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A randomized controlled study of the Arthritis Self-Management Programme in the UK

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Abstract

The objective of this study was to determine whether the Arthritis Self-Management Programme (ASMP) improves perceptions of control, health behaviours and health status, and changes use of health care resources. The design was a pragmatic randomized controlled study; participants were allocated to ASMP (Intervention Group) or a 4-month waiting-list Control Group. The Intervention Group completed a 12-month follow-up. In total, 544 people with arthritis were recruited from the community—311 in the Intervention Group and 233 in the Control Group. Main outcome measures included: arthritis self-efficacy, health behaviours (exercise, cognitive symptom management, diet and relaxation) and health status (pain, fatigue, anxiety, depression and positive affect). At 4 months follow-up, the ASMP had a significant effect on arthritis self-efficacy for other symptoms and pain subscales. Performance of a range of health behaviours (cognitive symptom management, communication with physicians, dietary habit, exercise and relaxation) was significantly greater among the Intervention Group. The Intervention Group were significantly less depressed and had greater positive mood. In addition, trends towards decreases on fatigue and anxiety were noted. Physical functioning, pain and GP visits remained stable at 4 months. A similar pattern of findings was found at 12 months follow-up for the Intervention Group. Furthermore, a significant improvement was found on pain and visits to GPs had decreased. Apart from a small improvement on physical functioning among the Intervention Group participants with osteoarthritis 12 months, all effects were independent of the type of arthritis. The findings suggest that the ASMP is effective in promoting improvements in perception of control, health behaviours and health status, when delivered in UK settings.

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Introduction

Arthritis is one of the most common chronic conditions with prevalence rates predicted to increase in accordance with the changing demographic profile. Although not considered a major public health problem, arthritis is the largest single cause of physical disability, affecting 8.2% of the population in the UK (Badley and Tennant, 1993). Challenges for the individual include the unpredictable course, uncertain prognosis and psychosocial impact (Anderson *et al.*, 1985; Fitzpatrick *et al.*, 1991; Revenson *et al.*, 1991; Lubeck, 1995; Reisine, 1995; Barlow, 1998; Barlow *et al.*, 1999a).

The role of psychoeducational interventions in helping patients adapt to the challenges of arthritis has received growing recognition. For example, Hirano *et al.* (Hirano *et al.*, 1994) suggest that educational interventions provide an additional 15–30% improvement over and above the effects of medication alone. One intervention, the Arthritis Self-Management Programme (ASMP), was designed as a community-based programme for

the mild to moderate end of the disease spectrum (Lorig and Holman, 1993) and is set within the framework of Self-Efficacy Theory (Bandura, 1991). A central tenet of the ASMP is to increase participants' perceptions of arthritis self-efficacy defined as perceived ability to control, or manage, various aspects of arthritis. Randomized controlled trials conducted in North America have shown the ASMP to be effective in terms of increasing perceptions of self-efficacy, decreasing pain, reducing depressed mood and leading to fewer visits to physicians at 4 months follow-up (Lorig and Holman, 1993). Moreover, improvements remained evident at 20 months (Lorig and Holman, 1989) and at 4 years (Lorig *et al.*, 1993). Other controlled studies of modified versions of the ASMP delivered in Australia and the Netherlands reported similar improvement, but failed to find significant reductions in pain after 12 (Lindroth *et al.*, 1989) and 14 (Taal *et al.*, 1993) months, respectively.

In the UK, the ASMP has been evaluated in a range of samples and delivery settings, focusing on change over time (Barlow *et al.*, 1997a, 1998a,b, 1999a,b). Results are in accordance with previous studies, but should be viewed with caution due to the lack of a randomized control group. Delivery of the ASMP in the UK is organized by Arthritis Care, a voluntary organization.

The overall aim of the present study was to determine the effectiveness of the ASMP when delivered among UK participants in a pragmatic, randomized, controlled study. The primary outcome measure was arthritis self-efficacy, with secondary outcomes comprising use of cognitive-behavioural techniques for managing arthritis, health status and use of formal health care resources.

The following hypotheses were tested.

(1) Participation in the ASMP increases perception of arthritis self-efficacy.
(2) Participation in the ASMP increases the use of cognitive-behavioural techniques.
(3) Participation in the ASMP improves health status (excluding physical functioning).
(4) Participation in the ASMP decreases use of health care resources (i.e. visits to GPs).

Participants and methods

Sample

Participants were recruited by Arthritis Care's trainers through the Arthritis Care Branch Network, information placed in GP practices and rheumatology departments, and public service announcements in local media. Course attendance was not dependent on participation in the evaluation. Entry criteria were: (1) age 18 or older, (2) ability to complete the questionnaire and (3) a diagnosis of arthritis from the participant's GP.

A participant information sheet, consent form and baseline questionnaire were sent to 602 people who wished to attend the ASMP. Randomization to an Intervention Group (attend an ASMP immediately) or to a comparison Control Group (a 4-month waiting list) was made on a regional basis. To be viable, each ASMP course needed at least 10 participants. Therefore, in those regions recruiting fewer than 20 people on a course, 10 were randomly assigned to the Intervention Group. For each region, randomization was conducted by an independent member of the research team, using pre-generated lists of random allocations. Included in each questionnaire pack was a letter informing participants of the date on which they would be attending a course. Participants were not informed of the existence of the other group.

Completed baseline questionnaires and consent forms were received from 544 participants (n = 311, Intervention Group; n = 233, Control Group). Sample recruitment and response rates are shown diagrammatically in Figure 1.

The intervention (ASMP)

The ASMP comprises six weekly sessions, each lasting approximately 2 h, delivered by pairs of lay leaders, most of whom have arthritis themselves. Leaders are trained by Arthritis Care and course delivery is guided by a manual to ensure consistency of content. The ASMP is multi-component and topics include: information about arthritis, an overview of self-management principles, exercise, cognitive symptom management (e.g. distraction, visualization and guided imagery), dealing with

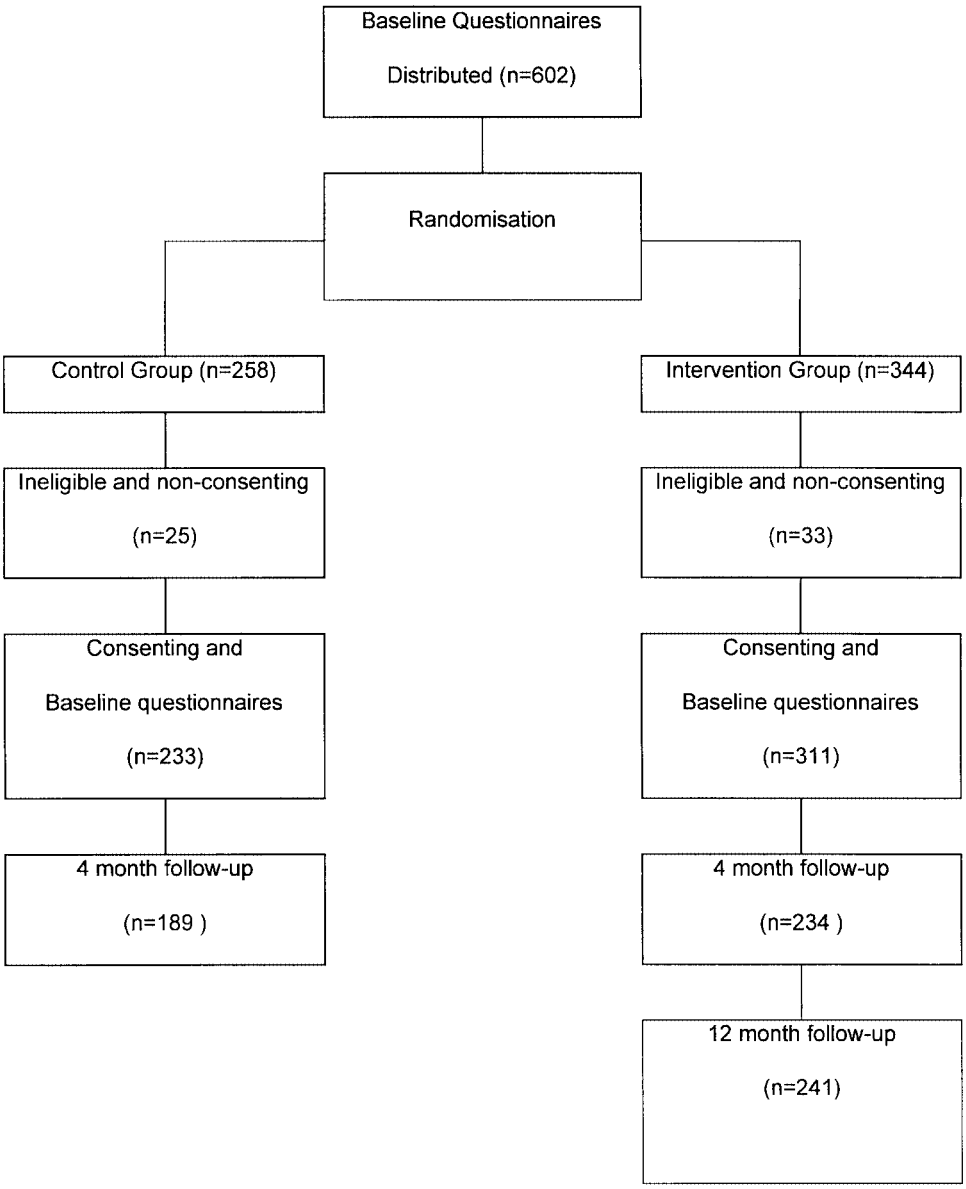

Fig. 1. Sample recruitment and response rates.

depression, nutrition, communication with family and health professionals, and contracting. The last of these involves the setting of realistic goals to be achieved during the forthcoming week. Participants report back to their group on their achievements at the next weekly session. Participants are given a copy of *The Arthritis Helpbook* (Lorig and Fries, 1995), which is an accompanying guide to the course. The format of the ASMP is largely interactive, with short 'lecturettes' to introduce topics,

group discussion, problem solving, role plays and mastery experience (i.e. trying out the skills introduced on the ASMP).

The ASMP aims to enhance perceived ability to control various aspects of arthritis through four major efficacy-enhancing strategies: skills mastery, modelling, persuasive communication and reinterpretation of symptoms. Skills mastery is considered to be the most potent efficacy-enhancing strategy. This involves learning and practising appropriate behaviours. New behaviours are broken down into smaller, manageable ones ensuring that each is successfully executed. It is important that course participants set their own goals in the form of a written contract. Personal goals serve to provide greater incentive for task accomplishment (Gonzales *et al.*, 1990). Moreover, making a contract and receiving feedback provide an opportunity for participants to monitor progress (Lorig *et al.*, 1985), a critical aspect of self-management.

Modelling is a technique whereby a realistic positive role model who is successfully managing aspects of their life serves as a source of inspiration to course participants. In the context of the ASMP, this role model is represented by the course leaders who themselves have arthritis. In addition, course participants act as models for their peers when encouraged to share their knowledge and strategies for overcoming disease-related problems (Gonzales *et al.*, 1990).

Persuasive communication is most effective when it involves encouraging participants to attempt a little more than they are currently doing. Evidence suggests that group members can influence a member who is reluctant to initiate a course of action (Gonzales *et al.*, 1990). Persuasion is most effective when used in combination with other techniques (Gonzales *et al.*, 1990).

Reinterpretation of physiological symptoms is the final type of efficacy enhancing strategy. Put simply, participants are taught to distinguish between physiological disease-related symptoms such as pain, fatigue and muscle soreness of their arthritis, and similar symptoms that can arise from therapeutic exercise, for example. In addition, cognitive symptom management techniques can be used to assist in overcoming feelings of helplessness in response to pain, for example.

Procedure

The ASMP was delivered throughout the UK at staggered intervals over a period of 16 months. Data were collected by self-administered postal questionnaires. The Intervention Group was assessed prior to attendance at the ASMP (baseline), at 4 months and at 12 months post-baseline. After assessments at baseline and at 4 months, the Control Group attended an ASMP. An earlier pilot study suggested that limiting the Control Group to one follow-up assessment might decrease attrition overtime.

Measuring instruments

Measures selected have been used in previous community studies of people with arthritis, and are reported to be reliable and valid. Demographic and arthritis-related information (e.g. disease duration) were collected at baseline only.

Health beliefs

These were assessed using two subscales of the Arthritis Self-Efficacy (ASE) Scale (Lorig *et al.*, 1989), i.e. ASE: Pain (five items) and ASE: Other symptoms (six items), validated for use in the UK (Barlow *et al.*, 1997b). Each item is scored from 0 (very uncertain) to 10 (very certain). Scores are summed across the items for each subscale, producing scores of 5–50 for ASE: Pain and 6–60 for ASE: Other symptoms. Higher scores indicate greater perceived ability to control various aspects of arthritis.

Use of cognitive-behavioural techniques

This was assessed using scales developed at the Stanford Arthritis Centre (Lorig *et al.*, 1996). These covered: exercise, diet, cognitive symptom management and communication with physicians. Exercise performed in the past week (e.g. flexibility, strengthening and swimming) was assessed using a Yes/No response. Dietary intake was assessed along two dimensions: number of cups/glasses of fluid consumed per day and number of days adhered to a healthy diet (dietary habit).

Cognitive symptom management and communication with physician were assessed using five-item scales with each item rated on a six-point scale (0–5) anchored by 'never' and 'always'. Scores for each scale are summed to produce total scores of 0–25. Higher scores indicate greater use of cognitive techniques and improved communication with physician.

Health status

The modified Health Assessment Questionnaire (HAQ) (Kirwan and Reeback, 1986) was included as an indicator of physical functioning only; no change was expected in physical functioning over the relatively short time period of the study. Scores range from 0 to 3, with higher scores indicating impaired physical functioning. Pain and fatigue were measured separately with standard 10-cm horizontal visual analogue scales (VAS) (Huskisson, 1983). Scores range between 0 and 10, with higher scores representing greater pain and fatigue. Psychological well-being was assessed using the Hospital Anxiety and Depression Scale (HADS) (Zigmond and Snaith, 1983) and the Positive and Negative Affect Scale (PANAS) (Watson *et al.*, 1988). The HADS has 14 items, seven representing anxiety and seven depression. Each item is scored on a four-point scale (0–3). Appropriate scores are summed to form separate total scores (range 0–21) for anxiety and depression. Higher scores indicate greater anxiety or depression. The PANAS comprises 20 adjectives used to describe positive and negative feelings and emotions. Each item is rated on a five-point scale (1–5), and relevant scores are summed to give separate total scores (range 10–50) for positive and negative effect. Higher scores indicate greater positive affect and greater negative effect.

Use of health care resources and global health state

Visits to the GP and GP visits where arthritis was discussed were assessed using a time frame of 'during the past 4 months'. A subsample completed the EuroQol (EQ-5D), a widely used measure of health status comprising five domains (i.e. mobility, self-care, usual activities, pain/discomfort and anxiety/depression) that are weighted (Dolan *et al.*, 1996) to provide a utility score ranging from 0 (death) to 1 (perfect health). The EuroQol VAS is a single vertical rating of health scored between 0 and 100 in the direction of good health.

Table I. *Baseline characteristics*

Characteristics	Intervention (n = 311)	Control (n = 233)
Age (years)[a]	57.3 (13.2)	59.1 (12.3)
Disease duration (years)[a]	10.7 (11.2)	11.3 (10.9)
Type of arthritis[b]		
RA	37	33
OA	52	52
other	11	14
Gender: women[b]	85	83
Ethnic origin: Caucasian[b]	98	94
Marital status: married/living with partner[b]	62	63
Some formal educational qualification[b]	52	52
Comorbidity: yes[b]	55	59

[a]Mean (SD).
[b]Percent.

Analyses

Data were analysed using the Statistical Package for the Social Sciences (SPSS, 1994). At baseline, the percentage of incomplete items per measure varied from 0 to 9% over all participants. There were no statistically significant differences in terms of selective demographic variables (i.e. age, duration of diagnosis, education or type of arthritis) across measures with complete and incomplete responses. Mean values were imputed for participants who had responded to at least half of the items on a scale. An-intent-to-treat analysis was performed with the corresponding baseline value replacing missing values at both follow-ups. The level of statistical significance was set at 1%. This enabled an effect size of 0.35 in the mean change scores from baseline to 4 months follow-up to be statistically discernible across the Intervention and Control Groups with a power of 90%.

Kruskal–Wallis, Wilcoxon, χ^2 and Fisher's exact tests were used, as appropriate, to compare particip-

Table II. *Change from baseline to 4 months follow-up and comparison of change from baseline to 4 months follow-up on health beliefs, self-management behaviours and health status*

Study variables	Baseline values		Change scores		Difference in change scores	
	Intervention Group (n = 311)	Control Group (n = 233)	Intervention Group (n = 311)	Control Group (n = 233)	(n = 311, 233)[b]	P value[c]
ASE: Other symptoms	30.02	30.96	5.47	1.55	3.93	<0.0005
(Scale 6–60, ↑ = better)	(28.14 to 31.89)	(28.87 to 33.04)	(3.94 to 7.01)	(–0.10 to 3.19)	(1.66 to 6.19)	
ASE: Pain	23.02	23.70	4.11	1.46	2.65	<0.0005
(Scale 5–50, ↑ = better)	(21.54 to 24.49)	(21.94 to 25.46)	(2.84 to 5.38)	(0.18 to 2.74)	(0.85 to 4.44)	
Cognitive symptom management	7.25	8.23	2.41	0.23	2.19	<0.0005
(Scale 0–25, ↑ = better)	(6.48 to 8.02)	(7.32 to 9.15)	(1.69 to 3.14)	(–0.49 to 0.94)	(1.18 to 3.20)	
Communication with physician	12.66	12.67	1.42	0.22	1.20	0.001
(Scale 0–25, ↑ = better)	(11.77 to 13.55)	(11.57 to 13.77)	(0.78 to 2.06)	(–0.51 to 0.95)	(0.23 to 2.17)	
No. of cups of fluid[a]	7.65	7.95	0.29	0.20	0.09	0.419
	(7.26 to 8.04)	(7.51 to 8.40)	(–0.05 to 0.62)	(–0.22 to 0.62)	(–0.44 to 0.62)	
Dietary habit	4.36	4.82	0.20	–0.20	0.40	0.001
(Days 1–7, ↑ = better)	(4.03 to 4.68)	(4.45 to 5.18)	(–0.02 to 0.42)	(–0.42 to 0.02)	(0.08 to 0.72)	
HAQ	1.42	1.45	0.01	–0.02	0.03	0.351
(Scale 0–3, ↓ = better)	(1.32 to 1.53)	(1.32 to 1.58)	(–0.04. to 0.06)	(–0.08 to 0.04)	(–0.05 to 0.10)	
Fatigue (VAS)	6.64	6.26	–0.44	0.05	–0.48	0.020
(Scale 0–10, ↓ = better)	(6.25 to 7.03)	(5.78 to 6.75)	(–0.81 to –0.06)	(–0.32 to 0.41)	(–1.00 to 0.04)	
Pain (VAS)	6.66	6.63	–0.31	–0.24	–0.08	0.707
(Scale 0–10, ↓ = better)	(6.29 to 7.03)	(6.17 to 7.08)	(–0.64 to 0.02)	(–0.64 to 0.17)	(–0.60 to 0.45)	
Anxiety (HAD)	9.31	9.45	–0.94	–0.35	–0.59	0.014
(Scale 0–21, ↓ = better)	(8.67 to 9.96)	(8.75 to 10.15)	(–1.35 to –0.52)	(–0.80 to 0.10)	(–1.20 to 0.03)	
Depression (HAD)	7.13	6.68	–1.00	–0.14	–0.86	<0.0005
(Scale 0–21, ↓ = better)	(6.58 to 7.68)	(6.14 to 7.21)	(–1.44 to –0.57)	(–0.55 to 0.27)	(–1.46 to –0.26)	
Negative Affect (PANAS)	19.41	20.01	–0.67	–0.24	–0.44	0.429
(Scale 10–50, ↓ = better)	(18.17 to 20.64)	(18.67 to 21.36)	(–1.58 to 0.23)	(–1.37 to 0.90)	(–1.87 to 0.99)	
Positive Affect (PANAS)	28.64	29.23	2.42	0.59	1.83	0.005
(Scale 10–50, ↑ = better)	(27.38 to 29.90)	(27.78 to 30.68)	(1.29 to 3.55)	(–0.61 to 1.79)	(1.65 to 3.50)	

Values are mean (99% CI).

[a]Square root transformation used in analyses. Changes are (4 month–baseline) values. Figures = number of cups of fluid. Differences are (change score for Intervention Group – change score for Control Group).

[b](Intervention Group, Control Group).

[c]P value for repeated measures.

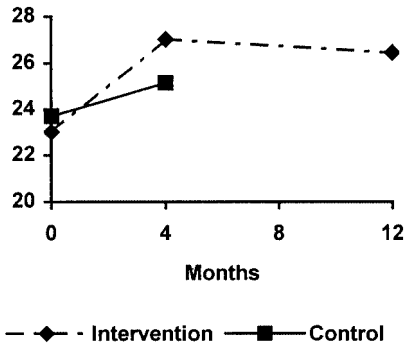

Fig. 2. Change over time on selected study variables: ASE: Pain.

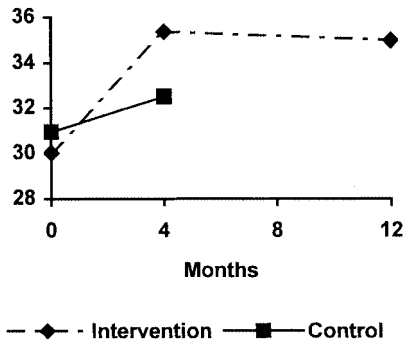

Fig. 3. Change over time on selected study variables: ASE: Other symptoms.

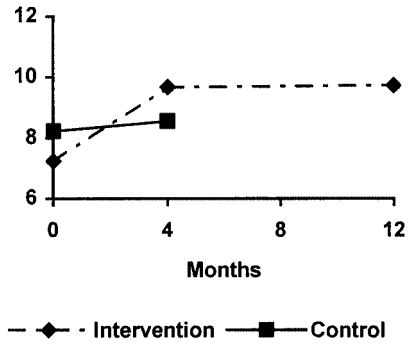

Fig. 4. Change over time on selected study variables: cognitive symptom management.

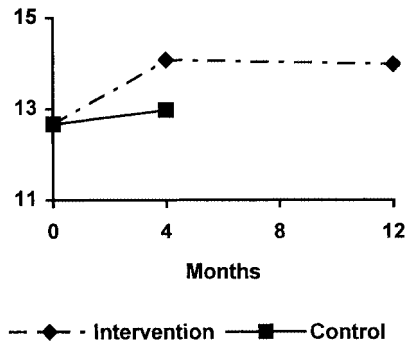

Fig. 5. Change over time on selected study variables: communication with physician.

ants' characteristics with respect to study Group and response status at 4 months follow-up (respondent or non-respondent) and at 12 months follow-up. Similar analyses were performed on baseline values of study variables.

Changes in mean values were compared using repeated measures analysis of variance with Time and study Group as the within-subject and between-subject factors. Ninety-nine percent confidence intervals were computed for mean changes over time for each Group separately and for the difference in mean change scores across the two Groups.

In the absence of recognised clinically important changes for the study variables, effect sizes were calculated for statistically significant changes using the following formula: effect size $= (x_2 - x_1)/\mathrm{SD}$, where x_2 is the mean score at 4 months (or 12 months), x_1 is the mean score at baseline and SD is the standard deviation at baseline. Boundaries recommended by Kazis *et al.* (Kazis *et al.*, 1989) were used to determine small (0.2), moderate (0.5) and large (0.8) changes in study variables. All analyses were repeated with age, disease duration, sex, co-morbidity and education as covariates. No differences were found in the statistically significant results; therefore, the simpler analyses are presented.

Changes in exercise were tested independently for each Group using McNemar's test. To test whether observed effects were consistent across the main types of arthritis [rheumatoid arthritis (RA) and osteoarthritis (OA)], repeated measures analyses of variance were conducted using time as a within-subject factor, and Group and type of arthritis as between-subject factors. These analyses

were performed without the Group factor for the effects baseline to 12 months follow-up in the Intervention Group.

Results

Participant characteristics are presented in Table I. There were no statistically significant differences at baseline between Groups or between respondents and non-respondents at 4 months follow-up.

Baseline to 4 months follow-up

Health beliefs

The mean increases in scores were significantly higher ($P < 0.0005$) on both subscales of the ASE for the Intervention compared with the Control Group. The mean difference in change scores between the two groups are included in Table II.

Statistically significant mean increases were found on ASE: Other symptoms (effect size 0.43) and on ASE: Pain (effect size 0.41) for the Intervention Group (Table II, see Figure 8); There was a small, but statistically significant, mean increase on ASE: Pain (effect size 0.14) for the Control Group (Table II).

The pattern of changes on key variables are depicted in Figures 2–7.

Cognitive-behavioural techniques

The mean increases in cognitive symptom management ($P < 0.0005$) and communication with physician ($P = 0.001$) were significantly higher in the Intervention Group compared to the Control group. There was a small increase in dietary habit among the Intervention Group compared to a small decrease in the Control Group ($P = 0.001$). No significant difference was found on changes in the mean daily intake of fluid (see Table II).

There were statistically significant mean increases on cognitive symptom management (effect size 0.46, Figure 8) and communication with physicians (effect size 0.24, Figure 8), among the Intervention Group; no mean change was apparent on dietary habit or daily intake of fluid (Table II). No significant mean changes were found on these variables for the Control Group.

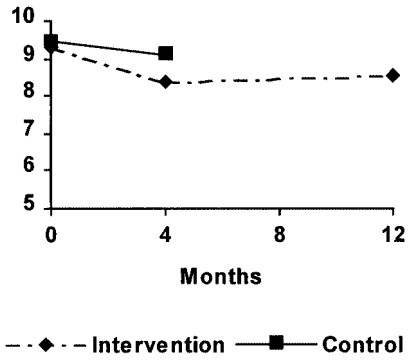

Fig. 6. Change over time on selected study variables: anxiety (HAD).

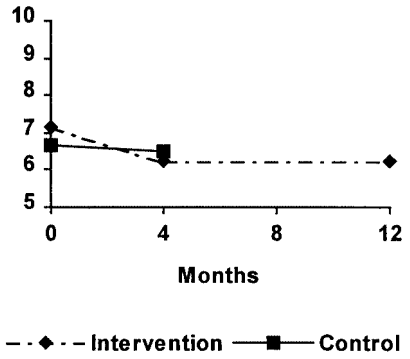

Fig. 7. Change over time on selected study variables: depression (HAD).

In the Intervention Group, significantly more participants carried out relaxation ($P < 0.0005$), flexibility exercises ($P < 0.0005$) and strengthening exercises ($P < 0.0005$) at 4 months follow-up than at baseline (Table III). Twenty-two percent of participants took up relaxation, 4% stopped and 44% had maintained their practice. Fifteen percent began, 2% stopped and 73% maintained flexibility exercises at 4 months. A similar pattern was found for strengthening exercises, (i.e. 17, 2 and 55%, respectively). No significant changes were found for the Control Group. No significant change was found for either Group in terms of walking, cycling or swimming.

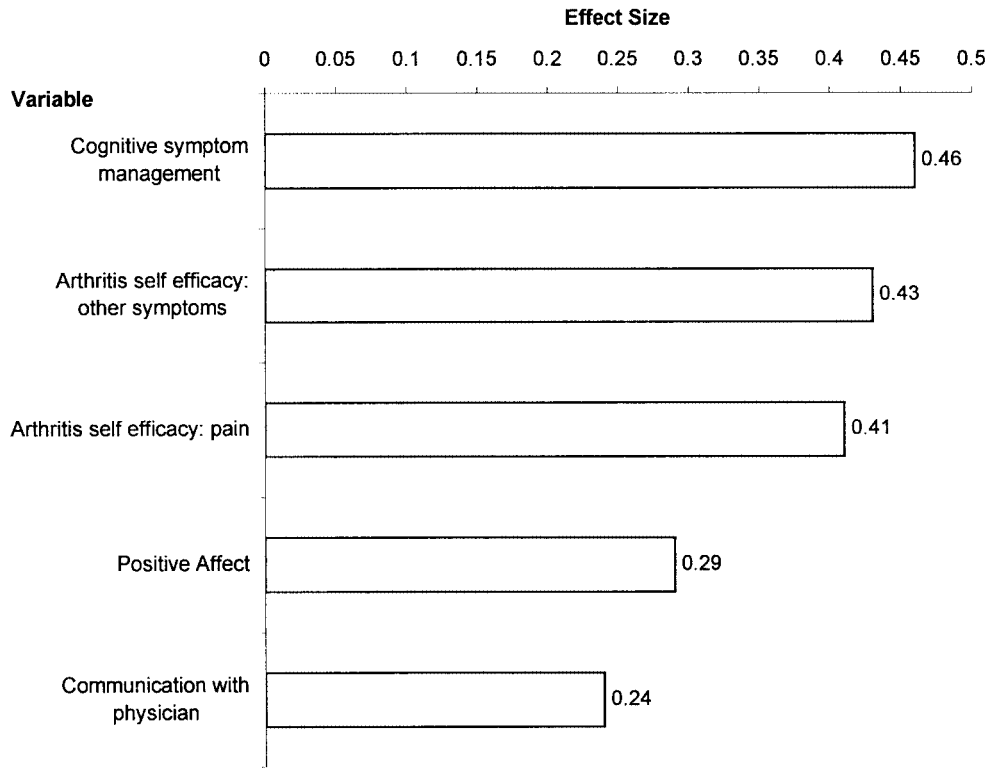

Fig. 8. Effect sizes for study variables on which a mean increase was found for the Intervention Group.

Health status

The mean changes in depression and positive mood were significantly different across Groups (Table II) with a larger decrease in depression ($P < 0.0005$) and a higher increase in positive mood ($P = 0.005$) for the Intervention Group. There were trends towards larger decreases on mean anxiety scores ($P = 0.014$) and mean fatigue scores ($P = 0.020$) for the Intervention Group. No significant mean changes or mean differences in change scores were found on HAQ, pain and negative affect either within or across the study Groups ($P = 0.351$, 0.707 and 0.429, respectively).

There were statistically significant mean decreases on fatigue (effect size 0.17), anxiety (effect size 0.21, Figure 9) and depression (effect size 0.27), and a significant mean increase on positive mood (effect size 0.29), for the Intervention Group (Table II, see Figures 8 and 9). There was no change in the Control Group.

GP visits and global health state

No significant differences were found on any other study variable at baseline between participants who received the EQ-5D and EuroQol VAS and those who did not. No statistically significant mean changes or between group differences were found on visits to the GP (either subscale), the EQ-5D or the EuroQol VAS (Table IV).

Baseline to 12 months follow-up (Intervention Group only)

Health belief measures

Statistically significant mean increases were found from baseline to 12 months follow-up on ASE: Other symptoms ($P < 0.0005$, effect size 0.39)

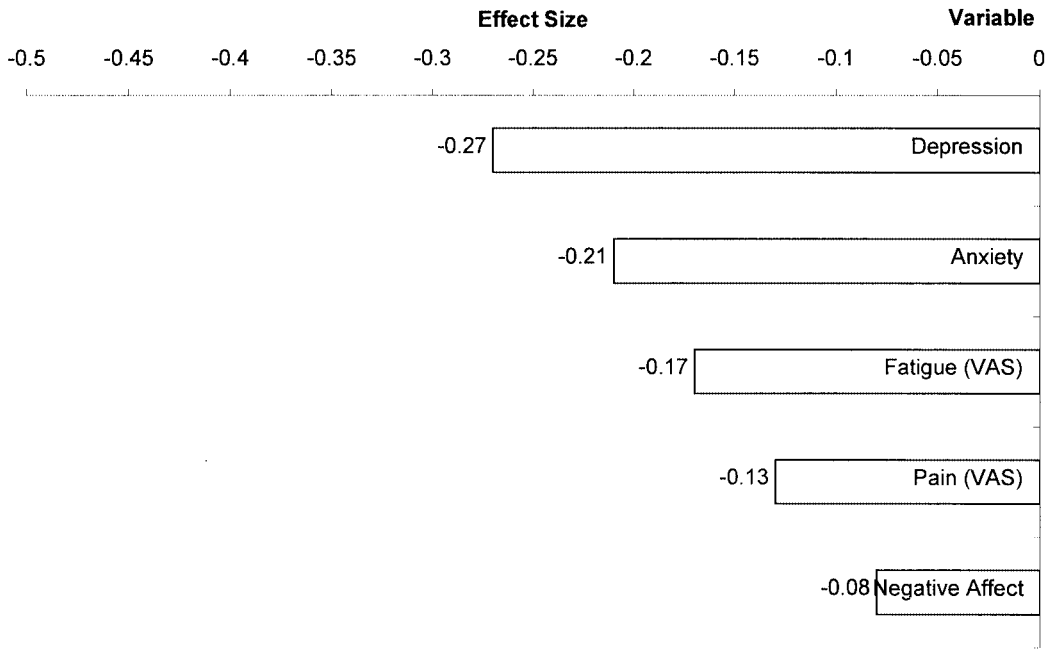

Fig. 9. Effects sizes for study variables on which a mean decrease was found for the Intervention Group.

and on ASE: Pain ($P < 0.0005$, effect size 0.35) (Table V).

Self-management behaviours

Statistically significant mean increases were found on cognitive symptom management ($P < 0.0005$, effect size 0.48), communication with physician ($P < 0.0005$, effect size 0.22) and daily fluid intake ($P = 0.013$, effect size 0.10). There was a trend towards an increase in Dietary habit ($P = 0.027$, effect size 0.08) (Table V).

Significantly more participants carried out relaxation ($P < 0.0005$), flexibility exercises ($P < 0.0005$) and strengthening exercises ($P = 0.001$) at 12 months follow-up. Compared with baseline activity, 25% of participants took up relaxation, 5% stopped practising relaxation and 39% had maintained their practice. With respect to flexibility exercises, 13% began, 2% stopped and 71% had maintained flexibility exercises. A similar pattern was found for strengthening exercises (18, 6 and 49%, respectively).

At baseline, most participants walked (84%) and only a few cycled (5%). A strong trend towards an increase was found in the numbers performing these activities at the 12 months follow-up. Six percent began cycling and 1% stopped ($P = 0.019$); 7% began walking as an exercise and 2% stopped ($P = 0.011$). No change was found for swimming.

Health status measures

Over the 12-month period, there were statistically significant mean decreases on fatigue ($P < 0.0005$, effect size 0.22), pain ($P < 0.0005$, effect size 0.23), anxiety ($P < 0.0005$, effect size 0.18) and depression ($P < 0.0005$, effect size 0.25). A significant mean increase was found on positive mood ($P < 0.0005$, effect size 0.33). There were no significant mean changes on HAQ ($P = 0.113$) or negative mood ($P = 0.137$) (See Table V).

GP visits and global health state

Compared with baseline, significantly fewer mean number of visits were made to the GP to discuss arthritis at 12 months follow-up ($P < 0.0005$, effect size 0.19). There was a significant improvement on

Table III. *Change in exercise (baseline to 4 months) for the Intervention and Control Groups*

	Intervention Group					Control Group				
	Baseline		Change (baseline to 4 months)			Baseline		Change (baseline to 4 months)		
	Yes	No	Yes to No	No to Yes	*P* value[a]	Yes	No	Yes to No	No to Yes	*P* value[a]
Cycling	13	256	6	10	0.45	13	187	6	4	0.75
Walking	226	43	9	17	0.17	170	30	12	12	1.00
Swimming	47	222	13	18	0.47	45	155	10	12	0.83
Relaxation	119	150	10	59	<0.0005	95	105	19	30	0.15
Flexibility	177	64	4	35	<0.0005	148	37	10	8	0.81
Strengthening	110	89	3	34	<0.0005	82	61	11	15	0.56

[a]McNemar test.

the EuroQol VAS ($P = 0.007$, effect size 0.28). No other statistically significant changes were found (see Table VI).

Comparison across RA and OA at 4 and 12 months

Only one difference in the statistically significant effects across time was found. There was a small, though statistically significant, increase in mean HAQ scores from baseline to 12 months follow-up for people with OA ($P = 0.006$). No significant change was found for people with RA.

Discussion

Results of a randomized controlled study show that at 4 months, the ASMP was effective in terms of improving perceptions of control (i.e. arthritis self-efficacy), use of self-management techniques (e.g. cognitive symptom management, communication with physicians and exercise) and health status (i.e. fatigue, anxious, depressed and positive mood). A similar pattern of findings was found at 12 months follow-up, suggesting that changes in health status and health behaviour were at least maintained in the longer term. Furthermore, a significant improvement was found on pain at 12 months, although with the absence of a control group at this assessment time, change cannot be attributed to the intervention. Similarly, the ASMP appeared to have little impact on the use of healthcare resources at 4 months, although by 12 months the Intervention Group were making fewer visits to their GPs. As expected, physical functioning remained fairly stable for all participants throughout the course of the study, although a small decline among Intervention Group participants with OA was noted at 12 months follow-up.

Given the well-known difficulties of changing behaviour, the increased use of exercise among the Intervention Group was encouraging, particularly since this change in health behaviour was maintained at 12 months with no additional intervention or support. The relatively low levels of adherence to exercise recommendations among people with chronic disease is a general cause for concern. Interventions designed to increase exercise behaviour often have limited success, particularly in the longer term. Interestingly, many participants select exercise as a focus for contracting, a key feature of the ASMP.

In accordance with studies of similar cognitive-behavioural type interventions (Slater *et al.*, 1997) participants felt better able to manage their pain but did not experience a reduction in pain intensity at 4 months. It is rare to find an intervention that impacts on all aspects of the pain experience (i.e. behaviour, severity and psychological consequences). Furthermore, the emphasis of the ASMP is on enhancing perceived ability to self-manage the consequences of arthritis (e.g. depressed mood), rather than reduction of symp-

Table IV. *Change from baseline to 4 months follow-up and comparison of change on EQ-5D, EuroQol VAS and GP visits*

Study variables	Baseline values		Change scores		Difference in change scores	
	Intervention Group (n = 86)	Control Group (n = 78)	Intervention Group (n = 86)	Control Group (n = 78)	(n = 86,78)[b]	P value[c]
EQ-5D	0.43	0.44	0.04	0.01	0.03	0.485
(Scale 0–1, ↑ = better)	(0.35 to 52)	(0.35 to 0.53)	(–0.04 to 0.11)	(–0.07 to 0.08)	(–0.07 to 0.13)	
EuroQol VAS	56.78	57.87	0.34	1.17	–0.82	0.736
(Scale 0–100, ↑ = better)	(51.83 to 61.73)	(52.84 to 62.91)	(– 3.93 to 4.62)	(–3.67 to 6.01)	(–7.18 to 5.53)	
	(n = 169)	(n = 149)	(n = 169)	(n = 149)	(n = 169, 149) [b]	P value[c]
No. of GP visits: other[a]	0.22	0.27	0.09	–0.11	0.20	0.110
	(0.10 to 0.39)	(0.13 to 0.47)	(–0.24 to 0.41)	(–0.50 to 0.27)	(–0.30 to 0.70)	
No. of GP visits to discuss arthritis[a]	1.16	1.47	–0.19	–0.13	–0.05	0.929
	(0.82 to 1.55)	(1.05 to 1.97)	(–0.60 to 0.22)	(–0.60 to 0.33)	(–0.67 to 0.56)	

Values are mean (99% CI).

[a]Square root transformation used in analyses. Changes are (4 month–baseline) values. Figures = number of visits. Differences are (change score for Intervention Group – change score for Control Group).

[b](Intervention Group, Control Group).

[c]P value for repeated measures.

Table V. *Change from baseline to 12 months follow up on health beliefs, self-management behaviours and health status for the Intervention Group participants*

Study variables	Baseline change scores		Effect size	*P* value[b]
	Intervention Group (n = 311)	Intent-to-treat (n = 311)		
ASE: Other symptoms	30.02	4.96	0.39	<0.0005
(Scale 6–60, ↑ = better)	(28.14 to 31.89)	(3.47 to 6.45)		
ASE: pain	23.02	3.44	0.35	<0.0005
(Scale 5–50, ↑ = better)	(21.54 to 24.49)	(2.18 to 4.70)	0.48	
Cognitive symptom management	7.25	2.49		<0.0005
(Scale 0–25, ↑ = better)	(6.48 to 8.02)	(1.71 to 3.27)		
Communication with physician	12.66	1.32	0.22	<0.0005
(Scale 0–25, ↑ = better)	(11.77 to 13.55)	(0.67 to 1.98)		
No. of cups of fluid[a]	7.65	0.29	0.10	0.013
	(7.26 to 8.04)	(–0.03 to 0.61)		
Dietary habit	4.36	0.18	0.08	0.027
(Days, 1–7 ↑ = better)	(4.03 to 4.68)	(–0.03 to 0.39)		
HAQ	1.42	0.03	0.05	0.113
(Scale 0–3, ↓ = better)	(1.32 to 1.53)	(–0.02 to 09)		
Fatigue (VAS)	6.64	–0.58	–0.22	<0.0005
(Scale 0–10, ↓ = better)	(6.25 to 7.03)	(–0.94 to –0.21)		
Pain (VAS)	6.66	–0.57	–0.23	<0.0005
(Scale 0–10, ↓ = better)	(6.29 to 7.03)	(–0.95 to –0.19)		
Anxiety (HAD)	9.31	–0.77	–0.18	<0.0005
(Scale 0–21↓ = better)	(8.67 to 9.96)	(–1.22 to –0.33)		
Depression (HAD)	7.13	–0.92	–0.25	<0.0005
(Scale 0–21, ↓ = better)	(6.58 to 7.68)	(–1.35 to –0.48)		
Negative Affect (PANAS)	19.41	–0.48	–0.06	0.137
(Scale 10–50, ↓ = better)	(18.17 to 20.64)	(–1.31 to 0.35)		
Positive Affect (PANAS)	28.64	2.81	0.33	<0.0005
(Scale 10–50, ↑ = better)	(27.38 to 29.90)	(1.74 to 3.88)		

Values are mean (99% CI).
[a]Square root transformation used in analyses. Figures = number of cups of fluid.
[b]*P* values for related *t*-test.

toms *per se*. Hence, this pattern of results might have been expected. Indeed, the lack of concordance between change in mood and change in pain adds weight to the conclusion that change derives from the intervention. However, the significant reduction in pain among the Intervention Group at 12 months suggests that greater use of self-management strategies and increased perceptions of control may take longer than 4 months to impact on this important aspect of the arthritis experience.

Previous studies reporting decreased physician visits were based in the USA (Lorig and Holman, 1989; Lorig *et al*., 1993), which has a different health care system compared with that in operation in the UK. Attendance on the ASMP did not result in increased GP visits. In fact, there did not appear to be any change in the use of healthcare resources at 4 months. However, by 12 months the Intervention Group reported a significant decrease in visits to GPs to discuss arthritis and perceived an improvement in health state as measured by the EuroQol VAS. Clearly, this issue warrants further investigation, particularly in the longer term and in greater detail, incorporating use and costs of medication, for example. Further studies are necessary to determine whether the nature of

Table VI. *Change from baseline to 12 months follow up on EQ-5D, EuroQol VAS and GP visits for the Intervention Group participants*

Study variables	Baseline change scores		Effect size	*P* value[b]
	Intervention group (n = 86)	Intent-to-treat (n = 86)		
EQ-5D (Scale 0–1, ↑ = better)	43 (0.35 to 0.52)	0.01 (–0.04 to 0.05)	0.03	0.653
EuroQol VAS (Scale 0–100, ↑ = better)	56.78 (51.83 to 61.73) (n = 311)	4.91 (0.19 to 9.63) (n = 311)	0.28	0.007 *P* value
No. of GP visits: other[a]	0.26 (0.15 to 0.40)	0.00 (–0.19 to 0.20)	0.00	0.175
No. of GP visits to discuss arthritis[a]	1.32 (1.04 to 1.61)	–0.38 (–0.66 to –0.09)	–0.19	<0.0005

Values are mean (99% CI).
[a]Square root transformation used in analyses. Figures = number of visits.
[b]*P* values for related *t*-test.

consultations with GPs, rheumatologists and other health professionals change following course attendance.

A strength of the study was the pragmatic research design that aimed to reflect the pattern of delivering of the ASMP. The ASMP was designed as a community-based programme to be delivered outside of hospital settings and open to adults with a diagnosis of arthritis.

The design controlled for motivational factors associated with enrolling on an educational intervention that requires active participation. Thus following expression of interest in the ASMP, participants were randomized to an intervention or a waiting list control group. This approach avoided ethical issues associated with denying people access to an intervention and it enabled identification of the sample from community sources. Further studies, using different recruitment strategies and research designs, are needed in order to tease out factors which may influence motivation to enrol and complete similar educational interventions offered to a known population with arthritis. For example, if the ASMP were to be offered exclusively to patients of a Primary Care Group, it might be possible to randomize patients to the ASMP or to an alternative intervention (e.g. leaflet, unstructured support group). This approach may shed light on the cause of change on one study variable among the control group identified in the present study. Such changes may have arisen from a Hawthorne effect (i.e. knowing that one is being monitored) or from factors associated with expression of interest in learning more about one's condition. The latter may have raised awareness of self-management among the control group participants, who may have begun to change their control beliefs in anticipation of attending the ASMP. Further strengths were the inclusion of a greater range of psychological measures (e.g. positive mood) than in previous studies and the cautious analytical approach based on intent-to-treat.

In conclusion, this community-based intervention appears to offer a number of important benefits to people with arthritis in the UK and will be a useful adjunct to medical care. Moreover, the possibility of testing the self-management approach in other chronic conditions appears worthy of attention.

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