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COPING STRATEGY USE: DOES IT PREDICT ADJUSTMENT TO CHRONIC BACK PAIN AFTER CONTROLLING FOR CATASTROPHIC THINKING AND SELF-EFFICACY FOR PAIN CONTROL?

Steve R. Woby,[1,2] Paul J. Watson,[3] Neil K. Roach[4] and Martin Urmston[1,2]

From the [1]Department of Physiotherapy, North Manchester General Hospital, Manchester, [2]Centre for Rehabilitation Science, University of Manchester, Manchester Royal Infirmary, Oxford Road, Manchester, [3]University Department of Anaesthesia, Critical Care and Pain Management, Leicester General Hospital, Leicester and [4]Institute for Biophysical and Clinical Research into Human Movement, Department of Exercise and Sport Science, Manchester Metropolitan University, MMU Cheshire at Alsager, UK

Objective: **To explore whether coping strategy use predicted levels of adjustment in chronic low back pain after controlling for the influence of catastrophic thinking and self-efficacy for pain control.**

Methods: **Eighty-four patients with chronic low back pain completed the Coping Strategies Questionnaire, a pain VAS and the Roland Disability Questionnaire. To derive composite measures of coping, the Coping Strategies Questionnaire subscales, excluding the Catastrophizing subscale and 2 single-item scales, were entered into a principal components analysis. The extent to which scores on the coping measures predicted levels of adjustment after controlling for catastrophic thinking (Catastrophizing subscale) and self-efficacy for pain control (2 single-item scales) was explored using sequential multiple regression analysis.**

Results: **Two coping dimensions emerged from the principal components analysis, which were labelled Distraction and Praying or Hoping, and Denial of Pain and Persistence. Scores obtained on these coping measures explained an additional 5% and 13% of the variance in pain intensity and disability, respectively. Interestingly, however, the scores on the coping measures did not predict pain intensity or disability after controlling for the influence of catastrophic thinking and self-efficacy for pain control.**

Conclusion: **Coping strategy use might only be related to levels of adjustment via the effect it has on catastrophic thinking and self-efficacy for pain control.**

Key words: coping, Coping Strategies Questionnaire, chronic low back pain, catastrophic, self-efficacy.

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Correspondence address: Steve Woby, Department of Physiotherapy, North Manchester General Hospital, Delauneys Road, Crumpsall, Manchester, M8 5RB, UK. E-mail: steve.woby@pat.nhs.uk

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INTRODUCTION

Back pain has a point prevalence of between 12% and 35% and a lifetime prevalence ranging from 49% to 80% (1–3). Despite these high prevalences, only a relatively small percentage of individuals (24%) appear to consult their primary care physician (3). Of those who present, approximately 50% will have stopped consulting within 1 week and 90% will have stopped within 1 month (4). The remaining 10% often continue to consult and in many instances go on to develop chronic low back pain (CLBP) (5).

Some individuals with CLBP appear to adjust relatively well to their symptoms and maintain a relatively "normal" level of functioning. In contrast, others do not adjust well and allow their symptoms to severely compromise their level of functioning, which in turn can lead to a number of psychosocial consequences (6). In the majority of cases, an underlying physical pathology cannot be identified to explain why some individuals adjust relatively well to CLBP whilst others do not (7–9).

The coping strategies employed by an individual with CLBP could be one factor that partly influences how well they adjust to their symptoms (10). The relationship between an individual's coping strategy use and their level of adjustment has typically been explored by asking individuals to complete the Coping Strategies Questionnaire (CSQ) (11) and various measures of adjustment. In the context of this study, the term "adjustment" refers to a patient's level of pain and/or disability. The CSQ assesses 7 different coping strategies, namely; Diverting Attention, Ignoring Pain Sensations, Reinterpreting Pain Sensations, Coping Self-statements, Catastrophizing, Praying or Hoping, and Increasing Activity Level. The CSQ also comprises 2 single-item scales that assess an individual's perceptions of their control over pain and confidence in their ability to decrease pain.

Numerous studies have shown that there is a relationship between scores obtained on composite CSQ measures and the levels of adjustment reported by patients with CLBP. For instance, Turner & Clancy (12) and Spinhoven et al. (13) both found that patients who scored higher on a composite CSQ measure, labelled Helplessness, tended to report greater levels of functional impairment. Similarly, Dozois et al. (14) observed that lower pre-treatment scores on a composite CSQ measure, also labelled Helplessness, predicted lower levels of functional impairment following treatment, even after controlling for demographics, pain related variables and baseline functional

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status. Finally, Spinhoven et al. (13) reported that higher scores on a composite CSQ measure, labelled Perceived Control, were related to lower levels of pain intensity and functional limitation.

The aforementioned studies appear to suggest that the coping strategies employed by patients with CLBP might be an important factor that influences their level of adjustment. However, it is noteworthy that each of these studies employed composite CSQ measures that might have been partly confounded by cognitive constructs other than coping. For instance, the studies by Turner & Clancy (12), Spinhoven et al. (13) and Dozois et al. (14) each found that higher scores on a composite CSQ measure, labelled Helplessness, were related to poorer levels of adjustment. In each of these studies, the Helplessness measure partly comprised the Catastrophizing subscale of the CSQ. Catastrophizing refers to an exaggerated negative orientation toward pain stimuli and pain experience (15, 16). Some investigators have argued that catastrophizing should be viewed as a coping strategy because individuals might catastrophize in order to communicate their distress and inability to cope with pain. By communicating their distress in this way, it is argued that individuals are attempting to obtain assistance or support from others. Indeed, according to the Communal Coping Model (CCM) (17), catastrophizing serves as a form of social communication directed towards obtaining support and assistance. Interestingly, the CCM appears to refer to observable catastrophic behaviour and not catastrophic thinking.

According to Lazarus and Folkman (18), coping is an effortful response to manage the external or internal demands that tax an individual's resources. On this basis, it is clear to see how catastrophic behaviour can be viewed as a coping strategy because it could represent an attempt to obtain support or assistance from others. However, it is less clear to see how catastrophic thinking can be seen as a form of coping strategy because it does not, in our opinion, represent an effortful response to obtain support or assistance from others.

It is noteworthy that the Catastrophizing subscale of the CSQ assesses catastrophic thinking, and not catastrophic behaviour. In view of this, we believe that the Catastrophizing subscale does not assess a coping strategy *per se*. This has important implications because studies have shown that scores obtained on composite CSQ measures that comprise the Catastrophizing subscale are often strongly related to measures of adjustment in patients with CLBP (12–14, 19). The fact that these measures partly comprised the Catastrophizing subscale raises the possibility that they might only have been strongly related to measures of adjustment because they also assessed a construct other than coping, that is, catastrophic thinking. If this were the case then the Catastrophizing subscale might have subsumed the effect of the other coping subscales, thus obscuring their relative influence.

The CSQ also contains 2 single-item scales that assess an individual's perceptions of their control over pain and ability to decrease pain. Although these scales appear to be related to the levels of adjustment reported by individuals with CLBP (13, 20), they appear to assess an individual's self-efficacy for pain control, and not a specific type of coping strategy *per se*. Therefore, in our opinion, composite CSQ measures that comprise the 2 single-item scales are confounded because they partly assess an individual's self-efficacy for pain control. Self-efficacy is defined as the expectation that one can execute a behaviour required to produce a desired outcome (21).

In view of the factors alluded to above, it could be argued that many studies might have employed coping measures that were confounded by constructs other than coping (e.g. catastrophic thinking and/or self-efficacy for pain control). Accordingly, the aim of this study is to investigate whether scores obtained on composite CSQ measures (coping measures), which do not assess catastrophic thinking and self-efficacy for pain control, are related to the levels of adjustment reported by patients with CLBP. In addition, the extent to which scores on these coping measures contribute to levels of adjustment after controlling for the effects of catastrophic thinking and self-efficacy for pain control will be determined. Similarly, the degree to which catastrophic thinking and self-efficacy for pain control predict adjustment after controlling for the influence of the coping measures will be established. These analyses will help elucidate whether both constructs (i.e. (i) coping strategies and (ii) catastrophic thinking and self-efficacy for pain control) are independently related to measures of adjustment, and delineate whether both constructs need to be targeted during treatment. For instance, if scores on the coping measures are related to levels of adjustment after controlling for catastrophic thinking and self-efficacy for pain control then it would seem prudent to try to modify patients' use of certain coping strategies during treatment. However, if scores on the coping measures are found not to be related to measures of adjustment, after controlling for catastrophic thinking and self-efficacy for pain control, then the utility of employing techniques aimed at modifying patients' use of coping strategies might be called into question. Indeed, such a finding would suggest that an intervention should perhaps place greater emphasis upon modifying patients' catastrophic thinking and self-efficacy for pain control, rather than their use of coping strategies *per se*.

METHODS

Subjects

Ninety patients with CLBP (duration since initial onset of back pain >3 months) who had been referred to an outpatient CLBP rehabilitation program were recruited to the study. Patients were referred to the program from general practitioners, orthopaedic consultants, rheumatology consultants and directly from accident and emergency. Exclusion criteria were nerve root compression, central nervous system impairment, progressive motor deficit, sphincter impairment due to neurological cause, presence of "red flags" (e.g., unexplained weight loss, recent urinary tract infection, history of intravenous drug use), and a reluctance to participate in the program. The rehabilitation program was underscored by cognitive-behavioural principles and was led exclusively by physiotherapists. The content and structure of this intervention is described elsewhere (22). The median age of the sample was 39 years (range = 3 months–42 years), and the median duration of back pain was 4 years (range = 3 months–42 years). Fifty-five percent of the sample was male, 55% reported referred leg pain, 9% had undergone previous surgery for their back pain, 73% had a previous history of back pain and

32% had either received or were pursuing medico-legal compensation for their back pain.

Patients completed a series of self-report measures prior to participating in the rehabilitation program.

Measures

Roland Disability Questionnaire (RDQ). The RDQ is a 24-item measure that assesses disability due to back pain (23). Patients respond to each item using a dichotomous, true or false, scoring system. The measure possesses excellent reliability, validity and responsiveness in patients with CLBP (23–25). Higher scores on this measure are indicative of greater levels of disability.

Pain Visual Analogue Scale (VAS). A 100-mm horizontal scale requiring patients to rate their current pain intensity was employed. The scale was anchored with endpoints labelled "No Pain" and "Worst Possible Pain". The VAS has been widely used in pain research and demonstrates good reliability, validity and responsiveness in patients with chronic pain (26, 27). Higher scores on this measure reflect greater levels of pain intensity.

Coping Strategies Questionnaire (CSQ). The CSQ is a self-report measure containing 42-items that assess 6 cognitive coping strategies (Diverting Attention, Ignoring Pain Sensations, Reinterpreting Pain sensations, Coping Self-statements, Catastrophizing, and Praying or Hoping) and 1 behavioural strategy (Increasing Activity Level) (11). Each coping strategy is rated on a 7-point scale according to frequency of use, where 0 = "Never do that" and 6 = "Always do that". The CSQ also contains 2 single-item scales that assess a patient's perceptions of their control over, and ability to decrease, pain. The CSQ has good internal consistency and is related to various measures of functioning in patients with chronic pain (28) thus supporting its validity. Higher scores on each of the subscales indicate greater use of that particular coping strategy.

Statistical analyses

Data were analysed using the Statistical Package for the Social Sciences (SPSS) (version 10). Six cases had missing data on the CSQ and were thus excluded from further analysis, resulting in a final sample size of 84. Scores on the Pain VAS (Z skewness = 3.36) and Reinterpreting Pain Sensations subscale of the CSQ (Z skewness = 3.3) were both moderately skewed (positively) and thus subjected to square root transformations. Following transformation, the distributions for the Pain VAS (Z skewness = 0.75) and Reinterpreting Pain Sensations subscale (Z skewness = 0.69) were normalized. The transformed scores were used in all statistical analyses. Significance was accepted at the 0.05 level (2-sided).

Principal components analysis. To identify composite measures of coping, the CSQ subscales were entered into an exploratory principal components analysis (PCA) with oblique (Oblimin) rotation. PCA was used because it is the most appropriate method for determining the probable number and nature of factors (29). Oblique rotation was chosen because the CSQ subscales assess varying, but related, dimensions of the same construct and are thus likely to correlate (29). The Catastrophizing subscale and 2 single-item scales were not included in the PCA because of the conceptual reasons outlined earlier. However, the Catastrophizing subscale and 2 single-item scales were combined into a composite measure, which we labelled Catastrophic Thinking and Self-Efficacy. Prior to combining these measures, the scores on the 2 single-item scales were inversed so that higher scores reflected lower self-efficacy.

The determinant of R was 0.12, indicating that the data were not affected by multicollinearity (29). The Kaiser-Meyer-Olkin (KMO) (30) measure of sampling frequency for multiple variables was 0.76 and the KMO values for individual variables were all greater than 0.70. These statistics, when viewed in light of the highly significant score on Bartlett's (31) Test of Sphericity ($p < 0.0001$), confirmed that the data were appropriate for PCA.

Of the factors emerging from the analysis only those having eigenvalues of greater than 1 were considered (29). A coping strategy was included on a factor if it correlated with that factor at a level greater than 0.60.

Sequential multiple regression analyses. Sequential multiple regression analyses were performed to determine whether scores on the coping measures and the measure for Catastrophic Thinking and Self-Efficacy were related to levels of pain intensity and disability. Two separate analyses were performed for each outcome measure. In the first analysis, age and sex (demographics) were entered in Step 1, pain intensity was entered in Step 2 (only when disability was the outcome), the coping measures were entered in Step 3, and the measure for Catastrophic Thinking and Self-Efficacy was entered in Step 4. In the second analysis, the order of entry for Steps 3 and 4 was reversed.

The predictor variables used in each of the regression analyses had Variance Inflation Factors that were considerably less than 10 (32) and tolerance levels that were all notably higher than 0.2 (33) indicating that the data were not affected by multicollinearity. Furthermore, in each of the analyses, no more than 5% of cases had standardized residuals greater than 2, and none had standardized residuals greater than 3, thus confirming that the models were an accurate reflection of the data (34). None of the cases in the analyses exerted an undue influence on the final models, based on Mahalanobis' distances ($p < 0.001$) (29), Cook's distances (less than 1) (35) and leverage values (less than 3 times the average value) (36).

RESULTS

Sample characteristics

Table I shows the descriptives for each of the measures used. The sample reported moderate levels of pain intensity (37) and disability (23, 25). The 2 most frequently used coping styles were Coping Self-statements and Increasing Activity Level, whilst the style employed least was Reinterpreting Pain Sensations.

Principal components analysis

The PCA identified 2 factors with eigenvalues greater than 1, which together accounted for 69.9% of the total variance in the CSQ responses. Examination of Cattell's (38) scree test confirmed the 2 factor solution. Table II shows the structure matrix of the oblique-rotated component analysis and the communalities (h^2). It can be seen that factor loadings ranged from 0.64 to 0.89. The high communalities indicated that the factors accounted for a substantial proportion of the variance in all coping subscales. Factor 1, which accounted for 50.2% of the variance in the CSQ responses, was labelled *Distraction and Praying or Hoping* and comprised the subscales for Diverting Attention, Praying or Hoping, Increasing Activity Level and Reinterpreting Pain Sensations. Higher scores on this factor

Table I. *Descriptive statistics for each measure*

Variable	Median	Range
Pain Intensity (VAS)[#]	35	4–100
Disability (RDQ)	13	2–23
Reinterpreting Pain Sensations[#]	6	0–30
Ignoring Pain Sensations	14	0–31
Diverting Attention	13.5	0–31
Praying or Hoping	17	0–36
Coping Self-statements	23.5	2–35
Increasing Activity Level	18	0–33
Catastrophizing	15.5	0–30
Ability to Decrease Pain	2.5	0–6
Ability to Control Pain	2.7	0–5

[#]Untransformed values.
RDQ: Roland Disability Questionnaire.

Table II. *Principal components analysis of the coping subscales (Oblique (Oblimin) rotation with Kaiser Normalisation)*

Factor	Coping subscale[a]			Communalities (h^2)
1	*Distraction & Praying or Hoping*			
	Diverting Attention	**0.88**	−0.43	0.80
	Praying or Hoping	**0.79**	0.03	0.78
	Increasing Activity Level	**0.73**	−0.52	0.72
	Reinterpreting Pain Sensations	**0.64**	−0.49	0.77
2	*Denial of Pain & Persistence*			
	Ignoring Pain Sensations	0.30	**−0.89**	0.62
	Coping Self-statements	0.30	**−0.88**	0.51

[a]Standardized regression coefficient.

indicate that a patient is more inclined to think of pleasant experiences to distract themselves away from their pain, imagine that their pain is not really there, and relinquish control of pain to others (e.g., god or doctors). Factor 2, which accounted for 19.7% of the variance in the CSQ responses, was labelled *Denial of Pain and Persistence* and comprised the subscales for Ignoring Pain Sensations and Coping Self-statements. Higher scores on this factor reflect a patient's tendency to ignore their pain sensations and continue, where possible, with their normal level of everyday functioning.

Sequential regression analyses

Predicting pain intensity. The results of the regression analysis predicting pain intensity are shown in Table III. Age and sex were not significantly related to pain intensity. In the first analysis, in which the measure for Catastrophic Thinking and Self-Efficacy was entered last, the coping measures explained an additional 5% of the variance in pain intensity beyond that accounted for by age and sex. Examination of the beta weights revealed that the measure labelled Distraction and Praying or Hoping was uniquely related to pain intensity, with higher scores associated with greater levels of pain intensity ($\beta = 0.24$, $p = 0.04$). After controlling for the influence of age, sex and the coping measures, the measure for Catastrophic Thinking and Self-Efficacy explained an additional 8% of the variance. Specifically, higher scores on this measure were related to greater levels of pain intensity. In the second analysis, in which the coping measures were entered last, the measure for Catastrophic Thinking and Self-Efficacy explained an additional 11% of the variance beyond that accounted for by age and sex. After controlling for the influence of age, sex and the measure for Catastrophic Thinking and Self-Efficacy, the coping measures did not explain any significant additional amount of variance in pain intensity.

Predicting disability. The results of the regression analysis predicting disability are shown in Table IV. Age and sex were not significantly related to disability. Higher levels of pain intensity were associated with greater levels of disability accounting for an additional 16% of the variance in this outcome beyond demographics. In the first analysis, in which the measure for Catastrophic Thinking and Self-Efficacy was entered last, the coping measures explained an additional 13% of the variance in disability after controlling for age, sex and pain intensity. Examination of the beta weights revealed that the measure labelled Denial of Pain and Persistence was uniquely related to disability, with higher scores associated with lower levels of disability ($\beta = -0.32$, $p = 0.01$). The measure for Catastrophic Thinking and Self-Efficacy explained an additional 8% of the variance in disability even after controlling for the influence of demographics, pain intensity and the coping measures. Specifically, higher scores on this measure were predictive of greater levels of disability. In the second analysis, in which the coping measures were entered last, the measure for Catastrophic Thinking and Self-Efficacy explained an additional 18% of the

Table III. *Sequential regression analysis with pain intensity as the outcome and the coping dimensions as predictors*

Step and Variable	R^2	R^2 change	F change	Beta[a]	p-value
1. Demographics	0.01	0.01	0.65		0.84
Age				0.03	0.79
Sex				0.13	0.27
Analysis 1					
2. Coping Measures	0.06	0.05	1.86		0.04
Distraction & Praying or Hoping				0.24	0.04
Denial of Pain & Persistence				−0.12	0.35
3. Catastrophic Thinking & Self-Efficacy	0.14	0.08	5.89	0.31	0.02
Analysis 2					
2. Catastrophic Thinking & Self-Efficacy	0.12	0.11	9.02	0.49	0.005
3. Coping Measures	0.14	0.02	0.92		0.42
Distraction & Praying or Hoping				0.14	0.30
Denial of Pain & Persistence				−0.07	0.81

[a]Standardized regression coefficient.

Table IV. *Sequential regression analysis with disability as the outcome and the coping dimensions as the predictors*

Step and Variable	R^2	R^2 change	F change	Beta[a]	p-value
1. Demographics	0.05	0.05	2.30		0.19
Age				0.19	0.09
Sex				0.18	0.10
2. Pain Intensity	0.21	0.16	15.71	0.41	0.000
Analysis 1					
3. Coping Measures	0.34	0.13	14.11		0.04
Distraction & Praying or Hoping				0.09	0.18
Denial of Pain & Persistence				−0.32	0.01
4. Catastrophic Thinking & Self-Efficacy	0.42	0.08	7.04	0.25	0.04
Analysis 2					
3. Catastrophic Thinking & Self-Efficacy	0.39	0.18	16.04	0.43	0.007
4. Coping Measures	0.42	0.03	1.18		0.30
Distraction & Praying or Hoping				0.04	0.81
Denial of Pain & Persistence				−0.18	0.11

[a]Standardized regression coefficient.

variance beyond that accounted for by demographics and pain intensity. Interestingly, the coping measures did not make any significant additional contribution to the prediction of disability after controlling for demographics, pain intensity and scores on the measure for Catastrophic Thinking and Self-Efficacy.

DISCUSSION

Numerous studies have shown that there is a relationship between scores obtained on composite CSQ measures and levels of adjustment in patients with CLBP (11–13). Many of these studies, however, employed composite CSQ measures that were potentially confounded by constructs other than coping. For instance, in addition to coping, the CSQ also assesses catastrophic thinking (Catastrophizing subscale) and self-efficacy for pain control (2 single-item scales), which in our opinion do not assess coping strategies. Interestingly, previous findings have shown that a strong relationship often exists between scores obtained on composite CSQ measures, which partly comprise the Catastrophizing subscale and 2 single-item scales, and levels of adjustment in patients with CLBP (12–14, 19). This raises the possibility that these measures might only have been related to measures of adjustment because they partly assessed constructs other than coping (e.g. catastrophic thinking and/or self-efficacy for pain control). If this is the case, then previous work might have provided a misleading insight into the role that coping strategy use plays in patients' adjustment to CLBP.

The aim of this study was to provide a more detailed insight into the role that coping strategy use plays in patients' adjustment to CLBP. Specifically, the study explored whether scores obtained on composite CSQ measures, which did not assess catastrophic thinking or self-efficacy for pain control, were related to levels of pain intensity and disability. Furthermore, the extent to which scores on the coping measures independently predicted levels of pain intensity and disability after controlling for the influence of catastrophic thinking and self-efficacy for pain control was explored.

To identify composite measures of coping, the CSQ subscales were entered into a principal components analysis (PCA). The Catastrophizing subscale and 2 single-item scales were not entered into the PCA due to the fact that they might not assess coping strategies *per se*. The PCA produced a 2-factor solution, which accounted for 69.9% of the total variance in the CSQ responses. Factor 1 was labelled Distraction and Praying or Hoping and comprised the subscales for Diverting Attention, Praying or Hoping, Increasing Activity Level, and Reinterpreting Pain Sensations. Factor 2 was labelled Denial of Pain and Persistence and comprised the subscales for Ignoring Pain Sensations and Coping Self-statements. The Catastrophizing subscale and 2 single-item scales were combined into a composite measure that we labelled Catastrophic Thinking and Self-Efficacy.

The study found that after adjusting for age and sex, the coping measures explained a small, but nonetheless, significant proportion (5%) of the variance in pain intensity. More specifically, it emerged that scores on the measure labelled Distraction and Praying or Hoping were uniquely related to levels of pain intensity, whereas scores on the measure labelled Denial of Pain and Persistence were not. Indeed, higher scores on the Distraction and Praying or Hoping measure were related to greater levels of pain intensity. This finding implies that interventions should perhaps utilize techniques aimed at reducing this type of coping strategy use because this might help bring about reductions in pain intensity. Scores on the measure for Catastrophic Thinking and Self-Efficacy explained an additional 8% of the variance in pain intensity even after controlling for the influence of the coping measures. This notable finding partially supports our contention that the measure for Catastrophic Thinking and Self-Efficacy might assess a different construct from the 2 coping measures. After controlling for the influence of catastrophic thinking and self-efficacy, the coping measures did not account for any significant additional variance in pain intensity. This suggests that coping strategy use might be indirectly related to pain

intensity via the effect it has on catastrophic thinking and self-efficacy.

In terms of predicting disability, the study found that after adjusting for age and sex, higher levels of pain intensity were associated with greater levels of disability. Specifically, pain intensity explained an additional 16% of the variance in this outcome, thus suggesting that pain intensity is an important factor influencing patients' disability. In spite of this, it should be noted that treatments aimed at pain relief are often unsuccessful, especially in those instances where the underlying cause of a person's back pain cannot be identified (39). According to the findings of this study, interventions that employ techniques aimed at reducing catastrophic thinking, whilst also increasing self-efficacy for pain control, might facilitate pain relief. However, these variables only explained a relatively small proportion of the variance in pain intensity (11%) and are thus unlikely to have any major effect upon pain relief, even if they were to be successfully targeted and modified during an intervention.

The coping measures explained an additional 13% of the variance in disability after adjusting for age, sex and pain intensity. This study, therefore, highlights that composite CSQ measures, which are not confounded by catastrophic thinking and self-efficacy for pain control, are related to the levels of disability reported by patients with CLBP. In direct contrast to the findings observed when pain intensity was the outcome, higher scores on the measure labelled Denial of Pain and Persistence were uniquely related to lower levels of disability, whereas scores on the measure labelled Distraction and Praying or Hoping were not. In light of these findings, it would seem that the relative importance of certain coping strategies might vary in accordance with the specific outcome measure used.

Current models of chronic pain postulate that avoiding certain activities because of pain, or expectation of pain, might ultimately exacerbate levels of disability in the longer-term (40). It is noteworthy that the Denial of Pain and Persistence coping measure comprised the CSQ subscales for Ignoring Pain Sensations and Coping Self-statements. Higher scores on these coping styles reflect a patient's tendency to ignore their pain sensations and continue, where possible, with their normal level of everyday functioning. On this basis, it would seem that the findings of this study support current models of chronic pain, which posit that those individuals who employ a confrontational style of coping report lower levels of disability (40).

The study found that scores obtained on the measure for Catastrophic Thinking and Self-Efficacy were independently related to levels of disability, after controlling for the influence of the coping measures. This highlights the strong predictive utility of this measure and provides partial support for our contention that this measure might not assess the use of coping strategies *per se*. In light of the important role that catastrophic thinking and self-efficacy appears to play in patients' adjustment to CLBP it would seem prudent to target these factors during treatment. An interesting area for future research would be to explore which treatment approaches are most effective at bringing about changes in these factors.

Although scores on the measure for Catastrophic Thinking and Self-Efficacy were independently related to levels of disability after controlling for the influence of the coping measures, the converse was not true. That is, scores on the coping measures did not make an independent contribution to the prediction of disability after controlling for the influence of catastrophic thinking and self-efficacy. Interestingly, as alluded to earlier, scores on the coping measures were significantly related to levels of disability prior to controlling for levels of catastrophic thinking and self-efficacy. When viewed together, these findings suggest that scores on the coping measures might only have been related to levels of disability because of their strong association with the measure for Catastrophic Thinking and Self-Efficacy. More specifically, it seems that the use of certain coping strategies might help reduce levels of catastrophic thinking and increase self-efficacy for pain control, which in turn might subsequently help reduce levels of disability.

The fact that the coping measures did not predict levels of disability after controlling for the influence of catastrophic thinking and self-efficacy suggests that the predictive utility of the CSQ might largely be due to the influence of the catastrophizing subscale and 2 single-item scales. It could, therefore, be argued that previous findings obtained using the CSQ might have overemphasized the role that coping strategy use plays in adjustment to CLBP. Investigators should be cognisant of this fact when reviewing these previous findings.

This study has a number of limitations that should be noted. Firstly, this study employed a pain VAS to assess pain intensity. Although the pain VAS has been shown to be valid and reliable (26, 27) its use potentially hides idiosyncratic meanings of pain (41). In order to address this limitation, future investigations might benefit from employing an alternative method of assessing pain, such as that described by Williams et al. (41). Secondly, the cross-sectional nature of our study precludes any causal inferences from being made. Indeed, whilst it is possible that the use of certain coping strategies and/or catastrophic thinking and self-efficacy might influence levels of adjustment, the converse may also be true. That is, levels of adjustment might influence patients' use of coping strategies and/or their levels of catastrophic thinking and self-efficacy. However, 2 recent studies found that early treatment changes (pre- to mid-treatment) in cognitive factors predicted late treatment changes (mid- to-post treatment) in pain severity and pain interference (42, 43). Conversely, early treatment changes in pain severity and pain interference did not predict late treatment changes in cognitive factors. These findings appear to suggest that changes in cognitive factors lead to changes in measures of adjustment.

To our knowledge, this is the first study to examine the predictive utility of the CSQ in patients with CLBP presenting for physiotherapy in the UK. Consequently, the degree to which the findings generalize to different physiotherapy contexts across different countries remains unsubstantiated. Furthermore,

this study derived data from patients who exhibited moderate levels of pain intensity and disability. Therefore, the extent to which the findings generalize to different groups of patients, such as those who exhibit high levels of pain intensity and disability, is unknown. It should also be noted that most of the coping strategies examined within this study were cognitive and not behavioural. Future investigations should consider employing measures such as the Chronic Pain Coping Inventory (CPCI) (44) to investigate whether the use of behavioural coping strategies influences the levels of adjustment reported by patients with CLBP.

A final limitation relates to the fact that we combined scores on the Catastrophizing subscale and 2 single-item scales of the CSQ. By doing this, it could be argued that we combined 2 constructs that are conceptually distinct, thus preventing us from determining their relative importance. Whilst we accept this limitation, it should be noted that the primary aim of this study was to explore whether scores obtained on coping measures, which were not confounded by catastrophic thinking and self-efficacy for pain control, were related to levels of adjustment in CLBP. Consequently, we believe that combining the scores on the Catastrophizing subscale and 2 single-item scales was appropriate within the context of this study because it enabled us simultaneously to control for catastrophic thinking and self-efficacy for pain control (in the same step of the analysis) prior to exploring whether the coping measures were independently related to measures of adjustment.

Despite the aforementioned limitations, the findings of this study have a number of theoretical and clinical implications. The study revealed that there was a significant relationship between coping strategy use and levels of adjustment in patients with CLBP. Interestingly, however, this relationship no longer existed when controlling for the influence of catastrophic thinking and self-efficacy. This suggests that coping strategy use was only indirectly related to adjustment via the effect it had on catastrophic thinking and self-efficacy. From a clinical perspective, the findings of this study suggest that a primary aim of CLBP rehabilitation should be to bring about changes in catastrophic thinking and self-efficacy. It would seem that influencing patients' use of certain coping strategies might facilitate this.

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