 1989; McCarberg et al 2001). The YOU Can Break the Pain Cycle (PC) program is an arthritis health education program developed by Stanford University for implementation in the community setting and addresses two primary goals: (1) to instill the belief that individuals can manage their arthritis, and (2) to increase utilization of Arthritis Foundation resources (SAC and AF 1996). The program has been used throughout the US and is open to any individual with a self- or medical diagnosis of arthritis.

It is widely accepted that physical activity is an important component of an arthritis self-management program (Kovar et al 1992; Minor 1994; Ettinger et al 1997; Mangione et al 1999). The effects of physical training have been demonstrated for 20 years to have positive short-term and long-term fitness effects in persons with rheumatoid arthritis and osteoarthritis (Minor 1994; Ettinger et al 1997). Low impact activity, such as walking, cycling, and swimming, have been successfully recommended for individuals with arthritis to help improve functional status without exacerbating pain or necessitating an increase in the use of medication (Allegrante et al 1993; Burckhardt et al 1994). The Walk With Ease (WWE) arthritis self-management program was developed by the Arthritis Foundation to be used in a community setting with individuals who may be either self- or medically diagnosed with arthritis. This group walking-based program addresses three primary goals: (1) to promote education about successful physical activity for people with arthritis; (2) to promote education about arthritis management; and (3) to provide participants who have arthritis with the opportunity for an on-going aerobic fitness program based on the latest research and recommendations (Rizzo 1999). WWE is designed to be affordable, easily implemented, and easily accessed by participants.

Many of the studies of community-based programs have used subject populations with medically diagnosed arthritis, which potentially omits a large number of people who have joint pain and participate in these programs, but who do not have a physician diagnosis of arthritis (Kovar et al 1992; Lorig et al 1993, 1998; Lindroth et al 1997). It is therefore necessary to determine the usefulness of such community-based programs in a subject pool that more closely resembles the population that typically attends these programs. The purpose of our study was to evaluate the effectiveness (changes in arthritis knowledge, self efficacy, quality of life, functional status, pain status, and physical abilities) of the PC pain-management program and the WWE exercise program in community dwelling adults with self- or medically-diagnosed arthritis. These variables were studied at 6-weeks and 4-months post-intervention.

Methods

Subjects

Subjects were recruited from pre-selected regions throughout Rhode Island by several methods: (1) mass mailings to individuals from a database maintained by the Southern New England Chapter of the Arthritis Foundation, (2) newspaper advertising (press releases and paid advertising), (3) fliers to physical therapy, rheumatology, group-physician, and pharmacy practices statewide, and (4) fliers to program sites hosting either the arthritis pain-management program or the walking program.

One hundred sixty-three men and women with arthritis volunteered for the study and fulfilled the following study requirements: (1) age 18 years or older, (2) a diagnosis of arthritis (self-diagnosis or medical diagnosis), (3) fluency in written and spoken English, and (4) able to ambulate independently (to participate in the WWE program). Subjects signed an informed consent approved by the University of Rhode Island Institutional Review Board.

Interventions

Thirteen program sites conducted the arthritis pain-management program, and of those locations, nine elected to also conduct the walking program. Sites were selected based on geographic location within the state, type of facility, or a previous connection with the Arthritis Foundation. Both programs were conducted according to established Arthritis Foundation guidelines.

Walking program

The walking intervention consisted of the 6-week long WWE program. Participants met three times a week at regional sites in groups of up to 30 participants under the direct supervision of a walking leader trained according to guidelines of the Arthritis Foundation. Each meeting began with a pre-walk discussion covering a specified topic related to exercise and/or arthritis, followed by a 10–40 minute walk that included a warm-up and cool-down as described in the *Walk With Ease* leader's guide (Rizzo 1999). Participants were instructed to walk at a self-selected speed, and for a self-selected distance under the guidance of the walking leader. Participants were also given a *Walk With Ease* educational handbook to be used in conjunction with the program (AF 1999).

Arthritis pain-management program

The arthritis pain-management program consisted of a single 90-minute presentation (PC), conducted by lay volunteers trained according to guidelines of the Arthritis Foundation. The presentation addressed the following topics: introduction to arthritis, the pain cycle, exercise, cognitive-pain management, treatment-decision making, and the Arthritis Foundation (SAC and AF 1996).

Measures

Survey

The self-report survey implemented in this study included nine sections addressing the subjects' demographics, arthritis knowledge, general health (McHorney et al 1993), arthritis self-management activities (Lorig et al 1996, 1998; Dannecker et al 2003), confidence about doing things (Gonzalez et al 1995), physical abilities (Pincus et al 1983), depression (Radloff 1977), health distress (Stewart and Ware 1992), and how arthritis affects their life (Devins et al 1990; Lorig et al 1996). The *arthritis knowledge* component was developed to reflect information presented during the PC program. Nine multiple-choice items relating to general knowledge of arthritis were used. These included, joints frequently affected by osteoarthritis, cause of rheumatoid arthritis, common problems experienced by people with arthritis, effects of increased pain, benefits of exercise, exercise modification techniques, methods of pain management, questions to ask when evaluating possible treatments, and programs offered by the Arthritis Foundation. The score for arthritis knowledge was the number of correct answers. *General health* was measured using a question from the Medical Outcomes Study short form 36-item (MOS SF-36) questionnaire (McHorney et al 1993). Questions addressing the subjects' *arthritis self-management activities* assessed three different types of activities: therapeutic exercise (eg, stretching, strengthening, and balance), aerobic exercise (eg, walking, swimming, and bicycling), and other self management techniques (eg, setting goals, self-talk, and practicing relaxation). For each of the three types of activity, subjects rated their readiness to perform the activities with questions based on the Transtheoretical model of behavior change (Dannecker et al 2003). Stages of readiness progressed from Precontemplation, Contemplation, Preparation, Action, and Maintenance. In addition, more detail regarding time spent performing therapeutic exercise and time spent in aerobic exercise during the past week was obtained using six items scored on a scale from 0–4 (0 = None; 1 = Less than 30 min/wk; 2 = 30–60 min/wk; 3 = 1–3 hrs/wk; 4 = More than 3 hrs/wk) (Lorig et al 1996). More detail on the subject's involvement in other self-management techniques during the past week was rated on a subscale that included progressive muscle relaxation, use of mental games, visualization, guided imagery, and self-talk (0 = Never; 1 = Almost never; 2 = Sometimes; 3 = Fairly often; 4 = Very often; 5 = Always) (Lorig et al 1996). Subjects' c*onfidence* in managing their arthritis symptoms was measured with the short version of the Arthritis Self Efficacy Scale (Gonzalez et al 1995), and their *perceived physical abilities* were addressed with questions from the Modified Health Assessment Questionnaire (Pincus et al 1983). *Depression* was measured using the Center for Epidemiological Studies Depression Scale (Radloff 1977) and *health distress* was assessed using a scale from the Medical Outcome Studies (Stewart and Ware 1992). Subjects also rated *how arthritis affects life* with thirteen questions from the Illness Intrusiveness Ratings Scale, measuring the impact of arthritis of on an individual's work, family, social and recreational life (Devins et al 1990; Lorig et al 1998). Finally, subjects rated their pain from arthritis and their fatigue over the previous two weeks on a 0 to 10 scale of numbered histograms based on the Medical Outcomes Study Pain Severity Scale (Stewart and Ware 1992; Gonzalez et al 1995).

Physical Tests

Three physical tests were utilized to evaluate subjects' change in performance. The Six Minute Walk Test is a single-trial test used to indirectly measure functional aerobic

exercise capacity (Kovar et al 1992) for individuals with arthritis and other chronic diseases (Guyatt et al 1985; Kovar et al 1992; Ettinger et al 1997). High reliability for the Six Minute Walk test has been established by Guyatt and colleagues (1985) within a population with chronic heart failure and by Kovar and colleagues (1992) in individuals with medically diagnosed osteoarthritis. The test was conducted on a firm and level surface at the program site. From a pre-determined starting line, subjects were instructed to walk around a measured indoor course covering as much distance as they comfortably could within the allotted time. At the end of the six minutes, walkers were instructed to stop and the total distance covered by each subject was measured to the nearest foot by a surveyor's wheel. Subjects were permitted to stop walking, or rest and resume walking before the end of the official testing period.

The Timed Get Up And Go Test is often used to assess physical functioning (Podsiadlo and Richardson 1991; Wall et al 2000; Piva et al 2004), but this global test involves sequential component tasks, for example rising from a chair and walking away, the times of which could interact (Wall et al 2000). Because of this, two different tests were used in this study, one to assess the effect of impairments in lower extremity functional strength and range of motion, and one to assess walking speed. The Squat Test was designed to measure the functional ability of subjects to bend at the knees and hips into a squat position. The Squat Test utilized a device that consisted of a graduated 4 ft piece of plastic pipe cemented into a base. With feet shoulder-width apart, subjects squatted as low as possible without bending forward or to the side. Concurrently, the subject slid a ring down the pipe with an extended arm (Figure 1). At the deepest point in their squat the subject was instructed to release the ring and return to standing unassisted. The tester recorded both the start and end position of the ring. Three trials were conducted and the average of the difference between starting and ending positions for the three trials was obtained. A rest period was given as needed between each trial. The psychometric properties of the Squat Test are unknown.

The Timed Functional Walking Test is a single-trial test designed to measure the subjects' ability to walk 60 ft at a maximal speed. Walking speed has been identified as a determinant of an ability to function safely in the community (Brus et al 1997), therefore 60 ft was chosen to represent the distance across a four-lane crosswalk. Each subject was instructed to walk at a self-selected maximal pace from a starting line, around a traffic cone positioned at 30 ft, and back to the starting line in a straight path. The subject's time was recorded in seconds.

Figure 1 Subject performing the Squat Test.

Procedures

Subjects self-selected the program(s) they participated in; WWE, PC, or both. At the start of each program, subjects were asked to fill out the arthritis survey in its entirety (initial test: Test-1). For those individuals with a visual impairment or who were unable to autonomously read or write, a tester dictated the complete survey and filled in the subject's reported answers. All follow-up testing was done in the same location as the initial testing to maintain internal consistency. In the event that the subject was unable to attend a follow-up testing session a survey was mailed, however, no physical test data were collected.

Immediately following the PC presentation, subjects repeated the Arthritis Knowledge component of the survey (re-test: Test-r) and completed the three physical tests (considered part of Test-1). Six-weeks and four months

following the arthritis pain-management program, subjects returned to complete the entire survey and the physical tests again (Test-6w & Test-4m respectively).

Subjects participating in WWE attended a pre-walking session 3–5 days prior to the start of their program. At the pre-walking session, subjects filled out the entire arthritis survey and completed the three physical tests (Test-1). Following an introduction to WWE by the walking leader, subjects repeated the Arthritis Knowledge survey component (Test-r). Six-weeks and 4-months following the walking program, subjects returned to complete the arthritis questionnaire and the physical tests again (Test-6w and Test-4m, respectively).

Research design & data analysis

In this quasi-experimental design study, subjects existed in one of three groups based on the program(s) attended. Group A consisted of subjects who participated only in PC. Group B consisted of subjects who participated only in WWE and Group C consisted of subjects who participated in both programs. The data collected from Group B served as non-intervention controls for the pain-management program, and the data collected from Group A served as non-intervention controls for the walking program.

Survey results were scored according to recommended procedures except for *how arthritis affects life* (Illness Intrusiveness Rating Scale). The Marital, Sexual and Family Relations subscale had a non-response rate of greater than 33% for the items regarding relationship with spouse, and sex life, and these two items were dropped from the analysis. A mean of the remaining items was used in the subsequent analyses. A reliability assessment of Test-1 data indicated acceptable reliability for components of *general health* (α=0.88), *confidence* (α=0.92), *physical abilities* (α=0.80), *depression* (α=0.81), *health distress* (α=0.87) and *how arthritis affects life* (α=0.91).

Main effects of differences between groups and changes over time were analyzed by a 3×3 repeated-measures ANOVA. A priori comparisons across time within groups was tested by paired t-tests. The significance level was set at p=0.05.

Results

Descriptive information about the subjects who completed Test-1 is presented in Table 1 to provide information about the characteristics of subjects who enrolled in the programs. The number of subjects who participated in Test-6w and Test-4m showed a substantial attrition, especially in Group A, and between Test-1 and Test-6w (Table 1).

Table 1 Subject characteristics (all subjects) at Test-1

	Group A	Group B	Group C
Gender (Female/Male)	91/11	26/3	27/5
% Caucasian	87%	93%	97%
Average level education completed (yrs of school)	13.6 ± 3.0	13.7 ± 3.5	12.7 ± 2.3
Type of arthritis (more than one answer possible)			
Osteoarthritis/DJD	58%	45%	78%
Rheumatoid	13%	7%	31%
Other	29%	10%	34%
Don't know	21%	45%	9%
Years symptomatic	14 ± 14	9 ± 10	16 ± 11
Arthritis knowledge (number correct out of 9)	5.3 ± 2.0	3.9 ± 2.0	4.5 ± 2.1
General health status (scale 1–5, lower is better)	3.1 ± .8	3.0 ± .9	3.2 ± .9
Confidence (scale 1–10, higher is better)	7.2 ± 2.6	8.2 ± 3.0	6.6 ± 2.8
Physical abilities (scale 0–3, lower is better)	1.4 ± .4	1.3 ± .3	1.4 ± .3
Depression (scale 0–60, lower is better)	15.8 ± 9.8	14.8 ± 10.6	15.6 ± 8.9
Health distress (scale 0–5, lower is better)	1.9 ± 1.3	1.6 ± 1.1	1.7 ± 1.0
How arthritis affects life (scale 1–7, lower is better)	2.5 ± 1.4	2.2 ± 1.5	2.9 ± 1.4
Arthritis Pain (last two weeks) (scale 0–10, lower is better)	5.6 ± 2.6	4.5 ± 2.1	5.7 ± 2.3
Fatigue (last two weeks) (scale 0–10, lower is better)	5.1 ± 2.8	5.0 ± 2.7	5.4 ± 2.8
Six Minute Walk Test (ft)	1050.0 ± 434.3	1059.8 ± 348.7	1103.6 ± 267.3
Squat Test (depth in cm)	36.3 ± 17.2	10.0 ± 12.4	42.3 ± 28.2
Timed Functional Walking Test (seconds)	18.7 ± 7.2	18.7 ± 5.4	17.5 ± 5.1
Number of subjects at Test-1	102	37	54
Number of subjects at Test-6w	29	20	19
Number of subjects at Test-4m	32	27	27

Abbreviations: DJD, degenerative joint disease.

Survey results

Arthritis knowledge

Scores on the Arthritis knowledge test showed a main effect for test indicating that when collapsed across groups, Test-1 scores were lower than Test-r, Test-6w, and Test-4m scores. There were no significant differences between scores at Test-r, Test-6w and Test-4m. The planned comparisons within groups indicated a significant increase in arthritis knowledge was demonstrated from Test-1 to the immediate-post test (Test-r) within both groups receiving the pain management program (Groups A and C). At six weeks (Test-6w), Group C continued to score significantly higher than Test-1, and by 4 months (Test-4m) all groups demonstrated a significant increase in their arthritis knowledge over pre-test scores (Table 2).

General health (status & attitudes)

There were no significant differences between groups, between tests, or in any of the planned comparisons between tests within groups for General health.

Arthritis self-management activities

Table 3 shows the distribution of subjects into the stages of regularly performing therapeutic exercise (strengthening, stretching, balance) at the time of Test-1, and the changes that occurred at Test-6w and at Test-4m. At Test-1, Group B showed a higher percentage of subjects in Preparation and a lower percentage of subjects in Maintenance. In general, a higher percentage of subjects participating in the WWE program (Groups B and C) indicated a progression in the stages of regularly performing therapeutic exercise. Table 3 also shows the average weekly time spent in performing these exercises of those already exercising (in Action and Maintenance). There were no significant differences between groups, between tests, or in any of the planned comparisons between tests within groups for the weekly time spent in therapeutic exercise.

Table 4 shows the same analysis as Table 3, but with aerobic exercise. At Test-1, Group B showed a higher percentage of subjects in Contemplation and Preparation and a lower percentage of subjects in Maintenance. In general, a higher percentage of subjects participating in the WWE program (Groups B and C) indicated a progression in the stages of regularly performing aerobic exercise, and also indicated an increase in time spent in aerobic activity. Over all subjects who indicated performance of aerobic exercise (Action or Maintenance), the time spent in aerobic exercise increased from Test-1 to Test-6w, but times from Test-1 were not different from Test-4m times. The planned comparisons found no differences between tests for Group A. Both groups participating in the WWE program showed an increase in aerobic exercise from Test-1 to Test-6w, but this increase was lost by Test-4m.

Table 5 shows the distribution of subjects into the stages of regularly performing activities to manage pain from arthritis (talking to their doctor, deep breathing, relaxation, setting personal goals for care) at the time of Test-1, and the changes that occurred at Test-6w and at Test-4m. Group A showed a higher percentage of subjects already performing these activities (ie, in Action and Maintenance), while groups B and C showed higher percentages of subjects getting ready to perform these activities regularly (ie, in Contemplation and Preparation). In general, Group B showed a higher percentage of subjects who showed progression at Test-6w and at Test-4m. Involvement in other self-management techniques also showed a main effect when collapsed across all groups, with an increase from Test-1 to Test-6w, and a significant increase was maintained at Test-4m. The planned comparisons indicated no differences between tests for either Groups A or Group B. Group C scores showed an increase from Test-1 to Test-6w, a significant increase was maintained at Test-4m.

Table 2 Increase in arthritis knowledge scores from initial test (Test-1) (mean increase and confidence interval [CI])

	Re-test (Test-r)		Test-6w		Test-4m	
Group	**Mean ↑**	**95% CI**	**Mean ↑**	**95% CI**	**Mean ↑**	**95% CI**
A[a]	1.9[d]	1.2–2.6	0.7	–0.1–1.4	1.0[d]	0.0–1.9
B[b]	0.9	–1.4–3.1	2.6	–0.3–5.4	2.0[d]	0.1–3.9
C[c]	2.6[d]	1.7–3.4	1.2 [d]	0.4–2.1	1.7[d]	1.0–2.4

Note: [a]YOU Can Break the Pain Cycle participants; [b]Walk With Ease participants; [c]Participants in both programs; [d]Statistically significant increase from Test-1 ($p<0.05$).

Confidence

Confidence showed a main effect for Test and Group. When collapsed across groups, Test-1 scores were lower than Test-6w but not Test-4m. Group A was less confident than Group B; Groups A and B were similar to Group C when collapsed across tests. The planned comparisons indicated no significant change in confidence across the tests for groups A and B. Group C increased in confidence from Test-1 to Test-6w, maintaining a significant increase at Test-4m.

Table 3 Distribution of subjects according to their readiness to perform therapeutic exercise (strengthening stretching, balance) at the initial test (Test-1), and changes from the initial test at 6 weeks (Test-6w) and 4 months (Test-4m). Of those already performing therapeutic exercise, the average time per week in this activity did not differ between groups or across tests within groups

	Test-1	Test-6w	Test-4m
Group A Pain Cycle	Precontemplation = 4% Contemplation = 11% Preparation = 26% Action = 12% Maintenance = 46%	26% progressed 55% no change 19% regressed	23% progressed 45% no change 32% regressed
Average exercise time (min/week) in those already exercising	72	74	79
Group B Walk With Ease	Precontemplation = 0% Contemplation = 18% Preparation = 46% Action = 18% Maintenance =18%	57% progressed 29% no change 14% regressed	31% progressed 38% no change 31% regressed
Average exercise time (min/week) in those already exercising	77	62	47
Group C Both Programs	Precontemplation = 3% Contemplation = 17% Preparation = 30% Action = 10% Maintenance = 40%	38% progressed 42% no change 21% regressed	30% progressed 52% no change 17% regressed
Average exercise time (min/week) in those already exercising	75	51	47

Physical abilities

There were no significant differences in physical abilities between groups or between tests. In the planned comparisons, Groups A and C showed no difference between any of the tests. Group B showed an increase from Test-1 to Test-6w, and maintained a significant increase at Test-4m.

Depression

When combined across all tests, Group A was more depressed than Group B; Group C was not different from either Group A or Group B. The planned comparisons indicated no significant change in depression across the tests for any of the three groups.

Health distress

Health Distress also showed main effects for Test and Group. When combined across groups, scores at Test-1 and Test-6w indicated less distress than did scores at Test-4m. When combined across all tests, Group A indicated more distress than Group B; Group C was not different from either Group A or Group B. In the planned comparisons, none of the groups demonstrated a difference between Test-1 and Test-6w, and all showed an increase in distress from Test-6w to Test-4m. In Groups B and C, scores at Test-4m indicated more distress than at Test-1.

How arthritis affects life

There were no significant differences between groups, between tests, or in any of the planned comparisons between tests within groups for the measurement of how arthritis affected their lives.

Two week pain

Main effect for arthritis pain combined across tests indicated Group A had more pain than both Group B and Group C. Group C were in more pain than Group B. The planned comparisons indicated no change across tests for Group A or for Group C. Group B showed a decrease in pain between Test-1 and Test-6w, a significant decrease was not maintained at Test-4m.

Two week fatigue

There were no main effects found for fatigue from arthritis. Planned comparisons indicated Group A and Group C showed no difference between any of the tests, but Group B showed a decrease in fatigue from Test-1 to Test-6w, a significant decrease was not maintained at Test-4m.

Table 4 Distribution of subjects according to their readiness to perform aerobic exercise (eg, walking, swimming, bicycling) at the initial test (Test-1), and changes from the initial test at 6 weeks (Test-6w) and 4 months (Test-4m). Of those already performing aerobic exercise, the average time per week in this activity is shown

	Test-1	Test-6w	Test-4m
Group A Pain Cycle	Precontemplation = 10%	19% progressed	26% progressed
	Contemplation = 9%	61% no change	47% no change
	Preparation = 19%	19% regressed	28% regressed
	Action = 11%		
	Maintenance = 52%		
Average exercise time (min/week) in those already exercising	126	131	106
Group B Walk With Ease	Precontemplation = 0%	60% progressed	44% progressed
	Contemplation = 25%	27% no change	38% no change
	Preparation = 43%	13% regressed	19% regressed
	Action = 18%		
	Maintenance =14%		
Average exercise time (min/week) in those already exercising	83	121[a]	111
Group C Both Programs	Precontemplation = 7%	28% progressed	17% progressed
	Contemplation = 7%	60% no change	52% no change
	Preparation = 30%	12% regressed	30% regressed
	Action = 7%		
	Maintenance = 50%		
Average exercise time (min/week) in those already exercising	107	143[a]	128

Note: [a]Statistically significant increase from Test-1 ($p<0.05$).

Summary of survey results

Significant main effects for Group and follow-up testing indicated that the subjects who self-selected into WWE (Group B) had more confidence in their ability to do things, were less depressed, had lower scores on Health distress, and were in less pain from their arthritis as compared with the individuals who participated in the pain management program (Group A). In general, the average of scores from participants in Group C (participated in both programs) was between Groups A's and B's scores in these variables.

The comparisons across tests within group indicated that participants in only the PC (Group A) had few statistically significant changes over time. They had an immediate increase in arthritis knowledge following the presentation; this increase was not maintained at Test-6w, but then showed an increase in knowledge scores at Test-4m. Like the other two groups, they showed an increase in the six minute walk distance from Test-1 to Test-6w, and an increase in Health distress from Test-6w to Test-4m.

Average scores in Group B (WWE only) showed an increase in time spent in aerobic and therapeutic exercise at Test-6w, but this increase was not maintained at Test-4m. Improvements were also seen in Physical abilities, Two week pain, Two week fatigue and six Minute Walk distances; these improvements were maintained at Test-4m. Health distress showed an increase after the program ended, from Test-6w to Test-4m.

No significant difference was found between or within any group or over time for the General health measure or for How arthritis affects life.

Physical test results

Planned comparisons indicated all groups demonstrated a significant increase in the Six Minute Walk Test distance from Test-1 to Test-6w; a significant increase was not maintained at Test-4m. There was no significant difference found between groups, between tests, or in the planned comparisons for the Squat Test, or for the Timed Functional Walking Test.

Discussion

The results from this multifactor community-based study demonstrate that participation in the PC and the WWE self-management programs have both positive cognitive and physical benefits. Prior research supports the use of community-based self-management programs for individuals with arthritis (Lorig et al 1989, 1993; Kovar et al 1992; Ettinger et al 1997), however, few studies have

examined participants with either a self- or medical diagnosis of arthritis. The two Arthritis Foundation programs studied were both designed to accommodate any individual interested in participating, regardless of arthritis type or disease status. In contrast to tightly controlling the inclusion criteria and randomly assigning subjects to groups, our study attempted to maximize external validity by using all subjects who responded to normal program recruitment procedures, and allow the subjects to self select into the two different programs just as they normally do.

Participants' knowledge of arthritis regarding pain-management options, exercise and general arthritis facts increased at the four month follow up for both programs. As anticipated, subjects in Group A, and Group C demonstrated immediate gains in knowledge (Test-r) following their participation in the educational program PC, while subjects in Group B received no education between Test-1 and Test-r, and did not show a similar increase. Because of the small educational component of the WWE program, it was somewhat surprising that Group B did not have a statistically significant increase in score at Test-6w, but did at Test-4m. The Test-1 to Test-6w difference scores had a larger variance; analyses of the raw data indicated that this large variance was caused primarily by several subjects who answered the best choice questions with two or more answers. These questions were marked incorrect even when the correct answer was one of the two answered. On the whole, these results speak favorably for the small educational component of the WWE program. In previous research, an individualized rheumatoid arthritis-management program showed significant increases in knowledge that continued at 12 months following the intervention (Lindroth et al 1997). In addition to their demonstrated gains in knowledge, the subjects' joint-protection skills and ability to cope with their disease was maintained, however their disease state did not change (Lindroth et al 1997). According to a study of the Arthritis Self-Management Course, it remains unclear whether a change in knowledge results in changes in behavior or health outcome (Lorig et al 1989), yet other research supports the importance of increasing knowledge as a fundamental component to patient-education interventions (Lindroth et al 1997).

Prior to this investigation, the PC program was evaluated by Lorig and colleagues (1998) at six weeks, unlike the WWE program which had not been previously evaluated. The results of the study by Lorig and colleagues (1998) compare well with those found in this study. In both cases, participants in the pain-management program demonstrated improvements in their arthritis knowledge after the

Table 5 Transtheoretical model distribution for regularity of activities to manage pain (talking with doctor, setting goals, practicing relaxation / deep breathing) at the initial test (Test-1), and changes from the initial test at 6 weeks (Test-6w) and 4 months (Test-4m)

	Test-1	Test-6w	Test-4m
Group A Pain Cycle	Precontemplation = 2% Contemplation = 6% Preparation = 34% Action = 11% Maintenance = 46%	36% progressed 39% no change 26% regressed	36% progressed 36% no change 28% regressed
Participation in other self-management activities (0 = Never, 5 = Always)	1.4 ± 1.1	1.6 ± 1.0	1.7 ± 0.9
Group B Walk With Ease	Precontemplation = 0% Contemplation = 22% Preparation = 41% Action = 22% Maintenance =15%	53% progressed 40% no change 7% regressed	44% progressed 31% no change 25% regressed
Participation in other self-management activities (0 = Never, 5 = Always)	1.1 ± 1.0	1.3 ± 0.9	1.2 ± 1.0
Group C Both Programs	Precontemplation = 3% Contemplation = 6% Preparation = 35% Action = 13% Maintenance = 42%	36% progressed 44% no change 20% regressed	36% progressed 41% no change 23% regressed
Participation in other self-management activities (0 = Never, 5 = Always)	0.9 ± 1.1	1.6 ± 1.1 [a]	1.5 ± 1.1 [a]

Note: [a]Statistically significant increase from Test-1.

completion of the program. The results of our study demonstrated a carryover in arthritis knowledge with an increase from initial test present at the four month follow-up. Lorig also found an increase in confidence following the PC program, a result that was not supported in our study. The long-term effects of educational programs offer the potential to change behaviors and manage pain in a manner that is beneficial to participants' overall health decision-making skills (Smarr et al 1997).

Research suggests that self-efficacy acquired in community-based programs provides the individual with the ability to decrease pain, reduce episodes of depressed mood, and increase perceived functional abilities (Lorig et al 1989; Barlow et al 1998; Lefebvre et al 1999). Self-efficacy influences individuals' selection of activities and goals despite obstacles that may exist. Reports from Gaines and colleagues (2002) suggest that there is a significant relationship between self-efficacy beliefs and self-reports of functional performance in women. This indicates that exercise and health education programs that are successful in increasing self-efficacy also may help to influence individuals' perceived functional capabilities, allowing them to function better in their daily lives and potentially enhance their overall quality of life. Further evidence is provided in our study where perceived physical abilities in Group B increased, and Group C demonstrated an increase in their confidence (self-efficacy) at six weeks and four months compared with their initial measurements.

The WWE program was apparently helpful in encouraging subjects to progress in their readiness to perform therapeutic and aerobic exercise. However, while the time spent in therapeutic exercise did not change, time spent in aerobic exercise was increased at six weeks in both groups participating in the WWE program. This result was expected as the WWE program primarily involves aerobic exercise. It is unfortunate that the subjects apparently did not regularly continue aerobic exercise to the four month time in any of the groups as outcomes are strongly predicted by maintaining performance over time (Marks and Allegrante 2005; Roddy and Doherty 2006). The lack of adherence in our study agrees with others (Ettinger et al 1997; Lindroth et al 1997), but little is known about how to increase adherence in individuals with arthritis (Roddy and Doherty 2006). Participation in other self management activities was also increased at six weeks in both groups participating in the WWE program. Group C maintained this increase at four months which may indicate an additive effect of both programs (Bennell and Hinman 2005). Taken together, these results support similar findings in studies with participants clinically diagnosed with arthritis. Smarr and colleagues' (1997) investigation of a cognitive-behavioral approach to managing rheumatoid arthritis indicated a correlation between self-efficacy and better health outcomes, decreased pain and decreased depressive symptoms. In addition, exercise as an intervention for osteoarthritis has also been shown to increase self-efficacy in participants when compared with non-intervention controls (Smarr et al 1997).

Survey results of particular interest show that individuals who chose to participate in only the health-education program initially reported less confidence, higher health distress and higher two week pain rating as compared with those who selected only the walking program. Additional research is needed to examine the reasons why these individuals avoid activity-based programs, so that programs could then be configured to more specifically target this population. Average scores on the scale measuring depression approached 16, a score which indicates the individual could be at risk for clinical depression (Radloff 1977). As these were average scores, many in the subject pool in all groups scored above 16; high Center for Epidemiologic Studies Depression Scale (CESD) scores have been reported previously in a similar sample (Lorig et al 1996). The lack of change at six weeks and four months suggests that the current programs did not help the group of subjects with this aspect of their disease.

It was also noted that no significant changes were recorded for other survey components measuring general health status and How arthritis affects life. One possible explanation is that these survey scales may not have been sensitive enough to record changes in the studied population. The participants represented a broad base of individuals with self- or medically diagnosed arthritis, therefore their symptoms as a whole group may have presented less severely than those with a definite medical diagnosis of arthritis (Coulton et al 1989).

Results from the physical tests show that both programs studied were effective in increasing distance walked during the Six Minute Walk Test at the six week follow-up. This is consistent with past research that indicates improvements with distance walked after participation in either educational or exercise based programs (Kovar et al 1992; Mangione et al 1999). A study done by Mangione and colleagues (1999) on the effects of both high and low intensity cycle ergometry in older individuals with knee osteoarthritis also used the

Six Minute Walk Test, as well as a timed chair rise test to assess functional improvement. Results of that study showed significant improvement in all functional tests including the timed-chair rise, Six Minute Walk Test, gait tests, and graded exercise treadmill tests (Mangione et al 1999). This is consistent with our study suggesting that the WWE program is successful in improving walking endurance that persisted until the six week follow-up. Other studies conducted have shown similar results; that exercise has shown to significantly improve function in persons with arthritis (Allegrante et al 1993; Minor 1994; Ettinger et al 1997; Lefebvre et al 1999). Subjects of the PC program also demonstrated positive results at six weeks, which suggests participants may have learned how to manage their arthritis symptoms better and were able to take the advice of the program and increase their physical activity levels. However, follow-up at four months for both programs was disappointing as none of the groups maintained the increases in walking distance when compared with their initial measurements. Attempting to promote long-term continuation of physical activity as an arthritis self-management technique is part of both programs, however, like other studies have shown, compliance among participants often decreases over time (Ettinger et al 1997; Lindroth et al 1997). Lindroth and colleagues (1997) evaluated an educational self-management program and reported that participants had an increase in home exercise immediately following the program, however this change was not maintained at 12 months. Ettinger and colleagues (1997) showed a decrease in compliance to 50% in subjects 18-months following an exercise intervention for knee osteoarthritis. This leads researchers to speculate that permanent lifestyle changes such as exercise may require a different level of facilitation by the educator, while topics and skills such as joint protection and knowledge may be retained with less support (Lindroth et al 1997). Findings from our study support the need to emphasize adherence to both physical activity and other arthritis self-management techniques beyond the completion of the programs. Community agencies may need to develop a mechanism to periodically follow-up with program participants or offer incentives to continue with pain management and exercise after participation in programs has finished.

There were no differences found in the Squat Test or the Timed Functional Walking Test. One possible explanation is that these measures may not have been sensitive enough for the population that self-selected into a walking program, and participants may have reached the ceiling levels afforded by the tests. It has been noted that individuals from the community setting typically demonstrate less severe impairments (Coulton et al 1989), and Table 1 indicates that this may have been the case with our sample. Future evaluations may need to incorporate tests that measure a higher functional status.

Although significant results were found, limitations of this study may have contributed to fewer significant results than expected from survey components, the Squat Test and the Timed Functional Walking Test. Study limitations include a relatively high attrition rate (approximately 46%), evidenced by failure of many subjects to both return for both follow-up testing sessions. Additionally, incomplete and incorrect completion of the questions reduced useable data. Unfortunately, because the four month follow-up test occurred during the New England winter, some subjects had difficulty with travel, or were otherwise unavailable for the follow-up testing. Screening of the data set indicated that there were no obvious differences between those who completed and those who were lost to follow-up.

However our findings support the use of the PC and the WWE programs as effective strategies for managing arthritis-related symptoms. This study uniquely targeted a broad population of community-based individuals with self- or medically diagnosed arthritis. The need for easily accessible, cost-effective, and comprehensive arthritis-management programs is ever increasing for both patients and clinicians, and these two programs can help meet this need.

Conclusion

Our results complement and expand findings of past research that support of the use of arthritis self-management programs in effectively controlling symptoms. In the context of attempting to increase access to care and the rising cost of health-related expenditures, the need for non-medically based programs that are effective at reducing arthritis symptoms is increased. WWE and PC are shown to be two such programs available to community-based individuals with self- or medically diagnosed arthritis.

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