EVIDENCE SUGGESTING THAT HEALTH EDUCATION FOR SELF-MANAGEMENT IN PATIENTS WITH CHRONIC ARTHRITIS HAS SUSTAINED HEALTH BENEFITS WHILE REDUCING HEALTH CARE COSTS

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Objective. **To determine the effects of the Arthritis Self-Management Program 4 years after participation in it.**

Methods. **Valid self-administered instruments were used to measure health status, psychological states, and health service utilization.**

Results. **Pain had declined a mean of 20% and visits to physicians 40%, while physical disability had increased 9%. Comparison groups did not show similar changes. Estimated 4-year savings were $648 per rheumatoid arthritis patient and $189 per osteoarthritis patient.**

Conclusion. **Health education in chronic arthritis may add significant and sustained benefits to conventional therapy while reducing costs.**

The present report describes observations and comparisons which suggest that health education for self-management in patients with chronic arthritis produces sustained health benefits and can reduce health care costs. The observations were made 4 years after 2 groups of patients participated in the Arthritis Self-Management Program. Because the observations were not part of a planned study, there is not a formal control group which would indicate secular trends in health outcomes and service utilization over the 4-year period. Therefore, for purposes of comparison, information from other groups with the same diagnoses followed over the same time period is presented.

Chronic arthritis is a prototypic chronic disease. In the absence of a cure, it requires protracted management and causes considerable discomfort, disability, and cost. Beneficial effects of treatment commonly are limited over time. Thus, patients must often change medications. The availability of methods for patient management which have sustained benefits would be highly desirable, particularly if those benefits are additive to the favorable effects of medications. The observations reported herein suggest that health education for self-management care has those effects.

This report is based on the Arthritis Self-Management Program (ASMP) which, in randomized studies, has been shown to achieve reductions in pain and depression together with increased physical activity, though disability was unchanged (1–3). These studies also demonstrated a trend toward fewer visits to physicians. Studies were also conducted to determine how the ASMP achieves its effects. Unexpectedly, it was shown that participants' use of taught behaviors was not primarily responsible for improvements in health status (4). Rather, a participant's level and growth of perceived self-efficacy to cope with the consequences of chronic arthritis correlated most strongly with the outcomes of the ASMP (2,4). Perceived self-efficacy is a behavior-specific psychological attribute akin to confidence, which can be learned and enhanced (5). Thus, it appears that the success of the ASMP depends more on strengthening or changing

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psychological attributes than on the performance of particular behaviors or techniques.

In prior studies of the ASMP, beneficial effects were demonstrated to last at least 8 months. In an effort to extend the duration of the assessment of benefits, we evaluated the effects of various types of educational reinforcement 20 months after initial participation in the ASMP (3). While no benefits of reinforcement were found, the original results of the ASMP persisted through the reinforcement attempt.

Because of this persistence, we reevaluated participants 4 years after they participated in the ASMP and found that the original benefits remained in effect. Surprised by this finding, we sought to replicate the result on a second group of ASMP participants. The outcomes were virtually identical. Because of the lack of control patients, we identified other groups of similar patients in order to provide comparisons concerning the representativeness of our patient samples and the outcomes of conventional management over the same time period. Herein we report health status and service utilization data from patients 4 years after participation in the ASMP, and from the comparison groups.

SUBJECTS AND METHODS

The subjects of this report, as with most studies of the ASMP, were volunteers recruited from the general population in 5 mid-California counties by means of public announcements and use of local media. Each had a diagnosis of chronic arthritis confirmed by a personal physician.

Participants in the ASMP were taught in 6 weekly, 2-hour sessions by pairs of trained lay-leaders. Each course was attended by 10–15 participants. Content included pathophysiology of osteoarthritis (OA) and rheumatoid arthritis (RA), design of individualized exercise and relaxation programs, appropriate use of injured joints, an overview of arthritis medications, aspects of patient–physician communications, and methods for solving problems that arise from illness. The course was taught from a structured protocol in an interactive manner which encouraged individual participation and experimentation with self-management techniques (6). All participants received a copy of *The Arthritis Helpbook* (7).

The ASMP studies from which the present subjects were drawn began in 1984. After completing baseline questionnaires, subjects were randomized to enter the ASMP immediately or to wait 4 months. After 4 months, data were again collected and the original control subjects then entered the ASMP. Over the first 4 months, treatment subjects, when compared with controls, experienced significant increases ($P < 0.01$) in the taught behaviors (e.g., exercise and practice of relaxation) and significant decreases ($P < 0.05$) in pain and depression. There was a trend toward fewer visits to physicians (1,3).

One year after entering the ASMP, the 343 subjects were randomized to participate in another 6-week arthritis education program, to receive a bimonthly newsletter, or to receive no reinforcement. When the 3 groups were compared 8 months later (20 months after the beginning of the ASMP), no benefits from reinforcement were found (3).

The reinforcement study was completed by 284 subjects who, 4 years after the beginning of the ASMP and 28 months after completion of the reinforcement study, were invited to become participants in the present investigation. Two hundred twenty-four of the 284 (79%) responded favorably (group 1). Twelve percent could not be located, 7% refused to participate, and 2% had died. There were no demographic or health status differences on completion of the reinforcement study between those who joined and those who did not join in the present 4-year evaluation.

As in previous studies, subjects in the 4-year study completed self-administered questionnaires. Pain was measured by a visual analog scale (8,9). Disability was measured by the Health Assessment Questionnaire (10) and depression by the short version of the Beck Depression Inventory (11). Number of visits to physicians was measured by self-report of visits during the preceding 4 months. Perceived self-efficacy was measured in group 1 by an early version of the self-efficacy scale for pain control (2). This early version included questions such as "How certain are you that you can control your pain a small amount without taking extra medication?" The validity of self-reports of visits to physicians was checked by a chart audit of 27 charts. While 3 subjects overreported their number of visits and 9 subjects underreported visits, the total number of visits found in the charts matched exactly with the total number self-reported.

The persistence of benefits of the ASMP at 4 years in this group led us to examine a second group of 219 subjects who took the ASMP in 1985. None of these subjects had received any further intervention over the 4 intervening years. The methods for the second study matched exactly those of the first, with the exception that we used new self-efficacy scales for pain and for some other symptoms (2). The new self-efficacy scale differed in that it had 2 additional pain questions, while the "other symptom" scale addressed symptoms such as fatigue, frustration, and depression. For the present replication study, data were collected from 177 subjects (81%); 7% of the potential subjects had died or were institutionalized and unable to answer, 2% refused, and 11% could not be located. Data at baseline and at 4 months after the original ASMP on the 177 participants in this group (group 2) were virtually identical to those for group 1.

Because the randomized controls in the original ASMP studies crossed over at 4 months to participate in the program, there were no concurrent controls with whom to compare our subjects at 4 years. We therefore sought comparison groups to determine the representativeness of our samples and the health outcomes for chronic arthritis in the years of our observations. For these comparison purposes, we combined the subjects from groups 1 and 2. Members of the combined ASMP group who had OA were compared with 44 patients with OA who participated in a

Table 1. Baseline characteristics of the patients studied*

	ASMP participants		Principal comparison groups	
	Group 1 (n = 224)	Group 2 (n = 177)	RA (n = 523)	OA (n = 44)
Age (years), mean	64.2	64.5	55.0	68.3
Education (years), mean	14.0	14.5	13.0	14.2
Disease duration (years), mean	10.6	10.2	11.3	13.3
Female, %	79	80	77	92
RA, %	15	24	100	–
OA, %	68	62	–	100
Other types of arthritis, %	17	14	–	–

* ASMP = Arthritis Self-Management Program; RA = rheumatoid arthritis; OA = osteoarthritis.

study of health system performance in this community (12). Members of the combined ASMP group with RA were compared with 423 patients with RA enrolled in an observational study in this geographic region (13). Ninety percent of the latter group resided in the San Francisco Bay area. These 2 comparison groups, referred to herein as the principal comparison groups, were participants in observational studies over the 4 years of our inquiry, with medical care provided by their personal physicians. Hence, the health outcomes for these groups reflect the effects of conventional therapy in the years of this study's observations.

Baseline data on the 2 principal comparison groups, and on all other persons entering ASMP studies during 1984–1989, provided us with information concerning the representativeness of our sample at baseline. In addition, we were able to compare the rates of visits to physicians from our ASMP and principal comparison groups with the physician visit rates of some other local groups with similar diagnoses, and with rates from larger regional and national groups of patients.

RESULTS

Changes in health status and service utilization in the 2 ASMP groups over 4 years. As shown in Table 1, demographic characteristics were similar in the 2 ASMP groups. Table 2 provides aggregate health status data and perceived self-efficacy scores for the 2 groups at baseline, together with changes over 4 months and over 4 years. In both ASMP groups a 15–20% decline in pain was achieved early and persisted through 4 years. The frequency of visits to physicians dropped early and remained well below baseline rates over 4 years, while perceived self-efficacy to cope with the consequences of arthritis rose considerably above baseline levels. These effects occurred despite a worsening of disability, and even appeared to strengthen between 4 months and 4 years. However, the modest improvement in depression experienced at 4 months was not sustained for the 4 years.

The data indicate that the ASMP had significant, lasting benefits and that the benefits identified in the first group were replicated in a second sample of similar subjects. Because the results were the same for the 2 ASMP groups, the data were combined for the further comparative analyses.

Table 2. Mean baseline values and changes at 4 months and at 4 years in health status, visits to physicians, and perceived self-efficacy among ASMP participants*

Outcome attribute	Baseline values		Change at 4 months		Change at 4 years		% change at 4 years	
	Group 1	Group 2	Group 1	Group 2	Group 1	Group 2	Group 1	Group 2
Pain (0–10 scale)	5.0 ± 2.4	5.0 ± 2.4	−0.62 ± 2.2†	−0.85 ± 2.2†	−0.95 ± 3.0†	−1.08 ± 3.0†	−19	−22
Disability (0–3 scale)	0.75 ± 0.53	0.75 ± 0.63	−0.02 ± 0.41	−0.004 ± 0.43	0.07 ± 0.52‡	0.06 ± 0.58	9	8
Depression (0–39 scale)	4.2 ± 3.9	4.3 ± 3.8	−0.45 ± 3.0‡	−0.76 ± 2.5†	−0.09 ± 3.4	−0.15 ± 3.5	−2	−3
Visits to physicians for arthritis per year	4.9 ± 7.8	5.1 ± 7.7	−1.0 ± 6.9‡	−1.2 ± 7.2‡	−2.07 ± 7.6†	−2.25 ± 7.6†	−42	−44
Original self-efficacy measure (10–100 scale)	58.3 ± 20.1	–	3.9 ± 20.4†	–	9.66 ± 24.6†	–	17	–
Self-efficacy pain measure (10–100 scale)	–	48.6 ± 21.7	–	5.6 ± 20.3†	–	16.4 ± 28.0†	–	34
Self-efficacy measure for other symptoms (10–100 scale)	–	57.1 ± 20.5	–	5.7 ± 19.6†	–	14.1 ± 25.3†	–	25

* Values are the mean ± SD. ASMP = Arthritis Self-Management Program.
† $P < 0.01$ versus baseline, by paired t-test.
‡ $P < 0.05$ versus baseline, by paired t-test.

Table 3. Mean baseline values and 4-year changes in health status and visits to physicians, among patients with osteoarthritis (OA)*

	OA ASMP group (n = 263)			OA principal comparison group (n = 44)		
	Baseline	4-year change	% change	Baseline	4-year change	% change
Pain	4.8†	−0.85	−18	3.5‡	0.02	2
Disability (0–3 scale)	0.67	0.11	16	0.68	0.08	12
Visits to physician per year	3.6§	−1.4	−39	8.0¶	0.50	6

* Mean age and mean disease duration were 67 years and 10.9 years, respectively, in the OA Arthritis Self-Management Program (ASMP) group and 66.5 years and 13.3 years, respectively, in the OA principal comparison group.
† Visual analog scale scored 0–10.
‡ Adjusted from visual analog scale scored 0–3.
§ Visits for arthritis only.
¶ Visits for all reasons.

Were ASMP participants representative of patients with chronic arthritis? The data in Tables 3–5 permit a number of comparisons relevant to representativeness. Table 3 displays baseline values and 4-year change scores for the OA participants from the ASMP and the OA principal comparison group (12). Baseline disability levels were identical. Baseline pain levels were measured by different visual analog scales, and the results may not be directly comparable. After adjustment of the results to the same scale, as in Table 3, pain levels at baseline were higher in the ASMP group than in the comparison group.

Visits to physicians were measured differently in the 2 groups (as visits for arthritis only in the ASMP group, and visits for all reasons in the principal comparison group), but the difference can be reconciled using data from Table 4, which provides national visit rates from the National Health Interview Survey (14). Visit rates for OA patients without comorbidity should be similar to rates of visits made only for arthritis by all persons with OA. Table 4 shows that the national annual visit rate of 3.6 for OA patients without comorbidity was identical to the arthritis-only rate for our ASMP group (Table 3). Table 4 also shows that the average annual national total visit rate for all persons with OA was 9.0, which is directly comparable with the average total visit rate of 8.0 in our principal comparison group of persons with all types of OA (Table 3). These data indicate that, at study entry, our ASMP subjects with OA were similar to subjects in our OA comparison group in terms of disability and rates of visits to physicians, but had higher levels of pain.

Table 4. National average annual rates of visits to physicians by patients with osteoarthritis (OA) and rheumatoid arthritis (RA), and similar rates for ASMP and principal comparison groups*

	National rates†	ASMP group rates	Principal comparison group rates
All OA patients	9.0	–	8.0
OA patients without comorbidity	3.6	3.6	–
All RA patients	12.3	–	–
RA patients without comorbidity	7.8	10.5	12.4

* ASMP = Arthritis Self-Management Program.
† From ref. 14.

Baseline data on patients with RA are presented in Table 5. The ASMP group had somewhat more pain, slightly less disability, and somewhat fewer arthritis-related physician visits than the RA principal comparison group. While the ASMP and comparison groups had annual visit rates for arthritis that were higher than the national average rate for persons without comorbidity, their visit rates were similar to the national rate for all patients with RA (Table 4).

The differences among the groups may be due to differences in sample selection and disease duration. For example, our RA principal comparison group consisted of patients identified by their visits to a rheumatologist. Such patients are known to have high levels of disease severity. By contrast, the national sample consisted of persons with any level of disease severity and RA of any duration. Further, patients in our ASMP RA group had an average disease duration of 7.6 years, which places them at a relatively early stage of the disease, compared with 11.3 years for the principal comparison group. As a group, persons with RA tend to have symptoms that worsen over approximately the first 12 years, after which they tend to

Table 5. Mean baseline values and 4-year changes in health status and in visits to physicians, among patients with rheumatoid arthritis (RA)*

	RA ASMP group (n = 75)			RA principal comparison group (n = 523)		
	Baseline	4-year change	% change	Baseline	4-year change	% change
Pain (0–10 scale)†	5.2	−1.4	−27	3.9	0.01	3
Disability (0–3 scale)	1.0	−0.09	−9	1.13	−0.03	−3
Visits to physician per year‡	10.5	−5.1	−49	12.4	0	0

* Mean age and mean disease duration were 57 years and 7.6 years, respectively, in the RA Arthritis Self-Management Program (ASMP) group and 55 years and 11.3 years, respectively, in the RA principal comparison group.
† Visual analog scale scored 0–10.
‡ Visits for arthritis only.

plateau (15). These data suggest that our ASMP RA group at baseline was reasonably representative of persons with that disease, both locally and nationally.

Can results over 4 years be accounted for by general trends in disease severity or management? Data from a number of sources indicate that results for the ASMP groups are quite different from general trends. First, between 1984 and 1988, 941 persons from this community enrolled in ASMP studies. During those years, the average pain scores at entry rose from 5.3 to 5.6 (+6%), disability scores rose from 0.84 to 0.89 (+6%), and visit rates increased from 5.3 to 5.6 (+6%). Entry scores would be unaffected by the ASMP and would reflect community trends in those years; these data indicate that in each outcome category, scores rose rather than declined during the 4 years.

Second, in both principal comparison groups, pain scores and visits to physicians over the 4 years increased slightly or did not change (Tables 3 and 5). Such stability contrasts sharply with the declines in these measures in the ASMP groups. Information from many sources suggests that outcomes in the principal comparison groups accurately represent outcomes in arthritis patients in general. For example, 220 OA patients in Kansas were followed up using the same instruments over the same years. They had mean increases in pain and disability of 7% and 23%, respectively (Wolfe F: personal communication). Also, 150 RA patients in this community with a mean disease duration of 15.9 years, during another study in the same 4 years, experienced a 9% decline in pain, a 5% increase in disability, and a 5% rise in physician visit rates (16). Finally, the trend toward increasing rates of visits to physicians was also found by 2 other sources. From 1982 to 1987, Kaiser Health Plan annual visit rates in northern California for all persons over age 65 rose from 6.0 to 6.5 (Yamada B, Kaiser Permanente: personal communication), and annual visit rates for all persons as reported in national data rose slightly during that time period (17).

Thus, evidence indicates that during the years of this study, patients with OA and RA who had not participated in ASMP generally experienced slow worsening in pain and disability, with increased use of physician services. The service utilization increments were similar to those of much larger non-arthritis groups regionally and nationally. Simultaneously, our composite ASMP study group, and the OA and RA subgroups, had declines in pain and in physician visit rates.

A possible explanation for the difference in outcomes could have been changes in medical treatment for RA during the 4 years, particularly if patients began treatment with a methotrexate. During the years of the study, methotrexate treatment was initiated in 91 members of the RA principal comparison group (17%) and 9 members of the ASMP group (12%). Thus, the drug most likely to induce major improvement was started more frequently in the comparison group, which did not improve as a whole.

The foregoing information makes it highly improbable that lack of representativeness of ASMP subjects or secular changes in disease outcomes over the study years accounted for the changes experienced by our study subjects. The magnitude of the improvement in the ASMP group makes it likely that the program was responsible for at least a portion of the beneficial change.

Financial extrapolations. Because the ASMP participants experienced a large reduction in fre-

quency of physician visits over 4 years, the data from group 1 were used in a cost–benefit analysis. The cost of the ASMP was determined using 1987 data from the Northern California Chapter of the Arthritis Foundation, which offers between 40 and 60 ASM programs a year. Costs per participant were divided between the costs for leader training and the costs for actually conducting the program. Leader training costs were $10.58 per participant and included room and board, commuting expenses, training materials, and administrative overhead. Variable costs incurred in running the program averaged $33.65 per participant and included leader stipends, materials, and advertising expenses. Finally, Arthritis Foundation office overhead costs of $9.78 included administrative staff salaries and travel expenses. The total cost per participant was thus $54.01.

Savings from the ASMP over the 4-year period of our analysis were estimated based on the reduction in annual visits to physicians between baseline and 48 months. We made the conservative assumption that visit rates for the principal comparison groups did not change over the 4 years, though the visit rates for the OA comparison group actually increased in that time period. The visit reductions were multiplied by an estimated charge of $45 per physician visit. Four-year savings were calculated by discounting the savings occurring in years 2–4 by a factor of 6%. Using this technique, the present value of savings due to decreases in physician visits was $701.68 per RA patient and $242.25 per OA patient over 4 years. Subtracting the cost per participant of $54.01 yielded net savings of $647.67 per RA participant and $189.24 per OA participant.

To estimate the potential savings that would accrue from nationwide implementation of the ASMP, we used data from the Health and Nutrition Education Survey (18). If 1% of the patients in the US with moderate-to-severe OA of the hand (103,000) and 1% of the patients with classic or definite RA (21,000) participated in the ASMP and achieved the same results as our study group, a rough estimate of total discounted savings over 4 years would be $13.6 million for RA and $19.5 million for OA. Table 6 summarizes these calculations.

Table 6. Potential 4-year savings from dissemination of the Arthritis Self-Management Program

	Savings ($)*	
	RA patients	OA patients
Discounted savings per participant due to decreased visits to physicians over 4 years (6% discount rate)	702	243
Program cost per participant	54	54
Net savings per participant	648	189
Total savings for 1% of patients with moderate or severe OA of the hand and 1% of patients with classic or definite RA†	13,601,070	19,491,720

* Values are rounded to the nearest dollar. See Results for details.
† One percent of patients in the US with moderate-to-severe osteoarthritis (OA) of the hand or with classic or definite rheumatoid arthritis (RA) = 103,000 and 21,000, respectively.

DISCUSSION

In this study, health education for self-management, known to have short-term benefit for patients with chronic arthritis, was also shown to have prolonged benefit in reducing pain and use of medical services. These effects persisted despite deterioration in physical abilities and were additive to the effects of other treatments the patients received. The decline in use of medical services created a potential cost savings that could be quite substantial if a significant number of the nation's persons with arthritis participated in the program and had the same outcomes.

In contemplating such results, the issue of validity is paramount. The strongest evidence for validity is the replication of the results in a second, independent sample. The greatest potential weakness is the absence of a control group. Fortunately, data from comparison groups in this community, plus regional and national data, compensate significantly for the absence of formal control data.

How comparable were the ASMP groups with the 2 principal comparison groups at baseline? They 1) came from the same general community, 2) had the same physician-confirmed diagnosis, 3) shared similar demographic attributes, 4) were all volunteers, 5) were studied in the same time period, 6) were evaluated with similar instruments, 7) had the same baseline levels of disability, and 8) had similar annual rates of visits to physicians at baseline (taking into account differences in sample composition and types of visits measured).

The ASMP and comparison groups also differed in certain ways. First, the ASMP participants volunteered for a health education program from which they assumed they would benefit. The comparison groups had no such expectations; they simply volunteered to

contribute data for an observational study over time. Second, the ASMP groups had somewhat higher baseline pain scores than the comparison groups. While both groups had their pain levels measured by visual analog scales, the scales were different in size and in scoring procedures. These differences may or may not account for the baseline differences in scores. It is also possible that the apparently higher pain scores in the ASMP groups were accurate and reflected the desire of those volunteers for assistance. Further, for the ASMP RA group, it is possible that the higher pain scores at baseline reflected their shorter average disease duration, placing them at a stage of disease when pain is intensifying compared with patients with longer disease duration (15).

Did the comparison groups provide an appropriate representation of trends in outcomes of the 2 diseases over the 4 years of study? During that time, pain levels and rates of visits to physicians rose slowly in the principal comparison groups. The rise in visit rates paralleled that seen in 2 other contemporary studies of arthritis patients, in this geographic region by the Kaiser Health System and nationally by the National Health Interview Survey. Thus, the trends in the comparison groups were consistent and did not show improvement in the measured variables. In contrast, in both ASMP groups and their subsets, pain and visits to physicians declined abruptly after participation in the program, and the declines persisted or even increased over 4 years.

We considered the possibility of various problems that could compromise the foregoing interpretation, for example, the question of whether declines in pain scores in the ASMP groups could represent regression toward the mean. There are good reasons for rejecting this possibility. First, the baseline pain levels in study participants are typical of those obtained by us in many studies of such patients in the community over many years, using a 10-cm visual analog scale. For example, as mentioned in Results, between 1984 and 1988 the mean baseline pain score for all persons entering ASMP studies rose from 5.3 to 5.6. Thus, for the ASMP groups in the present study, baseline pain levels were not high. Second, the ASMP studies began as randomized prospective studies with a control group. As may be seen from Table 2, the major portion of the decline in pain was achieved at 4 months. At that point, the controls crossed over and entered the ASMP; 4 months later, they too had achieved pain declines similar to those in the prior experimental group. Thus, the original experimental group experienced a pain decline that was statistically significant in comparison with the controls, and then the controls, after participating in the program, experienced a similar pain decline.

In sum, the baseline pain levels were not unusually high, and the major portion of the pain decline was achieved as a part of a randomized prospective study early in the 4-year period. These circumstances are strong arguments against a regression-to-the-mean interpretation of the decrease in levels of pain.

In the ASMP OA patients, the declines in pain and in frequency of visits to physicians occurred despite a rise in physical disability. Thus, an improvement in the basic disease cannot explain the changes in pain levels and visit rates. For the ASMP RA group, pain, disability, and visits to physicians declined. How much of those declines can be attributed to the ASMP as opposed to biologic or therapeutic changes is unclear, but the use of methotrexate was greater in the comparison group than in the study group. Overall, it is reasonable to assume that at least some of the beneficial changes were a consequence of participation in the program.

Assuming validity of the results, how generalizable are they? Only replication elsewhere will provide an answer, but certain points are pertinent. These studies used volunteers, who may have some characteristics different from those of arthritis patients as a whole. However, experience with the ASMP has shown that large numbers of persons with chronic arthritis are interested in the program. The ASMP is now offered in many areas of the US, Canada, Australia, and New Zealand. In the US, the Arthritis Foundation reports that more than 100,000 persons have participated. Thus, although the act of volunteering may distinguish a particular group of arthritis patients, the size of this group is substantial.

It is possible that reduced use of medical services led to impaired health and contributed to the increased disability. However, this is unlikely for 2 reasons. First, among the RA patients in the study, disability actually declined during the 4 years. Thus, both pain and disability improved for that group of patients. Second, the increase in disability for the ASMP OA patients was similar to that observed in the OA comparison groups receiving conventional care.

Finally, how might one explain the mechanism of ASMP effects and their duration? The principal mediator over shorter time periods has appeared to be a psychological attribute analogous to perceived self-efficacy, and we suspect that it operates over the

longer period as well. Akin to confidence, perceived self-efficacy conditions one's approach toward a disease and toward one's own role in managing its consequences. Strengthened by participation in the ASMP, perceived self-efficacy is distinct from a particular technique that might be learned, such as exercise or relaxation. Instead, it is a belief that affects the control people seek to exercise over conditions influencing their lives—what actions they choose to take, their motivation, their perseverance, and their vulnerability to stress and depression.

It is reasonable that a health education effect mediated by changes in perceived self-efficacy has a long duration, particularly when health outcomes are favorable. Indeed, in both ASMP groups in this study, perceived self-efficacy appeared to increase as time passed; this might be anticipated from an interaction between a favorable mind set and desired outcomes. Longevity of effect appears to also be the case for patients with other health conditions influenced by perceived self-efficacy, such as recovery from phobias and major cardiac events (19).

Improving the effectiveness and increasing the efficiency of health care, particularly for chronic illness, are central policy goals. In this study, health education for self-management achieved both goals for persons with chronic arthritis. Should further study confirm these findings, health education of this type would be an important addition to the current health service repertoire.

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