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Further Development of the Multidimensional Pain Readiness to Change Questionnaire: The MPRCQ2

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Abstract

This study describes further development of the Multidimensional Pain Readiness to Change Questionnaire (MPRCQ2), a measure of readiness to adopt a variety of pain management and coping strategies commonly taught in multidisciplinary treatment programs. Clinical samples were recruited from a Fibromyalgia Day Program (n = 139) and an Arthritis Day Program (n = 51) as well as 2 survey samples with pain resulting from either a spinal cord injury (n = 127) or an amputation (n = 120). The results indicate preliminary support for the reliability and validity of the MPRCQ2. The MPRCQ2 may be helpful in future research investigating the relationship between readiness to change pain-related coping and adoption of coping behaviors and adjustment to chronic pain.

Perspective—This study describes the development of a revised version of the MPRCQ, the MPRCQ2, in 4 patient samples. The results support the reliability and validity of the MPRCQ2 in individuals with fibromyalgia syndrome, arthritis, acquired amputation, and spinal cord injury and improve on some aspects of the instrument.

Keywords

Chronic pain; readiness to change; Multidimensional Pain Readiness to Change Questionnaire

Although multidisciplinary treatment programs for patients with chronic pain have been shown to be effective,^{4,20} not all patients appear to benefit equally.²⁶ The extent to which patients adopt pain management coping strategies proffered by such programs has been cited as one explanation for these individual differences.²⁹ The Transtheoretical Model (TTM) of behavioral change^{22–23} and the “stages of change” concept in particular have been suggested as a theoretical schema that may help explain why some individuals benefit and others do not.¹⁴ The Pain Stages of Change Questionnaire (PSOCQ¹⁶), informed by the TTM, has been developed to assess overall readiness to self-manage pain. Accumulating evidence suggests that readiness to self-manage pain, as assessed by the PSOCQ scales, is associated with coping

and adjustment to chronic pain and that increased commitment to a self-management approach may mediate improved outcomes during pain self-management treatment.^{2–9,14}

There is also evidence to suggest that classifying patients into discrete stages of pain-related readiness to change may have theoretical and practical limitations.^{5,10,25} In the broader health behavior literature, the “stage” concept has also been directly challenged.^{1,17} In short, the available evidence does not support the conclusion that individuals necessarily proceed through discrete stages of adaptation in a fixed sequence. However, the key idea that individuals may vary in their “readiness” to adopt new coping behaviors has not been criticized. Patient variation along a readiness continuum may be a key element in understanding how patients benefit or fail to benefit from multidisciplinary treatment programs.⁸ Indeed, there is evidence to suggest that PSOCQ scores are associated with improvement in both coping and changes during multidisciplinary treatment programs.⁹ Increased readiness to change during treatment, termed forward stage movement, has also been found to be reliably associated with improved outcomes.³

Whereas the PSOCQ assesses general readiness to self-manage pain and has a structure that emphasizes a stage model, a recently developed measure, the Multidimensional Pain Readiness to Change Questionnaire (MPRCQ¹⁹), was specifically designed to measure degree of readiness to change a wide range of coping behaviors that are typically addressed in multidisciplinary chronic pain management programs (eg, exercise, relaxation techniques, activity pacing). This measure is based on the idea that patients can and do vary in terms of their readiness to adopt each of these different pain management strategies. A questionnaire with this level of specificity might have important clinical utility because it would allow identification of domains of coping in which patients are more ambivalent or less ready to change. Such a measure might therefore be useful in research investigating more targeted interventions that can be tailored to patients’ degree of readiness to learn specific pain coping strategies.

The primary purpose of the present study is to continue a process of developing and evaluating the reliability and validity of the MPRCQ. Several modifications to the original version of the MPRCQ were made to enhance the sensitivity of the measure in detecting degree of readiness to adopt specific pain coping behaviors, the clarity of the item content, and the reliability and discriminant validity of the individual subscales. Examination of the psychometric properties of this revised version of the measure, now referred to as the MPRCQ2, in distinct samples of persons with persistent pain, was viewed as adding to the evidence for the reliability, criterion-related and discriminant validity, and factor structure of the measure.

Methods

Participants

To obtain diverse samples for development of the MPRCQ2, participants were simultaneously recruited from 2 sources: The Beryl & Richard Ivey Rheumatology Day Programs at St. Joseph’s Health Care (SJHC), a teaching hospital affiliated with the University of Western Ontario, and a research program on pain in persons with disabilities in the Department of Rehabilitation Medicine, University of Washington (UW), Seattle. Individuals recruited from the former location were patients being admitted to either the Arthritis Day Program or the Fibromyalgia Day Program. Participants in these programs were required to have been experiencing chronic pain for a minimum of 6 months and to have been diagnosed by a rheumatologist. All patients admitted to these programs are able to read and write English and were at least 20 years old.

Participants recruited from the UW were from 2 samples of individuals with chronic pain secondary to either spinal cord injury (SCI) or amputations (AMP). The SCI and AMP samples required participants to have a diagnosis of SCI or AMP, to have pain for a minimum of 6 months, to be 18 years of age or older, and to be able to read and write English.

The SJHC samples included 139 individuals with fibromyalgia syndrome (FM) and 51 with either inflammatory arthritis (63.5%) or osteoarthritis (36.5%). The mean ages of these 2 groups were 47.16 (SD, 8.75) and 55.48 (SD, 10.92), respectively. In the FM sample, 94.1% of participants were female, compared with 96.2% in the arthritis group. Ninety-two percent of the FM patients were Caucasian (2.7% Asian; 1% African-Canadian; 1% Hispanic; 0.3% native Canadian; 2.9% mixed ethnicity). Ethnicity data were not available for the arthritis sample. In terms of marital status, 57.8% of FM patients were married (or common law); 20.0% were separated, divorced, or widowed; and 22.2% were not married. In the arthritis group, 53.8% were married (or common law); 13.5% were divorced, separated, or widowed; and 32.7% were not married. Table 1 and Table 2 show educational backgrounds and employment status. Mean current pain ratings (0–10 scale: 0 = no pain, 10 = worst pain you can imagine) were 7.57 (SD, 1.84) for the FM group and 5.36 (SD, 2.36) for the arthritis group. The UW sample included 120 respondents with amputations and 127 with spinal cord injuries. Their mean ages were 57.61 (SD, 13.61) and 44.82 (SD, 14.48), respectively; 29.6% of the SCI group and 37.5% of the AMP group were female; and 88.8% of the SCI group were Caucasian (1.6% African-American, 4.0% Hispanic, 2.4% Asian, 4.0% Native American, 2.4% other). Within the AMP group, 93.3% were Caucasian (6.7% African-American, 0.8% Hispanic, 0% Asian, 2.5% Native American, 0% other). In the SCI group, 42.4% were married (including common law); 22.4% were widowed, divorced, or separated; 8.8% were not married but living with a significant other; and 26.4.0% were not married and living alone. In the AMP group, 55.8% were married (including common law); 24.0% were widowed, divorced, or separated; 5.0% were not married but living with a significant other; and 14.2% were not married and living alone. Educational level and employment status are shown in Table 1 and Table 2. Mean pain ratings were 5.55 (SD, 2.53) for SCI and 4.70 (SD, 2.60) for amputee respondents.

Scale Development

Although the initial report on the MPRCQ provided preliminary evidence for the reliability and validity of the measure, for both theoretical and practical reasons, a number of modifications seemed prudent. These included the expansion of item response options (from 6 to 7 options), changes in wording of apparent “double-negatives,” and increasing the number of items in some scales. Altering and expanding the response options of the MPRCQ to better reflect the readiness-to-change continuum as opposed to discrete stages was seen as a way of improving accuracy and clarity of reporting. One hypothesized scale, Avoid Guarding, was not identified in the initial study, and therefore efforts were made to create a reliable measure of this construct. In addition, it is important to provide further evidence for the discriminant validity of the MPRCQ, specifically its ability to predict reported use of related coping behaviors. If the MPRCQ2 scores are valid, we predicted that they would be positively associated with adaptive coping and negatively associated with maladaptive coping responses. A second hypothesis was that if the MPRCQ2 scores were valid, they would be positively associated with indicators of general readiness to self-manage pain (eg, Action and Maintenance scales of the PSOCQ) and negatively associated with a measure of lack of readiness to change (eg, Precontemplation scale of the PSOCQ).

A revised Multidimensional Pain Readiness to Change Questionnaire (MPRCQ2) was developed from an initial item pool of 81 questions, each of which was designed to measure 1 of the 10 readiness to change domains. These included items that assessed readiness beliefs related to Exercise, Task Persistence, Relaxation, Cognitive Control (with Diverting Attention,

Coping Self-Statements, Reinterpreting Sensations, Avoid Catastrophizing, and Ignoring Pain subscales), Pacing, Avoid Pain Contingent Rest, Avoid Asking for Assistance, Assertive Communication, Proper Body Mechanics, and Avoid Guarding. These content domains were selected because they reflect coping behaviors typically taught (or discouraged) in multidisciplinary treatment programs.^{8,19} Respondents are asked to indicate how ready they are to engage in each activity on a scale from 1 to 7. In this revision, the MPRCQ2 was divided into 2 sections, one containing items describing adaptive coping behaviors and the other maladaptive coping behaviors (Appendix). A number of studies support the classification of these coping responses in this way.^{11,12,27} The instructions and response options for each of these sections are worded slightly differently to reflect the intention to use adaptive behaviors versus the intention to stop using maladaptive behaviors. This change was done in response to respondents' concerns that "double-negatives" in the maladaptive items of the first version of the MPRCQ made them difficult to understand (eg, "Not always ask for help with chores just because I hurt"). The wording of such items was therefore changed to use the word "avoid" instead of "not." Thus, for example, the aforementioned question was changed to "Avoid asking for help with chores just because I hurt." Questions on the Relaxation scale were also changed, eliminating a frequency requirement. For example, "Listen to a relaxation tape to relax more than once per week" was changed to "Listen to a relaxation tape to relax."

Two new statements consistent with a precontemplation state (response options 1 and 2, Appendix) were also added to allow for differentiation between individuals who anticipate that they would never utilize a given coping behavior and those who feel they may be interested in doing so at some future time. Similarly, the responses reflecting action were expanded into: "I have recently started [stopped] doing this (within the past month)" and "I have been doing [not done] this for a while (more than 1 month but less than 6 months)." This change was made to allow for differentiation between individuals who have very recently changed a particular activity and those who have been able to maintain the change for a number of months. The final response option "I have been doing [not done] this for a long time (at least 6 months)" reflects maintenance of the rated coping behavior.

A major difference between the original MPRCQ and current MPRCQ2 is the number of items included in the measure. Items were added to the MPRCQ2 in an effort to increase scale reliability. Items were also added to some scales to replace items that had been deleted because of low item-to-total-scale correlations and their negative effect on scale reliability during initial test construction. In addition, an entire scale in the original MPRCQ had been dropped due to poor reliability (Avoid Guarding). In the present version, 6 new items were added in a second attempt to determine whether a measure of this construct could be developed.

If readiness to self-manage pain, as measured by the MPRCQ2, is a multidimensional rather than a unidimensional construct, a pattern of high intra-item correlations (eg, Cronbach's α), low inter-scale correlations and moderate scale-MPRCQ2 Total correlations should be obtained.

Criterion Measures

In addition to the MPRCQ2, participants completed the Chronic Pain Coping Inventory (CPCI), a 70-item questionnaire that asked respondents to indicate the number of days within the last week that they used specific coping methods to manage their pain. The CPCI has been shown to have excellent internal consistency (α coefficients ranging from .74–.89) and test-retest reliability (α coefficients ranging from .66–.90).¹³ In the 2 St. Joseph's Health Care samples, the full CPCI was administered, whereas in the University of Washington sample, a 2-item per scale version was administered.⁷ In addition, the Exercise scale of the CPCI was not administered to the 2 University of Washington samples because of concerns that the available items reflecting exercise might not be appropriate for persons with limited mobility. Consistent

with our hypotheses, it was expected that CPCI scales would be significantly but moderately correlated with their corresponding CPCI scales in each of the 4 samples. We were anticipating significant but moderate associations because (1) valid MPRCQ2 scales should predict corresponding coping behaviors but also (2) extremely high correlations would suggest that they measure the same construct and therefore lack discriminate validity.

The Pain Stages of Change Questionnaire (PSOCQ)¹⁵ measures general readiness to make changes in coping with pain. It includes 4 scales, Precontemplation, Contemplation, Action, and Maintenance, which correspond to the TTM Stages of Change. The PSOCQ scales have good internal consistencies (Cronbach's α 's, .77–.86) and have been shown to be stable over a 1-to 2-week period (test-retest correlation coefficients, .74–.88). It was predicted that correlations between the PSOCQ Action and Maintenance scales and MPRCQ2 scales would be significantly positive, and, conversely, that scores between the PSOCQ Precontemplation scale and the MPRCQ2 scales would be significantly negative. Again, these correlations were expected to be of moderate magnitude if the MPRCQ2 measures domain specific rather than general pain readiness-to-change.

The Catastrophizing and Ignoring Sensations scales of the Coping Strategies Questionnaire²⁴ were used in addition to the Self-Statement scale of the CPCI to evaluate the multifaceted Cognitive Control scale of the MPRCQ2 in all but the Arthritis sample because the CSQ scales were not administered to that group. This was 1 of 3 MPRCQ2 scales (the others were Assertive Communication and Body Mechanics) that was without corresponding CPCI scales. For these scales, alternative criterion indices were selected. Specifically, it was predicted that the MPRCQ2 Assertive Communication scale would correlate with the CPCI scales Asking for Assistance and Support, as these scales reflect patient engagement in assertive behaviors. Body Mechanics was similarly expected to correlate with the CPCI scales Exercise and Pacing, as these are behavioral contexts in which the use of proper body mechanics could be expected to occur. Again, the magnitude of these correlations was expected to be moderate.

Procedure

After receiving approval to proceed with the study from the Research Ethics Board of the University of Western Ontario, samples of participants were recruited consecutively from the 2 populations. Prospective participants were given an information sheet describing the study in general terms, and those individuals who wished to participate completed a consent form. The questionnaire booklet and a demographic sheet were then administered. Individuals in the SJHC sample were invited to participate at the time of time of their admission to a Day Program. Participants were thanked for their time but were not otherwise compensated for their participation. All participants in the SJHC sample agreed to participate.

In the UW samples, participants with chronic pain were obtained from 2 postal surveys examining quality of life in persons with SCI or AMP that included a number of pain-related measures. The AMP survey was mailed to 309 individuals, and the SCI survey was mailed to 426 individuals. For both groups, a consent form and a cover letter inviting potential participants to participate in the study accompanied each survey. Respondents were paid \$25 for completing and returning the consent forms and survey. The University of Washington Human Subjects Review Committee approved all study procedures. Of the 309 AMP surveys sent, 16 were returned due to incorrect addresses, 12 individuals were deceased, 1 individual was unable to consent due to altered mental status, and 3 declined to participate. Of the 277 remaining possible participants, 165 returned completed surveys, for a response rate of 59.6%. Only participants who indicated a chronic pain problem were included in the current study ($n = 120$). Of the 426 SCI surveys sent, 27 were returned due to incorrect addresses, 4 individuals were deceased, 4 declined to participate, and 2 were excluded for other reasons. Of the 389 remaining possible participants, 175 returned completed surveys, for a response rate of 45.0%.

Closer inspection of the returned surveys required an additional 10 surveys to be excluded due to not returning the consent form ($n = 3$), not having a SCI ($n = 2$), having a questionable mental status ($n = 2$), completing a duplicate survey ($n = 2$), providing insufficient data to conduct analyses ($n = 1$), and for other reasons ($n = 2$). Only participants who indicated a chronic pain problem were included in the current study's analyses ($n = 127$).

Data Analytic Plan

The first step in the data analytic plan was to examine the reliability, that is, the internal consistencies of the MPRCQ2 scales. Indices of internal consistency (α 's) of the scales were calculated followed by examination of item to total correlations and the effects of deleting items to improve α values. Criterion-related and discriminant validity were examined via several steps. Correlations of the MPRCQ2 scales with the CPCI and PSOCQ were calculated and examined for the pattern of intercorrelations. It was hypothesized that the indices of internal consistency of specific MPRCQ2 scales would be greater than their correlations with other MPRCQ2 scales. Furthermore, the magnitudes of the intercorrelations among the MPRCQ2 scales were hypothesized to be only moderate to provide evidence of their discrimination. Variability in the scale scores derived from the individual MPRCQ2 scales were also examined. Finally, Confirmatory Factor Analysis (CFA) was used to examine the replicability of the factor structure of the MPRCQ2 that was demonstrated in analyses of the original version of the measure. This CFA was conducted specifically to examine the relationships among the MPRCQ2 scales. It is worth noting that this use of CFA is different than the typical use in test construction, which utilizes individual items rather than scale scores as input data. In our previous paper¹⁹ we had identified 2 superordinate factors when the MPRCQ scales were factor analyses and, for theoretical reasons, we were interested in whether these factors would be replicated in the MPRCQ2.

Results

Internal Reliability

Corrected Cronbach's α 's were computed for MPRCQ2 scales (overall reliabilities ranged from .77–.94; Table 3). Two items were dropped because they were not significantly associated with their parent scales. Although the overall α value for the Guarding scale was .74, its reliabilities for the Arthritis and Amputee samples were too low for them to be acceptable for assessing readiness to use these coping responses (.68 and .63, respectively).

The 5 Cognitive Control subscales also showed adequate overall internal reliabilities (range, .76–.90) (Table 3) and were allowed to correlate with each other to form the Cognitive Control scale as described in our earlier paper.¹⁹

As expected, correlations among the scales were low. For the 4 samples, the mean absolute correlations among the MPRCQ2 scales were FM, .24 (SD, .16); Arthritis, .30 (SD, .19); AMP, .30 (SD, .15); and SCI, .23 (SD, .16). The individual scales also correlated moderately with the composite MPRCQ2 Total score. Mean absolute correlations were FM, .52 (SD, .13); Arthritis, .54 (SD, .14); AMP, .59 (SD, .10); and SCI, .49 (SD, .14).

Validity

As noted above, the validity of the MPRCQ2 was evaluated by correlating the MPRCQ2 scales with the questionnaires measuring the use of related coping behaviors (CPCI and CSQ) and overall readiness to change (PSOCQ). As expected, moderate correlations were generally found between the MPRCQ2 scales and the corresponding CPCI scales (Table 4). However, as was the case in our previous work, Readiness to Avoid Guarding was not significantly correlated with the CPCI Guarding scale. For the 3 MPRCQ2 scales without parallel CPCI

scales, Assertive Communication and Proper Body Mechanics correlated as predicted with the most relevant CPCI scales. As seen in Table 4, Assertive Communication correlated as expected with CPCI Asking for Assistance and CPCI Support; Proper Body Mechanics with CPCI Exercise; and CPCI Pacing. Cognitive Control also correlated as expected with the CPCI Self-Statement scale, CSQ Catastrophizing, and CSQ Ignoring Sensations scales, reflecting its multidimensional content.

As illustrated in Table 5, the expected significant correlations were found between the MPRCQ2 total score and the PSOCQ Precontemplative, Action, and Maintenance scales. In addition, significant correlations were obtained between 6 of the 9 MPRCQ2 scales and the same 3 PSOCQ scales. No significant correlations were found between MPRCQ2 scales and the PSOCQ Contemplation scale.

Interscale Variability

The means and standard deviations for each of the MPRCQ2 scales and total scores for each of our samples as well as for the combined samples are shown in Table 6. Consistent with our view that readiness to self-manage pain is a multidimensional construct, there is significant variation between the various mean MPRCQ2 scale scores. This variation is evident collapsing across samples (Combined) [$F(8,429) = 105.74, P < .0001$] and within each of our 4 samples [FM: $F(8,130) = 42.59, P < .0001$; Arthritis: $F(8,43) = 14.65, P < .0001$; AMP: $F(8,112) = 34.00, P < .0001$; SCI: $F(8,119) = 37.37, P < .0001$].

Confirmatory Factor Analysis

In the development of the original version of the MPRCQ,¹⁹ Exploratory Factor Analysis (EFA) using a Varimax rotation was used to examine the overall factor structure of the measure's scales. Results of the EFA revealed a 2-factor solution that accounted for 54.7% of scale variance. Based on item content as well as theory and prior research in this area, these factors were labeled Active Coping and Perseverance.¹⁹ In the present study, we sought to confirm this 2-factor structure in the MPRCQ2 using Confirmatory Factor Analysis (CFA). CFA is an application of structural equation modeling in which individual items are hypothesized a priori to load on specified factors. The fit of the hypothesized factor structure to the observed data is then evaluated by examining indices of model fit. The computer program Mplus version 3.13¹⁸ was used for all measurement model analyses.

Regarding model fit, we relied on the 2-index presentation strategy recommended by Hu and Bentler.⁶ This strategy is based on the observation that several fit indices have been shown to be highly correlated and may provide redundant information. Hu and Bentler⁶ therefore suggest the use of 2 indices that are not highly correlated. We selected the root mean square error of approximation (RMSEA) and the standardized root mean residual (SRMR) as our primary fit indices, as these indices have been shown to be dissimilar under various sample sizes. Good fitting models are generally supported by RMSEA $< .06$ and SRMR $< .08$.⁶ For descriptive purposes, we also examined the ratio of χ^2 to df (rather than simple significance of the χ^2 term) and the Bentler Comparative Fit Index (CFI), a measure of relative fit improvement over a null model.

To obtain a baseline model for comparison, a single-factor measurement model was tested. This model included all MPRCQ2 subscales as indicators loading on a single latent factor. As expected, this model was a poor fit to the observed data [$\chi^2/df = 14.08$; CFI = 0.60; RMSEA = 0.18; SRMR = .12]. A second model using the previously established 2-factor solution was also evaluated. This model represented a significant improvement in fit over the single factor model ($\chi^2_{diff} = 133.7, df_{diff} = 0; P < .05$), but fit indices remained marginal [$\chi^2/df = 9.85$; CFI = 0.75; RMSEA = 0.14; SRMR = .10]. Examination of the Lagrange modification indices

suggested that the subscale Task Persistence could also load on the Active Coping latent factor (coefficient = .38). Although the original EFA on the MPRCQ suggested that each subscale loads on only 1 factor (particularly in the Fibromyalgia sample), we allowed for cross-loading of this subscale in the present sample, based on the statistical indices as well as the theoretical position that persisting with a task despite pain is an intentional, active process reflecting both perseverance and active coping. Other significant Lagrange modifiers suggested correlation of certain error terms among subscales; we included these wherever the decrease in χ^2 was > 10.0 and where correlation made conceptual sense based on wording or other methodological similarities among items (Fig 1). For example, regarding cross-factor correlated error variances, the Avoid Asking for Assistance and Assertive Communication subscales both clearly contain items referring to social communication of pain that is not present in other subscales. Similarly, Task Persistence and Cognitive Control subscales both include items from Section 2 of the questionnaire (ie, those including alternate response options). After these modifications, the 2-factor structure suggested by the earlier EFA was confirmed as being an excellent fit to the observed data ($\chi^2/\text{df} = 2.5$; CFI = 0.97, RMSEA = .058, SRMR = .047). Further, each item indicator loaded significantly on its respective latent factor (all standardized factor loadings >.31, z values >1.96, P values <.05), supporting the 2-factor model suggested in earlier work.¹⁹ Coefficients and the factor structure are shown in Fig 1.

Discussion

The present study adds to previous research suggesting that the MPRCQ, and, in this case, the MPRCQ2, may be useful for assessing readiness to change a range of pain-related coping behaviors. Positive associations with adaptive pain-related coping and negative associations with maladaptive coping supported the validity of the MPRCQ2. Also as predicted, the MPRCQ2 tended to be associated negatively with a measure of lack of readiness to self-manage pain (the PSOCQ Precontemplation scale) and associated positively with 2 measures of readiness to self-manage pain (the PSOCQ Action and Maintenance scales).

The multidimensional nature of pain-related readiness to change also received strong support in this study. Several specific analyses support this contention, including demonstrations of (1) high internal consistencies within scales, (2) low correlations among MPRCQ2 scales, (3) significant correlations between the MPRCQ2 scales and their criterion scales, and (4) significant inter-scale variability. This pattern of results replicated our original work¹⁹ and extended it in patients with arthritis. The theoretical and clinical importance of this observation remains to be explored.

We were also interested in the relationships among the nine MPRCQ2 scales. CFA of these scales suggests that the factor structure identified in our earlier analysis of the MPRCQ scales is also present in the MPRCQ2. Two higher-order factors are embedded in the MPRCQ2: (1) An Active Coping factor that reflects a readiness to use a variety of specific coping strategies that involve active participation in pain management behaviors (eg, exercise, pacing, relaxation assertiveness, proper body mechanics, and cognitive techniques) and (2) a Perseverance factor, which involves a readiness to persist in activities. The latter factor includes avoidance of pain-contingent rest and avoidance of asking for assistance. Notably, the behavior of task persistence appears to be driven by both factors, consistent with the observation that completing a task despite pain is both an active strategy and one that reflects a tendency to persevere.

It is perhaps not surprising that many of the MPRCQ2 scales (as had those of the MPRCQ) load on a superordinate factor that can be characterized as readiness to actively cope. These coping behaviors are all methods of actively managing pain and its impact on the individual. More interesting is the Perseverance factor. Although interventions designed to increase activity have been a mainstay of operant and multidisciplinary treatment programs, in some

instances overactivity may contribute to disability.²⁸ An interesting future application of the MPRCQ2 may be to explore the role of motivational factors in adaptive versus maladaptive activity levels.

Some clinicians might view the MPRCQ2 as a tool with which to preselect patients for admission to multidisciplinary pain management programs or tailor treatment. We believe that it would be premature to consider using the MPRCQ2 for this purpose until a larger body of data is available to support such applications. We would, however, encourage the use of the MPRCQ2 in clinical research designed to evaluate its clinical utility.

Although the MPRCQ2 uses a multidimensional approach to assessing pain-related readiness to change, the MPRCQ2 scales could be combined to create a measure of general readiness to self-manage pain. Both the correlations of the MPRCQ2 scales with the PSOCQ and the moderate correlations of the individual scales with the Total MPRCQ score support this composite score.

Unfortunately, a second attempt to create a readiness to Avoid Guarding scale was not successful. The items for this scale were not well intercorrelated in the Arthritis and AMP samples, even though their internal reliabilities were adequate for the FM (.79) and SCI (.72) groups. The lack of association between the MPRCQ2 Guarding scale and CPCI Guarding scale is puzzling and cannot be explained simply by poor reliabilities, since 2 of the groups showed acceptable α values. Consequently, we have decided to discard this scale from the MPRCQ2.

Ultimately, the present study provided preliminary support for the validity and reliability of the MPRCQ2 scales. Acceptably high levels of internal reliability were obtained for each of the MPRCQ2 scales as well as for the MPRCQ2 Total. As was expected, the MPRCQ2 correlated moderately with the CPCI, CSQ, and PSOCQ, replicating and extending the concurrent validity data obtained in our earlier research. Taken together, these results support the idea that the MPRCQ2 assesses readiness to change or adopt pain coping methods in these diverse samples of individuals with chronic pain.

In addition to adding to the knowledge base about the measure, the revised version of the MPRCQ clarifies the response options. For example, in the previous version, a single response (“I don’t plan to do this”) tapped the precontemplative stages. We think that it is potentially important to differentiate between not being interested “in ever doing” a coping behavior and anticipating that the person may be interested “some day.” In addition, the increase in number of MPRCQ2 response options to 7 and changes to their content is consistent with our position that readiness to change should be assessed on a continuum rather than as discrete stages. From a purely psychometric perspective, when using categories to characterize a continuous distribution there is a loss of reliability for fewer than 7 steps on a scale.²¹ In the process of administering the original MPRCQ to our patients, we also found that the double-negatives created by the combination of the response options and item content were often confusing. The MPRCQ2 separates the items into those behaviors that are adaptive (ie, coping responses to increase) and those that are maladaptive (ie, coping responses to decrease), with appropriate corresponding response options. Our experience with the MPRCQ2 has been that there is considerably less confusion for patients completing the measure. For these reasons, we believe that, although the reliability and validity data of the MPRCQ and MPRCQ2 are similar, the latter represents an improvement over the former. We would therefore encourage the use of this new version.

A limitation associated with the present study is the lack of random selection of study samples from the populations that they represent. All were self-selected in terms of their willingness to participate in this study. Thus, their responses to the questionnaires may differ in some ways

from the populations of patients they portray. Although the sample sizes and the participation rates for this study were high, it is possible that if the samples had been randomly drawn from a broader population of individuals with painful chronic diseases that our results may have been different. The factor structure obtained in this sample, although very similar to that obtained in our previous study,¹⁹ may also have been different if these sampling issues were absent.

The generalizability of our results may also be limited by the gender and ethnic composition of our samples. Although both fibromyalgia and arthritis tend to be more common in women, the high percentages of women in our fibromyalgia and arthritis samples and the high proportion of Caucasian participants in all samples may limit the generalizability of our data. Future research with the MPRCQ2 should include samples with more male subjects and a broader range of ethnic groups. Indeed, cultural and ethnic differences in pain-related readiness for change have not been studied and deserve attention in future research.

It should also be pointed out that although the present study does suggest relationships between readiness for change and coping, these 2 constructs are measured here using only single self-report questionnaires. To address the broader relationship between readiness and self-management, longitudinal studies will be necessary to determine whether future self-management behaviors can be predicted from readiness to change indices. To date, research suggests that general readiness to change predicts treatment dropouts (but not outcome),¹⁴ whereas forward stage movement during treatment predicts outcomes.² Whether more specific readiness to change measures, such as the MPRCQ2, predict process and outcome indices better than more global measures remains to be seen.

A final limitation of this study is that the questionnaire is relatively long and has multiple response options. Thus, a potential limitation of the study is that assessment fatigue may have reduced both validity and reliability results. From this perspective, the development of a brief version of the MPRCQ2 may be helpful, particularly for use in settings where multiple questionnaires are administered concurrently.

An interesting area for future research will be to develop readiness profiles based on MPRCQ2 scores. It may be that common profiles can be identified in which certain scales are elevated or depressed concomitantly. Such profiles may also differ according to type of illness or sample type (eg, community vs clinical samples). If profile patterns can be identified, treatments could be tailored to the combination of low readiness areas identified. Factor scores based on the 2 factors identified in this study could also potentially serve as a basis for treatment matching and tailoring. Reliable readiness-to-change subgroups have been identified, based on PSOCQ profiles.¹⁶

In conclusion, the current study provides support for the MPRCQ2 questionnaire, a measure of readiness to use, or avoid using, specific pain coping strategies thought to influence outcome in pain management and functioning among persons with chronic pain. This measure may be helpful in elucidating and testing predicted associations between readiness to cope with pain and current and future coping behavior, as well as eventual adjustment to chronic pain.

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Appendix: MPRCQ2 and Scoring Key Instructions MPRCQ2

Name _____ Date _____

SECTION 1

Instructions. Please circle the number that best indicates your intention to use each of the following methods of coping with or managing your pain by using the 1 to 7 rating scale below:

1 = I am not doing this now, and am not interested in ever doing it.

2 = I might do this someday but I have made no plans to do it.

3 = I will probably start doing this sometime (in the next 6 months).

4 = I have made plans to start doing this soon (within the next month).

5 = I have recently started doing this (within the past month).

6 = I have been doing this for a while (more than 1 month but less than 6 months).

7 = I have been doing this for a long time (at least 6 months).

1 Walk fast, jog, swim (or use an exercise machine) at least 20 minutes 3 times a week or more.	1 2 3 4 5 6 7
2 Use imagery to decrease pain.	1 2 3 4 5 6 7
3 Distract myself from my pain.	1 2 3 4 5 6 7
4 Tell people I am close to what is on my mind.	1 2 3 4 5 6 7
5 Stand straight when I carry something heavy.	1 2 3 4 5 6 7
6 Tell myself often that I can manage the pain and its effects on my life.	1 2 3 4 5 6 7
7 Stretch my muscles (for at least 10 minutes) 3 times a week or more.	1 2 3 4 5 6 7
8 Break up tasks into smaller pieces to get more done.	1 2 3 4 5 6 7
9 Ignore the pain.	1 2 3 4 5 6 7
10 Use correct posture when sitting.	1 2 3 4 5 6 7
11 Express my feelings openly.	1 2 3 4 5 6 7
12 Exercise for at least 30 minutes 3 times a week or more.	1 2 3 4 5 6 7
13 Listen to a relaxation tape to relax.	1 2 3 4 5 6 7

14 Work steadily, but at a reasonable pace.	1 2 3 4 5 6 7
15 Put the pain in the background.	1 2 3 4 5 6 7
16 Reassure myself often that I am managing my pain well.	1 2 3 4 5 6 7
17 Alter the pain with my mind to something less unpleasant.	1 2 3 4 5 6 7
18 Use slow, deep breathing to relax.	1 2 3 4 5 6 7
19 Keep on doing what I want to do despite pain.	1 2 3 4 5 6 7
20 Keep my back straight when I am sitting.	1 2 3 4 5 6 7
21 Lift weights, do push-ups, or sit-ups (for at least 20 minutes) 3 times per week or more.	1 2 3 4 5 6 7
22 Concentrate on a hobby or chore to distract myself from pain.	1 2 3 4 5 6 7
23 Think about the pain differently so it is less upsetting.	1 2 3 4 5 6 7
24 Disregard the painful sensations.	1 2 3 4 5 6 7
25 Pace my activities so I don't get tired too soon.	1 2 3 4 5 6 7
26 Alter the pain with my mind so it is less intense.	1 2 3 4 5 6 7
27 Let others know what I want and need.	1 2 3 4 5 6 7
28 Use my mind to distract myself from the pain.	1 2 3 4 5 6 7
29 Lift heavy objects safely by keeping my back straight.	1 2 3 4 5 6 7
30 Put the pain sensations out of my thoughts.	1 2 3 4 5 6 7
31 Meditate to relax.	1 2 3 4 5 6 7
32 Remind myself often that I will feel better in the future.	1 2 3 4 5 6 7
33 Ignore the pain sensations.	1 2 3 4 5 6 7
34 Exercise the muscles where I hurt (for at least 5 minutes) 3 times a week or more.	1 2 3 4 5 6 7
35 Try not to slouch when I am sitting.	1 2 3 4 5 6 7
36 Picture calming images to relax.	1 2 3 4 5 6 7
37 Keep on doing what I need to do despite pain.	1 2 3 4 5 6 7
38 Pace myself so I can keep working slowly and steadily.	1 2 3 4 5 6 7
39 Tell myself often that I am doing well despite the pain.	1 2 3 4 5 6 7
40 Think about the pain differently so that it hurts less.	1 2 3 4 5 6 7
41 Use self-hypnosis to relax.	1 2 3 4 5 6 7
42 Disregard the pain.	1 2 3 4 5 6 7
43 Tell people I am close to how I feel.	1 2 3 4 5 6 7
44 Exercise to increase muscle strength (for at least 20 minutes) 3 times a week or more.	1 2 3 4 5 6 7
45 Work at a reasonable pace (not too fast or slow).	1 2 3 4 5 6 7
46 Practice relaxing the different muscles in my body.	1 2 3 4 5 6 7
47 Bend at the knees instead of the waist when lifting.	1 2 3 4 5 6 7
48 Put the pain sensations in the back of my mind.	1 2 3 4 5 6 7
49 Pay attention to something else when I hurt.	1 2 3 4 5 6 7
50 Not think about how the pain feels.	1 2 3 4 5 6 7
51 Stretch the muscles where I hurt (for at least 5 minutes) 3 times a week or more.	1 2 3 4 5 6 7
52 Pace myself so that I don't have to take long breaks.	1 2 3 4 5 6 7

SECTION 2

Instructions. The following questions are slightly different than those that you have already answered. For the remaining questions, please circle the number that best indicates your

intention to stop using each of the methods of coping with or managing your pain by using the 1 to 7 rating scale below:

1 = I am doing this now and am not interested in ever stopping.

2 = I might stop this someday, but I have made no plans to stop doing it.

3 = I will probably stop doing this sometime (in the next 6 months).

4 = I have made plans to stop doing this soon (within the next month).

5 = I have recently stopped doing this (sometime in the past month).

6 = I have not done this for a while (more than 1 month but less than 6 months).

7 = I have not done this for a long time (at least 6 months).

53 Ask for help with chores when I hurt.	1 2 3 4 5 6 7
54 Think about how bad the pain feels.	1 2 3 4 5 6 7
55 Rest when I hurt.	1 2 3 4 5 6 7
56 Sit down to rest when I hurt.	1 2 3 4 5 6 7
57 Ask for help with cleaning because of my pain.	1 2 3 4 5 6 7
58 Tell myself "I can't go on with this pain."	1 2 3 4 5 6 7
59 Allow pain to keep me from doing what I need to do.	1 2 3 4 5 6 7
60 Think about how overwhelming the pain feels.	1 2 3 4 5 6 7
61 Lie down to rest when I hurt.	1 2 3 4 5 6 7
62 Ask others for help when I hurt.	1 2 3 4 5 6 7
63 Worry about the pain.	1 2 3 4 5 6 7
64 Rest because of pain.	1 2 3 4 5 6 7
65 Tell myself "I can't stand this pain."	1 2 3 4 5 6 7
66 Ask for help with lifting or carrying because of pain.	1 2 3 4 5 6 7
67 Let pain prevent me from doing what I need to do.	1 2 3 4 5 6 7
68 Allow pain to stop me from doing what I want to do.	1 2 3 4 5 6 7
69 Think thoughts that make me feel worse.	1 2 3 4 5 6 7

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Scoring of the MPRCQ2 is done simply by summing the responses (1–7) for each of the above scales and subscales and dividing by the number of items.

1. Exercise: $(1 + 7 + 12 + 21 + 34 + 44 + 51)/7$
2. Task Persistence: $(19 + 37 + 59 + 67 + 68)/5$
3. Relaxation: $(2 + 13 + 18 + 31 + 36 + 41 + 46)/7$
4. Cognitive Control:
 - Diverting Attention: $(3 + 22 + 28 + 49)/4$
 - Coping Self-Statements: $(6 + 16 + 32 + 39)/4$
 - Reinterpreting Sensations: $(17 + 23 + 26 + 40 + 48)/5$
 - Avoid Catastrophizing: $(54 + 58 + 60 + 63 + 65 + 69)/6$
 - Ignoring Pain: $(9 + 15 + 24 + 30 + 33 + 42 + 50)/7$

Cognitive Control: (Diverting Attention + Coping Self-Statements + Reinterpreting Sensations + Avoid Catastrophizing + Ignoring Pain)/5

5. Pacing: $(8 + 14 + 25 + 38 + 45 + 52)/6$
6. Avoid Pain Contingent Rest: $(55 + 56 + 61 + 64)/4$
7. Avoid Asking for Assistance: $(53 + 57 + 62 + 66)/4$
8. Assertive Communication: $(4+11 + 27 + 43)/4$
9. Proper Body Mechanics: $(5 + 10 + 20 + 29 + 35 + 47)/6$

The Total MPRCQ2 score is the sum of the 9 primary scales.

$\chi^2 (20) = 47.47, P < .001; \chi^2 / df = 2.50; CFI = 0.97, RMSEA = .058, SRMR = .047$

EX = Exercise; REL = Relaxation; COG = Cognitive Control; PACE = Pacing; COMM = Assertive Communication; MECH = Proper Body Mechanics; TASK = Task Persistence; REST = Avoid Contingent Rest; ASK = Avoid Asking for Assistance

Figure 1.
Confirmatory Factor Analysis (CFA) model of the 2-factor solution.

Table 1

Educational Level (Percentage of Patients in Each Sample)

	SJHC FIBROMYALGIA	SJHC ARTHRITIS	UW AMPUTEE	UW SPINAL CORD INJURY
Less than grade 9	6.0	7.7	2.5	0.8
Some high school	11.3	5.8	9.2	4.0
High school graduate	12.0	11.5	29.2	26.2
Vocational/technical*	9.0	11.5	6.7	8.0
Some college/university [†]	25.5	11.5	25.8	28.0
College/university graduate [†]	30.1	34.6	19.2	23.2
Graduate or professional school	6.0	17.3	19.2	9.6

Abbreviations: SJHC, St. Joseph's Health Care, a teaching hospital affiliated with the University of Western Ontario; UW, a research program on pain in persons with disabilities in the Department of Rehabilitation Medicine, University of Washington.

* Includes community college in Canada.

[†] College is Liberal Arts College in the United States.

Table 2
Employment Status (Percentage of Patients in Each Sample)

	SJHC FIBROMYALGIA	SJHC ARTHRITIS	UW AMPUTEE*	UW SPINAL CORD INJURY*
Full time	22.0	24.7	20.0	20.0
Part time	14.3	8.7	10.0	9.6
School full time	0.3	0.0	0.0	2.4
School part time	0.6	0.0	1.7	2.4
Homemaker	4.5	4.1	6.7	5.6
Retired	4.5	26.5	40.8	17.6
Unemployed: Due to disability	52.8	23.4	37.5	44.0
Unemployed: Other reason	1.0	12.6	6.7	7.0

Abbreviations: SJHC, St. Joseph's Health Care, a teaching hospital affiliated with the University of Western Ontario; UW, a research program on pain in persons with disabilities in the Department of Rehabilitation Medicine, University of Washington.

* In these samples, categories were not mutually exclusive; thus, totals are > 100%.

Table 3
MPRCQ2 Internal Reliabilities (Cronbach's α) by Sample

SAMPLE	EXERCISE	PERSIST	RELAX	PACING	AVOID REST	AVOID ASSISTANCE	ASSERTIVE COMMUNICATION	BODY MECHANICS
SJHC Fibromyalgia	.87	.77	.82	.85	.86	.81	.68	.72
SJHC Arthritis	.82	.73	.89	.88	.87	.84	.81	.82
UW Amputee	.85	.75	.79	.82	.75	.78	.83	.83
UW SCI	.83	.75	.81	.88	.77	.83	.83	.76
Overall α	.85	.77	.82	.86	.81	.82	.79	.80

COGNITIVE CONTROL SUBSCALES				
COGNITIVE CONTROL	DIVERT ATTENTION	SELF-STATEMENT	REINTERPRET SENSATIONS	AVOID CATASTROPHIZING
SJHC Fibromyalgia	.90	.74	.82	.79
SJHC Arthritis	.89	.61	.69	.80
UW Amputee	.94	.80	.74	.84
UW SCI	.91	.77	.80	.83
Overall α	.92	.76	.76	.83

Abbreviations: SJHC, St. Joseph's Health Care, a teaching hospital affiliated with the University of Western Ontario; UW, a research program on pain in persons with disabilities in the Department of Rehabilitation Medicine, University of Washington; SCI, spinal cord injury.

Table 4

MPRCQ2 Correlations With CPCI and CSQ Scales

CPCISCALES										CSQ SCALES		
EXERCISE	PERSISTENCE	RELAXATION	SELF-STATEMENTS	ASK ASSISTANCE	PACING	RESTING	SUPPORT	CATASTROPHIZING	IGNORE SENSATIONS			
								</				

J Pain. Author manuscript; available in PMC 2009 October 7.

CPCISCALES										CSQ SCALES		
EXERCISE	PERSISTENCE	RELAXATION	SELF-STATEMENTS	ASK ASSISTANCE	PACING	RESTING	SUPPORT	CATASTROPHIZING	IGNORE SENSATIONS			
ia	0.37	0.30	0.16	0.18	0.51	0.17	.30	-.28	.01			
	0.52	0.40	0.49	0.04	0.71	0.04	.44	n/a	n/a			
	n/a	0.00	0.05	-0.07	0.40	-0.12	.06	-.18	.17			
	n/a	0.16	0.12	0.02	0.59	0.08	.01	-.09	.18			
ia	-0.23	-0.04	0.00	-0.10	-0.08	-0.17	-.07	.01	.16			
	-0.14	0.01	-0.15	-0.32	-0.31	-0.05	-.15	n/a	n/a			
	n/a	-0.08	0.07	-0.08	0.00	-0.11	-.13	-.13	.12			
	n/a	-0.17	-0.03	-0.24	-0.12	-0.40	-.21	-.05	.06			
ia	-0.04	0.30	0.23	0.27	0.23	0.01	.30	-.13	-.07			
	0.01	0.15	0.56	0.33	0.48	-0.02	.54	n/a	n/a			
	0.01	-0.13	0.09	0.17	0.01	-0.04	.29	-.13	.10			
	0.00	0.19	0.20	0.23	0.02	-0.05	.28	-.13	-.09			
ia	0.21	0.23	0.12	-0.07	0.20	-0.04	.17	-.20	.19			
	0.00	0.43	0.39	-0.23	0.39	-0.23	.23	n/a	n/a			
	0.07	-0.05	0.07	-0.17	-0.20	-0.37	-.08	.17	.13			
	0.04	0.18	0.04	0.00	-0.26	-0.02	-.02	-.12	.13			

J Pain. Author manuscript; available in PMC 2009 October 7.

St. Joseph's Health Care, a teaching hospital affiliated with the University of Western Ontario; UW, a research program on pain in persons with disabilities in the Department of Medicine, University of Washington; SCI, spinal cord injury. **Bold** = $P < .001$.

Table 5
Correlations of MPRCQ2 With PSOCQ Scales (Fibromyalgia Sample)

MPRCQ2 SCALES	PSOCQ SCALES			
	PRECONTEMPLATION	CONTEMPLATION	ACTION	MAINTAIN
Exercise	-0.18	-0.09	0.34	0.35
Task Persistence	-0.03	0.08	0.07	0.02
Relaxation	-0.14	-0.03	0.29	0.34
Avoid Asking Assistance	0.06	-0.06	-0.05	0.10
Pacing	-0.18	-0.01	0.28	0.37
Avoid Rest	0.03	-0.04	-0.08	0.00
Assertive Communication	-0.13	-0.00	0.29	0.22
Body Mechanics	-0.24	-0.06	0.24	0.25
Cognitive Control	-0.26	0.08	0.42	0.46
MPRCQ2 Total	-0.25	0.04	0.40	0.47

Bold = $P < .001$.

Table 6

Means and Standard Deviations for MPRCQ2 Scales

MPRCQ2 SCALE	SJHC FIBROMYALGIA		SJHC ARTHRITIS		UW AMPUTEE		UW SCI		COMBINED	
	MEAN	SD	MEAN	SD	MEAN	SD	MEAN	SD	MEAN	SD
Exercise	4.24	1.40	4.45	1.30	3.89	1.75	4.53	1.62	4.25	1.57
Task Persistence	4.58	1.51	4.75	1.59	5.49	1.58	5.38	1.59	5.08	1.61
Relaxation	3.69	1.29	4.12	1.39	3.23	1.51	3.12	1.58	3.44	1.49
Cognitive Control	4.42	1.10	4.75	1.07	5.01	1.46	5.03	1.41	4.80	1.32
Divert Attention	4.72	1.50	5.19	1.23	5.07	1.89	5.16	1.86	5.00	1.70
Self-Statements	4.80	1.56	5.23	1.31	5.10	1.75	5.01	1.84	5.00	1.67
Reinterpret Sensations	4.01	1.45	4.45	1.43	4.63	1.97	4.54	2.06	4.39	1.80
Avoid Catastrophizing	4.19	1.39	4.35	1.50	5.07	1.86	4.92	1.76	4.66	1.69
Ignore Sensations	4.39	1.69	4.33	1.83	5.18	1.87	5.52	1.82	4.93	1.86
Pacing	5.12	1.37	4.99	1.33	5.18	1.67	5.10	1.89	5.11	1.61
Avoid Contingent Rest	2.83	1.78	2.30	1.78	3.25	1.94	3.23	2.07	3.00	1.91
Avoid Asking for Assistance	3.17	1.83	3.16	2.18	3.87	2.12	3.61	2.20	3.49	2.08
Assertive Communication	4.69	1.52	4.78	1.54	4.58	2.13	4.53	2.10	4.59	1.88
Proper Body Mechanics	5.19	1.29	5.26	1.36	4.87	1.81	4.49	1.81	4.91	1.63
MPRCQ2 Total	37.90	6.52	38.56	6.97	39.25	9.29	38.82	7.87	38.61	7.79

Abbreviations: SJHC, St. Joseph's Health Care, a teaching hospital affiliated with the University of Western Ontario; UW, a research program on pain in persons with disabilities in the Department of Rehabilitation Medicine, University of Washington; SCI, spinal cord injury.