



# Further evaluation of the pain stages of change questionnaire: is the transtheoretical model of change useful for patients with chronic pain?

Mark P. Jensen<sup>a, b, \*</sup>, Warren R. Nielson<sup>c, d</sup>, Joan M. Romano<sup>b, e</sup>,  
Marilyn L. Hill<sup>d</sup>, Judith A. Turner<sup>a, b, e</sup>

<sup>a</sup>Department of Rehabilitation Medicine, Box 356490, University of Washington School of Medicine, Seattle, WA 98195-6490, USA

<sup>b</sup>Multidisciplinary Pain Center, University of Washington Medical Center–Roosevelt, 4245 Roosevelt Way Northeast, Seattle, WA 98105-6920, USA

<sup>c</sup>Department of Medicine, Division of Rheumatology, University of Western Ontario, London, Ontario, N6A 5A5, Canada

<sup>d</sup>Rheumatology Day Care Program, London Health Sciences Centre, London, Ontario, N6A 5A5, Canada

<sup>e</sup>Department of Psychiatry and Behavioral Sciences, Box 356560, University of Washington School of Medicine, Seattle, WA 98195-6560, USA

Received 21 June 1999; received in revised form 10 January 2000; accepted 31 January 2000

## Abstract

Patient readiness to adopt new beliefs and coping responses to pain may predict response to multidisciplinary or cognitive-behavioral pain treatments that emphasize changes in beliefs and coping behaviors. According to the transtheoretical model of change, individuals go through specific stages in the process of changing maladaptive behaviors. Based on this model, Kerns et al. (1997) (Kerns RD, Rosenberg R, Jamison RN, Caudill MA, Haythornthwaite J. Readiness to adopt a self-management approach to chronic pain: the Pain Stages of Change Questionnaire (PSOCQ). *Pain* 1997;72:227–234) developed a measure of readiness to adopt a self-management approach to pain problems (the Pain Stages of Change Questionnaire; PSOCQ) and provided preliminary data supporting the validity of the measure. The current study sought to further evaluate the PSOCQ by determining the generalizability of these preliminary findings and the ability of the PSOCQ to classify persons with chronic pain into specific stages of readiness to self-manage pain. One hundred ten patients with diverse chronic pain problems, and 119 patients with fibromyalgia completed the PSOCQ and two measures of pain-related beliefs and coping prior to entry into two separate multidisciplinary pain programs. The internal consistency and concurrent validity of the PSOCQ subscales were largely replicated, supporting the validity of the subscales as measures of readiness to self-manage pain. However, the PSOCQ demonstrated less utility as a tool for classifying individuals into one of four specific stages of readiness to adopt a self-management approach. This result may be due to the classification procedure used in the current study, the characteristics of the samples in the study, specific limitations of the measure, and/or limitations in the applicability of the transtheoretical model of change to patients with chronic pain. © 2000 International Association for the Study of Pain. Published by Elsevier Science B.V. All rights reserved.

**Keywords:** Pain Stages of Change Questionnaire; Chronic pain; Stages of change

## 1. Introduction

A growing body of research supports the effectiveness of psychological treatments for chronic pain problems (such as cognitive-behavioral therapy, multidisciplinary treatment, and relaxation training; see reviews by Keefe et al., 1992; NIH Technology Assessment Panel on Integration of Behavioral and relaxation Approaches into the treatment of Chronic Pain and Insomnia, 1996; Compas et al., 1998; Morley et al., 1999). However, many individuals either do not improve or relapse following initial improvement after such treatments (Turk, 1990; Turk and Rudy, 1991).

Although there are many potential reasons for treatment failure, including the possibility that some treatments are effective only for subgroups of patients (Turk, 1990), one explanation may be patient lack of readiness to change behavior.

Unlike many traditional biomedical treatments, psychologically based pain treatments require patients to make substantial changes in the way they view and cope with pain. Patients are guided to identify and change those beliefs and behaviors that may be ineffective or even maladaptive, and to adopt coping strategies, beliefs, and behaviors that are thought to lead to decreased pain and disability. Only individuals ready to consider making these changes would be expected to benefit from psychological pain treatments (Jensen, 1996; Kerns et al., 1997).

\* Corresponding author. Tel.: +1-206-543-3185; fax: +1-206-685-3244.

E-mail address: mjensen@u.washington.edu (M.P. Jensen)

DiClemente and Prochaska (DiClemente and Prochaska, 1982; Prochaska et al., 1992a) have studied the processes involved in changing maladaptive behaviors. According to their transtheoretical model of change, people pass through specific stages in the process of changing problem behaviors. These stages are: precontemplation (not considering any change in behavior), contemplation (serious consideration of change sometime in the future), preparation (initial behavioral steps towards change), action (concrete activities that will lead to the desired change), and maintenance (active efforts to sustain the changes made).

Prochaska et al.'s (1992a) model of change makes specific predictions concerning the relationships between stage of change and behavior. The model predicts, for example, that people in different change stages should evidence different treatment success rates, with those persons in the action stage more likely to benefit than those in the precontemplation stage. Treatment outcome research supports this prediction for both smoking cessation (Ockene et al., 1988; Prochaska et al., 1992a) and weight control (Prochaska et al., 1992b). Similarly, the model predicts that a person's behavior should reflect his or her change stage. For example, by definition, precontemplators would be expected to disagree with suggestions that a change in behavior is needed, and would not be expected to exert effort towards making changes in the 'problem' behavior. Individuals in the action stage, on the other hand, would be expected to endorse the need for change and engage in specific behaviors that would lead to changes in the problem behavior. Using the stages of change model as a starting point, Miller and his colleagues (cf. Miller and Rollnick, 1991) developed a therapeutic model of change, which suggests specific therapeutic responses that facilitate movement from one stage to the next, and therefore facilitate behavior change.

The stages of change model has the potential to shed light on reasons for differences in patient outcomes after cognitive-behavioral or multidisciplinary pain treatment, and to help identify those individuals most likely to benefit from such treatment. Furthermore, the identification of a particular patient's stage of change might enable a treatment to be individually tailored according to that stage, which in turn might improve the chances of treatment success (Miller and Rollnick, 1991; Jensen, 1996; Kerns et al., 1997). Before such goals can be realized, a valid and reliable measure of readiness to change pain-related beliefs, coping strategies, and behaviors is needed. Towards this end, Kerns et al. (1997) recently developed a measure of readiness to adopt a self-management approach to pain problems; the Pain Stages of Change Questionnaire (PSOCQ). Although Kerns et al. (1997) originally sought to develop a measure with five scales (each assessing one of the five stages in Prochaska and DiClemente's model, see Prochaska et al., 1992a), the resulting Contemplation and Preparation scales were closely related, so the items from these scales were combined into a single scale that they labeled Contemplation. The four resulting scales (Precontemplation, Contem-

plation, Action, and Maintenance) were shown to have good to excellent internal consistency (Cronbach's alphas ranged from 0.77 to 0.86) and good to excellent test-retest stability (over a 1–2 week period; test-retest correlations ranged from 0.74 to 0.88). Interscale correlations indicated a very strong association (correlation coefficient = 0.80) between the Action and Maintenance scales, but more distinctiveness (range = -0.42–0.23) among the other scales.

Preliminary evidence for the validity for the PSOCQ scales was found in their associations with other pain-related measures in hypothesized directions (Kerns et al., 1997). For example, the Precontemplation scale was negatively and significantly associated with measures of belief in control over pain and active coping behaviors. The Action and Maintenance scales were associated positively with belief in control over pain and active coping. Although the Contemplation scale evidenced a weaker association with the belief and coping measures, the results suggested that this scale is associated positively with belief in control over pain and with active coping. In a subsequent study, Kerns and Rosenberg (2000) found that the PSOCQ Precontemplation and Contemplation scales distinguished patients who participated in chronic pain self-management treatment from those who either declined to participate or dropped out. Moreover, treatment-related changes in the Action and Maintenance scales were associated with improved patient outcomes, suggesting the possibility that increased commitment to a self-management approach may mediate, at least in part, treatment outcome (Kerns and Rosenberg, 2000). Given these positive preliminary findings, there is a need for additional research to further evaluate the PSOCQ.

The primary purpose of the current study was to further examine the psychometric properties of the PSOCQ in two new samples of patients with chronic pain that differ in terms of diagnoses, geographic location, and treatment care setting. The use of two different patient samples provides an assessment of the generalizability of the study results regarding the validity and reliability of the PSOCQ as a measure of readiness to adopt self-management strategies for chronic pain.

Based on the preliminary data reported by Kerns et al. (1997) and the transtheoretical model of change, we hypothesized that Precontemplation scale scores would be associated negatively with beliefs and coping strategies consistent with an active self-management approach (belief in control over pain, use of relaxation, task persistence, exercise, and coping self-statements) and positively with beliefs and coping strategies inconsistent with a self-management approach (beliefs that one is disabled, that hurt equals harm and that activity should be avoided, that others should be solicitous in response to pain, and that an eventual medical cure for pain exists; guarding, resting, and asking for assistance when one has increased pain). We hypothesized that the Action and Maintenance scales would show the opposite pattern of relationships. Given that contemplation is viewed as a transition stage from

precontemplation to action, and consistent with the findings of Kerns et al. (1997), we hypothesized that the Contemplation scale would be more weakly associated than the other scales with the measures of beliefs and coping. However, we expected the associations to be in the same direction as those of the Action and Maintenance scales. Because the study participants were about to enter treatment that emphasizes self-management of chronic pain, we reasoned that most precontemplators (individuals not interested or willing to participate in learning self-management skills) would have been screened out, and that those in the action and maintenance stages (for pain self-management) would not require treatment. We therefore hypothesized that the majority of the study participants would be classified as contemplators. Finally, we hypothesized that patients classified into the four stages would differ in beliefs and coping strategies, with those in the latter stages endorsing more adaptive beliefs and coping strategy use, and fewer maladaptive beliefs and coping strategy use than those in the 'earlier' stages.

## 2. Methods

### 2.1. Participants

#### 2.1.1. Pain clinic sample

The pain clinic sample consisted of 110 patients with chronic pain who were recruited as part of an ongoing longitudinal study of multidisciplinary pain treatment, approved by the University of Washington institutional review board. These participants were recruited from patients over the age of 17 at the time of entering the University of Washington Multidisciplinary Pain Management Program. Prior to being accepted for the pain treatment program, all patients underwent a medical and psychological evaluation. Patients were excluded from treatment (and therefore participation in the study) if the medical evaluation revealed any surgically remediable causes of pain, complicating medical conditions requiring treatment, or other disease processes that might significantly affect ability to participate in active physical therapy. They were also excluded if the psychological evaluation revealed current substance abuse or severe psychopathology (e.g. psychosis) that would not allow the patient to tolerate the requirements of a structured pain management program. Patients were also excluded from the study if they could not read, speak, or write English.

Of 139 eligible patients during the time of PSOCQ data collection, 110 (79%) enrolled in the study. The 110 patients who enrolled were compared with the 29 patients who declined to participate on age, gender, and measures of pain duration, average pain intensity (0–10 scale), disability (Roland Scale; Roland and Morris, 1983), race/ethnic status, marital status, compensation status, education level, employment status, and site of primary pain. Comparisons were made using t-tests for continuous measures and chi-

square tests for categorical measures. No significant differences were found for age, pain duration, average pain intensity, disability, gender, ethnicity, marital status, pain site, compensation status, or employment status. However, participants were more likely than those who declined participation to have been educated beyond high school (71 vs. 28%, chi-square = 18.26,  $P < 0.001$ ).

Average age of the pain clinic sample was 44.09 years (range = 23–74) and 54% were female. Seventy percent were married, and the remainder were unmarried and living alone (20%), unmarried but cohabiting (6%), or separated (4%). Ethnicity was reported as Caucasian by 89%, African-American by 2%, Asian by 2%, Hispanic by 2%, Native American by 1%, and 'other' by 4%. Primary pain site varied, with 30% presenting with low back pain, 17% shoulder/arm pain, 16% neck pain, 15% leg or foot pain, 7% head pain, and the remainder a variety of other pain sites. Pain duration ranged from 7 months to 48 years ( $M = 6.32$  years, median = 3.08 years). Fourteen percent had an education level less than high school, 16% had a high school education or equivalent, and the remaining had at least some college or technical school training. Sixty-three percent reported receiving some financial compensation for pain and 65% reported being unemployed due to pain.

#### 2.1.2. Fibromyalgia sample

The fibromyalgia sample consisted of 119 individuals with fibromyalgia who were part of an ongoing study evaluating the effectiveness of a multidisciplinary treatment program at London Health Sciences Centre, a teaching hospital affiliated with the University of Western Ontario. All participants were first screened by a rheumatologist who ensured that they met the American College of Rheumatology 1990 diagnostic criteria for fibromyalgia (Wolfe et al., 1990). The medical assessment also excluded patients who had medically treatable illnesses that accounted for their symptoms or who were unable to participate in physical therapy because of a medical condition. A second evaluation by a clinical psychologist screened out patients who had severe psychological disorders that would prevent them from benefiting from a multidisciplinary treatment program (e.g. psychoses, severe major depression). Those who were unable to read or write English were also excluded.

The PSOCQ and other measures (described below) were administered as part of the evaluation and outcomes assessment of treatment and no person who agreed to be treated declined to complete the measures. Average age of the fibromyalgia sample was 46.08 years (range = 20–67), and 103 (87%) were female. Sixty-nine percent were married, and the remainder were unmarried and living alone (20%), unmarried but cohabiting (6%), or separated (5%). Pain duration ranged from 9 months to 39 years ( $M = 6.90$  years, median = 5.25 years). Eleven percent had an education level less than high school, 47% had a high school education or equivalent, and the remaining participants had at least some college or technical school training. Forty-six

percent reported receiving some financial compensation for pain, with the majority of these receiving some form of government disability (28%) or private insurance long-term disability (38%).

## 2.2. Measures

### 2.2.1. Stage of change

Patients in both samples were administered the Pain Stages of Change Questionnaire (PSOCQ; Kerns et al. 1997). Sample items for each of the four PSOCQ scales are as follows. Precontemplation: 'All this talk about how to cope better with pain is a waste of my time.' Contemplation: 'I have been thinking that the way I cope with my pain could improve.' Action: 'I am testing out some coping skills to manage my pain better.' Maintenance: 'I have made lots of progress in coping with my pain.' The psychometric properties of the four scales of the PSOCQ in the scale development sample were described above. Given the significant association among most pairs of the PSOCQ scale scores (Kerns et al., 1997), we also computed a 'Total' PSOCQ score by averaging the four scale scores (reverse-scoring the Precontemplation scale) and explored the association between this overall measure of readiness to self-manage pain and the criterion variables, described below. In addition, we classified each patient as being in one of four stages based on his or her relative score on each of the PSOCQ scales; the scale with the highest score determined the stage classification.

### 2.2.2. Pain beliefs

Patients in both samples were administered a slightly reworded version of the 57-item Survey of Pain Attitudes (SOPA, Jensen et al., 1994), which assesses seven pain-related beliefs hypothesized to be associated with adjustment to chronic pain (Twenty-three items were reworded slightly for increased clarity. For example, item 2, 'The pain I usually experience is a signal that damage is being done,' was reworded as 'The pain I feel is a sign that damage is being done,' and item 20, 'My pain is not emotional, it is purely physical,' was reworded as 'My pain is physical, not emotional.'). The SOPA scales have demonstrated adequate to excellent reliability (alpha coefficients ranged from 0.71 to 0.81, test-retest reliability over a 6-week period on average ranged from 0.63 to 0.68; Jensen et al., 1994). The validity of the SOPA scales has been demonstrated through their significant associations, in predicted directions, with measures of psychological and physical functioning (Jensen and Karoly, 1992; Strong et al., 1992; Jensen et al., 1994).

### 2.2.3. Coping

The Chronic Pain Coping Inventory (CPCI, Jensen et al., 1995) was used to assess coping responses to pain. This 65-item measure includes eight scale scores and three measures of medication use. The scales of the CPCI have demonstrated adequate to excellent internal consistency and test-

retest stability in a previous sample of patients with chronic pain (alpha coefficients ranged from 0.74 to 0.89, test-retest reliability over a 2-week period on average ranged from 0.66 to 0.90; Jensen et al., 1995). The validity of four scales of the CPCI (Guarding, Resting, Asking for Assistance, and Task Persistence) was supported by their associations with patient- and spouse-reported patient adjustment. Six of the scales used in this study (Guarding, Opioid Medication Use, Sedative-Hypnotic Medication Use, Resting, Asking for Assistance, and Exercise/Stretch) demonstrated moderate to strong relationships between patient and spouse versions, further supporting their validity (Jensen et al., 1995).

## 2.3. Procedure

### 2.3.1. Pain clinic sample

Just before their initial evaluation at a large university medical center pain center, patients completed at home a questionnaire containing pain history and sociodemographic questions. Patients who were accepted and enrolled for treatment in a multidisciplinary pain management program were approached to participate in the study. Those who were eligible, agreed to participate, and gave informed consent, were administered telephone interview versions of each of the other measures described above at the beginning of treatment. The pain program is a 3-week (5.5 days per week) outpatient treatment program aimed at improving pain management skills and physical and psychological functioning. It includes physical therapy, occupational therapy, individual cognitive-behavioral psychotherapy, vocational counseling (if indicated), group pain education and coping skills training, and the tapering of opioid and sedative-hypnotic medications (when indicated).

### 2.3.2. Fibromyalgia sample

Those in the second sample completed a battery of questionnaires as part of their psychological assessment prior to entering the treatment program. The Fibromyalgia Program at London Health Sciences Centre is a 4-week (5 days per week) outpatient treatment program that includes cognitive-behavioral therapy (cognitive restructuring, reduction of pain behaviors, assertiveness training, relaxation training, electromyographic [EMG] biofeedback), education about fibromyalgia, physiotherapy (stretching, strengthening and cardiovascular conditioning exercises), occupational therapy (principles of energy conservation and pacing), and tapering of opioid and sedative-hypnotic medications where appropriate.

## 3. Results

### 3.1. Pain stages of change questionnaire scores in the two samples

The first purpose of this study was to examine the psychometric properties of the PSOCQ in two new samples of

Table 1  
Means and standard deviations of the Pain Stages of Change Questionnaire scale scores and total score

PSOCQ scale	Pain clinic sample (N = 110)		Fibromyalgia sample (N = 119)		T-value for the difference between means (df = 227)
	Mean (SD)	Cronbach's alpha	Mean (SD)	Cronbach's alpha	
Precontemplation	2.79 (0.68)	0.75	2.43 (0.58)	0.70	4.29*
Contemplation	4.10 (0.48)	0.79	4.17 (0.53)	0.87	1.05
Action	3.75 (0.65)	0.80	3.39 (0.70)	0.83	4.04*
Maintenance	3.51 (0.48)	0.88	3.49 (0.67)	0.86	0.26
Total	3.64 (0.48)	0.70 <sup>a</sup>	3.65 (0.43)	0.77 <sup>a</sup>	0.17

<sup>a</sup> Calculated assuming each PSOCQ scale score is an 'item' of a four-item scale of total readiness to change, with Precontemplation reverse-scored.  
\* $P < 0.01$ .

persons with chronic pain. Table 1 presents the means, standard deviations, and internal consistency measures of the PSOCQ scale scores for each sample. Internal consistency coefficients were greater than or equal to 0.70 for all subscales in both samples, and are consistent with those reported by Kerns et al. (1997). In order to determine the overall similarity of the two samples with respect to readiness to self-manage pain, five *t*-tests were performed, one for each of the scores from the PSOCQ. As can be seen, the pain clinic patients had higher mean scores on the Precontemplation ( $t(227) = 4.29, P < 0.01$ ) and Action ( $t(227) = 4.04, P < 0.01$ ) scales than did the fibromyalgia patients. No significant differences between the two samples were found for the Contemplation, Maintenance, or Total scale scores.

### 3.2. Associations among the PSOCQ scales

Table 2 shows the PSOCQ scale score interrelations, calculated separately for the two samples. The associations among the scales for the two samples are remarkably similar, and are also similar to the associations found in the original scale development sample (Kerns et al., 1997). Strong associations ( $r_s = 0.79$  and  $0.74$  in the pain clinic and fibromyalgia samples, respectively;  $r = 0.80$  in the scale development sample, Kerns et al., 1997) were found between the Action and Maintenance scales. However, the

associations between Maintenance and Contemplation ( $r_s = 0.14$  and  $-0.04$  in the pain clinic and fibromyalgia samples, respectively;  $r = 0.12$  in the original scale development sample, Kerns et al., 1997) were consistently non-significant, and smaller than those between Action and Contemplation ( $r_s = 0.36$  and  $0.21$  in the pain clinic and fibromyalgia samples, respectively;  $r = 0.23$  in the original scale development sample), indicating that individuals contemplating action are somewhat more likely to endorse action items than maintenance items. Precontemplation was negatively associated with Contemplation, Action, and Maintenance in both samples, although one of the coefficients (representing the correlation between Precontemplation and Contemplation) was non-significant in the fibromyalgia sample.

### 3.3. Validity of the PSOCQ

Table 3 presents the correlations between the PSOCQ scales and the criterion measures, separately for each sample. In order to control for alpha inflation due to the large number of coefficients computed, a modified (multi-stage) Bonferroni approach for each family of analyses (beliefs and coping for each of the two samples) was used to determine the significance level needed to conclude that an association differs significantly from zero at the  $P < 0.05$  level (Larzelere and Mulaik, 1977) (This method involves

Table 2  
Pain Stages of Pain Questionnaire interscale correlation coefficients

PSOCQ scale	Contemplation	Action	Maintenance	Total
<i>Pain clinic sample (N = 110)</i>				
Precontemplation	-0.23*	-0.38***	-0.28**	-0.66***
Contemplation		0.36***	0.14	0.51***
Action			0.79***	0.89***
Maintenance				0.82***
<i>Fibromyalgia sample (N = 119)</i>				
Precontemplation	-0.14	-0.31***	-0.27**	-0.62***
Contemplation		0.21*	-0.04	0.43***
Action			0.74***	0.87***
Maintenance				0.77***

\* $P < 0.05$ , \*\* $P < 0.01$ , \*\*\* $P < 0.001$ .

Table 3  
Correlations between the PSOCQ scales and criterion measures for each sample

Belief and coping measures	PSOCQ scale				
	Pre-contemplation	Contemplation	Action	Maintenance	Total
<i>Pain clinic sample (N = 110)</i>					
Coping (Chronic Pain Coping Inventory scales)					
Guard	0.25	-0.01	-0.28	-0.29	-0.31*
Rest	0.13	0.15	0.06	0.05	0.03
Ask for assistance	0.16	-0.01	-0.03	-0.06	-0.10
Relaxation	-0.20	-0.11	0.24	0.34*	0.27
Task persistence	-0.21	0.06	0.24	0.23	0.27
Exercise/stretch	-0.15	-0.06	0.32*	0.35*	0.29
Coping self-statements	-0.19	0.07	0.18	0.11	0.19
Seek social support	-0.08	0.01	0.00	0.11	0.07
Beliefs (Survey of Pain Attitude scales)					
Pain control	-0.45*	0.28	0.55*	0.51*	0.63*
Disability	0.33*	-0.11	-0.30*	-0.33*	-0.38*
Harm	0.40*	-0.27	-0.45*	-0.36*	-0.51*
Emotion	-0.31*	0.25	0.25	0.28	0.38*
Medication	0.25	-0.16	-0.17	-0.21	-0.27
Solicitude	0.10	0.08	0.07	0.00	0.01
Medical Cure	0.32*	-0.05	-0.03	-0.06	-0.16
<i>Fibromyalgia sample (N = 119)</i>					
Coping (Chronic Pain Coping Inventory scales)					
Guard	0.21	-0.03	0.06	0.14	-0.05
Rest	-0.01	0.07	0.20	0.27	0.22
Ask for assistance	0.17	-0.09	0.04	0.12	-0.02
Relaxation	-0.06	0.07	0.32*	0.47*	0.31*
Task persistence	-0.14	0.09	0.06	0.00	0.10
Exercise/stretch	-0.12	-0.05	0.33*	0.43*	0.33*
Coping self-statements	0.00	0.05	0.26	0.36*	0.26
Seek social support	0.01	0.06	0.35*	0.35*	0.29*
Beliefs (Survey of Pain Attitude scales)					
Pain control	-0.25	0.11	0.16	0.04	0.20
Disability	0.27	-0.02	-0.13	-0.08	0.18
Harm	0.55*	-0.30*	-0.19	-0.19	-0.43*
Emotion	-0.17	0.34*	-0.08	-0.16	0.07
Medication	0.26	-0.27	-0.20	-0.14	-0.31*
Solicitude	0.22	0.07	-0.06	-0.23	-0.17
Medical cure	0.49*	-0.14	-0.19	-0.10	-0.32*

\* $P < 0.05$ , as determined using a modified (multistage) Bonferroni procedure to control for alpha inflation within each family of analyses (coping and beliefs separately for each sample) due to multiple comparisons (Larzelere and Mulaik, 1977).

determining an initial nominal significance level for each individual test using the usual Bonferroni procedure for each family of analyses; in this case, 0.05/40 for the coping coefficients from each sample and 0.05/35 for the belief coefficients from each sample. The first stage of testing is performed with this significance level. In the next stage, the remaining provisionally 'non-significant' coefficients are examined using a new nominal significance level equal to 0.05/[number of remaining 'non-significant' coefficients]. The procedure continues to as many stages as is needed to reach a point at which none of the remaining null hypotheses are rejected.) The modified Bonferroni approach was chosen over the standard Bonferroni procedure because the latter substantially increases the chances of Type II errors when true associations between variables can be expected (Larzelere and Mulaik, 1977).

As can be seen in Table 3, all of the hypothesized associations between the PSOCQ scales and the criterion measures, when statistically significant, were in the directions hypothesized. Precontemplation scores were associated with belief in little ability to control pain, belief one is disabled, and belief that emotions do not influence pain in the pain clinic sample, and belief that hurt equals harm and belief in a medical cure in both samples. In the pain clinic sample, the Action and Maintenance scales were significantly associated with use of exercise and stretching, and beliefs in ability to control pain, that one is not disabled, and that hurt does not equal harm. Maintenance was associated with the use of relaxation. In the fibromyalgia sample, the Action and Maintenance scales were not significantly associated with the belief scales, but were associated with several active coping strategies. In the pain clinic sample,

Contemplation was not significantly associated with any belief or coping scales. In the fibromyalgia sample, there were modest associations between Contemplation and belief that hurt does not equal harm and that emotions impact pain. Although the data shown in Table 3 suggest that the two samples may differ in some ways in the relationships between the PSOCQ scores and the criterion measures, only nine of 75 pairs of coefficients (12%) were found to differ significantly at the  $P < 0.05$  level or lower (see Ferguson (1976) for the method used to compare coefficients).

### 3.4. Differences between individuals in each stage

Each study participant was classified into one of four stages based on his or her highest PSOCQ scale score. For purposes of classification, when an individual had two or more scale scores that were equal, we arbitrarily placed him or her into the 'higher' of the two stages. This occurred only five times (out of 110 participants; 5%) in the pain clinic sample and five times (out of 119; 4.2%) in the fibromyalgia sample. Based on this classification procedure, only five patients in the pain clinic sample (5%) and one patient in the fibromyalgia sample (1%) were classified as precontemplators. As predicted, the majority of persons in both samples (59% of the pain clinic and 76% of the fibromyalgia sample) were classified as being in the contemplation stage. However, there were individuals in both samples whose highest score was on the Action (23% of the pain clinic and 8% of the fibromyalgia sample) and Maintenance (14% of the pain clinic and 16% of the fibromyalgia sample) scales.

One-way analyses of variance were performed to test for predicted differences among the stage of change groups in the four PSOCQ scales. To control for alpha inflation in

these analyses, a familywise Bonferroni alpha was set at 0.0125 (0.05/4) for the omnibus analyses. Tukey's HSD test was used to control for alpha inflation associated with multiple comparisons between the groups if the omnibus ANOVA was significant (Kirk, 1982). Because there were only five participants in the precontemplation stage in the pain clinic sample, and one participant in the precontemplation stage in the fibromyalgia sample, analyses compared only the contemplation, action, and maintenance groups.

As can be seen in Table 4, the results of the analyses comparing PSOCQ scale scores of the three stages of change groups indicate that the method used to classify patients into specific change stages was only partially successful in creating distinct subgroups. None of the groups differed significantly on the Precontemplation scale. In addition, patients classified as being in the action or maintenance stages did not differ significantly from one another on any of the PSOCQ scales. Only patients classified as contemplators differed significantly from the other patients on some of the PSOCQ scales. For example, in the pain clinic sample, contemplators had significantly higher scores on the Contemplation scale than did patients classified as being in the action or maintenance stages. In the fibromyalgia sample, contemplators did not differ significantly from patients in the action stage on the Contemplation scale, although their Contemplation score was significantly higher than was that of patients classified as being in the maintenance stage. In both samples, contemplators had significantly lower scores on the Action scale than did patients classified as being in the action stage, and they also had significantly lower scores on the Maintenance scale than did patients classified as being either in the action or maintenance stages. Given these findings, as well as the strong association found between the Action and Maintenance scales in both of the samples, it appears that the

Table 4  
Comparisons of patients classified into three stages on the Pain Stages of Change Questionnaire scales<sup>a</sup>

PSOCQ scale score	Classified stage			F-value
	Contemplation	Action	Maintenance	
<i>Pain clinic sample</i>				
PSOCQ scale score mean (SD)				
Precontemplation	2.80 (0.61) <sup>1</sup>	2.60 (0.64) <sup>1</sup>	2.66 (0.73) <sup>1</sup>	0.97
Contemplation	4.26 (0.40) <sup>1</sup>	3.97 (0.44) <sup>2</sup>	3.81 (0.56) <sup>2</sup>	8.41*
Action	3.59 (0.63) <sup>1,3</sup>	4.25 (0.32) <sup>2</sup>	3.94 (0.52) <sup>2,3</sup>	13.10*
Maintenance	3.27 (0.77) <sup>1</sup>	3.87 (0.39) <sup>2</sup>	4.28 (0.45) <sup>2</sup>	18.11*
<i>Fibromyalgia sample</i>				
PSOCQ scale core mean (SD)				
Precontemplation	2.45 (0.58) <sup>1</sup>	2.14 (0.31) <sup>1</sup>	2.34 (0.54) <sup>1</sup>	1.47
Contemplation	4.32 (0.41) <sup>1</sup>	3.96 (0.58) <sup>1,2</sup>	3.62 (0.57) <sup>2,3</sup>	19.97*
Action	3.29 (0.67) <sup>1</sup>	4.11 (0.58) <sup>2,3</sup>	3.58 (0.65) <sup>1,3</sup>	7.11*
Maintenance	3.35 (0.64) <sup>1</sup>	3.86 (0.64) <sup>2</sup>	4.07 (0.35) <sup>2</sup>	13.05*

<sup>a</sup> Note: means with different superscripts differ significantly ( $P < 0.05$ ), using the Tukey HSD test. Because of the small number of patients classified as being in the precontemplation stage, comparisons were limited to those between persons classified as being in the contemplation, action, and maintenance stages. \* $P < 0.0125$ .

Action and Maintenance scales tap into the same overall dimension, and that patients classified as being in the action and maintenance stages are more similar to each other than they are different from one another. Therefore, these two groups were combined in all subsequent analyses.

*T*-tests were used to compare the two stage groups (contemplators vs. those classified as being either in the action or maintenance stages) across the belief and coping measures (As an additional check on the lack of difference between patients classified as being in the action or maintenance stages, *t*-tests were used to compare those classified into these two stages across the belief and coping measures. No significant differences emerged.). To control for alpha inflation, a familywise Bonferroni alpha was set at 0.00625 (0.05/8) for the analyses involving the eight coping scales of the CPCI and 0.00714 (0.05/7) for the tests involving the seven scales of the SOPA. The only significant finding to emerge in the pain clinic sample, out of 15 tests, was for the CPCI Relaxation scale ( $t(103) = 3.04, P < 0.001$ ). In this sample, contemplators reported using relaxation less often (mean = 2.10, SD = 1.42) than did patients classified as being in the action or maintenance stages (mean = 3.07, SD = 1.70). Similarly, most of the analyses comparing beliefs and coping strategies between persons in different stages in the fibromyalgia sample failed to yield significant differences. The exceptions were for the CPCI Relaxation and CPCI Exercise/Stretching scales. Those in the action and maintenance stages indicated that they used relaxation techniques more frequently (mean = 3.07, SD = 1.73) than did those in the contemplation stage (mean = 1.90, SD = 1.73;  $t(116) = 3.74, P < 0.0001$ ). Those in the former stage reported doing exercises more often (mean = 4.18, SD = 1.62) than did those in the latter (mean = 3.09, SD = 1.88;  $t(116) = 2.80, P < 0.01$ ).

#### 4. Discussion

The results of this study are generally consistent with those reported by Kerns et al. (1997), and provide additional support for the internal consistency of the PSOCQ scale scores in two new and distinct samples of persons with chronic pain. In both samples in the present study, the four PSOCQ scales as well as a total score created by averaging the four scale scores showed adequate to excellent internal consistency (Cronbach's alpha  $\geq 0.70$  for each scale).

Consistent with the findings of Kerns et al. (1997), the pattern of associations between the PSOCQ scales and the criterion measure supports their validity in measuring receptivity to a self-management approach to chronic pain. However, more often than not, these associations were only of weak to moderate magnitude. Across both the pain clinic and fibromyalgia samples in the current study, the only relationships that were consistently significant were positive associations between Precontemplation and a

measure of the belief that pain is associated with physical damage and that activity should be avoided, between Precontemplation and the belief that health care professionals are responsible for managing and curing pain problems, between Action and the use of exercise, and between Maintenance and the use of exercise and relaxation.

The findings of this study suggest that the PSOCQ in its current form may not be useful clinically as a tool for classifying pain clinic patients accepted for multidisciplinary treatment into distinct stages. No differences were found on the measures of beliefs and coping between patients classified as being in the action vs. maintenance stages, and few differences were found between persons classified as being in the contemplation vs. the action or maintenance stages.

One possible explanation for the relative lack of differences between persons identified as being in different stages concerns the use of the 'self-management' concept as a construct for classifying patients' readiness to change. The stages of change model was developed to explain the process of change when targeting cessation of a specific problem behavior (e.g. smoking) and then maintaining this behavior change over time. In contrast, 'self-management' is a general approach to pain management, reflected by a relatively large number of behaviors and attitudes. It is possible for someone to be, simultaneously, in the precontemplation stage concerning some pain self-management behaviors (e.g. thinking that he or she will never be able to exercise regularly), in the contemplation stage concerning other behaviors (e.g. considering decreasing or stopping the use of analgesic and sedative medications), in the action stage for other behaviors (e.g. in the process of learning relaxation strategies for coping with pain), and in the maintenance stage for still other responses (e.g. regular use of coping self-statements). It is therefore possible for patients to simultaneously endorse a large number of contemplation ('I have been thinking that the way I cope with my pain could improve'), action ('I am testing out some coping skills to manage my pain better'), and maintenance ('I use what I have learned to help keep my pain under control') items concerning a number of different pain self-management beliefs and coping responses. For this reason, the trans-theoretical model of change may have less applicability to the multiple issues and responses associated with readiness to adopt a self management approach to chronic pain than it does to readiness to change relatively discrete problem behaviors.

It is also possible, however, that the difficulties encountered with classifying patients into specific stages based on their PSOCQ scores in the present study are related to the characteristics of the samples of patients chosen for this study. Patients in both samples were assessed just before beginning multidisciplinary treatment of their pain problem. The intake and screening procedures for multidisciplinary treatment likely eliminated many precontemplators and



perhaps others from the samples. Thus, many of the study participants would be expected to endorse a general readiness to learn new strategies to manage pain; they may be too similar to each other to be classified reliably into separate stages. Some evidence for this possibility can be found by examining means of the scale scores of the PSOCQ presented in Table 4. In both samples, patients classified as being in the contemplation, action, or maintenance stages (95 and 99% of the patients from the pain clinic and fibromyalgia samples, respectively), scored greater than 3 on average (indicating more agreement than disagreement with the scale items) on the Contemplation, Action, and Maintenance scales. This means that the overwhelming majority of the participants in this study tended to agree with items in all three of these scales. In short, the participants in both samples appear to be simultaneously in the contemplation, action, and maintenance stages concerning the self-management of chronic pain. It is quite possible that larger differences exist between persons in the precontemplation stage and persons in the contemplation, action, or maintenance stages. Support for this assertion comes from a recent study which found, among a group of patients offered treatment (regardless of their scores on the PSOCQ), the Precontemplation and Contemplation scales distinguished between patients who participated fully and those who chose not to participate in a chronic pain self-management treatment program (Kerns and Rosenberg, 2000). Unfortunately, it was not possible to detect differences between precontemplators and persons in the other stages reliably in the current samples, due to the small number of patients classified as being precontemplators.

It is also possible that the strategy we used to categorize patients was not the optimum method. Alternative approaches, such as the use of cluster analysis to identify specific PSOCQ profile subgroups or classifying a person's readiness stage based on the 'highest' stage for which the patient scored a 3 or more (even if the greatest absolute score was for a lower stage) could possibly yield different results. Despite these difficulties in assigning patients to change stage, the PSOCQ scale scores, including the total scale score, may be useful for predicting readiness to engage in a variety of self-management strategies, and therefore may predict treatment outcome for treatments that are based on self-management principles. Perhaps among individuals with chronic pain, readiness to adopt a self-management approach to pain management may be better conceptualized as a continuum rather than discrete stages. Future research is needed to examine these possibilities.

The limitations of this study should be noted. First, all measures were self-report, which might have artificially increased their association due to shared method variance. Although self-report is the most direct way to assess beliefs and readiness to adopt self-management strategies for coping with pain, the use of other sources of information (e.g. spouse's reports) may provide additional measures of many of the coping strategies. Second, not all of the patients

(from the pain clinic sample) who were eligible to participate chose to enroll. We therefore do not know the extent to which the findings may generalize to the population of patients seeking care for chronic pain problems in tertiary clinics, or to patients seen outside specialty pain clinics or those not accepted for multidisciplinary treatment. However, patients with chronic pain from different clinics are known to differ from one another on a number of demographic and pain-related variables (Holzman et al., 1985), so the generalizability of findings from chronic pain samples, even when all eligible patients participate, are always suspect. A strength of the current study is the use of two separate samples of persons with chronic pain. The fact that so many of the findings were similar between the two samples argues for their generalizability.

Despite the limitations of the current study, the findings help to clarify the strengths and potential weaknesses of the PSOCQ. Across two distinct samples of persons with chronic pain, the PSOCQ scales demonstrated adequate to excellent reliability and validity as measures of readiness to adopt a self-management approach to pain. On the other hand, the PSOCQ may be less useful for classifying persons with chronic pain into discrete stages of readiness to adopt a self-management approach to chronic pain. This raises the possibility that the transtheoretical model may have less applicability for individuals with chronic pain than it does for individuals with specific problem behaviors such as smoking (Prochaska et al., 1992a) or problem drinking (Miller and Rollnick, 1991). Rather, among persons with chronic pain, there are a constellation of cognitive, affective, and behavioral responses that are involved in patient adjustment, and the desired outcomes of chronic pain treatment are improvement in many areas, not just one specific behavior. Future research in additional samples of persons with chronic pain is warranted to determine the extent to which the current findings replicate, and to further explore the validity and utility of the PSOCQ.

### Acknowledgements

This study was supported, in part, by National Institutes of Health grant R01 31683 to three of the authors (MPJ, JAT, and JMR).

### References

- Compas BE, Haaga DAF, Keefe FJ, Leitenberg H, Williams DA. Sampling of empirically supported psychological treatments from health psychology: smoking, chronic pain, cancer, and bulimia nervosa, *J Consult Clin Psychol* 1998;66:89–112.
- DiClemente CC, Prochaska JO. Self-change and therapy change of smoking behavior: a comparison of processes of change in cessation and maintenance. *Addict Behav* 1982;7:133–144.
- Ferguson GA. *Statistical analysis in psychology and education*, 4th ed. New York: McGraw-Hill, 1976.

- Holzman AD, Rudy TE, Gerber KE, Turk DC, Sanders SH, Zimmerman J, Kerns RD. Chronic pain: a multiple-setting comparison of patient characteristics. *J Behav Med* 1985;8:411–422.
- Jensen MP. Enhancing motivation to change in pain treatment. In: Gatchel RJ, Turk DC, editors. *Psychological approaches to pain management: a practitioner's handbook*, New York: Guilford Press, 1996. pp. 78–111.
- Jensen MP, Karoly P. Pain-specific beliefs, perceived symptom severity, and adjustment to chronic pain. *Clin J Pain* 1992;8:123–130.
- Jensen MP, Turner JA, Romano JM, Lawler BK. Relationship of pain-specific beliefs to chronic pain adjustment. *Pain* 1994;57:301–309.
- Jensen MP, Turner JA, Romano JM, Strom SE. The Chronic Pain Coping Inventory: development and preliminary validation. *Pain* 1995;60:203–216.
- Keefe FJ, Salley AN, Lefebvre JC. Coping with pain: conceptual concerns and future directions. *Pain* 1992;51:131–134.
- Kerns RD, Rosenberg R. Predicting responses to self-management treatments for chronic pain: application of the pain stages of change model. *Pain* 2000;84:49–55.
- Kerns RD, Rosenberg R, Jamison RN, Caudill MA, Haythornthwaite J. Readiness to adopt a self-management approach to chronic pain: the Pain Stages of Change Questionnaire (PSOCQ). *Pain* 1997;72:227–234.
- Kirk RE. *Experimental Design: Procedures for the Behavioral Sciences*, 2nd Edition. Monterey: Brooks/Cole, 1982.
- Larzelere RE, Mulaik SA. Single-sample tests for many correlations. *Psychol Bull* 1977;84:557–569.
- Miller WE, Rollnick S. *Motivational Interviewing: Preparing People to Change Addictive Behavior*, New York: Guilford Press, 1991.
- Morley S, Eccleston C, Williams A. Systematic review and meta-analysis of randomized controlled trials of cognitive behaviour therapy and behaviour therapy for chronic pain in adults, excluding headache. *Pain* 1999;80:1–13.
- NIH Technology Assessment Panel on Integration of Behavioral and Relaxation Approaches into the Treatment of Chronic Pain and Insomnia, on Integration of behavioral and relaxation approaches into the treatment of chronic pain and insomnia. *J Am Med Assoc*. 276 1996 313-318
- Ockene J, Ockene I, Kristeller J. National Heart-Lung-Blood Institute. The Coronary Artery Smoking Intervention Study, 1988.
- Prochaska JO, DiClemente CC, Norcross JC. In search of how people change: applications to addictive behaviors. *Am Psychol* 1992a;47:1102–1114.
- Prochaska JO, Norcross JC, Fowler JL, Follick MJ, Abrams DB. Attendance and outcome in a work-site weight control program: processes and stages of change as process and predictor variables. *Addict Behav* 1992b;17:35–45.
- Roland M, Morris R. A study of the natural history of back pain. Pain 1. Development of a reliable and sensitive measure of disability in low-back pain. *Spine* 1983;8:141–144.
- Strong J, Ashton R, Chant D. The measurement of attitudes towards and beliefs about pain. *Pain* 1992;48:227–236.
- Turk DC. Customizing treatment for chronic pain patients: who, what, and why. *Clin J Pain* 1990;6:255–270.
- Turk DC, Rudy TE. Neglected topics in the treatment of chronic pain patients: relapse, noncompliance, and adherence enhancement. *Pain* 1991;44:5–28.
- Wolfe F, Smythe HA, Yunus MB, Bennett RM, Bombardier C, Goldenberg DL, Tugwell P, Campbell SM, Abeles M, Clark P, Fam AG, Farber SJ, Fiechtner JJ, Franklin CM, Gatter RA, Hamaty D, Lessard J, Lichtbroun AS, Masi AT, McCain GA, Reynolds WJ, Romano TJ, Russell IJ, Sheon RP. The American College of Rheumatology criteria for the classification of fibromyalgia: report of the multicenter criteria committee. *Arthritis Rheum* 1990;33:160–172.