Psychological Predictors of Pain During Dental Hygiene Treatment

Abstract
This study examined the role of catastrophizing (i.e., a tendency to exaggerate the threat value of potentially painful situations) in predicting pain experience during dental hygiene treatment. Participants in the research were 100 patients undergoing scaling and/or root planing procedures at Dalhousie University's Dental Clinic. Following treatment, participants completed the Pain Catastrophizing Scale, a measure of emotional distress, a pain scale, and the Dental Anxiety Scale—Revised. Participants who scored above the median on the Pain Catastrophizing Scale were classified as catastrophizers, participants who scored below the median were classified as noncatastrophizers. Results showed that catastrophizers reported significantly more dental anxiety, emotional distress and pain than noncatastrophizers, and that distress reactions were more pronounced in men than in women. Discussion focuses on the importance of addressing psychological factors in dental hygiene practice, particularly as they relate to reactions to dental hygiene procedures, and avoidance of dental care.

Key words: Pain, emotional distress, dental hygiene, catastrophizing.

Psychological Predictors of Pain Experience During Dental Hygiene Treatment
Clinicians in dental practice have long been aware that people differ markedly in their ability to tolerate painful or stressful dental procedures. Certain individuals appear to be able to undergo dental procedures with little or no evidence of discomfort. For others, however, even the thought of undergoing dental procedures can produce significant distress.

Over the past two decades, researchers have attempted to identify the psychological factors that contribute to distress reactions in response to painful or stressful procedures. Several research investigations have shown that "catastrophizing" is associated with heightened pain experience. Catastrophizing refers to an exaggerated negative orientation toward stressful or painful situations. One of the first attempts to examine the correlates of catastrophizing was a study by Chaves and Brown where they examined dental patients' thoughts and coping efforts during a dental stress situation. Like many other subsequent investigations, they found that people who catastrophized tended to report more stress during a dental surgery procedure than individuals who did not catastrophize.

One of the factors that has impeded research in this area has been the difficulty associated with the measurement of catastrophizing. In Chaves and Brown's study, as well as in later investigations, research subjects participated in an extensive interview following the pain experience. In Chaves and Brown's study, subjects were asked to "...tell the experimenter as completely as possible what was going on through his/her mind during the procedure." Transcripts of the interviews were prepared and evaluated for the presence of coping and catastrophizing ideas. According to predetermined criteria, subjects were then classified as catastrophizers, copers, or deniers. The time and cost involved in using interview-based procedures to assess catastrophizing limited their applicability to clinical settings.

Recently, Sullivan et al. developed a short self-report instrument to assess the degree to which individuals catastrophize during painful experiences. The Pain Catastrophizing Scale (PCS) is a 13-item scale that asks respondents to endorse phrases describing different thoughts and feelings that may be experienced in painful situations. The PCS is based on a multidimensional view of catastrophizing that includes rumination (e.g., "I keep thinking about how much it hurts"), magnification (e.g., "I wonder whether something serious will happen"), and helplessness (e.g., "There is nothing I can do to reduce the intensity of the pain"). The PCS is written at a Grade 6 reading level, suitable for most patients seen in dental clinics, and can be completed and scored within five minutes.

The purpose of the present research was to examine the utility of the PCS as a measure of catastrophizing during dental hygiene procedures. The PCS was administered to a sample group of patients undergoing scaling and/or root planing procedures. Participants were asked to report the degree of pain and emotional distress they experienced during the procedure. Consistent with previous research, we predicted that patients who engaged in catastrophic thinking would report more pain and emotional distress than individuals who did not catastrophize.

Demographics
Participants in this research were 100 (44 men, 56 women) consecutive referrals to the Dalhousie University Dental Clinic. All participants were scheduled for scaling and/or root planing procedures performed by senior dental hygiene students. The mean age of the sample was 42.2 years (SD = 15.1). Participants were classified as catastrophizers or noncatastrophizers if they scored above or below the median (Median = 14) of scores of the PCS, respectively.
Measures and Methods
A four-point severity scale was used to indicate the location and distribution of hard and soft deposits on the teeth: (1) minimal subgingival plaque and calculus to (4) heavy supragingival plaque and calculus, generalized tenacious subgingival calculus, and staining. Ratings were made by dental hygiene students and were reviewed and confirmed by dental hygiene faculty.

Catastrophizing was assessed with the Pain Catastrophizing Scale.1 On the PCS, respondents are instructed to indicate the degree to which they experience each of 13 different thoughts or feelings when experiencing pain. A copy of the PCS appears in Table 1. Dental anxiety was assessed with the Dental Anxiety Scale-Revised.2 The DAS-R (check-up version) assesses the degree to which subjects experience fear or anxiety in response to imagining different aspects of dental procedures (e.g., preparing for a check-up, waiting for their turn in the chair, waiting while the dentist prepares the drill, and waiting while the dentist or hygienist prepares the scaling instruments).

Participants were also asked to rate the intensity of different moods they experienced during the dental procedure on a 11-point scale with the endpoints (0) for not at all and (10) for extremely. The measure of mood consisted of nine mood adjectives that were combined to yield three separate subscales: 1) sadness (sad, discouraged, hopeless), 2) anger (angry, hostile, irritable), and 3) anxiety (anxious, afraid, worried). Alpha coefficients were .82, .93, and .76, for the sadness, anger, anxiety subscales, respectively. Patients were asked to rate the intensity of the pain they experienced during the dental hygiene treatment on a single-item 11-point scale with the endpoints (0) for no pain at all and (10) for extreme pain.

Under normal circumstances, local anesthetic is not used during dental hygiene appointments. However, individuals with moderate or severe periodontal disease are offered local anesthetic prior to scaling and root planing procedures to allow thorough treatment while keeping the patient relatively comfortable. In this study, anesthetic was administered to 22 patients. Topical anesthetics and local anesthetics were administered either by a third- or fourth-year dental student, or by a dental faculty member.

Dental hygiene students asked patients to complete the PCS, the DAS-R, the mood questionnaire, and the pain scale upon completion of the dental hygiene appointment. Patients were also asked to report the aspects of dental treatment they found most bothersome. Patients were assured that responses would remain anonymous and that participation in the study was voluntary. Demographic information as well as information relevant to patients' dental hygiene habits (e.g., frequency of brushing and flossing) and vital signs which were taken at the beginning of the dental hygiene appointment were recorded from clinic charts.

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### Table 1

<table>
<thead>
<tr>
<th>Name: __________________________</th>
<th>Age: _______</th>
<th>Gender: _______</th>
<th>Date: ____________</th>
</tr>
</thead>
</table>

Everyone experiences painful situations at some point in their lives. Such experiences may include headaches, tooth pain, joint or muscle pain. People are often exposed to situations that may cause pain such as illness, injury, dental procedures or surgery.

We are interested in the types of thoughts and feelings that you have when you are in pain. Listed below are thirteen statements describing different thoughts and feelings that may be associated with pain. Using the following scale, please indicate the degree to which you have these thoughts and feelings when you are experiencing pain.

0—not at all | 1—to a slight degree | 2—to a moderate degree | 3—to a great degree | 4—all the time

#### When I’m in pain...

1. I worry all the time about whether the pain will end.
2. I feel I can’t go on.
3. I’m terrible and I think it’s never going to get any better.
4. It’s awful and I feel that it overwhelms me.
5. I feel I can’t stand it anymore.
6. I become afraid that the pain will get worse.
7. I keep thinking of other painful events.
8. I anxiously want the pain to go away.
9. I can’t seem to keep it out of my mind.
10. I keep thinking about how much it hurts.
11. I keep thinking how badly I want the pain to stop.
12. There’s nothing I can do to reduce the intensity of the pain.
13. I wonder whether something serious may happen.

TOTAL

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Findings
Catastrophizers tended to be somewhat younger (M = 39.6) than noncatastrophizers (M = 45.2), t (98) = 1.9, p < .06. Heart rate and blood pressure did not differ as a function of level of catastrophizing. Catastrophizers did not differ significantly from noncatastrophizers in their frequency of brushing and flossing, or in the location and distribution of tooth deposits. Of the 22 patients who received anesthetic, 16 (73%) were catastrophizers, X² (1) = 4.4, p < .05.

Consistent with previous research, catastrophizers reported significantly more emotional distress than noncatastrophizers. The results of a multivariate analysis of variance comparing catastrophizers and noncatastrophizers on the three mood scales appears in Figure 1, multi F (3, 97) = 3.3, p < .05. Catastrophizers experienced more sadness and anxiety during the dental hygiene procedure than noncatastrophizers. Significant interactions with the gender of the patient indicated that distress reactions as a function of catastrophizing were more pronounced in men than in women. Also consistent with previous research, catastrophizers reported significantly more pain during dental hygiene procedures than noncatastrophizers, F (1, 99) = 10.5, p < .001, and men reported more pain than women, F (1, 99) = 4.1, p < .05. These differences were seen even when statistically controlling for the location and distribution of tooth deposits.

Analyses revealed that there were more aspects of the dental hygiene situation that were bothersome to catastrophizers (M = 1.2, SD = .76) than noncatastrophizers (M = .8, SD = .66), t (98) = 2.66, p < .01. As shown in Figure 2, 28 patients reported being bothered by needles, 40 patients reported being bothered by pain, 11 were bothered by drills, five were bothered by smells and sounds, and 10 were bothered by the cost of dental hygiene treatment. Of the 28 patients who indicated that they were bothered by needles, 22 (80%) were catastrophizers, X² (1) = 10.2, p < .001.

On the measure of dental anxiety, catastrophizers scored significantly higher (M = 8.8) than noncatastrophizers (M = 6.4), t (98) = 3.7, p < .001. As shown in Figure 3, catastrophizers reported more anxiety than noncatastrophizers when a) imagining that they had to return for a dental appointment the following day; b) that they were waiting for their turn in the dentist chair; c) they were waiting while the dentist was preparing the drill; and d) that they were waiting while the dentist or hygienist was preparing the scaling instruments.

Figure 1—Male
Pain and Emotional Distress During Dental Hygiene Treatment*
Discussion and Implications
The results of this study indicate that individuals who catastrophize experience significantly more emotional distress and pain during dental hygiene procedures than individuals who do not catastrophize. Catastrophizers were more anxious and sad than noncatastrophizers, and male catastrophizers were more angry than male noncatastrophizers.

Our findings suggest that catastrophizing may be a useful predictor of distress reactions during dental hygiene procedures. The relation between catastrophizing and distress was significant even when controlling for the distribution and location of tooth deposits, i.e. catastrophizing predicted distress reactions regardless of the amount of scaling or root planing that was performed by the dental hygienist.

An interesting finding was that catastrophizers were more likely than noncatastrophizers to receive anesthetic. Again the relation between catastrophizing and the likelihood of receiving anesthetic remained significant even when controlling for the location and distribution of tooth deposits. In other words, there did not appear to be “objective” indicators that catastrophizers required anesthetic more than noncatastrophizers. It is possible that catastrophizers’ anticipatory distress reactions, or their display of pain behavior, may have prompted the hygienist to recommend the administration of anesthetic.

Catastrophizers also reported that they were bothered by needles to a greater extent than noncatastrophizers. Indeed, the majority of patients who reported being bothered by needles were catastrophizers. In past research, fear of needles has been discussed as a primary reason for avoidance of dental care. Consistent with this line of reasoning, catastrophizers also tended to report being more anxious or fearful at the thought of returning for another dental appointment, and imagining different aspects of the dental situation.

It is possible that catastrophizing during dental hygiene procedures may lead to the development of high levels of dental anxiety. As a function of repeated dental experiences characterized by high levels of emotional distress and pain, individuals who catastrophize may become increasingly more anxious about future dental visits. In turn, catastrophizers’ high levels of dental anxiety may contribute to poor oral hygiene habits and avoidance of dental care.

For the dental hygienist, the present data suggest that interventions aimed at reducing catastrophizing may be useful in preventing the development of maladaptive levels of dental anxiety. There has been limited data on the efficacy of strategies that may be useful in reducing catastrophizing. Heymen et al. have provided data suggesting that individuals who catastrophize may be unable to make use of distraction strategies to reduce their pain. However, catastrophizers who were instructed to engage in self-instruction strategies were able to significantly reduce their level of pain. Self-instruction strategies involve targeting negative self-statements related to the pain eliciting situation, and using these thoughts as cues for generating coping statements.

Dental hygienists can be easily educated to instruct individuals who catastrophize in the use of self-instruction strategies. Research currently underway at the Dalhousie Dental Clinic is examining the efficacy of different intervention programs for reducing the distress in individuals who catastrophize during dental hygiene procedures.

In summary, the present study showed that individuals who catastrophize experience more pain and emotional distress during dental hygiene treatment than individuals who do not catastrophize. The results also suggested that certain aspects of the dental hygiene situation, particularly injections, are more bothersome to catastrophizers than noncatastrophizers. It is recommended that dental hygienists receive training in methods to reduce distress in catastrophizers in order to prevent the development of high levels of dental anxiety and subsequent avoidance of dental care.

References

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