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Catastrophizing, pain, and disability in patients with soft-tissue injuries

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Abstract

The present study examined the role of catastrophizing in predicting levels of pain and disability in a sample of individuals who had sustained soft-tissue injuries to the neck, shoulders or back following work or motor vehicle accidents. Participants were 86 (27 men, 59 women) consecutive referrals to the Atlantic Pain Clinic, a multidisciplinary treatment centre for the management of persistent pain disorders. Findings revealed that catastrophizing, measured by the Pain Catastrophizing Scale (PCS; Sullivan, M.J.L. et al., Psychol. Assess., 7 (1995) 524–532) was significantly correlated with patients' reported pain intensity, perceived disability and employment status. The results of a regression analysis further showed that catastrophizing contributed to the prediction of disability over and above the variance accounted for by pain intensity. In addition, catastrophizing was associated with disability independent of the levels of depression and anxiety. The rumination subscale of the PCS was the strongest predictor of pain and disability. Theoretical and clinical implications of the findings are discussed.

Keywords: Catastrophizing; Pain; Disability; Depression; Anxiety

1. Introduction

The costs associated with pain-related disability are staggeringly high, whether assessed from a medical, occupational or psychosocial perspective (Frymoyer, 1992; Nachemson, 1992). As measured in health care dollars, chronic back pain is currently considered to be the most expensive benign condition afflicting the North American working-age population (Mayer et al., 1987; Cats-Baril and Frymoyer, 1991). Additionally, chronic pain has been associated with high, and often debilitating, levels of anxiety, depression, social and occupational dysfunction (Romano and Turner, 1985; Sullivan and Loeser, 1992; Turk and Okifuji, 1996).

Although pain has typically been considered the primary determinant of disability in chronic pain sufferers, it has also been suggested that pain and disability are distinct and partially independent phenomena (Frymoyer, 1992; Fordyce, 1997). For example, Fordyce (1976, 1995) has argued that environmental, social and monetary reinforcers, as opposed to pain, may be the primary determinants of disability. It has also been suggested that emotional variables such as depression, anxiety, and fear may be important determinants of disability (Rosenstiel and Keefe, 1983; Sullivan and Loeser, 1992; Turner and Clancy, 1986; Gatchel et al., 1995).

In recent years, increasing attention has been drawn to examining the contributions of 'catastrophizing' to the prediction of pain and disability in individuals suffering from chronic pain. Catastrophizing has been broadly defined as an exaggerated negative orientation toward pain stimuli and pain experience (Chaves and Brown, 1987; Sullivan et al., 1995). Numerous clinical and experimental investigations have shown that catastrophizing is associated with heightened pain experience (Spanos et al., 1979; Rosenstiel and Keefe, 1983; Keefe et al., 1989; Heyneman et al., 1990;

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Jensen et al., 1991; Sullivan and D'Eon, 1990; Sullivan et al., 1995). To date, a relation between catastrophizing and pain has been observed in several populations including patients with low back pain (see Jensen et al., 1991 for a review), patients with arthritis (Keefe et al., 1989), patients undergoing aversive diagnostic procedures (Sullivan et al., 1995), dental patients (Chaves and Brown, 1987; Sullivan and Neish, 1997), and headache sufferers (Ukestad and Wittrock, 1996; Bédard et al., 1997).

A number of studies have also shown that measures of catastrophizing are significantly correlated with objective and subjective measures of disability. In an early study, Rosenstiel and Keefe (1983) reported that the Coping Strategies Questionnaire (CSQ; which includes a catastrophizing subscale) accounted for 37% of the variance in patients' pain ratings, and 19% of the variance on a measure of functional capacity. Similarly, Turner and Clancy (1986) reported that the CSQ accounted for 27% of the variance in disability and psychosocial impairment, and 16% of the variance in downtime. In patients with rheumatoid arthritis and fibromyalgia, it has been shown that factor scores of the CSQ (which included the catastrophizing scale) were also predictive of functional impairment classification and pain behaviours (Keefe et al., 1987; Parker et al., 1989; Beckman et al., 1991; Nicassio et al., 1995).

In each of the studies described above, the different subscales of the CSQ were entered in a factor analysis and factor scores, as opposed to individual subscales, were used as predictor variables. In each study, the factor containing the measure of catastrophizing was the strongest predictor of functional disability. However, the specific contribution of catastrophizing to the prediction of disability cannot be evaluated given that other CSQ subscales were included in the same factor.

Two studies have examined the unique contribution of catastrophizing to the prediction of disability. Robinson et al. (1997) showed that the catastrophizing subscale of the CSQ was significantly correlated with all activity-related indices of the Multidimensional Pain Inventory (Kerns et al., 1985). In a sample of patients with primary fibromyalgia, Martin et al. (1996) reported that the catastrophizing subscale of the CSQ was correlated with the Total Disability Scale of the Sickness Impact Profile (Bergner et al., 1981). The available literature, therefore, points to the important role of catastrophizing as a predictor of pain and disability in chronic pain patients.

Questions concerning the psychological predictors of disability have been central in discussions of the rehabilitation of individuals with soft-tissue injuries (Fordyce, 1995). Soft-tissue injuries following motor vehicle or work accidents can result in significant disability, and the cost of compensation associated with these injuries has been rising at an alarming rate (Frymoyer, 1992). Pain and mobility restrictions resulting from soft-tissue injuries can prevent individuals from performing a variety of life activities, including activities related to their occupation. It has been suggested that the criterion for successful outcome in individuals suffering from pain-related disability following soft-tissue injury should be employment status (Frymoyer, 1992; Fordyce, 1995). To date, the relation between catastrophizing and employment status in individuals with soft-tissue injuries has not been assessed. Thus, one of the aims of the present research was to examine whether high scores on a measure of catastrophizing predicted subjective ratings of occupational disability, as well as current employment status.

A second aim of the research was to examine which components of catastrophizing were most predictive of pain and disability in chronic pain patients. Sullivan et al. (1995) have suggested that catastrophizing, as measured by the Pain Catastrophizing Scale (PCS), can be viewed as a conceptually integrated construct that comprises three related components: rumination 'I can't stop thinking about how much it hurts', magnification 'I worry that something serious may happen', and helplessness 'There is nothing I can do to reduce the intensity of the pain' (Sullivan et al., 1995; Study 1). Currently, it is unclear whether the three components of the PCS contribute significantly to the prediction of disability or whether certain components are more predictive than others. Information concerning the components of catastrophizing that are most predictive of disability may help tailor interventions for chronic pain in a manner that may facilitate positive rehabilitation outcome.

Finally, in order to make a case for the conceptual utility of catastrophizing, it is also necessary to address whether catastrophizing is distinct from more basic emotional variables such as depression and anxiety (Sullivan and D'Eon, 1990; Haaga, 1992). Issues concerning the degree to which catastrophizing may be conceptually and operationally confounded with depression have been debated in the literature (Sullivan and D'Eon, 1990; Jensen et al., 1991; Haaga, 1992; Sullivan et al., 1995). Indeed, there is research to show that depression and anxiety can contribute to negative rehabilitation outcome (Sullivan and Loeser, 1992; Gatchel et al., 1995). From a perspective of parsimony, if the relation between catastrophizing and disability can be accounted for by depression and anxiety, then the construct does not add to our understanding of the determinants of disability. Thus, a third aim of the present research was to examine the degree to which catastrophizing predicted disability beyond the variance accounted for by depression and anxiety.

The research questions addressed by the present research can be summarized as follows:

1. Does catastrophizing predict occupational disability and employment status in patients with soft-tissue injuries?
2. What are the components of catastrophizing that are most predictive of disability?
3. In the prediction of disability, can catastrophizing be distinguished from depression and anxiety?

2. Subjects and methods

2.1. Participants

Participants were 86 (27 men, 59 women) consecutive referrals to the Atlantic Pain Clinic. The Atlantic Pain Clinic is a multidisciplinary treatment centre specializing in the management of persistent pain disorders. The mean age of the sample was 36.2 years (standard deviation (SD) = 7.8). Mean duration of pain was 2.7 years, and all patients had experienced pain for more than 6 months. Primary diagnoses included lumbar sprain ($n = 64$) and cervical sprain ($n = 22$). Only a small percentage of patients had surgery (14%). The majority of patients were married (78%).

2.2. Procedure and measures

Participants completed the following measures during their initial visit to the Atlantic Pain Clinic. Participants were aware that information collected was confidential and would only be reported in aggregate form.

2.2.1. Catastrophizing

The Pain Catastrophizing Scale (PCS; Sullivan et al., 1995) consists of 13 items describing different thoughts and feelings that individuals may experience when they are in pain. The PCS instructions ask participants to reflect on past painful experiences, and to indicate the degree to which they experienced each of 13 thoughts or feelings when experiencing pain, on 5-point scales with the end points (0) not at all and (4) all the time. The PCS yields a total score and three subscale scores assessing rumination, magnification and helplessness. The PCS has been shown to have adequate to excellent internal consistency (Cronbach, 1951), coefficient alphas: total PCS = 0.87, rumination = 0.87, magnification = 0.66, and helplessness = 0.78 (Sullivan et al., 1995).

2.2.2. Depression

The Beck Depression Inventory (BDI; Beck et al., 1961) was used as a self-report measure of depression. The BDI consists of 21 items describing various symptoms of depression. Subjects' responses were summed to yield an overall index of severity of depressive symptoms. The BDI has been shown to be a reliable and valid index of depressive symptoms in chronic pain patients (Bishop et al., 1993).

2.2.3. Anxiety

The State–Trait Anxiety Inventory (Spielberger et al., 1970) was used to measure situational and dispositional anxiety. Subjects were asked to rate the frequency with which they experienced each of 40 symptoms of anxiety on a 4-point scale with the endpoints (1) almost never and (4) always. Subjects responses were summed to yield composite indices of state and trait anxiety.

2.2.4. Pain

The McGill Pain Questionnaire (MPQ; Melzack, 1975) was used to assess pain. Participants were asked to endorse adjectives that best described their current pain experience. The Pain Rating Index (PRI) is a weighted sum of all adjectives endorsed, and is considered one of the more reliable and valid indices of an individual's pain experience (Turk et al., 1985). Present Pain Intensity (PPI) represents participants' ratings of their current pain intensity on a 6-point scale with the endpoints (0) no pain and (5) excruciating pain.

2.2.5. Disability

The Pain Disability Index (PDI; Pollard, 1984) was used to assess the degree to which subjects experienced pain-related disability in 7 different areas of daily living (home, social, recreational, occupational, sexual, self-care, life support). For each life domain, participants are asked to provide disability ratings on 11-point scales with the endpoints (0) no disability and (10) total disability. The PDI has been shown to be internally reliable and significantly correlated with objective indices of disability (Tait et al., 1987, 1990).

3. Results

3.1. Sample characteristics

Age, injury, gender and occupational characteristics of the sample are presented in Table 1. The primary cause of pain onset was motor vehicle accident (82%), resulting in persistent back (75%) or neck (17%%) pain. At the time of the evaluation, 56% of patients were unemployed, 30% were employed part-time, and 14% were employed full-time.

Mean scores on measures of catastrophizing, depression, anxiety, pain, and disability are presented in Table 2. Levels of depression were somewhat elevated compared to those reported in previous studies examining psychological correlates of chronic pain (e.g. Sullivan and D'Eon, 1990; Bishop et al., 1993). Scores on measures of pain, anxiety and self-reported disability were comparable to those described in previous research (Tait et al., 1990). Gender differences were found only for depression where women scored significantly higher on the BDI (mean = 22.3, SD = 11.4) than men (mean = 16.1, SD = 10.8), $t(84) = 2.2$, $P < 0.05$.

3.2. Correlates of disability

Correlations between measures of catastrophizing, depression, anxiety, pain, and the 7 subscales of the PDI are presented in Table 3. The PCS was significantly correlated with participants' ratings of occupational disability, $r = 0.47$, $P < 0.01$. Measures of depression, anxiety, and pain also correlated significantly with ratings of occupa-

tional disability. Only the PCS and the MPQ Present Pain Intensity were significantly correlated with employment status, $r = -0.29$, $P < 0.01$; $r = -0.24$, $P < 0.05$, respectively. Examination of Table 3 reveals that higher levels of catastrophizing, depression, anxiety and pain were associated with higher levels of perceived disability across most domains of activity assessed by the PDI.

3.3. Catastrophizing, pain, and disability

A hierarchical regression was conducted to examine the relative contribution of the three PCS subscales to the prediction of total disability. As shown in Table 4, age and pain duration were entered in Step 1 of the analysis. Two subscales of the MPQ (Pain Rating Index, Present Pain Intensity) were entered in Step 2 of the analysis, and contributed significant variance to the prediction of disability. The three subscales of the PCS were entered in Step 3, and also contributed significantly to the prediction of disability. Together the three subscales of the PCS accounted for 4% of the variance in disability scores, beyond the variance accounted for by age, pain duration, and pain intensity. Examination of the beta weights indicated that in the final regression equation, pain duration, the MPQ Pain Rating Index, and the rumination subscale of the PCS contributed unique variance to the prediction of disability.

Since previous research has suggested that the degree of overlap between catastrophizing and emotional distress may be sufficiently high to be considered redundant, it was necessary to determine the degree to which measures of catastrophizing and emotional distress contributed unique variance to the prediction of disability. A direct regression analysis was conducted using catastrophizing, depression and anxiety as predictor variables, and the total PDI score was used as the dependent variable. The results of the regression analysis are presented in Table 5. Together, the measures of catastrophizing, depression, and anxiety accounted for 37% of the variance in disability scores. Examination of the beta weights revealed that only the PCS contributed significant unique variance to the prediction of disability.

Table 1

Patient characteristics

	n	%
Age	36.2 years (range 22–58)	
Sex		
Male	27	31
Female	59	69
Primary pain site		
Back	64	75
Neck	15	17
Shoulders	4	5
Arms	3	3
Type of injury		
MVA	68	80
Work	16	18
Sport	2	2
Employment status		
Unemployed	48	56
Part-time	26	30
Full-time	12	14

Table 2

Psychological variables related to pain and disability

Variable	Mean	SD
PCS	27.96	12.78
BDI	20.42	11.57
STAI-T	50.05	15.33
STAI-S	52.51	16.58
MPQ-PPI	3.41	0.97
MPQ-PRI	38.04	13.69
PDI	44.46	12.56

$n = 86$. PCS, Pain Catastrophizing Scale; BDI, Beck Depression Inventory; STAI-T, State–Trait Anxiety Inventory – Trait; STAI-S, State–Trait Anxiety Inventory – State; MPQ-PPI, McGill Pain Questionnaire, Present Pain Intensity; MPQ-PRI, McGill Pain Questionnaire, Pain Rating Index; PDI, Pain Disability Index.

4. Discussion

The findings of the present research join a growing literature showing that catastrophizing contributes to heightened levels of pain and disability (cf. Jensen et al., 1991; Turk and Rudy, 1992). In the present study, catastrophizing was associated with heightened disability in all domains of activity assessed by the PDI. Of interest are the findings showing that high scores on a measure of catastrophizing were associated with greater pain intensity, higher ratings of occupational disability, and greater likelihood of unemployment.

Although previous research has shown a relation between catastrophizing and measures of disability, the present study is the first to show that catastrophizing is associated with employment status in individuals who have sustained soft-tissue injuries. Occupational dysfunction is a common consequence of cervical or lumbar sprain following motor vehicle accidents or work injury. The present findings suggest that, following injury, individuals who engage in catastrophic thinking about their pain may face greater challenges in their efforts to return to employment. Catastrophizing accounted for almost 30% of the variance in patients' ratings of their occupational dysfunction, and 9% of the variance in actual employment status. Catastrophizing predicted ratings of occupational dysfunction even after controlling for patients' level of pain. These findings suggest that rehabilitation interventions that specifically target catastrophizing, may have a positive impact on occupational outcome.

Table 3
Correlates of disability

	Pain disability index								Employment status
	Home	Social	Recre	Occup	Sex	Self	Life	Total	
PCS	0.48**	0.41**	0.37**	0.47**	0.46**	0.36**	0.40**	0.55**	–0.29**
BDI	0.37**	0.40**	0.41**	0.34**	0.56**	0.19	0.12	0.47**	–0.01
STAI-S	0.46**	0.40**	0.45**	0.43**	0.58**	0.20	0.21	0.51**	–0.09
STAI-T	0.44**	0.50**	0.45**	0.39**	0.53**	0.10	0.12	0.47**	–0.12
MPQ-PRI	0.41**	0.24*	0.28**	0.21	0.41**	0.40**	0.38**	0.46**	0.01
MPQ-PPI	0.33**	0.25*	0.20	0.38**	0.32**	0.23	0.17	0.34**	–0.24*

Pain Disability Index (PDI) subscales: Home, home maintenance activities; Social, social activities; Recre, recreational activities; Occup, occupational activities; Sex, sexual activities; Self, self-care activities; Life, life-support activities; Total, total PDI score. Employment status: 0, unemployed; 1, part-time employment; 2, full-time employment. Other abbreviations: see Table 2.
*$P < 0.05$; **$P < 0.01$.

The rumination factor (e.g. 'I can't stop thinking about how much it hurts') of the PCS was the component of catastrophizing most strongly associated with disability. This finding is consistent with the results of numerous investigations showing a relation between attention and pain experience (McCaul and Malott, 1984; Fernandez and Turk, 1987). The present findings suggest that individuals who attend excessively to their pain sensations are not only likely to experience more pain, but are likely to show evidence of greater disability as well. There are several potential explanations for the relation between rumination and disability. Spanos et al. (1979) suggested that catastrophizers' tendency to focus on pain sensations may interfere with the efficacy of coping strategies (see also Turk and Rudy, 1992; Sullivan et al., 1995). It is possible that interference with the effective use of coping strategies may also contribute to increased disability. It is also possible that increased attention to pain may foster the development of a helpless orientation toward the management of pain, and in turn, contribute to disability. Consistent with this perspective, Rosenstiel and Keefe (1983) reported that the 'helplessness' factor of the CSQ was associated with greater perceived disability.

Table 4
Components of catastrophizing and the prediction of disability: hierarchical regression analysis

Variables	Beta	*r*	*F*(change)	*P*
Step 1				
Age	–0.07			
Duration	0.36**	0.23	2.3	0.10
Step 2				
MPQ-PRI	0.32**			
MPQ-PPI	0.06	0.54	8.4	0.001
Step 3				
Rumination	0.38**			
Magnification	0.05			
Helplessness	0.14	0.73	12.5	0.001

MPQ-PRI, McGill Pain Questionnaire, Pain Rating Index; MPQ-PPI, McGill Pain Questionnaire, Present Pain Intensity. Rumination, Magnification, and Helplessness are the three subscales of the PCS. The beta weights are from the final regression equation.

The observed relation between rumination, pain and disability suggests that interventions that assist individuals in avoiding excessive focus on their pain sensations may be a viable means of reducing catastrophizing and facilitating rehabilitation progress. However, efforts to assist individuals who catastrophize in turning their attention away from pain may meet with unexpected clinical challenges. For example, Heyneman et al. (1990) reported that individuals who catastrophized were unable to make effective use of distraction strategies to reduce their pain. Similarly, Sullivan et al. (1997) found that catastrophizing was associated with a high frequency of pain-related thought intrusions when participants were asked to suppress thoughts about an upcoming painful procedure. Thought intrusions also predicted heightened pain experience. On the basis of these findings, Sullivan et al. (1997) suggested that individuals who catastrophize may possess 'pain schema' that increase the accessibility of pain-related information. Pain stimuli may serve to activate pain schema and increase the probability that thoughts about pain will intrude into consciousness even when individuals are deliberately attempting to divert attention away from pain.

A number of studies have shown that strategies other than attention diversion may be useful in reducing the pain experience of individuals who catastrophize. Heyneman et al. (1990) reported that self-instruction was effective in reducing level of pain for individuals who catastrophized. Self-instruction refers to a coping strategy where individuals identify their negative cognitions and attempt to change them to more positive cognitions about their ability to cope with the pain situation (see also Vallis, 1984). To date, research on the use of self-instruction to reduce pain in individuals who catastrophize has been conducted only in experimental settings and it remains unclear whether similar effects would be observed in clinical populations. Recently, Sullivan and Neish (1997) reported that, for individuals who obtained high scores on a measure of catastrophizing, emo-

Table 5

Direct regression examining the unique contribution of catastrophizing, depression and anxiety to the prediction of disability scores

Variables	Beta	Partial corr.	*t*	*P*
PCS	0.40	0.40	3.8	0.001
BDI	0.16	0.14	1.2	0.28
STAI-S	0.16	0.10	0.9	0.34
STAI-T	0.00	0.00	0.0	0.97

Multiple $r = 0.61$; $F(4,82) = 11.9$; $P < 0.001$.
PCS, Pain Catastrophizing Scale; BDI, Beck Depression Inventory; STAI-S, State–Trait Anxiety Inventory – State; STAI-T, State–Trait Anxiety Inventory – Trait.

tional disclosure was effective in reducing levels of emotional distress and pain experienced during a dental procedure. For individuals who catastrophized, the opportunity to disclose their dental worries and concerns prior to the dental procedure resulted in lower ratings of pain and emotional distress. However, emotional disclosure was not of benefit to individuals who did not catastrophize.

Horowitz (1986) has suggested that emotional distress frequently results in the experience of intrusive thoughts, and fosters increased attention to emotion-related information. It is possible that the relation between catastrophizing and heightened pain experience may arise as a function of mood-related processes such as selective attention and thought intrusions. In situations that do not foster disclosure, the more intense negative emotional experience of individuals who catastrophize may lead them to focus excessively on pain-related stimuli and experience a higher frequency of thought intrusions. These factors may combine to magnify the unpleasantness of the pain situation or interfere with the individual's ability to make effective use of pain reducing coping strategies (Spanos et al., 1979; Turk and Rudy, 1992; Sullivan et al., 1997). Ironically, this perspective suggests that, for individuals who catastrophize, interventions that foster expression of pain-related worries and concerns may be more effective in reducing excessive focus on pain sensations than interventions that foster inhibition or control of pain-related cognitions.

The relation between catastrophizing and disability can also be addressed within the framework of models of pain behaviour and abnormal illness behaviour (Pilowsky and Spence, 1975; Mechanic, 1977; Fordyce, 1976, 1997). The communicative function of pain behaviour may be particularly relevant to explaining why catastrophizing is associated with high levels of disability, independent of level of pain. It has been suggested that catastrophizing may be related to a communal and emotionally expressive orientation toward dealing with stress situations (Lyons and Sullivan, 1998; Sullivan et al., 1998). Through heightened displays of distress and by communicating an inability to deal effectively with a painful situation, individuals who catastrophize may be maximizing the probability that potential caregivers or companions will maintain proximity or offer support or assistance. This perspective suggests that high levels of catastrophizing may be closely associated with social needs and may thus be resistant to change unless therapeutic interventions address the network of social reinforcers that are maintaining catastrophizing (cf. Flor et al., 1989)

Questions have been raised about the degree to which catastrophizing may be confounded with more basic emotional constructs such as depression and anxiety (Sullivan and D'Eon, 1990; Jensen et al., 1991; Haaga, 1992). Consistent with previous research, the present findings showed that catastrophizing, depression, state and trait anxiety, were all significantly correlated with ratings of perceived disability (Rosenstiel and Keefe, 1983; Tait et al., 1990). It is possible, therefore, to make a case for the conceptual distinctiveness of catastrophizing. While catastrophizing may overlap to some degree with depression and anxiety, catastrophizing adds significantly to the predictive power of models of pain-related disability.

Although research has consistently highlighted the significance of catastrophizing as a determinant of pain and disability, most research has proceeded in the absence of a unified theoretical framework. It has been suggested that catastrophizing may represent an exaggerated negative appraisal of pain-related stimuli (Chaves and Brown, 1987; Jensen et al., 1991). It has also been suggested that catastrophizers may possess dysfunctional pain schema resulting in basic deficits in their ability to control pain-related ideation (Spanos et al., 1979; Turk and Rudy, 1992; Sullivan et al., 1997). Finally, catastrophizing has been discussed in terms of its social communicative functions and its relation to communal coping efforts (Sullivan et al., 1998). Little is currently known about the development of catastrophizing, the situational specificity of catastrophizing or its amenability to change (Vallis, 1984; Turner and Clancy, 1986). These are important questions for future research which will have significant bearing on our ability to more fully understand the psychological determinants of pain-related disability, and to be able to develop interventions that are effective in successfully managing, or even preventing, pain-related disability.

One of the assumptions guiding the current line of research is that catastrophizing is causally related to heightened pain and disability. Clearly, however, given the correlational design of the present study, it is difficult to rule out the possibility that increased pain and disability may lead individuals to catastrophize. However, findings from previous research can be cited in support of catastrophizing's antecedent or causal relation to pain and disability. Sullivan et al. (1998) showed that catastrophizing measured in a pain-free state predicted pain intensity ratings and pain behaviour when subjects were later asked to immerse one arm in ice water. Similarly, Sullivan and Neish (under review) showed that a measure of catastrophizing obtained 1 week prior to a dental appointment was a significant predictor of pain ratings obtained during an aversive dental procedure. In future research, it will be important to demon-

strate a similar prospective relation between catastrophizing and indices of occupational dysfunction in individuals who have sustained disabling soft-tissue injuries.

Another limitation of the present study was that no objective indices of disability were assessed (with the exception of employment status). Participants were asked to rate their level of perceived disability in different life domains. There was no feasible method of verifying the degree to which participants were indeed disabled in these areas. Objective indices of disability are costly and time-intensive, and tend to be domain-specific, and thus are lacking in the comprehensiveness that is afforded by self-report measures of disability. In spite of limitations, measures of perceived disability have previously been shown to correlate significantly with actual disability. For example, Gallon (1989) reported that high scores on a measure of perceived disability were directly related to prolonged disability in chronic pain patients. Similarly, Tait et al. (1990) reported that scores on the PDI were correlated with nurses' ratings of patients' pain behaviour such as verbal complaints, grimacing, and mobility impairment. In future research, greater precision may be afforded by examining the relation between catastrophizing and objective indices of social and occupational disability.

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References

Beck, A.T., Ward, C.H., Mendelson, M., Mock, J. and Erlbaugh, J., An inventory for measuring depression, Arch. Gen. Psychiatry, 4 (1961) 53–63.

Beckman, J.C., Keefe, F.J., Caldwell, D.S. and Roodman, A.A., Pain coping strategies in rheumatoid arthritis: Relationships to pain, disability, depression and daily hassles, Behav. Ther., 22 (1991) 113–124.

Bédard, G.B., Reid, G.J., McGrath, P.J. and Chambers, C.T., Coping and self-medication in a community sample of junior high school students, Pain Res. Managem., 2 (1997) 151–156.

Bergner, M., Bobbitt, R.A., Carter, W.B. and Gilson, B.S., The Sickness Impact Profile: Development and final revision of a health status measure, Med. Care, 19 (1981) 787–805.

Bishop, S.R., Edgley, K., Fisher, R. and Sullivan, M.J.L., Screening for depression in chronic low back pain with the Beck Depression Inventory, Can. J. Rehab., 7 (1993) 143–148.

Cats-Baril, W.L. and Frymoyer, J.W., Identifying patients at risk of becoming disabled due to low back pain: The Vermont Rehabilitation Engineering Center predictive model, Spine, 16 (1991) 605.

Chaves, J.F. and Brown, J.M., Spontaneous cognitive strategies for the control of clinical pain and stress, J. Behav. Med., 10 (1987) 263–276.

Cronbach, L.J., Coefficient alpha and the internal structure of tests, Psychometrika, 16 (1951) 297–334.

Fernandez, E. and Turk, D.C., The utility of cognitive coping strategies for altering pain perception: a meta-analysis, Pain, 38 (1987) 123–135.

Flor, H., Turk, D.C. and Rudy, T.E., Relationship of pain impact and significant other reinforcement on pain behaviours: the mediating role of gender, marital status and marital satisfaction, Pain, 38 (1989) 45–50.

Fordyce, W.E., Behavioral Methods for Chronic Pain and Illness, C.V. Mosby, St. Louis, 1976.

Fordyce, W.E., On pain, illness and disability, J. Back Musculoskel. Rehab., 5 (1995) 259–264.

Fordyce, W.E., On the nature of illness and disability, Clin. Orthop. Rel. Res., 336 (1997) 47–51.

Frymoyer, J.W., Predicting disability from low back pain, Clin. Orthop. Rel. Res., 279 (1992) 101–109.

Gallon, R., Perception of disability in chronic back pain: a long term follow-up, Pain, 37 (1989) 67–75.

Gatchel, R.J., Polatin, P.B. and Kinney, R.K., Predicting outcome of chronic back pain using clinical predictors of psychopathology: A prospective analysis, Health Psychol., 14 (1995) 415–420.

Haaga, D.A.F., Catastrophizing, confounds, and depression: A comment on Sullivan and D'Eon (1990), J. Abnorm. Psychol., 101 (1992) 206–207.

Heyneman, N.E., Fremouw, W.J., Gano, D., Kirkland, F. and Heiden, L., Individual differences and the effectiveness of different coping strategies for pain, Cogn. Ther. Res., 14 (1990) 63–77.

Horowitz, M.J., Stress Response Syndromes (2nd ed.), Jason Aronson, Northvale, NJ, 1986.

Jensen, M.P., Turner, J.A., Romano, J.M. and Karoly, P., Coping with chronic pain: A critical review of the literature, Pain, 47 (1991) 249–283.

Keefe, F.J., Caldwell, D.S., Queen, K.T., Gil, K.M., Martinez, S., Crisson, J.E., Ogden, W. and Nunley, J., Pain coping strategies in osteoarthritis patients, J. Consult. Clin. Psychol., 55 (1987) 208–212.

Keefe, F.J., Brown, G.K., Wallston, K.A. and Caldwell, D.S., Coping with rheumatoid arthritis: Catastrophizing as a maladaptive strategy, Pain, 37 (1989) 51–56.

Kerns, R.D., Turk, D.C. and Rudy, T.E., The West-Haven Yale Multidimensional Pain Inventory (WHYMPI), Pain, 23 (1985) 345–356.

Lyons, R. and Sullivan, M.J.L., Curbing loss in illness and disability: A relationship perspective. In: J.H. Harvey (Ed.), Perspectives on Personal and Interpersonal Loss, Taylor and Francis, New York, 1998, pp. 137–152.

Martin, M.Y., Bradley, L.A., Alexander, R.W., Alarcon, G.S., Triana-Alexander, M., Aaron, L.A. and Alberts, K.R., Coping strategies predict disability in patients with primary fibromyalgia, Pain, 68 (1996) 45–53.

Mayer, T., Gatchel, R., Mayer, H., Kishino, N., Keeley, J. and Mooney, V., A prospective two year study of functional restoration in industrial low back injury, an objective assessment procedure, J. Am. Med. Assoc., 258 (1987) 1763–1767.

McCaul, K.D. and Malott, J., Distraction and coping with pain, Psychol. Bull., 95 (1984) 516–533.

Mechanic, D., Illness behaviour, social adaptation, and the management if illness, J. Nerv. Ment. Disord., 165 (1977) 79–87.

Melzack, R., The McGill Pain Questionnaire, Pain, 1 (1975) 272–299.

Nachemson, A.L., Newest knowledge of low back pain. A critical look, Clin. Orthop., 279 (1992) 8–20.

Nicassio, P.M., Schoenfeld-Smith, K., Radojevic, V. and Schuman, C., Pain coping mechanisms in fibromyalgia: Relationship to pain and functional outcomes, J. Rheumatol., 22 (1995) 1552–1558.

Parker, J.C., Smarr, K.L., Buesher, K.L., Phillips, L.R., Frank, R.G., Beck, N.C., Anderson, S.K. and Walker, S.E., Pain control and rational thinking: Implications for rheumatoid arthritis, Arth. Rheum., 32 (1989) 984–990.

Pilowsky, I. and Spence, N.D., Patterns of illness behaviour in patients with intractable pain, J. Psychosom. Res., 19 (1975) 279–287.

Pollard, C.A., Preliminary validity study of the Pain Disability Index, Percept. Motor Skills, 59 (1984) 974.

Robinson, M.E., Riley, J.L., Myers, C.D., Sadler, I.J., Kvaal, S.A., Geisser, M.E. and Keefe, F.J., The Coping Strategies Questionnaire: A large sample, item level factor analysis, Clin. J. Pain, 13 (1997) 43–49.

Romano, J.M. and Turner, J.A., Chronic pain and depression: Does the evidence support a relationship?, Psychol. Bull., 97 (1985) 18–34.
Rosenstiel, A.K. and Keefe, F.J., The use of coping strategies in chronic low back pain patients: Relationship to patient characteristics and current adjustment, Pain, 17 (1983) 33–44.
Spanos, N.P., Radtke-Bodorik, H.L., Ferguson, J.D. and Jones, B., The effects of hypnotic susceptibility, suggestions for analgesia, and utilization of cognitive strategies on the reduction of pain, J. Abnorm. Psychol., 88 (1979) 282–292.
Spielberger, C.D., Gorsuch, R.L. and Lushene, R.E., STAI: Manual for the State–Trait Anxiety Inventory, Consulting Psychologists Press, Palo Alto, CA, 1970.
Sullivan, M.D. and Loeser, J.D., The diagnosis of disability: Treating and rating disability in a pain clinic, Arch. Intern. Med., 152 (1992) 1829–1835.
Sullivan, M.J.L., Bishop, S. and Pivik, J., The Pain Catastrophizing Scale: Development and validation, Psychol. Assess., 7 (1995) 524–532.
Sullivan, M.J.L. and D'Eon, J., Relation between catastrophizing and depression in chronic pain patients, J. Abnorm. Psychol., 99 (1990) 260–263.
Sullivan, M.J.L. and Neish, N., Psychological predictors of pain during dental hygiene treatment, Probe, 31 (1997) 123–127.
Sullivan, M.J.L., Rouse, D., Bishop, S. and Johnston, S., Thought suppression, catastrophizing, and pain, Cogn. Ther. Res., 21 (1997) 555–568.
Sullivan, M.J.L., Tripp, D. and Santor, D., Gender differences in pain and pain behaviour: the role of catastrophizing, Cogn. Ther. Res. (1998) in press.
Tait, R.C., Chibnall, J.T. and Krause, S., The Pain Disability Index: psychometric properties, Pain, 40 (1990) 171–182.
Tait, R.C., Pollard, C.A., Margolis, R.B., Duckro, P.N. and Krause, S.J., The Pain Disability Index: psychometric and validity data, Arch. Phys. Med. Rehab., 68 (1987) 438–441.
Turk, D.C. and Okifuji, A., Perception of traumatic onset, compensation status and physical findings: Impact on pain severity, emotional distress, and disability in chronic pain patients, J. Behav. Med., 19 (1996) 435–453.
Turk, D.C. and Rudy, T.E., Cognitive factors and persistent pain: A glimpse into Pandora's Box, Cogn. Ther. Res., 16 (1992) 99–122.
Turk, D.C., Rudy, T.E. and Salovey, P., The McGill Pain Questionnaire reconsidered: Confirming the factor analysis and examining appropriate uses, Pain, 21 (1985) 385–397.
Turner, J.A. and Clancy, S., Strategies for coping with chronic low back pain: Relationship to pain and disability, Pain, 24 (1986) 355–366.
Ukestad, L.K. and Wittrock, D.A., Pain perception and coping in female tension headache sufferers and headache-free controls, Health Psychol., 15 (1996) 65–68.
Vallis, T.M., A complete component analysis of stress inoculation for pain tolerance, Cogn. Ther. Res., 8 (1984) 313–329.