ARTHRITIS CARE & RESEARCH 45:122–128, 2001

ORIGINAL ARTICLE

Effects of Stress Management on Pain Behavior in Rheumatoid Arthritis

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Objective. **To examine the effects of stress management training on pain behavior exhibited by persons with rheumatoid arthritis (RA) and the relationship of change in pain behavior with certain patient characteristics as well as change in self-reported levels of pain.**

Methods. **Patients with RA (n = 131) were randomly assigned to 1 of 3 groups: a stress management group, an attention control group, or a standard care control group. The stress management and attention control groups received a 10-week intervention followed by a 15-month maintenance phase.**

Results. **The 3 groups did not differ significantly in the change in pain behavior at any of the assessment periods. However, persons with RA who had less disease activity tended to exhibit positive changes in pain behavior over time. Changes in self-reported pain were not significantly related to changes in pain behavior.**

Conclusion. **The results indicate that stress management interventions do not reduce total pain behaviors exhibited by persons with RA. Changes in pain behaviors appear to be related to disease activity, age, and disease duration, but not to changes in self-reported measures of pain.**

KEY WORDS. Pain behaviors; Stress management; Rheumatoid arthritis.

INTRODUCTION

Cognitive–behavioral treatment, including stress management training, has been used in several studies with persons with rheumatoid arthritis (RA), and results indicate improvements in psychological variables and, in some cases, in joint tenderness, pain, and disease activity (1–3). The evidence also indicates that an RA patient's belief in his or her abilities to cope with stressors, including the effects of disease, relates to pain. That is, when a person feels capable of coping successfully, pain intensity tends to lessen. One limitation is that most studies of pain management and cognitive–behavioral treatment for persons with RA have assessed a patient's level of pain via self-report measures.

In addition to subjective reports of pain, a reliable methodology for measuring pain behaviors in patients has been developed by Keefe and Block (4) and adapted for use with patients with RA (5). Pain behavior refers to observable movement by patients, such as limps or grimaces, that communicate to others when pain is occurring. Given that previous research has indicated that self-reported pain significantly decreases after cognitive–behavioral interventions (e.g., stress management training), pain behaviors might decrease as well. One of the few studies to examine this hypothesis was done by Bradley and colleagues (1), who conducted a randomized clinical trial to evaluate a cognitive–behavioral treatment program in comparison with a social support program and a control group. The cognitive–behavioral intervention consisted of 5 individual thermal biofeedback training sessions and 10 small group meetings with family members and close friends. The group meetings included 4 phases: (a) an educational

Presented at the annual convention of the American Psychological Association, Washington, DC, August 7, 2000.

The opinions are those of the grantee and do not necessarily reflect those of the U.S. Department of Education.

Supported by the Medical Research Service Department of Veterans Affairs and by the National Institute on Disability and Rehabilitation Research of the U.S. Department of Education under grant 133B80075.

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Submitted for publication November 22, 1999; accepted in revised form November 30, 2000.

component describing the rationale for the cognitive–behavioral model, (b) a skills acquisition phase focusing on palliative coping strategies, (c) self-instructional training in the use of rewards for achieving goals, and (d) an application phase in which participants practiced the skills that they learned and reported on their progress in the group. The support group program included 15 sessions of structured social support in small group meetings with family members and close friends, and the control group received no adjunct treatment. Bradley and colleagues (1) found that the cognitive–behavioral intervention produced significantly fewer total pain behaviors than either of the other group interventions at posttreatment. However, these effects were not maintained at the 6-month followup.

It is important to note that Bradley and colleagues (1) reported that in their well controlled study there were no differences between the 3 treatment groups with regard to age, duration of disease, or socioeconomic status. Thus, the positive effects that they found could not be associated with systemic differences between the treatment groups on these patient characteristics. In a study by Anderson and colleagues (6), significant positive correlations were found between total pain behavior and measures of disease activity. Anderson and colleagues (7) also demonstrated that disease duration was a significant predictor of total pain behavior in patients with RA, although age did not predict a significant portion of the variance. Socioeconomic status was not examined by that research group as a possible predictor of total pain behavior. Thus, although there has been some indication in the literature that age, disease duration, and socioeconomic status may be correlated with pain behavior, it is not known whether there is a relationship between changes in pain behavior and these patient variables. McDaniel and colleagues (5) found evidence to support the relationship between total pain behavior and self-reports of pain as measured by the visual analog scales (8,9) and the McGill Pain Questionnaire (10). However, it has yet to be demonstrated whether changes in pain behavior would be related to changes in self-report pain measures. This would be important in the examination of pain behavior as an outcome variable.

The purpose of the present study was to examine the utility of the variable of pain behavior as an outcome measure. Specifically, we examined the effects of stress management training on pain behavior exhibited by persons with RA. This training was designed to emphasize generalizability and the maintenance of long-term effects, with a particular emphasis on pain control. Developing control over pain should result in decreased pain behaviors such as guarding and bracing. Specifically, it was hypothesized that persons in the stress management group would show significant decreases in pain behaviors across assessment periods relative to participants in control groups. In addition, we examined the relationship of change in pain behavior from pre- to post-intervention with certain patient characteristics (i.e., age, socioeconomic status, duration of disease, and disease activity) as well as change in self-reported levels of pain.

SUBJECTS AND METHODS

The data for this study came from a larger project examining the effects of stress management training on such clinical outcomes as helplessness, self-efficacy, coping, self-reported levels of pain, and health status (2).

Study subjects. Subjects were 72 men and 56 women with a diagnosis of classic or definite RA. All study participants were recruited from a midwestern Department of Veterans Affairs hospital (n = 50), a university medical center (n = 31), and a private rheumatology practice (n = 47). The diagnosis of RA was made by collaborating rheumatologists who used the 1987 diagnostic criteria of the American College of Rheumatology (ACR), formerly known as the American Rheumatism Association (11). Potential subjects who had 1 or more of the following features were excluded from the study: (a) a history of organic brain disorder, (b) presence of a psychotic disorder, (c) presence of an uncontrolled medical disorder, (d) presence of a major communication disorder, and (e) illiteracy. Persons who were classified as functional class IV (12) also were excluded because of the demands of the protocol. In addition, only those patients (n = 128) who were videotaped for the pain behavior ratings both pre- and post-intervention were included in this study.

The mean age of the 128 participants included in the study (± SD) was 58.4 ± 10.5 years, and the mean educational level was 11.7 ± 2.4 years. The mean disease duration for the study sample was 149.1 ± 116.8 months or approximately 12.4 years. The Hollingshead index of socioeconomic status produced a mean value of 44.9 ± 10.5, indicating a predominantly middle-class sample.

Study groups. A randomized stratified method was used to assign subjects to 1 of 3 groups: the stress management (SM) group, the attention control (AC) group, or the standard care control (CN) group. Stratification was according to clinic site, functional class, and degree of life stress. All 3 groups received ongoing rheumatologic care.

Stress management group. The SM group members (n = 44) participated in a comprehensive outpatient stress management program. The 3 counselors all had master's degrees in psychology and were well trained in the cognitive–behavioral techniques used in this SM intervention. All counselors used a semistructured script to promote consistency across the 3 counselors. A computer with specialized software added a multimedia component to the didactic part of the program. Participants in the SM program were given 10 weekly individual sessions of approximately 1.5 hours each. The semistructured SM program included relaxation training and instruction in cognitive–behavioral strategies to effectively manage daily stressors commonly associated with RA. Topics covered in the individual visits included identification of stressors, development of coping strategies for common problems and emotional distress, management of pain, development of life goals, adaptation to changes in lifestyle, enhancement of self-esteem, and optimization of social relationships. Home practice was emphasized throughout the SM program.

Table 1. Description of pain behaviors

Behavior	Description
Guarding	Abnormally stiff, interrupted, or rigid movements
Bracing	Support of an abnormal weight distribution by an extended limb
Grimacing	Obvious facial expression of pain
Sighing	Exaggerated exhalation of air
Rigidity	Excessive stiffness of an affected body part
Active rubbing	Massaging of an affected body part
Self-stimulation	Repetitive movement of a non–weight-bearing body part
Passive rubbing	Resting or holding an affected body part with another body part

After the 10-week intervention phase was concluded, a 15-month maintenance program was provided to help sustain treatment gains. During this maintenance phase, each person was seen individually at least once every 3 months. Sessions focused on recognizing life stressors and on assistance with using cognitive–behavioral techniques for coping with those stressors.

Attention control group. A general education program was used as the AC condition because Sackett and Haynes (13) found in their review of the literature that information alone does not produce a significant effect on health outcomes. Therefore, participants in the AC group (n = 42) received a patient education program with the same 3 counselors who delivered the SM program. A computer-assisted program based on materials from the Arthritis Foundation was presented and was discussed individually with each subject. The numbers of sessions and followup visits for the subjects in the AC and SM groups were identical. However, no active problem solving or stress management components were used in the AC program.

Standard care control group. The subjects in the CN group (n = 42) received only their ongoing rheumatologic care. They were exposed to neither the AC nor the SM programs.

Measures. *Pain behavior.* Pain behavior ratings were obtained in a manner described by McDaniel and colleagues (5). Patients were videotaped as they engaged in a 10-minute standardized sequence of activities. The sequence of movements included a 1- and 2-minute sitting period, a 1- and 2-minute standing period, 2 1-minute reclining periods, and 2 1-minute walking periods. The order of these activities was randomly assigned for each subject. Specific pain behaviors (i.e., guarding, bracing, grimacing, sighing, rigidity, active rubbing, self-stimulation, passive rubbing) were counted by 2 trained raters. Specific definitions for each type of pain behavior are presented in Table 1. The total pain behavior score was computed by summing the frequencies for the 8 pain behaviors. Reliability and validity have been demonstrated by McDaniel and colleagues (5) and by Anderson and colleagues (6). Interrater agreement rates in the studies reported in Anderson and colleagues (6) were quite high, ranging from 96% to 100%.

Disease activity. Disease activity was measured via joint counts, as recommended by the ACR (14). A trained clinical nurse examiner performed all joint counts. The number of joints found to be painful (tender) or swollen was used as the joint count measure. The examiner had no knowledge of the treatment condition assigned to each patient.

McGill Pain Questionnaire. The McGill Pain Questionnaire (MPQ) (10) is a self-report pain measure with 7 subscales that measure sensory pain, affective pain, evaluative pain, miscellaneous pain, number of words chosen, percentage of body in pain, and present pain intensity. Subjects are asked to respond to the MPQ by assessing their current pain level. The MPQ has adequate test–retest reliability (15), and factor-analytic evidence for validity in an arthritis population has been reported (16).

Visual Analog Scale. The Visual Analog Scale (VAS) (8) consists of a 10-centimeter line anchored with "no pain" on one extreme end and "pain as bad as it can be" on the other extreme end. Subjects must select the point on the line that represents the degree of pain felt over the previous week. The VAS has been reported to have adequate reliability and validity (8–9,17).

Arthritis Impact Measurement Scales. The Arthritis Impact Measurement Scales (AIMS) is a 66-item measure with 9 subscales to assess the health status of persons with arthritis "during the past month" (18). Both reliability and validity of the AIMS have been reported as acceptable (18–19). Brown and colleagues (20) used factor analysis to identify 3 major health status factors: physical disability, psychological status, and pain. Only the pain component was used in this study.

Procedures. A total of 436 patients were screened for possible entry into the study. Forty-seven were not eligible because of the exclusion criteria, and 248 declined for logistic reasons, such as driving distance. Of the 141 subjects enrolled according to the study protocol of Parker and colleagues (2), 13 were not videotaped at both the pre-treatment and post-treatment assessment periods and therefore were eliminated from this study.

Once each subject was accepted into the study, a comprehensive medical and sociological history was obtained. The current medical profile was recorded, and medication regimes were tracked over the course of the study. Credibility questions concerning the treatment programs were administered to all subjects in the SM and AC groups, and analyses of these results showed no differences between the SM and AC groups on the credibility questions either pre- or post-treatment. See Parker and colleagues (2) for a more complete description of the questions and the analyses.

Videotaping for the pain behavior ratings and the collection of dependent measures occurred at pre-treatment, post-treatment, 3-month followup (from the end of treatment), and 15-month followup (from the end of treatment). The administration of measures and the videotaping occurred at the same time of day (± 1 hour) for each study participant. There was no financial incentive for study participation other than having travel expenses reimbursed.

Frequencies of each of the 8 pain behaviors listed in

Table 1 were rated by an independent rater who was blind to the treatment group assignment of each participant. This rater was an advanced doctoral student in clinical psychology and was 1 of the 2 raters of pain behaviors in a previous study using the same procedures, which achieved an interrater agreement rate of 96% (21).

Data analyses. The data were analyzed in the following 5 phases. First, normality tests were performed on all study variables. Second, descriptive statistics were generated, and the SM, AC, and CN groups were compared according to baseline pain behavior ratings. Third, baseline scores were used as covariates in one-way nonparametric analyses of covariance (ANCOVA) at post-treatment, the 3-month followup, and the 15-month followup (22). Fourth, Spearman correlations between the change scores from pre-treatment to post-treatment for total pain behavior and demographic variables and disease activity variables were computed. Finally, Spearman correlations between the change score from pre-treatment to each of the other assessment periods (post-treatment, 3-month followup, and 15-month followup) for total pain behavior and changes for those same assessment periods for measures of self-reported pain were computed. The analyses of baseline comparisons on demographic variables as well as the frequencies of dropouts and medication changes can be found in the report of Parker and colleagues (2). Kruskal-Wallis tests showed no significant differences among groups on any of the demographic variables noted in Table 2. The low dropout rate overall was found not to be substantially different across the 3 groups, and changes in medication regimen were randomly distributed across groups.

Table 2. Frequencies of demographic variables in the 3 treatment conditions*

Demographic variables	SM	AC	CN	Total
Sex				
Male	26	23	23	72
Female	18	19	19	56
Location				
Veterans' hospital	17	17	16	50
Medical center	12	8	11	31
Private practice	15	17	15	47
Income				
<$3,500	2	0	3	5
$3,500–$7,000	3	7	5	15
$7,000–$10,000	7	7	3	17
$10,000–$15,000	4	7	9	20
$15,000–$20,000	11	6	6	23
>$20,000	17	15	16	48
Employment				
Retired/disabled	31	25	25	81
>30 hrs per week	8	13	12	33
<30 hrs per week	0	4	4	8
Unemployed	5	0	1	6
Living arrangements				
Married	35	31	35	101
Divorced	4	6	5	15
Widowed	3	4	2	9
Single	2	1	0	3
Functional class				
I	10	12	5	27
II	28	27	33	88
III	6	3	4	13
Anatomic stage				
I	13	9	10	32
II	13	17	15	45
III	14	12	10	36
Missing				15
Corticosteroid use	21	23	18	62
Absence of comorbidity	23	27	18	68

* SM = stress management group; AC = attention control group; CN = standard care control group.

RESULTS

Normality tests. All demographic variables and pain behaviors were examined for normality. These variables were found to be skewed, so nonparametric statistical methods were used.

Analyses of intervention effects on pain behavior. The means and standard deviations for each of the pain behaviors (e.g., guarding) and total pain behavior at each assessment period (i.e., pre-treatment, post-treatment, 3-month followup, 6-month followup) are reported in Table 3. One-way nonparametric ANCOVAs on each of the pain behaviors failed to reveal a significant group effect at post-intervention, the 3-month followup, or the 15-month followup using an alpha level of 0.05. In addition, a one-way nonparametric ANCOVA failed to reveal a significant group effect for the total pain behavior at post-intervention, the 3-month followup, or the 15-month followup. Thus, the stress management training conducted in individual sessions showed no significant effects on pain behavior.

Relationship of demographic variables to change in total pain behavior. In an effort to assess the impact of continuous demographic variables on the amount of change in pain behaviors, Spearman correlations were computed with the total sample (n = 128). Although the change in pain behavior total was not significantly correlated with socioeconomic status (r = 0.04; $P = 0.63$), it was significantly correlated with both age (r = −0.25; $P < 0.01$) and duration of disease (r = 0.22; $P = 0.01$). That is, there was a greater amount of change in pain behaviors for younger patients and for those who had RA for a longer time period.

Relationship of baseline and change in disease activity to change in total pain behavior. The change in total pain behaviors from pre-treatment to post-treatment was examined for the total sample with indicators of disease activity. Significant negative correlations were found for total joint count with swelling (r = −0.37; $P = 0.0001$), total active joint count (r = −0.29; $P = 0.001$), and disease severity rating (r = −0.20; $P = 0.02$). Therefore, persons with RA who had less swelling, fewer active joint counts, and a less severe disease rating tended to experience more positive change in pain behaviors.

Table 3. Means and standard deviations for pain behaviors by condition and assessment*

Pain behavior	SM	AC	CN
Guarding			
Pre-treatment	2.52 ± 3.02	1.84 ± 2.76	2.02 ± 2.98
Post-treatment	1.93 ± 3.14	2.36 ± 3.18	1.60 ± 2.75
3-month followup	2.07 ± 3.14	2.03 ± 2.92	1.61 ± 2.52
15-month followup	2.08 ± 3.10	1.97 ± 3.12	1.53 ± 2.93
Bracing			
Pre-treatment	0.11 ± 0.54	0.10 ± 0.62	0.33 ± 1.20
Post-treatment	0.39 ± 1.22	0.14 ± 0.93	0.43 ± 1.42
3-month followup	0.34 ± 1.17	0.11 ± 0.45	0.21 ± 0.70
15-month followup	0.28 ± 1.22	0.17 ± 0.74	0.16 ± 0.97
Grimacing			
Pre-treatment	0.23 ± 0.52	0.21 ± 0.68	0.24 ± 0.82
Post-treatment	0.25 ± 0.65	0.17 ± 0.49	0.17 ± 0.70
3-month followup	0.12 ± 0.33	0.18 ± 0.69	0.37 ± 1.05
15-month followup	0.23 ± 0.70	0.25 ± 0.81	0.13 ± 0.53
Sighing			
Pre-treatment	0.20 ± 0.55	0.10 ± 0.30	0.10 ± 0.37
Post-treatment	0.16 ± 0.43	0.12 ± 0.45	0.10 ± 0.30
3-month followup	0.17 ± 0.38	0.11 ± 0.31	0.11 ± 0.39
15-month followup	0.23 ± 0.53	0.36 ± 0.68	0.11 ± 0.39
Rigidity			
Pre-treatment	0.66 ± 2.05	0.76 ± 2.21	0.31 ± 1.57
Post-treatment	0.36 ± 1.43	0.40 ± 1.55	0.60 ± 2.13
3-month followup	0.44 ± 1.98	0.13 ± 0.58	0.39 ± 1.22
15-month followup	0.15 ± 0.95	0.33 ± 1.04	0.29 ± 1.23
Active rubbing			
Pre-treatment	0.20 ± 0.63	0.07 ± 0.34	0.36 ± 1.01
Post-treatment	0.11 ± 0.32	0.00 ± 0.00	0.07 ± 0.34
3-month followup	0.32 ± 1.21	0.13 ± 0.66	0.26 ± 0.86
15-month followup	0.25 ± 0.93	0.08 ± 0.28	0.21 ± 0.58
Self-stimulation			
Pre-treatment	5.14 ± 3.68	5.60 ± 4.51	5.38 ± 4.65
Post-treatment	4.45 ± 4.20	6.12 ± 4.85	4.50 ± 4.35
3-month followup	5.05 ± 4.26	5.76 ± 4.39	5.16 ± 4.59
15-month followup	3.03 ± 3.53	5.08 ± 4.03	4.18 ± 4.24
Passive rubbing			
Pre-treatment	8.30 ± 4.50	8.12 ± 5.64	8.19 ± 5.31
Post-treatment	7.45 ± 5.01	8.00 ± 5.41	8.76 ± 5.39
3-month followup	8.12 ± 5.43	10.24 ± 4.93	9.66 ± 5.81
15-month followup	6.73 ± 5.80	8.67 ± 5.06	8.16 ± 6.04
Total pain behaviors			
Pre-treatment	17.36 ± 7.70	16.81 ± 10.36	16.93 ± 10.54
Post-treatment	15.11 ± 8.79	17.31 ± 8.50	16.21 ± 10.31
3-month followup	16.63 ± 8.94	18.68 ± 8.37	17.76 ± 10.09
15-month followup	12.95 ± 8.72	16.92 ± 7.37	14.76 ± 10.79

* SM = stress management group; AC = attention control group; CN = standard care control group. See "Subjects and Methods" for details of intervention. SM group: n = 44 (pre- and post-treatment); n = 41 (3-month followup); n = 40 (15-month followup). AC group: n = 42 (pre- and post-treatment); n = 38 (3-month followup); n = 36 (15-month followup). CN group: n = 44 (pre- and post-treatment); n = 40 (3-month followup); n = 39 (15-month followup).

The changes in indicators of disease activity were correlated with the change in total pain behaviors from pre-treatment to post-treatment. Significant positive correlations were found for change in total active joint count ($r = 0.46$; $P = 0.001$), change in disease severity rating ($r = 0.31$; $P = 0.0004$), change in total pain and tenderness count ($r = 0.22$; $P = 0.01$), and change in total involved joint count ($r = 0.20$; $P = 0.02$). In sum, persons with RA who exhibited positive change in pain behaviors also tended to show positive change in total active and involved joint counts, disease severity ratings, and total pain and tenderness count.

Relationship of change in self-reported pain to change in total pain behavior. Finally, the change in total pain behavior from pre-treatment to post-treatment, pre-treatment

Table 4. Means and standard deviations for self-reported pain measures by assessment period

Pain measure	Pre-treatment	Post-treatment	3-month	15-month
McGill Pain Questionnaire				
Sensory pain	10.12 ± 7.55	9.10 ± 7.32	9.28 ± 6.83	8.46 ± 7.31
Affective pain	1.03 ± 1.64	1.06 ± 1.76	1.18 ± 1.99	1.10 ± 1.82
Evaluative pain	1.49 ± 1.27	1.47 ± 1.29	1.48 ± 1.27	1.45 ± 1.32
Miscellaneous pain	2.10 ± 2.48	1.84 ± 2.41	2.17 ± 2.77	1.78 ± 2.41
Present pain intensity	1.74 ± 1.02	1.66 ± 1.11	1.81 ± 1.07	1.68 ± 1.20
Percentage of body in pain	7.40 ± 8.77	5.97 ± 5.35	7.67 ± 8.97	7.10 ± 8.16
Number of words chosen	6.38 ± 4.43	5.86 ± 4.51	6.32 ± 4.35	5.87 ± 4.76
Visual Analog Scale	3.72 ± 2.24	3.38 ± 1.91	3.83 ± 2.01	3.69 ± 2.13
AIMS*: pain symptoms	5.27 ± 1.87	5.23 ± 1.82	5.20 ± 1.94	4.98 ± 2.11

* AIMS = Arthritis Impact Measurement Scales.

to 3-month followup, and pre-treatment to 15-month followup was correlated with the change in self-reported pain for the same assessment periods. Subjects reported their current pain using the MPQ (using 7 subscales), their pain in the last week using the VAS, and their pain "during the last month" with the pain component score of the AIMS. The means and standard deviations for each of the self-report pain measures are reported in Table 4, and the 27 correlations are presented in Table 5. Only 1 of the correlations (change in the MPQ subscale of pain intensity with change in pain behavior at the 3-month followup) was significant at the $P < 0.05$ level. However, it would not be significant if a Bonferroni correction were used. Therefore, the change in total behavior was not significantly correlated with the change in self-reported pain at any of the assessment periods.

DISCUSSION

This study investigated the short- and long-term effects of stress management training on pain behavior exhibited by persons with RA. It also examined the relationship of change in total pain behavior from pre- to post-intervention to major demographic characteristics of the patients as well as to both the initial assessment of disease activity and the change in disease activity. Finally, the changes in total pain behavior from pre-treatment for the followup assessment periods (post-treatment, 3-month followup, and 15-month followup) were correlated with changes in the self-report pain measures for the same periods.

Table 5. Correlations of change in total pain behaviors with self-reported pain measures*

Pain measures	Time 1–2	Time 1–3	Time 1–4
McGill Pain Questionnaire			
Sensory pain	0.02	0.06	0.12
Affective pain	−0.08	0.01	0.07
Evaluative pain	0.13	0.03	0.06
Miscellaneous pain	−0.16	0.03	0.06
Present pain intensity	0.11	0.24†	0.09
Percentage of body in pain	−0.16	−0.03	−0.06
Number of words chosen	−0.05	0.05	0.10
Visual Analog Scale	−0.09	0.10	0.06
AIMS‡: Pain symptoms	−0.05	0.16	0.08

* Time 1 = pre-treatment; time 2 = post-treatment; time 3 = 3-month followup; time 4 = 15-month followup.
† $P < 0.05$.
‡ AIMS = Arthritis Impact Measurement Scales.

The primary finding in this study was that pain behavior did not appear to be responsive to the stress management treatment at post-treatment, 3-month followup, or 15-month followup. These results are not completely consistent with what Bradley and colleagues (1) found in their study of the effects of a cognitive–behavioral treatment (CBT) intervention in comparison to a social support program and a control group. Although Bradley and colleagues found a post-treatment difference after a 15-week treatment, with the CBT group showing significantly less total pain behavior than the other 2 groups, at the 6-month followup there was no significant difference among the groups. However, the authors noted that in the CBT group "there was a great deal of variation among subjects in application of their coping skills after treatment was terminated" (p. 1113). In the present study, the cognitive–behavioral (i.e., stress management) treatment was shorter (10 sessions) than in the Bradley study (1), and this may have been a factor in the lack of statistical differences among groups at post-treatment for total pain behavior. Also, the stress management treatment in this study consisted of individual sessions, whereas Bradley and colleagues (1) included family members and close friends in small group sessions. These significant others may have helped the participants in that treatment condition to be more aware of their pain behavior or even to actively encourage change in pain behavior. The followup visits in this study were designed to actively encourage the SM group to continue using cognitive–behavioral strategies to cope with daily stressors. However, just as in the Bradley study (1), there were no significant differences among the groups on pain behaviors at followup.

Within the total sample, the change in total pain behavior from pre- to post-intervention varied quite widely regardless of group assignment. Although change in total pain behavior did not have a significant relationship with socioeconomic status, it did have a significant negative correlation with age and a significant positive correlation with duration of disease. These findings indicate that younger patients and those who have had RA for a longer period of time are more likely to exhibit greater change in pain behavior. For younger patients, a return to nonpain

behaviors may happen more easily, yet persons who have had RA for a long time may have more pain behavior that can change and, therefore, more opportunity for improvement.

Another finding in this study was that persons with RA with less joint swelling, fewer active joint counts, or a less severe disease rating tended to exhibit more change in pain behaviors. These results coincide with the finding of Parker and colleagues (21) that pain behavior in a group of 31 male veterans with RA was significantly related to disease activity. Anderson and colleagues (6,7) also found that pain behaviors were significantly associated with rheumatic disease activity.

Finally, these results suggest that change in total pain behavior over time is not significantly related to change in self-reported level of pain. Thus, the results in this study correspond with Parker and colleagues' (21) findings and with their suggestion that pain behavior may be more closely related to disease activity than to self-reported pain, health status, or perceived self-efficacy. In fact, Parker and colleagues suggested that behaviors such as bracing and guarding might be better labeled "illness behavior" as opposed to strictly pain behavior because RA is a systemic disease with destructive effects on the joints.

It is important to note some of the limitations of the study. First, all of the participants in this study were from the Midwest, although efforts were made to increase the generalizability of the findings by including patients from 3 types of clinic sites (i.e., Veterans Affairs medical center, university clinic, and private practice). Second, there might have been some mono-method bias in that 1 judge made all the ratings of pain behavior. It is not known how ratings made by a counselor or by a clinical examiner might relate to ratings made by external judges. Anderson and colleagues (6) found significant differences between the frequencies of pain behavior observed by trained observers during physical examinations and the frequencies observed during videotaped sessions, such as the ones used in this study.

This study examined the utility of the variable of pain behavior as an outcome measure. In summary, the results suggest that stress management interventions based on cognitive–behavioral principles do not have a significant impact on reducing overt pain behaviors for persons with RA. Pain behaviors appear to be related to disease activity, age, and disease duration, but not to self-reported measures of pain. The application of objective measures of pain (or possibly illness) behavior appear to have clinical relevance for persons with RA. As Anderson and colleagues (6) suggest, "brief observations of pain behaviors may aid health professionals in their clinical evaluation and treatment of RA patients" (p. 42). However, it is important to learn more about the variable of pain behavior and its potential for usefulness as an outcome measure in research.

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