The influence of communication goals and physical demands on different dimensions of pain behavior

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Abstract

The purpose of the present research was to examine the influence of communication goals and physical demands on the expression of communicative (e.g., facial grimaces) and protective (e.g., guarding) pain behaviors. Participants with musculoskeletal conditions (N = 50) were asked to lift a series of weights under two communication goal conditions. In one condition, participants were asked to estimate the weight of the object they lifted. In a second condition, participants were asked to rate their pain while lifting the same objects. The display of communicative pain behaviors varied as a function of the communication goal manipulation; participants displayed more communicative pain behavior when asked to rate their pain while lifting objects than when they estimated the weight of the object. Protective pain behaviors varied with the physical demands of the task, but not as a function of the communication goals manipulation. Pain ratings and self-reported disability were significantly correlated with protective pain behaviors but not with communicative pain behaviors. The results of this study support the functional distinctiveness of different forms of pain behavior. Findings are discussed in terms of evolutionary and learning theory models of pain behavior. Clinical implications of the findings are addressed.

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1. Introduction

It is becoming increasingly clear that pain experience and pain behavior are distinct phenomena. Pain behaviors are the various actions or postural displays that are enacted during the experience of pain. Self-reports of pain intensity rarely account for more than 10–15% of the variance in indices of pain behavior (Keefe and Block, 1982; Labus et al., 2003). Recent theory and research suggest that pain report and pain behavior might serve different functions, might be influenced by different internal and external contingencies,
and may respond differentially to treatment (Williams, 2002; Craig, 2004; Sullivan et al., 2004, 2005).

It has been suggested that one of the functions of pain behavior is to protect injured areas of the body (Prkachin, 1986; Bateson, 1991). The withdrawal of a limb from a hot surface serves to terminate the action of a noxious stimulus and in turn, protects the limb from further injury (Wall, 1999). Similarly, the use of limping to alter weight distribution might minimize pain to an injured limb and reduce the probability of injury exacerbation (Decchi et al., 1997; Corbeil et al., 2004).

There has also been considerable discussion of the communicative functions of pain behavior (Prkachin and Craig, 1995; Hadjistavropoulos and Craig, 2002; Williams, 2002). The overt display of distress during pain experience conveys information to observers about the internal state, pain-related limitations, and needs for assistance of the individual who is experiencing pain (Hadjistavropoulos and Craig, 2002; Williams, 2002; Craig, 2004; Deyo et al., 2004). Facial displays and vocalizations can communicate distress to observers but these behaviors do not have a direct protective function.

Although there is intuitive appeal to the notion that different types of pain behaviors might serve different functions, there have been few empirical efforts to examine the differential determinants of communicative and protective pain behaviors (Sullivan et al., 2004). The absence of research addressing the functional basis of different forms of pain behavior has limited theoretical advance in this area. Research examining the functional distinctiveness of different types of pain behaviors might have implications for the refinement of conceptual models of pain behavior, and might also have implications for the assessment and treatment of persistent pain conditions.

The present research examined the influence of communicative goals and physical demands on the expression of communicative and protective pain behaviors. Participants with musculoskeletal conditions lifted a series of weights under two communication goal conditions. In one condition, participants estimated the weight of the object they lifted; in a second condition, participants rated their pain while lifting the same objects. Analyses addressed whether manipulation of the communication goal (i.e., weight report versus pain report) and variations in physical demands of the task (i.e., different weights, different postural lifting positions) differentially influenced the expression of communicative and protective pain behaviors. In light of previous research on sex differences in pain expression, analyses also addressed whether the effects of communication goals and physical demands on pain behavior varied as a function of sex (Keefe et al., 2000).

2. Methods
2.1. Participants

The participants were 50 (25 men and 25 women) individuals with persistent pain who had been referred for assessment at one of two chronic pain treatment centres in Montreal, Quebec. At the time of assessment, all participants were off work due to a musculoskeletal condition and were receiving disability compensation. The mean age of the sample was 44.5 years with a range of 24–60 years. The mean duration of pain was 36.6 months with a range of 3–104 months. Participants were considered for participation if they had been experiencing symptoms of back (n = 40) or neck (n = 10) pain for more than 3 months and if there were no medical contraindications to performing the physical maneuvers involved in the study.

2.2. Measures

2.2.1. Pain severity

The McGill Pain Questionnaire (Melzack, 1975) was used to assess pain severity. Participants were asked to endorse adjectives that best described their current pain experience. For each participant, the MPQ Pain Rating Index (PRI) was computed as the weighted sum of all adjectives endorsed. The MPQ PRI has been shown to be a reliable and valid measure of an individual’s chronic pain experience (Turk et al., 1985).

2.2.2. Disability

The Pain Disability Index (PDI) (Pollard, 1984) was used as a self-report measure of pain-related disability. Participants are asked to rate their level of disability in seven 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. Responses were summed to yield an overall index of functional disability. The PDI has been shown to be internally reliable and significantly correlated with objective measures of disability (Tait et al., 1990).

2.3. Procedure and apparatus

The program of research received ethical approval from the Ethics Review Committee of the Université de Montréal. Participants were informed that the study was concerned with the development of new assessment procedure for individuals suffering from persistent pain. They were made aware that the lifting task might lead to temporary increases in discomfort and they were free to discontinue at any point. Participants were invited to sign a consent form and to complete the MPQ and the PDI prior to performing the lifting task.

A lifting task modeled after Butler and Kosey (2003) was used to elicit pain behaviors. Participants were asked to stand in front of a table (adjusted to waist height) (surface: 80 cm × 120 cm) on which were placed 18 containers (4-L size paint canisters) that were partially filled with sand. The canisters weighed 2.9, 3.4 or 3.9 kilograms and were arranged in 3
rows of 6 canisters. The selection of loads was based on research suggesting a 12\% weight difference for detection threshold and NIOSH (National Institute for Occupational Safety and Health) recommendations for safety weight limits (Karwowski et al., 1992; Waters et al., 1993).

The different weight canisters were positioned such that each weight was represented twice in each location of a double latin square. The participant was asked to lift each canister according to a pre-determined sequence. The task was designed such that the forward flexion and arm extension required to lift canisters further away from the body would increase the loading on the cervical and lumbar portions of the spine, momentarily increasing discomfort (Tsuang et al., 1992). The canister locations corresponded to three functional anthropometric postural positions: normal, maximum and extreme reaches. In the normal reach position (position 1), the participant stood erect with his or her elbow bent at 90\%; in the maximum reach position (position 2), the participant stood erect with his or her arm fully extended; in the extreme reach condition (position 3), the participant was forward flexed with his or her arm fully extended (Butler and Kosey, 2003).

The participants were asked to perform three different tasks; (1) lifting tolerance, (2) weight estimation, and (3) pain rating. The lifting tolerance task was always the first task performed by the participant. The order of the weight estimation task and the pain rating task was counterbalanced across participants.

2.3.1. Lifting tolerance task
In the lifting tolerance task, participants were asked to lift a canister in the third position (i.e., furthest away from the body) and hold the container with the arm fully extended as long as they were able.

2.3.2. Weight estimation task
In the weight estimation task, participants were asked to lift canisters in a pre-determined sequence (i.e., column 1, first, second, third position; column 2, first, second, third position; etc). Participants were asked to estimate the weight of each canister and to provide a verbal estimate in imperial or metric units. All weight estimates were later converted to metric units.

2.3.3. Pain rating task
In the pain rating task, participants lifted the same canisters in the same sequence as they were lifted in the weight estimation task. Participants were asked to provide a verbal rating of their pain as they lifted each canister, on an 11-point scale with the endpoints (0) no pain and (10) extreme pain.

2.4. Pain behavior
Participants were videotaped throughout the procedure. A camera, behind an opaque dome, positioned at a 45\° angle to the table, afforded a 3/4 view of the face, trunk and upper extremities of the participant. Participants were aware they were being videotaped but they could not see the video camera. A research assistant sat approximately 2 m in front of the table. The ostensible purpose of the research assistant was to record the participants’ weight estimates and pain ratings. The camera was positioned beside the research assistant to maximize the probability that the face would be visible to the camera when the participant reported his or her ratings to the research assistant.

Two trained coders, blind to experimental hypotheses, independently coded each video record for instances of pain behavior. The procedure used for assessing pain behavior was modeled after the coding system developed by Keefe and Block (1982). All coding categories from Keefe and Block (1982) were considered but no minimum behavior duration was required for classification of pain behaviors. Coders were trained to competency using a pain behavior coding manual developed for the present study.

Each video record was divided into 18 different segments (i.e., cycles) corresponding to the lift of each different canister. A cycle was defined as the period starting with the participant touching the handle of one canister and ending with the moment the participant touched the handle of the next canister. For each cycle, the duration and intensity of pain behaviors were recorded. Pain behaviors were classified as communicative pain behaviors or protective pain behaviors. The following pain behaviors were classified as communicative pain behaviors: (1) facial expressions such as grimacing or wincing, and (2) verbal or paraverbal pain expressions such as pain words, grunts, sighs, and moans. The following pain behaviors were classified as protective pain behaviors: guarding, holding, touching or rubbing. For each pain behavior, coders provided intensity ratings on a three-point scale with the following anchors (1) mild, (2) moderate and (3) intense.

Percentage agreement for the classification of different pain behaviors relative to the total number of different pain behaviors coded was 90.8\% and 82.6\%, for communicative and protective pain behaviors, respectively. Discrepancies were resolved through discussion. Percentage agreement for the ratings of pain behavior intensity was 87.4\% for communicative pain behaviors and 81.4\% for protective pain behaviors, respectively. For pain behavior intensity and pain behavior duration, the mean of the two coders’ ratings was used in analyses. Indices of pain behavior were computed separately for communicative and protective pain behaviors by multiplying the duration of pain behavior by the intensity of the pain behavior (Prkachin et al., 2004).

2.5. Data analytic approach
The effect of communication goals on pain behavior was addressed by examining differences in pain behavior between the weight lifting task and the pain rating task. The effect of physical demands on pain behavior was addressed by examining differences in pain behavior as a function of canister weight and canister position.

The lifting tolerance task was used as an attention control condition. In other words, any differences in pain behavior between the weight estimation and pain rating task could be explained in terms of differences in attention to pain sensations. In the lifting tolerance task, since participants’ were not asked to engage in any mental activity that might divert their attention away from their pain, and they were asked to hold the canister until they were no longer able to tolerate the pain, it could be assumed that the participants’ attention was focused on their pain sensations. Pain behavior during the lifting tolerance task was used as a covariate in analyses examining the influence of communication goals on pain behavior.
Analyses of variance were used to assess the effects of canister weight and canister position on weight estimates and pain ratings. Canister weight and position were intended as manipulations of physical demand. As such, it was expected that weight estimates and pain ratings would be greater when lifting heavier canisters or canisters positioned further away from the body.

Due to the low frequency of pain behaviors while lifting the lighter canisters, a number of cells of the design contained only null values. As such, pain behaviors were summed across different weight canisters, removing canister weight as a factor in the design of analyses of pain behavior.

The pain behavior data were initially analyzed as a five-way mixed factorial with task (weight estimation, pain rating), task order (weight estimation first, pain rating first), canister position (pos 1, pos 2, pos 3), and type of pain behavior (communicative, protective) as within groups factors and sex (male, female) as the between groups factor. There were no significant effects involving task order, and this factor was thus omitted from the presentation of results. Following an omnibus test of main effects and interactions, separate three-way ANOVAs were conducted to examine the effect of communication goals and physical demands on communicative and protective pain behaviors. Correlational analyses were used to examine the relation between pain ratings, self-reported disability and pain behavior scores.

3. Results

3.1. Sample characteristics

Means and standard deviations for sample demographics and pain condition characteristics are presented in Table 1. Scores on measures of pain severity and self-reported disability are comparable to those that have been reported in previous research on pain behaviors in chronic pain patients (Hill and Craig, 2004; McCahon et al., 2005). Women reported more severe pain than men, t(62) = 2.8, p < .05, and women also reported more severe pain-related disability than men, t(62) = 2.5, p < .01.

3.2. Weight estimates

A three-way (canister weight × canister position × sex) mixed ANOVA on participants’ weight ratings revealed significant main effects for canister weight, F(2,96) = 76.6, p < .001, and sex, F(1,48) = 5.2, p < .05. As shown in Table 2, significant linear trends were observed for both canister weight (p < .001) and canister position (p < .001) such that higher weight estimates were provided for heavier canisters and higher weight estimates were provided for canisters further away from the body. Women provided higher weight estimates than men. Main effects were qualified by a significant canister weight × canister position interaction where weight estimates for the 3.9 kg canisters differed between Position 1 and Position 2, but did not differ between Position 2 and Position 3.

3.3. Pain ratings

A three-way (canister weight × canister position × sex) mixed ANOVA on participants’ pain ratings revealed significant main effects for canister weight, F(2,96) = 44.1, p < .001, and sex, F(1,48) = 5.2, p < .05. As shown in Table 3, significant linear trends were observed for canister weight (p < .001) and canister position (p < .001) where higher pain ratings were provided when lifting heavier canisters, and higher pain ratings were provided when lifting canisters further away from the body. Main effects were qualified by a significant canister weight × canister position interaction where pain ratings while lifting the 3.9 kg canister differed between Position 1 and Position 2, but did not differ significantly between Position 2 and Position 3. Women rated their pain as more intense than men while lifting the canisters.

3.4. Omnibus test of main effects and interactions

A four-way (task × type of behavior × canister position × sex) was performed on pain behavior scores. Means and standard deviations are presented in Table 4. The analysis revealed main effects for task, F(1,48) = 13.5, p < .001, canister position, F(2,96) = 24.5, p < .001, and sex, F(1,48) = 4.7, p < .05. Examination of marginal means indicated that more pain behaviors were expressed during the pain rating task than during the weight estimation task, more pain behaviors were expressed while lifting canisters further away from the body, and women expressed more pain behaviors than men. The main effect for sex remained significant even when controlling for pain severity (MPQ-PRI), F(2,47) = 4.1, p < .05.

The main effect for task was qualified by task × type of pain behavior, F(1,48) = 9.3, p < .01, task × canister position, F(2,96) = 5.9, p < .01, and task × type of behavior × canister position, F(2,96) = 9.1, p < .001, interactions. To further explore these interactions, separate three-way ANOVAs were performed for communicative and protective pain behaviors.
3.5. Communicative pain behaviors

A three-way (task × canister position × sex) mixed ANOVA was performed on communicative pain behavior scores. The analysis revealed significant main effects for task, $F(1,48) = 15.8$, $p < .001$, and canister position, $F(2,96) = 21.9$, $p < .001$ (see Table 4). The main effect for sex was marginally significant, $F(1,48) = 3.2$, $p < .08$. Partial eta square values were .24 and .31 for the task and canister position main effects, respectively. The main effect for task remained significant even when controlling for communicative pain behavior expressed during the lifting tolerance task (i.e., attention control condition), $F(1,47) = 11.4$, $p < .001$.

The main effects for task and canister position were qualified by a significant task × canister position interaction, $F(2,96) = 12.4$, $p < .001$. The task × canister position interaction is depicted in Fig. 1. Communicative pain behaviors showed little change as a function of canister position during the weight estimation task. However, during the pain rating task, communicative pain behaviors increased as participants lifted canisters progressively further away from the body. Tests of simple effects revealed that, at all three canister positions, communicative pain behavior scores were higher for the pain rating task than for the weight estimation task, all $p < .01$.

3.6. Protective pain behaviors

A three-way (task × canister position × sex) mixed ANOVA was performed on protective pain behavior scores. The analysis revealed significant main effects for sex, $F(1,48) = 4.8$, $p < .05$, and canister position, $F(2,96) = 5.6$, $p < .01$. The main effect for task failed to attain statistical significance, $F(1,48) = 1.7$, $p < .19$. Partial eta square values were .03, .07, and .10 for the task, sex, and canister position main effects, respectively.

3.7. The relation between pain ratings and pain behavior

Table 5 shows correlations between the pain ratings provided for each canister position during the pain rating task, and pain behavior scores for each canister position. Analyses revealed that pain ratings while lifting canisters were more strongly associated with protective pain behaviors than communicative pain behaviors. Similarly, scores on the MPQ and PDI were significantly correlated with protective pain behaviors for lifting positions 2 and 3. The MPQ and PDI were not significantly correlated with any of the communicative pain behavior scores.

4. Discussion

In the present research, physical demands were manipulated across 18 trials by varying the weight lifted and the postural position used to execute the lift (Butler and Kosey, 2003). Participants were able to distinguish between the different weights they lifted, and they provided higher weight estimates for canisters further away from the body. In addition, the lifting task was effective in giving rise to self-report ratings of pain intensity that varied as a function of postural lifting position and canister weight.

Consistent with previous research, significant sex differences in pain behavior were observed (Unruh, 1996; Keefe et al., 2000). Women reported more intense pain

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Table 2
Weight estimates as a function of canister weight and canister position

<table>
<thead>
<tr>
<th></th>
<th>Women</th>
<th></th>
<th>Men</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pos 1</td>
<td>Pos 2</td>
<td>Pos 3</td>
</tr>
<tr>
<td>Weight 1 (2.9 kg)</td>
<td>2.1 (1.5)</td>
<td>2.4 (1.5)</td>
<td>2.9 (1.9)</td>
</tr>
<tr>
<td>Weight 2 (3.4 kg)</td>
<td>2.7 (2.0)</td>
<td>3.3 (2.4)</td>
<td>4.3 (2.5)</td>
</tr>
<tr>
<td>Weight 3 (3.9 kg)</td>
<td>2.9 (1.6)</td>
<td>4.5 (2.8)</td>
<td>4.6 (3.2)</td>
</tr>
</tbody>
</table>

Note: Numbers in parentheses are standard deviations. Pos 1 refers to the canister position closest to the participant’s body, Pos 3 is the canister position furthest away from the participant’s body.

Table 3
Pain ratings as a function of canister weight and canister position

<table>
<thead>
<tr>
<th></th>
<th>Women</th>
<th></th>
<th>Men</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pos 1</td>
<td>Pos 2</td>
<td>Pos 3</td>
</tr>
<tr>
<td>Weight 1 (2.9 kg)</td>
<td>3.3 (2.6)</td>
<td>4.5 (2.4)</td>
<td>5.4 (2.5)</td>
</tr>
<tr>
<td>Weight 2 (3.4 kg)</td>
<td>4.4 (2.8)</td>
<td>5.2 (2.3)</td>
<td>6.6 (3.0)</td>
</tr>
<tr>
<td>Weight 3 (3.9 kg)</td>
<td>4.9 (2.6)</td>
<td>6.7 (2.8)</td>
<td>6.9 (2.3)</td>
</tr>
</tbody>
</table>

Note: Numbers in parentheses are standard deviations. Pos 1 refers to the canister position closest to the participants body, Pos 3 is the canister position furthest away from the participant’s body.
and displayed more pain behavior than men. Interestingly, sex differences in pain behavior remained significant even when controlling for pain severity ratings (MPQ-PRI). Although pain ratings can also be construed as a form of pain behavior, the latter finding suggests that pain ratings and other forms of pain behaviors may implicate different processes (Hadjistavropoulos and Craig, 2002; Jolliffe and Nicholas, 2004). Sex did not interact with communication goals or physical demands suggesting that these factors influence the pain behavior of men and women in similar ways.

Of central interest in the present study was whether the manipulation of communication goals had a differential influence on the display of communicative and protective pain behaviors. Approximately 24% of the variance in communicative pain behavior was accounted for by the communication goals manipulation; only 3% of the variance in protective pain behaviors was explained by the communication goals manipulation.

The main effect of communication goals on communicative pain behavior remained significant even when controlling for pain behavior during the lifting tolerance task. The lifting tolerance task was intended as a control for attentional factors that might lead individuals to express more pain behavior (Arntz et al., 1991). In the lifting tolerance task, participants held the canister until they could no longer tolerate the pain but they were not asked to report their pain. In this manner, the lifting tolerance task replicated the essential conditions of the pain rating task (e.g., focus on pain sensations) except that the communication of pain was not specifically requested. The results suggest that the increase in communicative pain behavior observed during the pain rating task was probably not due to increased attention to pain sensations. This interpretation however rests on the assumption that attention to pain sensations was comparable in the pain rating task and the lifting tolerance task. In the absence of an objective index of attention in the execution of these tasks, the interpretation of this finding must proceed with caution.

Although the communication goals manipulation had a significant impact on the display of communicative pain behavior, the data collected in the present study do not elucidate the processes underlying this effect. One possibility is that performance of the weight estimation task led to a ‘suppression’ of pain behavior while performance of the pain rating task led to a ‘release’ of pain behavior. During the weight estimation task, participants might have inferred that their pain experience was not of interest and thus might have suppressed its expression. During the pain rating task, where it was clear that pain experience was of interest,

Table 4
Pain behavior scores as a function of task, type of pain behavior, canister position and sex

<table>
<thead>
<tr>
<th>Task 1</th>
<th>Women</th>
<th></th>
<th>Men</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pos 1</td>
<td>Pos 2</td>
<td>Pos 3</td>
<td>Pos 1</td>
</tr>
<tr>
<td>Comm</td>
<td>1.4 (2.0)</td>
<td>2.3 (3.4)</td>
<td>4.4 (6.6)</td>
<td>0.3 (0.7)</td>
</tr>
<tr>
<td>Protect</td>
<td>2.2 (6.8)</td>
<td>3.1 (5.4)</td>
<td>4.6 (7.3)</td>
<td>0.8 (1.4)</td>
</tr>
<tr>
<td>Task 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Comm</td>
<td>4.8 (7.1)</td>
<td>5.9 (6.4)</td>
<td>12.5 (14.4)</td>
<td>1.5 (4.0)</td>
</tr>
<tr>
<td>Protect</td>
<td>3.4 (6.5)</td>
<td>6.2 (9.0)</td>
<td>5.4 (5.4)</td>
<td>0.8 (2.8)</td>
</tr>
</tbody>
</table>

Note: Numbers in parentheses are standard deviations. Comm, communicative pain behavior scores; Protect, protective pain behavior scores; Task 1, weight estimation task; Task 2, pain rating task. Pos 1 refers to the canister position closest to the participant’s body. Pos 3 is the canister position furthest away from the participant’s body.

Table 5
Correlations between pain ratings, disability and pain behavior

<table>
<thead>
<tr>
<th></th>
<th>Communicative pain behavior</th>
<th>Protective pain behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pos 1</td>
<td>Pos 2</td>
</tr>
<tr>
<td>Pain ratings during lifting</td>
<td>.16</td>
<td>.21</td>
</tr>
<tr>
<td>MPQ-PRI</td>
<td>.05</td>
<td>.10</td>
</tr>
<tr>
<td>PDI</td>
<td>.15</td>
<td>.07</td>
</tr>
</tbody>
</table>

Note: N = 50. MPQ-PRI, McGill Pain Questionnaire – Pain Rating Index; PDI, Pain Disability Index.

* p < .05
** p < .01

Fig. 1. Communicative pain behavior scores as a function of type of task (communication goals) and physical demands.
participants might have been more willing to express behavior to complement their pain reports. This explanation proceeds from the assumption that pain behavior should mirror pain experience unless external forces foster inhibition or exaggeration of behavior. This type of explanation would be consistent with evolutionary perspectives on the functions of pain behavior (Williams, 2002; Craig, 2004).

An alternate explanation is that features of the pain rating task resembled situations when pain behavior was previously reinforced. According to learning theory, a particular behavior (e.g., grimacing) that is followed by a positive consequence (e.g., empathic attention) will have a higher probability of being emitted under similar conditions in the future, regardless of the level of pain (Fordyce, 1976). For pain patients, requests for pain reports are likely to be followed by increased attention to their physical or emotional state by treating professionals or family members (Giardino et al., 2003; Jolliffe and Nicholas, 2004). Since observers typically give more weight to facial displays than bodily movements when inferring others’ pain, communicative pain behaviors might be more likely to be reinforced than protective pain behaviors. This might explain why the communication goal manipulation significantly influenced the expression of communicative behaviors but not protective behaviors (Prkachin et al., 1983).

The assumptions underlying evolutionary and learning theory models of pain behavior are not necessarily incompatible. Each may account for different facets of pain behavior. For example, a suppression explanation might explain why communicative pain behaviors increased with physical demands only during the pain rating task. A learning theory explanation might explain why communicative pain behaviors were influenced by the communication goals manipulation and protective pain behaviors were not. More research is needed to systematically address the conditions under which each model might have primacy in determining influences on pain behavior.

Although pain behavior likely serves a communicative function, little is currently known about the communication rules that guide the expression of pain behavior. It is important to consider that individuals are active agents in a dynamic interpersonal exchange, and pain behavior might follow rules similar to those of other forms of interpersonal communication (Dance and Larson, 1976). The consideration of communication rules within evolutionary or learning theory models of pain behavior might increase their explanatory power.

The increase in protective pain behavior observed as a function of physical demands, but not communication goals, suggests that protective pain behaviors are functionally distinct from communicative pain behaviors. Unlike communicative pain behaviors, the movements involved in the lifting task directly implicate the muscular nature that would be the target of protective actions such as holding or guarding. Proceeding from the assumption that protective pain behaviors lead to a reduction in pain, they might be expected to be invoked more frequently when pain levels are higher, and reinforced by pain reduction. The correlations between pain severity and pain behaviors across the two task conditions also support the functional distinctiveness of communicative and protective pain behaviors. Scores on measures of pain severity (MPQ-PRI) and pain-related disability (PDI) did not correlate with communicative pain behaviors but were significantly correlated with protective pain behaviors.

There are a number of advantages to the procedure used in this study to elicit pain behaviors. The task is comprised of 18 discrete events, each providing a quantifiable physical challenge. Pain behaviors are elicited at high frequency, particularly under conditions where individuals rate their pain while lifting the canisters. The entire task can be completed in less than 10 min and can incorporate indices of performance (e.g., lift duration, accuracy of weight estimates) in addition to pain behavior. Although the task of coding pain behavior is resource intensive, recently developed real-time pain behavior coding procedures might be adapted to the ‘pain-can protocol’ to facilitate its inclusion into clinical practice (Prkachin et al., 2002).

Caution must be exercised in the interpretation of the findings pertaining to the functional distinctiveness of communicative and protective pain behaviors. These classification categories were conceptually derived on the basis of previous discussions on the functions of pain behavior, and distinctions were drawn with respect to their primary function, not their sole function (Hadjistavropoulos and Craig, 2002; Williams, 2002; Labus et al., 2003). Although behaviors such as guarding and holding were classified as protective pain behaviors, they also have a communicative influence insofar as they are perceived by others. Similarly, communicative pain behaviors can also serve a protective function by soliciting assistance or caregiving from others (Craig, 2004).

There are currently no widely accepted definitions of pain behavior. Different classification systems emphasize different aspects of behavior, and variations across classification systems likely influence the nature of relations that will be observed (Labus et al., 2003). The conditions under which pain behaviors are assessed are also important. The laboratory situation is devoid of the complex array of environmental stimuli under which pain is typically experienced. In addition, experimental pain paradigms are not associated with the same degree of threat that typically accompanies the pain of injury or illness. These factors necessarily compromise the ecological validity of the findings.

In spite of these limitations, the results of the present study provide preliminary evidence for the functional distinctiveness of communicative and protective pain...
behaviors. Communicative pain behaviors were influenced primarily by communication goals while protective pain behaviors were influenced primarily by physical demands and pain symptoms. Whereas communicative pain behaviors might be more likely to be reinforced by social environmental contingencies, protective pain behaviors might be more likely to be reinforced by their effect on pain. Variations in pain behavior as a function of communication goals might provide an important index of pain and disability that has not previously been included in pain assessment procedures. The ‘pain-can protocol’ might provide a useful addition to traditional self-report measures of pain and disability, and might point to new avenues for the treatment of persistent pain conditions.

References