Effects of Social Support and Education on Health Care Costs for Patients with Fibromyalgia

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ABSTRACT. ***Objective.*** The rising costs of health care are of great concern, particularly for the chronically ill. Interventions that promote health status and well being while teaching appropriate use of the health care system have led to cost savings among patients with osteoarthritis. We carried out social support and education interventions with patients with fibromyalgia (FM) and assessed the effect on health care costs, psychosocial variables, and health status.

Methods. Participants were 600 patients with FM who were members of a health maintenance organization. They were randomly assigned to one of 2 experimental groups (social support; social support and education) or to a no-treatment control group. Assessments were conducted at baseline and following a one year intervention. Health care cost data were obtained directly from participants' medical records.

Results. Results indicated significant reductions in all groups' costs of prescriptions, laboratory tests, and visits to a nurse, nurse practitioner and/or physicians' assistant. All groups also showed improvements on variables assessing effect of FM, self-efficacy, depression, and knowledge of FM. The social support and education group was less helpless after one year than the other groups; differential changes for all other variables were not significant.

Conclusion. The study did not reveal differential changes in health care costs among participants in the experimental and control groups. These findings emphasize the importance of using objective health care utilization data when calculating health care costs, as well as the value of including a no-treatment control group to prevent erroneous conclusions about treatment efficacy. (J Rheumatol 2001;28:2711–9)

Key Indexing Terms:
FIBROMYALGIA SOCIAL SUPPORT EDUCATION HEALTH CARE COSTS

National health care strategies must focus on improving the health of the population while simultaneously attempting to reduce health care costs[1]. Consequently, health based interventions should be evaluated for their effects on both health status and health care costs[2]. One way to achieve this is through cost effectiveness analysis, a methodology that evaluates the outcomes and costs of interventions designed to improve health[3]. Another is to identify high users of the health care system and plan interventions that focus specifically on reducing their use of health care services without negatively affecting their health status.

Within the United States, annual national health care costs for fibromyalgia (FM) are estimated at over $20 billion[4], with the cost per patient reported as $2,274[5]. Patients with FM think about, talk about, and experience more pain than patients with rheumatoid arthritis (RA)[6]. They also experience considerable personal and occupational disability and low rates of employment[7]. Further, patients with established FM seen in rheumatology centers and followed for as long as 7 years did not show substantial improvements in their pain, fatigue, functional disability, sleep disturbance, or psychological status, suggesting that conventional medical care does not alter the outcome or prognosis of FM[8].

Research findings suggest a positive relationship between social support and health outcomes[9-11]. Gallo[12,13] found that the size of one's social network was positively related to health status and negatively related to health care use. Functional measures of social support, particularly emotional support, have also been associated with decreases in health care use within a primary care setting[14]. Patients with FM are more likely to rank their physicians as intimate members of their social networks and less likely to take initiative in meeting new people than patients with RA[15]. This implies that improving the social networks of FM patients might help to improve their health status while simultaneously reducing health care utilization.

Education programs for patients with arthritis increase patients' internal sense of control over their disease[16] and improve their health status above standard clinical prac-

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tice[17,18]. Education based group therapy also led to improvements in both pain and functional status for patients with FM[19], as well as providing them with new ways to cope, increasing understanding of the syndrome, and teaching them the importance of exercise[20].

To date, no studies have utilized social support as a primary intervention mechanism for patients with FM, and only one study[21] has conducted a cost effectiveness evaluation of an FM intervention[3]. However, Cronan, *et al*[22] found that the health care costs of patients with osteoarthritis participating in a social support, education, or social support and education intervention were significantly lower than those of no-treatment controls, without negative effects on health status. Their findings were maintained for at least 2 years following the intervention[23]. Our purpose was to extend Cronan's findings[22] by examining the effects of a social support and a social support and education intervention on health care costs in patients with FM, using objective health care cost data obtained directly from participants' medical records. It was hypothesized that the social support and the social support and education groups would show greater decreases in health care costs than a no-treatment control group, without a corresponding decrease in health status.

MATERIALS AND METHODS

Subject selection. Several different strategies were necessary to recruit patients with FM who were members of the same health maintenance organization (HMO). Letters explaining the study and inviting people to participate were sent to randomly selected HMO members, advertisements were placed in the Sunday newspaper, flyers were posted in the HMO waiting rooms, and E-mails were sent to HMO physicians telling them about the study and asking them to refer qualified patients.

To be eligible, participants had to be diagnosed by a physician and had to meet the American College of Rheumatology criteria[24] for FM. At an initial interview, informed consent was obtained and a trained examiner performed a manual tender point examination to confirm the diagnosis of FM. Only participants who met all criteria were retained for this study.

Research design. Upon admission, participants completed a battery of questionnaires, then were randomly assigned to one of 2 experimental groups, or to a no-treatment control group.

Interventions. The experimental groups met for 10 weekly meetings, followed by 10 monthly meetings. Each meeting was 2 hours in length. The no-treatment control group participated in assessment interviews only. The *social support* intervention involved group discussions prompted by assigned tasks aimed at promoting empathy and sharing of coping techniques between group members. At the first group meeting, group members were told by the investigators that support groups can be effective in helping people to deal with their FM, and that sometimes physicians and other health care providers are contacted because relatives, friends, or other people with the same complaints are not available. In addition, many people with FM have suggested that having a support group might be beneficial. Tasks for the social support group were assigned by the investigators and given to the group in written form at the beginning of the meetings. Beginning at the second meeting, no staff members were present during these discussions. The social support group tasks ranged from electing a group chairperson to lead the group throughout the study to discussing common emotions associated with FM.

The *social support and education* intervention consisted of 1 hour of health education provided in lecture format by professional health educators, followed by 1 hour of social support. During the second hour, no staff members were present. Materials for the education intervention were adapted from the fibromyalgia literature, the Arthritis Foundation's Fibromyalgia Self-Help Course[25], Fries[26], and Bingham[27].

Data collection. Unless otherwise noted, all measures were taken at the baseline and the one year assessments.

Demographics. Participants reported their age, sex, ethnicity, marital status, education level, employment status, income, years as an HMO member, and duration of FM symptoms at the baseline assessment. They were also asked to rate their health on a Likert-type scale ranging from 1 (very poor) to 5 (excellent). Information about comorbid conditions was collected by asking participants to report other diagnosed illnesses they had prior to their entry into the study (e.g., high blood pressure, heart disease, diabetes, cancer, etc.).

Health care costs. Health care costs were the primary outcome measure of the intervention. Health care utilization data were collected from participants' medical records from the HMO one year before and one year after the start of the intervention. Information was obtained about all contacts, including mental health and inpatient stays. Health care costs were then estimated by multiplying the number of each type of health care contact by recent national average cost figures. Costs per contact for physician, mental health specialist, rehabilitation specialist (e.g., physical therapists, occupational therapists), and technician visits were estimated by taking the contact category average from the Physician's Fee Reference[28] at the 50th percentile level. The costs of medical tests were also estimated using the 50th percentile level. Nurse practitioner, nurse, and physicians' assistant costs were estimated as 85% of physician fees, which corresponds to their current national reimbursement value. Costs for emergency room visits were estimated based on the University of California San Diego Hospitals' average for the 1998-99 fiscal year. The average costs for inpatient stays were obtained from the Agency for Health Care Policy and Research Hospital Inpatient Statistics, 1996[29]. The retail values of the medications prescribed were obtained directly from patient records. Overall cost was then summed for each participant.

Knowledge of FM. Participants' knowledge about FM was assessed using a 20 item, true/false self-report questionnaire based on the Arthritis Foundation's Fibromyalgia Self-Help Course[25]. Sample items from this measure included "Fibromyalgia means pain in muscles, ligaments, and tendons (true)" and "Inflammation is not a part of FM (true)."

Group cohesiveness. Sociometry is a technique used to map relationships of attraction and rejection among members of a group; using this technique, each group member expresses choices for or against other members of the group. In this study, a sociometric questionnaire developed by project staff was used to determine the level of cohesiveness among group members. For this measure, cohesiveness was defined as the level of support developed among members of each experimental group. This 9 item self-report scale is intended to sample a range of intimacy, and thus should indicate a range of tendencies of individuals to share and support each other. The questions in this scale were ranked by 2 judges from least intimate (e.g., To whom in your group would you say "hello" outside the group; With whom would you carpool to a group meeting) to most intimate (e.g., If you were experiencing problems, whom would you call; Whom would you consider a close friend). This was intended to produce a Guttman-like scale, in which the items are arranged so that a response to any given item can be taken as an indication of agreement with all items of lower rank. For each item, the participants are asked to list the names of group members who fit the item description. The names listed are then summed to create an overall cohesiveness score. For example, if a participant indicates that he or she would say "hello" to 10 members outside the group, and would consider one member a close friend, the total cohesiveness score would be either 10 or 11 (10 if the close friend was listed as one that the member would say "hello" to, or 11 if the close friend was distinct from this list).

Self-efficacy. Perceived self-efficacy was measured using an adapted

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version of the Arthritis Self-Efficacy Scale; the term "arthritis" was changed to "fibromyalgia"[30]. This scale has been adapted for use with FM patients in multiple studies[31,32]. This self-administered scale consists of 20 items that measure participants' confidence in their ability to perform specific tasks; for example, how certain they are that they can decrease their pain, or walk 100 feet on flat ground in 20 seconds. The participants are asked to rate their confidence in performing these tasks by marking a value ranging from 0 (very uncertain) to 100 (very certain). Three subscale scores are yielded from this scale: self-efficacy for pain, for function, and for other symptoms. This scale has demonstrated test-retest reliability ranging from 0.71 to 0.85, and has demonstrated construct validity as well[30].

Helplessness. Participants' perceptions of helplessness in coping with FM were measured with a version of the Arthritis Helplessness Index[33], adapted for FM by replacing the word "arthritis" with "fibromyalgia." Similar versions of this adapted scale have been used in multiple FM studies[20,34,35]. Participants were asked to rate their agreement with 11 statements on a scale from 1 (strongly disagree) to 6 (strongly agree). Scores were reverse coded so that higher scores indicated greater helplessness. This scale has demonstrated internal consistency (Cronbach's alpha = 0.69), as well as test-retest reliability of 0.52[36].

Depression. Depression was assessed using the Center for Epidemiological Studies-Depression Scale (CES-D). This 20 item self-questionnaire is used to measure depressive symptomatology in general population surveys. A 4 point Likert-type scale is used to measure the rate at which a specific symptom was experienced, with 0 = rarely or none of the time and 3 = most or all of the time, for the past week. High internal consistency, moderate test-retest reliability, and high concurrent and construct validity have been reported[37].

Health status. Health status was assessed using the Quality of Well-being Scale (QWB)[38]. The QWB is a general utility based measure of health related quality of life. It combines preference weighted measures of symptoms and functioning to calculate a numerical point-in-time expression of well being. This expression ranges from 0 (death) to 1 (optimal asymptomatic functioning), and represents a combined index of morbidity and mortality. Participants were asked to review a list of 27 symptom/problem complexes that are weighted by perceived severity and to identify those that were present in the past 6 days. The QWB also evaluates levels of functioning on 3 different dimensions: mobility, physical activity, and social activity; each step of these scales is associated with its own preference weight. Reliability for the QWB has been confirmed[39,40] and its validity as an outcome measure has been shown for various conditions[41], including FM[42]. The QWB was administered by a trained research assistant.

Fibromyalgia impact. The impact of FM was measured using the Fibromyalgia Impact Questionnaire (FIQ)[43]. The FIQ is a brief, self-administered, 10 item questionnaire that measures physical functioning, depression, work status, sleep, anxiety, pain, stiffness, fatigue, and well being in people with FM. The first item of the FIQ consists of 10 subitems that focus primarily on the patient's ability to perform large muscle tasks (i.e., doing yard work, vacuuming a rug), presented in a Likert-type scale format ranging from 0 (always able to do) to 3 (never able to do). The sum of these 10 subitems is divided by the number of valid scores to provide one physical functioning score. The remainder of the items assess pain, fatigue, morning stiffness, anxiety, depression, and ability to perform at work. Each item is standardized on a 0 to 10 scale, with 10 indicating greater impairment. The items are then summed to create a total impact score.

Program evaluation. Evaluations of the intervention were assessed using a 10 item self-report questionnaire developed by project staff. The participants were asked to rate various components of the program (e.g., materials, activities, usefulness of information, number of sessions, participant control, application to daily life), and their overall rating of the program, on 5 point Likert-type scales ranging from 1 (poor/not helpful) to 5 (excellent/very helpful). Participants' qualitative responses about what they liked most and least about the intervention, and what they would recommend to improve it, were also obtained. Only participants in the experimental groups completed the evaluation, which was administered at the one year assessment.

Data analysis. Groups were examined for preexisting differences on demographic characteristics using chi-square statistics for categorical variables and analyses of variance (ANOVA) for continuous variables. Controlling for comorbid conditions, repeated measures analyses of covariance (ANCOVA) were used to test for a 3 (group) by 2 (time of assessment) interaction, as the interaction indicates whether the groups changed differentially over time. Mathematical proofs show that this interaction is equivalent to evaluations of outcomes with statistical control for baseline scores[44]. Alpha for all analyses was set at $p < 0.05$. When followup tests were necessary, Bonferroni corrections were used to control for the number of comparisons made. All analyses were conducted using the Statistical Package for the Social Sciences (SPSS).

Visual inspections of the sampling distribution of mean health care costs revealed violations of the normality and linearity assumptions of the repeated measures ANCOVA; the data were heavily skewed in the positive direction. When violations of these assumptions occur, transformations of the data are recommended to induce normality and reduce the influence of outliers. When the data are substantially skewed in the positive direction, a logarithmic transformation is advised[45], and was consequently performed on the health care cost data.

RESULTS

Of the 686 HMO members who came to the initial assessment with a diagnosis of FM from their physician, 86 did not qualify for the study because they did not pass the tender point examination. In total, 600 participants (572 women, 28 men) entered the study. Their mean age was 54 years (SD 11). Eighty-five percent were Caucasian, 64% were married, 34% were employed full-time, and 77% had completed some college or beyond. Their median income fell between $30,000 and $40,000. At the one year assessment, 10 participants were no longer members of the HMO; consequently, these 10 participants were excluded from analyses involving health care costs. For all other outcome variables, data were available for 492 subjects; the remaining 108 subjects were dropped from the analyses because they failed to complete the one year assessment. Of these 108 subjects, 27.5% gave no reason for dropping out, 24.5% indicated that they were no longer interested or did not like the study, 15.3% had moved, 14.3% cited inconvenience, 10.2% had "other" reasons, and 8.2% were ill or had surgery (Figure 1).

Demographic characteristics. Differences among the groups at the baseline assessment were not statistically significant (Table 1).

Health care costs. Changes in the groups' total health care costs were examined. The costs of health care contacts, medical tests, and prescriptions were also examined individually. Significant decreases were detected for participants in all groups for costs of prescriptions ($p < 0.001$), laboratory tests ($p = 0.015$), and visits to nurses, nurse practitioners and/or physicians' assistants ($p = 0.017$). No differential changes in health care costs were detected (see Table 2 for mean costs, F values, and effect sizes).

To examine the effects of attendance on health care costs,

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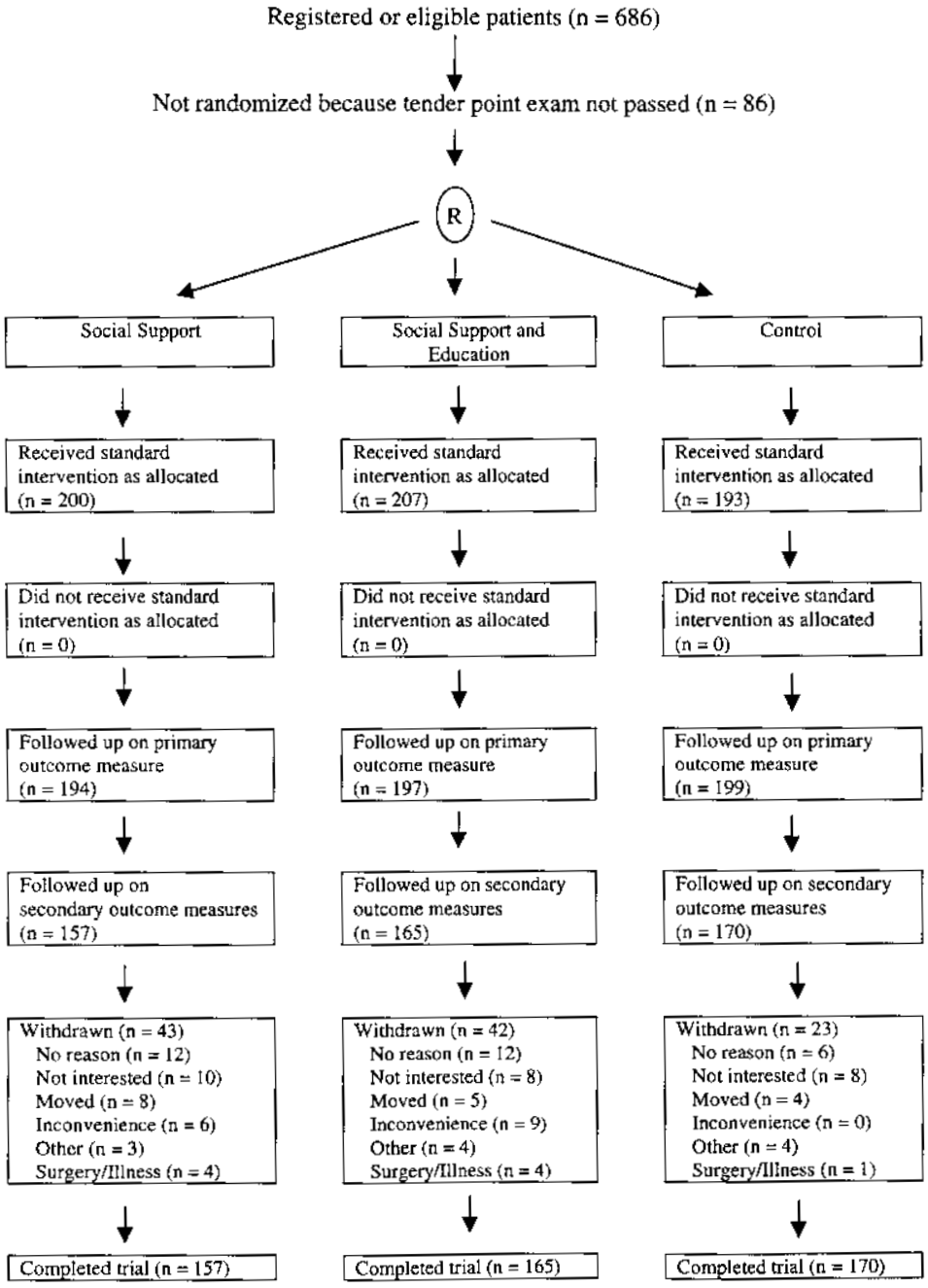

Figure 1. Consolidation of standards for reporting trials recruitment flow diagram.

participants in the experimental groups were divided into 2 groups, using a median split based on their frequency of attendance. Participants attending eight or fewer of the 20 meetings were considered "low" attendees (n = 184), while those attending 9 or more meetings were classified as "regular" attendees (n = 187). For the low group, the mean number of meetings attended was 2.80 (SD 2.88); for the regular group, the mean number attended was 13.84 (SD 3.01). There were no significant differences in total health care costs between low and high attendees, nor did total health care costs differ significantly between those who dropped out and those who did not. See Table 3 for mean costs by attendance and attrition.

Manipulation checks. Means, standard deviations, F values, and effect sizes for manipulation check variables can be found in Table 4. Differential changes in outcomes directly affected by the intervention (i.e., group cohesiveness, FM knowledge) were examined. However, group cohesiveness, as measured by the sociometric scale, cannot be examined for statistical significance in the same manner as other vari-

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Table 1. Preassessment demographic means (SD) and percentages.

Variable	Control, n = 193	Social Support n = 200	Social Support and Education, n = 207
Age	52.9 (11.7)	53.7 (11.6)	55.1 (11.0)
Years as HMO member	14.3 (10.2)	13.7 (9.6)	13.6 (9.9)
Duration of FM symptoms, yrs	11.7 (12.1)	13.6 (13.2)	14.4 (14.2)
Sex (%)			
Male	5.7	4.5	3.9
Female	94.3	95.5	96.1
Education (%)			
High school or less	16.1	23.5	17.4
Some college	53.4	45.5	51.2
College degree	15.5	15.0	17.4
Higher degree	15.0	16.0	14.0
Ethnicity (%)			
Caucasian	83.9	86.0	85.0
Native American	1.0	1.5	2.4
African American	2.6	4.0	3.4
Latino/Hispanic	7.8	7.0	6.8
Other	4.7	1.5	2.4
Employment (%)			
Working	49.7	46.0	52.7
Not working	50.3	54.0	47.3
Income (%) *			
Under $20,000	16.1	18.5	12.1
$20,000 – 40,000	38.3	36.5	35.3
$40,000 – 60,000	22.8	23.0	29.0
Over $60,000	20.2	19.0	19.8
Decline to state	2.6	3.0	3.9
Marital status (%)			
Single	11.9	7.5	12.6
Married	63.2	63.0	66.2
Divorced/separated	2.6	5.5	5.8
Widowed	22.3	24.0	15.5
Presence of comorbid conditions (%)			
Yes	62.7	62.0	66.2
Self-reported health rating (%)			
Very poor	4.1	6.0	4.3
Poor	17.1	14.0	15.0
Fair	37.8	36.0	37.7
Good	36.8	38.5	38.6
Excellent	4.1	5.5	4.3

HMO : health maintenance organization. * $US

ables. This is because the experimental groups were composed of participants who were randomly assigned to the groups; they did not know each other prior to the intervention. Thus, all baseline cohesiveness scores would equal zero. The group means for cohesiveness after the completion of the 10 weekly meetings indicated that the intervention did create cohesiveness among the groups. When examining group cohesiveness from the 3 month to the one year assessment, no significant changes were detected.

For FM knowledge, participants in all groups showed significant increases in knowledge from the preassessment to the one year assessment ($p < 0.001$). The groups did not change differentially over time.

Attendance and attrition. Attendance records for the 2 experimental groups indicated that participants attended an average of 5.60 of the 10 weekly meetings (SD 3.5) and 3.34 of the 10 monthly meetings (SD 3.3), with an average total of 8.38 of the 20 meetings attended (SD 6.2). Attendance rates did not differ significantly among the experimental groups. Attrition was significantly more likely to occur in the experimental groups than in the control group ($p = 0.027$); the social support and social support and education groups did not differ significantly from one another.

Psychosocial outcomes. Means, standard deviations, F values, and effect sizes for psychosocial outcome variables can be found in Table 4.

Helplessness. Significant decreases were found in helplessness for participants in all groups ($p = 0.011$). However,

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Table 2. Mean (SD) health care costs ($US) per participant.

	Control, n = 199		Social Support, n = 194		Social Support and Education, n = 197		Interaction	ME	ME
	Pre	Post	Pre	Post	Pre	Post	F (2,587)	F (1,587)	η^2
Technician	49 (71)	42 (83)	47 (79)	52 (98)	47 (66)	46 (61)	2.15	0.91	0.002
Rehabilitation specialist	153 (385)	135 (309)	136 (362)	86 (2302)	167 (388)	126 (312)	0.43	2.66	0.005
Specialist	507 (580)	475 (657)	547 (647)	539 (617)	491 (716)	511 (640)	1.52	0.85	0.001
Nurse*[b]	115 (121)	97 (132)	118 (176)	124 (279)	130 (176)	105 (122)	0.44	5.75	0.010
Mental health	167 (437)	139 (373)	181 (677)	181 (552)	144 (623)	140 (718)	0.65	0.38	0.001
Physician	305 (307)	323 (478)	330 (260)	336 (308)	308 (316)	311 (294)	0.43	0.047	0.001
Emergency	221 (646)	204 (494)	212 (376)	180 (349)	206 (474)	220 (525)	2.06	0.08	0.000
Inpatient stay	588 (2070)	787 (4240)	900 (3257)	592 (2174)	449 (1902)	971 (3345)	1.26	0.15	0.000
Radiology	507 (754)	509 (829)	488 (360)	545 (758)	512 (713)	504 (768)	0.34	0.74	0.001
Lab tests[a]	613 (785)	598 (1421)	637 (875)	621 (659)	550 (601)	656 (931)	1.04	5.90	0.010
Prescriptions[a]	1428 (3399)	912 (1460)	1218 (1541)	910 (1107)	1230 (2026)	805 (1108)	0.22	23.80	0.039
Total contacts	2107 (2896)	2206 (5043)	2474 (4061)	2096 (2913)	1944 (2878)	2432 (4113)	0.060	0.19	0.000
Total tests	1121 (1273)	1109 (2060)	1126 (1291)	1168 (1145)	1063 (1141)	1161 (1446)	1.65	2.59	0.004
Total costs	4656 (5871)	4227 (7998)	4818 (5698)	4174 (4060)	4238 (4878)	4398 (5592)	0.81	1.42	0.002

* "Nurse" comprises nurse, nurse practitioner, and physician assistant visits. ME: main effect.
[a] Significant main effect, $p \leq 0.01$; [b] Significant main effect, $p < 0.05$.

Table 3. Mean (SD) total health care costs ($US) by attendance and attrition.

	Pre	Post
Attendance level		
"Low"attendance, n = 187	4845 (6238)	4666 (5771)
"Regular" attendance, n = 187	4413 (4498)	3918 (3701)
Attrition		
Continued, n = 492	4654 (5613)	4260 (6095)
Dropped, n = 108	4139 (4824)	4310 (6019)

significant differential changes were also found; a one-way repeated measures ANCOVA revealed that the social support and education group was significantly less helpless at the one year assessment than were the social support and control groups ($p < 0.001$).

Self-efficacy. Participants in all groups showed significant improvements in the pain ($p < 0.001$), function ($p < 0.001$), and other symptoms ($p < 0.001$) subscales of self-efficacy. No significant differential changes among the groups were found.

Depression. Participants in all groups were significantly less depressed at the one year assessment than at baseline ($p < 0.001$). No significant differential changes among the groups were found.

Health status and impact of FM. No significant changes were found for changes in QWB scores over time, nor differentially by group. For FIQ scores, participants in all groups reported significantly less FM impact over time ($p < 0.001$). No significant differential changes among groups were found (Table 4).

Program evaluation. A multivariate analysis of variance (MANOVA) was used to examine differences in the experimental groups' program evaluations (the control group was not assessed). Significant differences were found between the social support and the social support and education groups on their ratings of the usefulness of materials and activities, application of the intervention to daily life, usefulness of the information, likelihood of recommending the intervention to a friend, whether or not the intervention should be offered by the HMO, and the overall evaluation of the intervention; the social support and education group rated these aspects of the intervention significantly higher than did the social support group. The groups did not differ significantly in their ratings of the number of sessions, or perceived responsibility and control over the program (see Table 5 for group means and univariate F tests). When asked what was most liked about the intervention, the most prevalent qualitative response was the enjoyment of interacting socially with others with FM (42.7%), followed by gathering information and sharing it with others (32.7%). When asked what was least liked, the most frequent response was inconvenience due to the length, days of week, and/or location of the intervention (13.7%), followed by too little leadership within the groups (13.1%). When asked what could be done to improve the intervention, the most common suggestion was to increase the number of speakers and materials used in the intervention (18.8%), followed by suggestions for greater structure (16.3%).

DISCUSSION

The study revealed no differential changes in health care costs among the experimental and control groups. Significant reductions took place for all groups' costs of

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Table 4. Means (SD) of manipulation checks, psychosocial, and health status outcomes.

		Control, n = 170		Social Support, n = 157		Social support and education, n = 165		Interaction	ME	ME
	Range	Pre	Post	Pre	Post	Pre	Post	F (2,489)	F (1,489)	η^2
FM knowledge[a]	(0–20)	15.5 (2.6)	16.6 (2.2)	15.8 (2.3)	16.3 (2.4)	15.3 (2.2)	16.6 (2.3)	2.58	49.00	0.091
Cohesiveness[†]	(0–25)	N/A	N/A	14.9 (7.7)	14.4 (7.9)	14.3 (8.4)	14.7 (8.3)	0.88	0.00	0.000
Helplessness[a,b]	(1–5)*	3.1 (0.7)	3.0 (0.7)	3.1 (0.7)	3.0 (0.7)	3.2 (0.7)	2.9 (0.7)	4.57	19.24	0.038
SE (pain)[a]	(0–100)	47.4 (23.3)	52.0 (19.6)	45.7 (21.4)	53.6 (22.1)	46.5 (21.9)	55.4 (18.7)	1.27	34.58	0.066
SE (function)[a]	(0–100)	65.1 (24.0)	71.7 (21.9)	68.2 (22.0)	71.5 (20.9)	67.1 (22.3)	73.3 (20.8)	1.73	50.67	0.094
SE (other)[a]	(0–100)	46.2 (18.4)	52.5 (15.9)	46.5 (19.5)	53.8 (16.5)	48.2 (19.6)	54.9 (15.6)	0.17	66.79	0.120
Depression[a]	(0–60)*	20.0 (12.2)	15.5 (10.0)	20.6 (12.2)	14.6 (10.1)	18.9 (10.0)	14.2 (8.9)	1.01	116.27	0.192
Health status	(0–1)	0.555 (0.748)	0.548 (0.801)	0.558 (0.720)	0.556 (0.755)	0.564 (0.736)	0.562 (0.810)	0.22	1.02	0.002
FM impact[a]	(0–100)*	62.6 (15.6)	58.3 (17.3)	60.8(16.3)	54.7 (18.0)	59.7 (16.7)	56.0 (16.5)	1.11	49.03	0.091

*Lower scores indicate improvement. ME: main effect, SE:self-efficacy.

[†] Cohesiveness was assessed at 3 months instead of baseline.

[a]Significant main effect, $p \le 0.01$,[b] Significant interaction effect, $p \le 0.01$, $\eta^2 = 0.018$

Table 5. Evaluation means (SD) and univariate F tests.

Evaluation Items	Social Support, n = 179	Social support and Education, n = 192	Univariate F (1,231)
Number of sessions	3.1 (0.8)	3.0 (0.7)	0.02
Usefulness of materials and activities[a]	3.7 (1.1)	4.3 (0.7)	21.40
Application to daily life[b]	3.9 (0.9)	4.1 (0.7)	4.30
Usefulness of information[a]	3.8 (1.0)	4.1 (0.7)	6.70
Participant responsibility/ control in program	3.1 (0.8)	3.0 (0.5)	2.86
Would recommend to a friend[a]	3.7 (1.2)	4.2 (0.7)	19.51
Recommend that HMO offer program[a]	3.9 (1.0)	4.3 (0.7)	11.16
Overall evaluation[a]	3.6 (1.0)	4.1 (0.7)	20.92

[a] $p \le 0.01$, [b] $p < 0.05$. Wilks' lambda F (8, 224) = 4.11, $p < 0.001$.

prescriptions, laboratory tests, and nurse, nurse practitioner and/or physicians' assistant visits. Psychosocially, a differential change was found for helplessness; the group that received both social support and education was significantly less helpless after one year than the social support and control groups. Significant improvements were seen for all groups on variables assessing FM impact, self-efficacy, depression, and FM knowledge.

While statistically significant improvements did occur over time for participants in all groups, these changes cannot be attributed to either of the interventions. However, although the hypothesized outcomes were not obtained, several aspects of this study merit attention. First, with 600 participants, this study represents the largest intervention conducted to date with FM patients, and the only study to utilize objective health care use data instead of patient self-report. The data taken directly from patients' medical records indicated that the health care costs of FM patients were nearly double the patient reported costs documented by Wolfe and colleagues[5]. The authors believe that this finding demonstrates the importance of using actual health care utilization data, rather than retrospective self-report, in calculating health care costs. This study was also the first to examine the effects of social support as a treatment mechanism for FM patients. The finding that experimentally developed social support does not lead to differential changes in health care costs has valuable implications for FM treatment planning. Finally, the importance of including a no-treatment control group within this study cannot be discounted; without it, we would have erroneously concluded that the interventions had produced the decreased costs.

Recent findings from studies with FM samples suggest that combining patient education, physical exercise, and cognitive-behavioral therapy may be the most effective intervention for patients with FM[46,47]. However, most behavioral treatment outcome studies with FM patients have yielded modest results[46,48], indicating that psychological and behavioral approaches to treating FM may be no more effective than attention-placebo[49]. Our study employed social support and patient education as treatment mechanisms, and, with the exception of helplessness, did not produce differential changes related to group assignment. Speculating on this, several hypotheses can be formulated

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about behavioral interventions for FM in general, and the present study in particular.

First, the variety of symptoms associated with FM, the tendency for symptom severity to fluctuate, and the lack of a clear biological cause create difficulty in knowing what to address within the treatment component of a behavioral intervention. In this study, the information presented within the education component may not have been directed at a sufficiently high level. As indicated by participants' scores on the FM knowledge questionnaire, our participants had begun the intervention with a substantial amount of information about FM; perhaps they found the information presented in the education component to be redundant. Similarly, the discussions within the social support component may not have led to productive decision-making about coping with FM or use of the health care system. Second, the timing of assessments within the interventions may be inappropriate for detecting treatment outcomes. In particular, this study examined data resulting from the one year assessment, which took place immediately following the intervention. However, the time period between behavioral change and subsequent changes in health status may be longer than anticipated[50]. It is possible that immediately following the intervention the full effects had not yet occurred. Third, the length of treatment itself may have been inadequate for producing behavioral change; the groups might have obtained greater benefits from group meetings had they continued to meet weekly instead of decreasing to monthly. Fourth, attendance rates for the intervention were fairly low, with participants in the experimental groups attending about 40% of all meetings. It is possible that if the participants had attended more frequently, differential treatment gains would have been found. In previous studies with FM patients, adherence has been linked to multiple factors, including treatment characteristics (i.e., group membership) and participant characteristics (i.e., age and education level)[51]. Poor adherence has also been attributed to the perception that treatment is difficult or inconvenient[52]. In this study, nearly 40% of the patients who did not complete the study cited inconvenience and/or difficulty attending meetings. Poor adherence could also have negatively affected group cohesiveness, which could significantly affect intervention efficacy, particularly within the social support component.

All participants in this study demonstrated improvements in physical and psychological well being, regardless of intervention group assignment. Gains in self-efficacy were also made by all participants. Gains in self-efficacy are of particular importance because increased self-efficacy is a likely precursor to successful health behavior change[30]. The changes seen in all groups, as opposed to the hypothesized differential changes expected, point toward the idea that the attention received by participating in an intervention may lead to improvements in FM, regardless of treatment received. Or, as previously reported, FM patients may tend to improve over time without any particular assistance[8,53]. The finding that the costs of prescriptions and laboratory tests decreased for all participants may also be indicative of a growing acceptance that FM is not a biological ailment that can be treated through standard medical care. However, further implementation of group based interventions for FM, particularly patients attempting to improve adherence, are necessary precursors to such conclusions.

This study is limited by the use of a convenience sample that was obtained from one HMO, and in the use of self-report measures to assess physical and psychological outcomes. It is also limited by a lack of systematic data to examine changes in participants' out-of-pocket health care expenses. However, the study is unique in its use of social support as a primary treatment mechanism, as well as in its use of objective health care utilization data taken directly from participants' medical records, rather than from patient self-report. While the results do not support the notion that social support and education alone are sufficient for reducing health care costs in patients with FM over one year, they nevertheless contribute in the search to discover beneficial treatments for FM that are cost effective as well.

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