Catastrophic thinking and heightened perception of pain in others

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Received 8 August 2005; received in revised form 1 February 2006; accepted 6 February 2006

Abstract

Past research has shown that pain catastrophizing contributes to heightened pain experience. The hypothesis advanced in this study was that individuals who score high on measures of pain catastrophizing would also perceive more intense pain in others. The study also examined the role of pain behaviour as a determinant of the relation between catastrophizing and estimates of others’ pain. To test the hypothesis, 60 undergraduates were asked to view videotapes of individuals taking part in a cold pressor procedure. Each individual in the videotapes was shown three times over the course of a 1 min immersion such that the same individual was observed experiencing different levels of pain. Correlational analyses revealed a significant positive correlation between levels of pain catastrophizing and inferred pain intensity, \( r = .31, p < .01 \). Follow-up analyses indicated that catastrophizing was associated with a heightened propensity to rely on pain behaviour as a basis for drawing inferences about others’ pain experience. Catastrophizing was associated with more accurate pain inferences on only one of three indices of inferential accuracy. The pattern of findings suggests that increasing reliance on pain behaviour as a means of inferring others’ pain will not necessarily yield more accurate estimates. Discussion addresses the processes that might underlie the propensity to attend more to others’ pain behaviour, and the clinical and interpersonal consequences of perceiving more pain in others.

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Keywords: Catastrophizing; Pain communication; Pain behaviour; Perceiving others’ pain

1. Introduction

Numerous investigations have addressed the relation between pain catastrophizing and pain experience (e.g., Sullivan et al., 2001). The term pain catastrophizing refers to a particular response to pain that includes elements of rumination, magnification and helplessness. Cross-sectional and prospective studies have shown that high levels of pain catastrophizing are associated with more intense pain experience, more pronounced displays of pain behaviour, heightened emotional distress and greater disability (Sullivan et al., 2001; Keefe et al., 2004; Thorn et al., 2004). Research has yet to address questions concerning the relation between pain catastrophizing and the perception of pain in others.

Craig and his colleagues (Prkachin and Craig, 1995; Craig, 1998; Hadjistavropoulos and Craig, 2002) have proposed a communication model of pain that addresses the processes by which pain is expressed and perceived. According to this model, perception of pain may be influenced by a host of psychological, behavioural and contextual factors including the senders’ pain behaviour, the receiver’s sensitivity to features of the senders’ behaviour and the receiver’s attitudes and beliefs (Prkachin and Craig, 1995; Hadjistavropoulos et al., 1997; Hadjistavropoulos and Craig, 2002; Craig, 2004; Prkachin et al., 2004).
A defining characteristic of pain catastrophizing is the tendency to exaggerate the threat value of pain stimuli (i.e., magnification) (Sullivan et al., 2001). It is possible that catastrophizers’ beliefs about the high threat value of pain-eliciting situations might lead them to infer more intense pain in others. It is also possible that mechanisms related to fear might contribute to greater attention to pain stimuli (Vlaeyen and Linton, 2000; Keogh et al., 2001). Since pain catastrophizing and pain-related fear are partially overlapping constructs, the fear component of catastrophizing might lead individuals to preferentially process information about pain-related stimuli (Crombez et al., 1998; Van Damme et al., 2004).

Research on the neuroanatomical correlates of pain further suggests that mechanisms involved in the experience of pain might also be implicated in the perception of pain in others (Singer et al., 2004; Botvinik et al., 2005; Jackson et al., 2005). Gracely et al. (2004) reported that catastrophizing was associated with greater activation of the anterior cingulate cortex (ACC) when patients with fibromyalgia were exposed to painful stimulation. Similar regions show activation when participants observe others experiencing pain (Botvinik et al., 2005). There are grounds therefore for proposing that individuals who score high on measures of pain catastrophizing will not only experience more intense pain, but will perceive more intense pain in others as well.

The hypothesis advanced in this research was that higher levels of pain catastrophizing would be associated with a propensity to estimate others’ pain as more intense. The study also examined the role of pain behaviour as a determinant of the relation between catastrophizing and estimates of others’ pain. Participants were asked to estimate the levels of pain of individuals who were filmed during a cold pressor procedure. Since the self-reported pain of individuals in the cold pressor procedure was known, it was also possible to examine the relation between catastrophizing and the accuracy of inferred pain.

2. Methods

2.1. Participants

Sixty (13 men, 44 women) students enrolled in psychology courses at the University of Montreal volunteered to participate in this study. The mean age of the sample was 23.1 years (SD = 5.2) with a range of 20–57 years.

2.2. Stimuli and measures

2.2.1. Stimuli: video depictions of pain in others

A group of 11 university undergraduates (5 men, 6 women) agreed to be videotaped while participating in a cold pressor procedure. Individuals were instructed to place their dominant arm on the moveable armrest of the cold pressor apparatus and to lower their arm in the water. Water temperature was maintained at 2–4°C. Individuals were signalled to provide verbal ratings of their pain at 20-s intervals during 1 min of immersion. Self-reported pain ratings were made on a 0–10 scale with the endpoints (0) no pain and (10) extreme pain.

A series of 33 video sequences of 5-s duration were extracted and used as stimuli for the present research. The 5-s sequences were taken immediately prior to the individuals’ pain report. The video sequences contained the image of individuals’ entire body as well as the cold pressor apparatus.

Since the self-reported pain ratings of the individuals depicted in the video sequences were known, the accuracy of observers’ estimates of the individuals’ pain could also be examined. By using multiple (3) sequences from the same individual, it was possible to assess accuracy of observers’ pain estimates across stimuli as well as sensitivity to changes in pain within stimuli.

2.2.2. Stimuli: assessment of pain behaviour

Two judges blind to the experimental hypotheses independently coded the videotapes according to a modification of a procedure described by Sullivan et al. (2004). The original coding procedure was modified to accommodate differences in the experimental paradigm where Sullivan et al. (2004) coded pain behaviours occurring during the cold pressor immersion and during the first minute post-immersion; the current study only assessed pain behaviours occurring during the cold pressor immersion. Judges were trained to competency following a manualized approach to coding pain behaviour previously developed in our laboratory (Sullivan et al., 2000, 2004). Judges provided a frequency count (1 = present, 0 = absent) and recorded the duration (in seconds) of each of two categories of pain behaviours: (1) facial expressions such as grimacing or wincing and verbal and paraverbal pain expressions such as phrases, grunts, sighs and moans, and (2) bodily movements such as arching of the neck, bending forward, rocking, hand clenching or shaking. Preliminary analyses revealed that the majority of verbal/paraverbal expressions (97%) co-occurred with facial expressions. As such the decision was made to combine both forms of pain behaviour within the same category. The pain behaviour classification procedure differs from previous research from our laboratory where facial expressions, verbal/paraverbal expressions and bodily movements were coded as separate categories and then combined to yield a total pain behaviour duration score (Sullivan et al., 2000).

When a pain behaviour was judged to be present, it was subsequently rated by two judges on a three-point intensity scale with the following anchors: (1) mild, (2) moderate and (3) intense. An intensity value of 0 was assigned when no pain behaviour occurred during a 5-s stimulus period. Percentage agreement for the classification of different pain behaviours was 88% and 86%, for facial/(para)verbal expressions, and bodily movements, respectively. Discrepancies were resolved through discussion. Percentage agreement for the ratings of pain behaviour intensity was 82% and 86% for facial/(para)verbal expressions, and bodily movements, respectively. Correlations between the two coders’ ratings of pain behaviour duration were .84 and .80 for facial/(para)verbal expressions, and bodily movements, respectively. For pain behaviour intensity ratings and pain behaviour
duration ratings, the mean of the two coders' ratings was used in analyses. Pain behaviour scores were derived separately for facial/(para)verbal and bodily movement pain behaviour by multiplying the duration of pain behaviour by the intensity of the pain behaviour.

2.2.3. Catastrophic thinking

The Pain Catastrophizing Scale (PCS; Sullivan et al., 1995) was used as a measure of catastrophic thinking in relation to pain. The PCS is a 13-item self-report instrument that assesses the frequency with which individuals experience ruminative, alarmist or helpless thoughts when they are in pain. Respondents are asked to rate the frequency with which they experience different pain-related thoughts and feelings on a 5-point scale with the endpoints (0) not at all and (4) all the time. Numerous investigations have supported the reliability and validity of the PCS in clinical and experimental samples (Sullivan et al., 2001). In the present study, the French version of the PCS was used (French et al., 2005).

2.2.4. Estimates of pain in others

Participants were provided with a rating form on which to inscribe their estimates of the pain they observed in the individuals depicted in the stimuli (described below). Participants rated others’ pain on 11-point scales with the endpoints (0) no pain and (10) extreme pain.

2.3. Procedure

Participants were told that the research addressed the accuracy with which others’ pain could be inferred. At the beginning of the testing session, participants were asked to complete the PCS. The 33 video sequences were presented on a projector screen (4 ft × 5 ft) in random order with the constraint that no two sequences of the same individual appeared in immediate succession. The same random sequence was used for all participants. The experimenter explained that the individuals in the video sequences had participated in a previous experiment examining responses to painful stimulation. Participants were told that their task was to infer the degree of pain experienced by the individuals in the video sequence using the 0–10 scale that appeared on their response sheet. Individuals who had previously participated in a cold pressor procedure or had previously observed a person participating in a cold pressor procedure were not considered for participation in the present research.

2.4. Data reduction and data analytic approach

2.4.1. Stimulus-based ratings index

The degree to which individuals based their pain ratings on features of the stimuli was determined by computing, for each participant, the within-subject correlation between inferred pain ratings and corresponding pain behaviour scores, across all 33 stimuli. Stimulus-based ratings indices were computed separately for facial/(para)verbal expressions and bodily movements. Higher values reflect greater covariation (range −1 to 1) between pain behaviour scores and inferred pain ratings.

2.4.2. Accuracy indices

Three indices of inferential accuracy were used. (1) Cross-stimulus discrepancy was determined by computing the absolute value of the difference between participants’ pain estimates and the self-reported pain ratings of the individuals depicted in the video sequences. Cross-stimulus discrepancy indices were computed separately for each of the three test points (i.e., 20, 40 and 60 s). Higher values reflect a greater discrepancy (lower accuracy) between participants’ inferred pain and the self-reported pain ratings of the individuals depicted in the video sequences. (2) Self-reported pain and inferred pain covariation were determined by computing, for each participant, the within-subject correlation between inferred pain ratings and self-reported pain ratings, across all 33 stimuli. Higher values indicate greater covariation and reflect observers’ cross-stimulus sensitivity to differences in pain of the individuals depicted in the video sequences. (3) An index of within-stimulus perception of change was also computed in order to determine the degree to which participants were sensitive to the changes in pain experienced by the individuals depicted in the video sequences, across the 1-min immersion. The difference between the first (i.e., 20 s) and last (i.e., 60 s) self-reported pain ratings of the individuals depicted in the video sequences was computed. A difference of less than + or −1 point was classified as no change, an increase of more than one point was classified as increased pain and a decrease of more than one point was classified as decreased pain. The same classification scheme was used for participants’ inferred ratings. The number of matches was counted across stimuli, where higher values reflect greater accuracy.

No single index can be used to unambiguously assess inferential accuracy. For example, the cross-stimuli discrepancy index can vary as a function of a systematic over- or under-estimation bias and is not necessarily indicative of greater cross-stimulus sensitivity to differences in pain. Similarly high scores on the self-reported pain and inferred covariation index do not necessarily reflect accuracy since an individual might be sensitive to changes in pain across stimuli, yet consistently under- or over-estimate levels of pain. Inferential accuracy must be determined by an individuals’ combined performance on all three indices. High inferential accuracy would be reflected in low cross-stimulus discrepancy, high self-reported pain and inferred pain covariation and high degree of matches in within-stimulus changes in pain.

Analyses of variance were used to examine participants’ estimates of others’ pain as a function of time and stimulus sex. Correlational analyses were used to examine the relation between participants’ level of catastrophizing and the intensity of the pain they perceived in others. Regression analyses were used to examine the basis of relations between catastrophizing and inferred pain ratings.

3. Results

3.1. Stimulus characteristics

The mean pain ratings and the pain behaviour scores for the stimuli used in the present study are presented in Table 1. A repeated-measures analysis of variance revealed that the self-reported pain ratings increased
revealed significant main effects for stimulus sex, further. A two-way within-subjects analysis of variance any main effect or interaction and is not considered of participant did not emerge as a significant factor in estimates of others’ pain are presented in Table 2. Sex separately for male and female stimuli. Participants’ for each of the three test points (i.e., 20, 40 and 60 s),

3.2. Pain perception in others

Participants’ estimates of others’ pain were averaged for each of the three test points (i.e., 20, 40 and 60 s), separately for male and female stimuli. Participants’ estimates of others’ pain are presented in Table 2. Sex of participant did not emerge as a significant factor in any main effect or interaction and is not considered further. A two-way within-subjects analysis of variance revealed significant main effects for stimulus sex, F(1,59) = 6.2, p < .01, and time, F(2,118) = 22.7, p < .001. Examination of marginal means indicated that

<table>
<thead>
<tr>
<th>Time</th>
<th>Sex of stimuli</th>
<th>Female</th>
<th>Male</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Female</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>6.1 (3.1)</td>
<td>5.8 (2.5)</td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>8.3 (1.8)</td>
<td>6.6 (2.6)</td>
<td></td>
</tr>
<tr>
<td>60</td>
<td>8.3 (2.7)</td>
<td>7.8 (1.9)</td>
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<table>
<thead>
<tr>
<th>Facial/(para)verbal pain behaviour index</th>
<th>Time</th>
<th>Sex of stimuli</th>
<th>Female</th>
<th>Male</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>20</td>
<td>5.1 (4.7)</td>
<td>4.8 (6.5)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>40</td>
<td>.66 (.81)</td>
<td>2.4 (5.3)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>60</td>
<td>.66 (1.2)</td>
<td>2.4 (5.2)</td>
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</table>

<table>
<thead>
<tr>
<th>Bodily movement pain behaviour index</th>
<th>Time</th>
<th>Sex of stimuli</th>
<th>Female</th>
<th>Male</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>20</td>
<td>2.5 (2.8)</td>
<td>4.0 (5.0)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>40</td>
<td>2.0 (2.2)</td>
<td>5.0 (6.4)</td>
<td></td>
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<tr>
<td></td>
<td>60</td>
<td>1.3 (.81)</td>
<td>3.0 (5.1)</td>
<td></td>
</tr>
</tbody>
</table>

Note. Pain ratings were made on a 0–10 scale. Values in parentheses are standard deviations.

significantly over time, F(2,18) = 8.3, p < .01. Self-reported pain ratings were comparable to those reported in previous research using a cold pressor procedure (Sullivan et al., 1995, 2004). A repeated-measures analysis of variance on the facial/(para)verbal pain behaviour index revealed a significant main effect for time, F(2,18) = 5.0, p = .01, where pain behaviour decreased over the course of the one minute immersion. No other significant effects emerged for the bodily movement pain behaviour index.

There was a significant correlation between the self-reported pain ratings of the individuals depicted in the video sequences and their facial/(para)verbal pain behaviour scores, r = .35, p < .05. The correlation between self-reported pain ratings and bodily movement pain behaviour scores was not significant, r = .11, ns. In other words, self-reported pain was more likely to be associated with heightened facial expressions of pain than with heightened bodily movements. Still, facial pain behaviour scores were a poor indicator of self-reported pain, accounting for only 12% of the variance in self-reported pain ratings.

3.3. Catastrophizing and pain estimation

Correlations between participants’ catastrophizing scores and their estimates of others’ pain are presented in Table 3. Across all stimuli combined, increasing levels of catastrophizing were associated with estimates of more intense pain in others, r = .31, p < .01. Correlations between catastrophizing and estimates of others’ pain were significant for female stimuli at the 20 and 40 s test points, and for male stimuli, only for the 20 s test point.

The role of stimulus pain behaviour as a determinant of pain estimates was addressed by computing (within individual) correlations between observers’ pain estimates for each stimulus and the two pain behaviour indices corresponding to that stimulus. For the entire sample, the mean correlation for the facial/(para)verbal pain behaviour index (M = .60, SD = .18) was significantly greater than the mean correlation for the bodily movement pain behaviour index (M = .51, SD = .16), t(59) = 5.4, p < .001. These data suggest that 25–36% of variance in inferred pain ratings could be accounted for by the pain behaviour exhibited by the individuals depicted in the stimuli, and that observers used facial information more than bodily movement information in drawing their inferences about others’ pain.

Catastrophizing was significantly correlated with the stimulus-based ratings index for facial/(para)verbal

<table>
<thead>
<tr>
<th>Stimulus sex</th>
<th>20 s</th>
<th>40 s</th>
<th>60 s</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>.26</td>
<td>.21</td>
<td>.09</td>
</tr>
<tr>
<td>Female</td>
<td>.31**</td>
<td>.31**</td>
<td>.24</td>
</tr>
</tbody>
</table>

Note. p < .05. ** p < .01.
expression, \( r = .25, p < .05 \), and for bodily movement, \( r = .28, p < .05 \). Thus, catastrophizing was associated with a heightened propensity to rely on pain behaviour as a basis for drawing inferences about others’ pain experience. Correlations were also computed between the different subscales of the PCS and the stimulus-based ratings indices. As shown in Table 4, these analyses revealed that only the helplessness subscale of the PCS was significantly correlated with the stimulus-based ratings indices for facial/(para)verbal pain expression, \( r = .27, p < .05 \) and bodily movement pain behaviour \( r = .29, p < .05 \).

A hierarchical multiple regression was computed to address whether the relation between catastrophizing and inferred pain was due to catastrophizers’ tendency of use pain behaviour information as the basis of their judgements. The mean of inferred pain ratings over the three test periods was used as the dependent variable. The stimulus-based ratings indices for facial/(para)verbal pain expression, bodily movement pain behaviour were entered in the first step of the analysis and contributed significant variance to the prediction of inferred pain ratings, \( R^2 = .25, F(1,58) = 3.9, p < .05 \). Only the beta weight for the facial/(para)verbal pain behaviour score was significant \( (B = .28, p = .05) \). The total PCS score was entered in the final step of the analysis but did not contribute significant variance to the prediction of inferred pain ratings, \( R^2 \) change = .04, \( F(1,56) = 2.6, p = .11 \). In other words, when controlling for the pain behaviour indices, the PCS total score was no longer significantly associated with inferred pain scores \( (B = .21, p = .10) \).

### 3.4. Accuracy of inferred pain ratings

The relation between catastrophizing and inferential accuracy was addressed for each of the three accuracy indices: cross-stimulus inferential accuracy (i.e., mean discrepancy between self-reported pain and inferred pain), self-reported pain and inferred covariation (i.e., the degree to which participants’ inferred pain ratings covaried with self-reported pain ratings across all 33 stimuli) and within-stimulus perception of change (i.e., the degree to which participants could detect changes in pain in the same stimulus from the 20 s to the 60 s test points).

Cross-stimulus inferential discrepancy was computed by averaging the absolute difference between inferred pain ratings and the self-reported pain ratings of the individuals depicted in the stimuli, for each of the test points. As shown in Table 5, there was a significant correlation between catastrophizing scores and the cross-stimulus discrepancy index only for the second test point (i.e., 40 s) for female stimuli, \( r = -.30, p < .05 \).

The correlation between catastrophizing and the self-reported pain and inferred pain covariation index was not significant for male, \( r = .04, ns \), or female stimuli, \( r = .09, ns \). In other words, catastrophizing was unrelated to sensitivity to differences in self-reported pain ratings across stimuli.

The within-stimulus perception of change was derived by computing the number of matches between changes in self-reported pain across the three test points and inferences changes in pain. The correlation between catastrophizing and the within-stimulus perception of change index was not significant for either male, \( r = .10, ns \), or female, \( r = .12, ns \), stimuli.

A hierarchical multiple regression was computed in order to explore further the relation between catastrophizing and the cross-stimulus discrepancy index. In this analysis, the cross-stimulus discrepancy index (for the second test point for female stimuli) was used as the dependent variable. The stimulus-based ratings indices for facial/(para)verbal, bodily movement pain behaviour, and the inferred pain intensity score were entered in the first step of the analysis and contributed significant variance to the prediction of the cross-stimulus discrepancy index, \( R^2 = .85, F(3,56) = 51.5, p < .001 \). Only the inferred pain intensity score contributed significant unique variance to the prediction of the cross-stimulus discrepancy score \( (B = -.80, p < .001) \). The PCS total score was entered in the final step of the analysis but did not contribute significant variance to the prediction of the cross-stimulus discrepancy index, \( R^2 \) change = .001, \( F(1,55) = .15, ns \). This pattern of findings suggests that catastrophizing is not associated with greater sensitivity to variations in others’ self-reported pain. However, individuals high in catastrophizing might appear to be more accurate as a result of a generalized tendency to underestimate others’ pain less than individuals low in catastrophizing.

### Table 4
Correlations between catastrophizing subscales and the stimulus-based ratings indices

<table>
<thead>
<tr>
<th>PCS subscales</th>
<th>Facial/(para)verbal</th>
<th>Bodily movement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rumination</td>
<td>.17</td>
<td>.24</td>
</tr>
<tr>
<td>Magnification</td>
<td>.12</td>
<td>.08</td>
</tr>
<tr>
<td>Helplessness</td>
<td>.27*</td>
<td>.29*</td>
</tr>
<tr>
<td>Total</td>
<td>.25*</td>
<td>.28*</td>
</tr>
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</table>

* \( p < .05 \).
4. Discussion

The results of the present study suggest that individuals with high levels of catastrophizing not only experience more intense pain but perceive more intense pain in others as well. When participants viewed video depictions of individuals taking part in a cold pressor procedure, participants with higher levels of catastrophizing inferred more intense pain for both male and female stimuli.

When asked to infer the pain of individuals exposed to a painful stimulus, observers have access to two main sources of information contained in the stimulus display; the behaviour of the individual experiencing pain and features of the pain eliciting stimulus (Craig et al., 1992; Williams, 2002). To address the degree to which participants relied on pain behaviour as a basis of their inferences of others’ pain, within-subject correlations (i.e., stimulus-based ratings index) were computed between pain behaviour scores and participants’ inferred pain ratings. Analyses of the stimulus-based ratings index revealed that 25–36% of the variance in participants’ pain inferences could be accounted for by the pain behaviour of the individuals depicted in the video sequences. Catastrophizing was associated with a heightened propensity to rely on pain behaviour as the basis for inferring the pain level of the individuals depicted in the video sequences. When the stimulus-based ratings index was statistically controlled, the relation between catastrophizing and the intensity of inferred pain was no longer significant.

Of the three subscales of the PCS, only the helplessness subscale was significantly correlated with the stimulus-based ratings index. It is possible that perceivers with high levels of helplessness (as a dimension of catastrophizing) might preferentially process behaviour displays that resemble how they believe they would react in a similar situation. Alternatively, high helplessness might be associated with more intense pain-related fear, which might draw perceivers’ attention more toward feared stimuli (Vlaeyen and Linton, 2000; Keogh et al., 2001). An additional possibility is that interpersonal aspects of catastrophizing, perhaps associated with affiliative, caregiving or dependency concerns, might have led to increased attention to others’ distress (Sullivan et al., 2001; Lackner and Gurtman, 2004; Thorn et al., 2004).

The role of catastrophizing in the perception of pain in others might be due to the utilization of pain behaviour information and not necessarily to preferential attention to pain behaviour. Individuals with low levels of catastrophizing might be just as likely to attend to pain behaviour but might discount this information as an unreliable index of others’ level of pain. Discounting the information value of pain behaviour is probably an important factor contributing to individuals’ tendency to understate others’ pain (Drayer et al., 1999; Hadjistavropoulos and Craig, 2002; Craig, 2004; Prkachin et al., 2004).

The relation between catastrophizing and inferred pain ratings was most pronounced for ratings made for stimuli at the 20 s immersion test point. Catastrophizing was not significantly correlated with inferred pain ratings at the 60 s test point, for either male or female stimuli. Consistent with previous research using cold pressor procedures, the self-reported pain ratings provided by the individuals depicted in the video sequences increased over time while pain behaviour decreased over time (Craig and Patrick, 1985). Thus, a propensity to rely on pain behaviour would contribute to higher pain ratings near the onset of a pain stimulus, but would contribute to lower estimates of pain at subsequent test points, even though self-reported pain ratings were increasing.

Consideration of the implicit rules that guide interpersonal communication might be required in order to explain why pain behaviour would decline over time while pain ratings increased (Dance and Larson, 1976). Individuals are active agents in a dynamic interpersonal communication exchange, and pain behaviour likely follows rules similar to those of other forms of communication. A man experiencing a headache upon arrival home may announce to his spouse that he has a headache (verbally or behaviourally) but it is unlikely that he will continue to repeat this information even though his pain situation remains unchanged. Pain communication may be repeated only if the sender perceives that the information was not received (or considered), or if there is a significant change in pain. In this manner, pain behaviour might not necessarily mirror pain experience. Pain behaviours may not increase with subjective pain experience unless the change in pain exceeds a threshold where the individual considers that he or she is communicating ‘new’ information (Dance and Larson, 1976).

It is interesting that the covariation between inferred pain ratings and pain behaviour (25–36%) greatly exceeded the covariation between self-reported pain ratings and pain behaviour, which ranged from 1% for bodily movement to 12% for facial expression. The low degree of covariation between pain behaviour and self-reported pain ratings places limits on the degree to which observers can accurately infer others’ pain. In the absence of pain behaviour, perceivers can also appeal to features of the pain stimulus to infer others’ pain experience. In the present study, 10 stimuli were judged to show no pain behaviour. Yet participants inferred a mean rating of 2.0 (SD = 3.4) for these stimuli, indicating that they based their ratings on factors other than pain behaviour. For these stimuli, the correlation between catastrophizing and inferred pain was not significant, Thus, it appears that catastrophizing influenced pain inferences primarily in
Catastrophizing was associated with greater inferential accuracy on only one of three accuracy indices. Catastrophizing was not associated with greater cross-stimulus sensitivity for changes in pain ratings or greater within-stimuli sensitivity to changes in pain. Given high catastrophizers’ propensity to rely on pain behaviour to infer pain ratings, and the low degree of covariation between pain behaviour and self-reported pain ratings, it is not surprising that they were not more sensitive to difference in pain across and within stimuli. There was however a relation between catastrophizing and the cross-stimulus discrepancy index. The overall discrepancy between inferred and self-reported pain ratings decreased as pain catastrophizing scores increased. The results of a regression analysis suggested that this relation might be due to high catastrophizers’ tendency to infer more intense pain ratings, thereby underestimating others’ pain less than low catastrophizers.

The relation between catastrophizing and heightened pain perception in others might play a role in the oft-cited associations between catastrophizing and emotional distress. Cognitive models of pain and depression suggest that the negative cognitive content of catastrophizing might impact on mood (Turk and Kerns, 1983; Thorn, 2004). The present findings suggest that attentional bias or preferential processing of distress-related interpersonal stimuli might represent another vehicle through which catastrophizing might impact on mood.

The relation between catastrophizing and heightened perception of others’ pain could also have implications for how catastrophizing might influence caregiving behaviour of others in their social environment (Goubert et al., 2005; Cano et al., in press). One possibility is that the caregiver with high levels of catastrophizing might be better able to detect pain behaviours and in turn respond with appropriate intervention. However, the catastrophizing spouse of a chronic pain patient might be motivated to engage in excessive palliative or solicitous behaviour to reduce the patient’s expression of distress, and inadvertently contribute to increased disability in the pain patient (Romano et al., 1995; Cano et al., in press). In a recent study (Sullivan et al., in press), findings showed that observers inferred higher levels of pain of individuals who were high catastrophizers. Empirical investigation of the interaction between clinicians’ level of catastrophizing and patients’ level of catastrophizing might yield useful theoretical and clinical insights.

It is important to note some of the limitations of the present study. First, the sample of participants were undergraduate students and the individuals depicted in the stimuli were students participating in an experimental pain procedure. Cold pressor pain, whether experienced or observed, is not associated with the same degree of threat, uncertainty and life disruption that accompanies the pain of injury or the pain associated with clinical procedures. The psychological factors that determine the perception of pain in others in low threat situations such as the cold pressor might differ from those influencing pain perception in high threat situations such as injury or illness. The modest sample size also limited the nature of mediating or confounding relations that could be explored. The conclusions drawn on the basis of the present findings must be considered speculative until replicated under more ecologically valid conditions.

In spite of these limitations, the present study is the first to show that catastrophizing influences the perception of pain in others. High levels of catastrophizing were associated with estimates of more intense pain in others. On the basis of the results of the regression analysis, it is possible to speculate that attentional factors or preferential processing of pain behaviour might underlie the relation between catastrophizing and heightened pain perception in others. Questions of interest for future research concern the manner in which the relation between catastrophizing and pain perception might impact on interpersonal or caregiving behaviour.

Acknowledgements

The authors thank Jesse Bouvier for his assistance in coding and data entry. This research was supported by a grant from the Social Sciences and Humanities Research Council of Canada.

References


