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Behavioral inhibition, maladaptive pain cognitions, and function in patients with chronic pain

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HIGHLIGHTS

- Trait behavioral inhibition (BI) is hypothesized to influence patient function.
- In a sample of individuals with chronic pain, BI was associated with depression.
- BI also moderated the association between kinesiophobia and depression.
- Research to study the benefits of minimizing the negative effects of BI is warranted.

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ABSTRACT

Background and aims: Trait behavioral inhibition represents a tendency to react with negative emotions – primarily worry – to cues which signal potential threats. This tendency has been hypothesized by a two-factor model of chronic pain to have direct effects on psychological and physical function in individuals with chronic pain, as well as to influence the associations between pain-related maladaptive cognitions and function. Our aim was to test these hypothesized associations in a sample of individuals who were being screened for possible interdisciplinary chronic pain treatment.
Methods: Eighty-eight patients referred to an interdisciplinary chronic pain management program were administered measures of average pain intensity, trait behavioral inhibition, kinesiophobia, pain catastrophizing, depressive symptoms, and pain interference. We then performed two linear regression analyses to evaluate the direct effects of trait behavioral inhibition on depressive symptoms and pain interference and the extent to which behavioral inhibition moderated the associations between kinesiophobia and pain catastrophizing, and the criterion variables.
Results: In partial support of the study hypotheses, the results showed significant (and independent) direct effects of trait behavioral inhibition on depressive symptoms, and behavioral inhibition moderated the association between kinesiophobia and depression, such that there were stronger associations between kinesiophobia and depressive symptoms in those with higher dispositional sensitivity to fear-inducing stimuli. However, neither direct nor moderating effects of behavioral inhibition emerged in the prediction of pain interference.

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Conclusions: If replicated in additional studies, the findings would indicate that chronic pain treatments which target both reductions in maladaptive cognitions (to decrease the direct negative effects of these on depressive symptoms) and the individual's tendency to respond to pain with worry (as a way to buffer the potential effects of maladaptive cognitions on depressive symptoms) might be more effective than treatments that targeted only one of these factors.
Implications: Additional research is needed to further evaluate the direct and moderating effects of pain-related behavioral inhibition on function, as well as the extent to which treatments which target behavioral inhibition responses provide benefits to individuals with chronic pain.

1. Introduction

Chronic pain often has a significant negative impact on a variety of health-related quality of life domains, including psychological function [1,2] and individuals' abilities to engage in daily activities [3]. The importance of addressing pain's negative impact on these function domains is acknowledged by consensus recommendations, which note that physical and psychological function should be measured as outcome domains in pain clinical trials [4]. Consistent with this idea, a large and growing number of chronic pain clinical trials include measures of these domains as primary, co-primary, or secondary outcome variables (e.g., [5–7]). Given the growing recognition of the negative effects of chronic pain on broad areas of function, as well as the importance of these as outcome variables, knowledge concerning the modifiable variables that influence pain's negative impact on function would be useful for identifying potential treatment targets in chronic pain treatment programs.

One factor that has been proposed to play a role in pain's impact on function is the individual's trait tendency to inhibit behavior in response to environmental cues which signal the possibility of negative (punishing) events [8]. The concept of behavioral inhibition tendency is based on well-established two-factor models of behavioral regulation (e.g., [9–12]), of which Jeffrey Gray's reinforcement sensitivity theory is perhaps the most well-known [13]. These models hypothesize the existence of two distinct neurophysiological systems that underlie behavioral and emotional responses: (1) a Behavioral Activation System (BAS) which underlies approach behaviors and associated emotional responses (e.g., hope, optimism) in the presence of cues for potential reinforcement and (2) a Behavioral Inhibition System (BIS) which underlies withdrawal behaviors and associated emotional responses (e.g., anxiety, fear) in the presence of cues for potential punishment (i.e., pain).

Based on a BIS-BAS model of pain and pain-related responses, Jensen and colleagues have hypothesized that having a greater tendency for BIS activation – as reflected by higher scores on the Behavioral Inhibition System subscale of the BIS/BAS scale [14] – would be a vulnerability factor that could increase the negative effects of maladaptive pain-related thoughts on function [8]. Thus, individuals with chronic pain who endorse a greater tendency to inhibit behavior in response to cues signaling potential punishment would be hypothesized to report higher levels of psychological dysfunction (e.g., anxiety and depressive symptoms) and behavioral dysfunction (e.g., pain interference) than individuals who do not endorse this tendency. In addition, higher levels of trait behavioral inhibition would be hypothesized to moderate the effects of maladaptive cognitions such as pain catastrophizing [15] and thoughts reflecting fear of pain associated with activity [16] on function. Therefore, those who report more inhibition tendencies would be expected to show stronger associations between these thoughts and poorer function [8].

Consistent with the BIS-BAS model of pain, high trait behavioral inhibition has been found to be associated with headache frequency and severity in a sample of college students [17]. In addition, trait behavioral inhibition has been shown to make unique contributions to the prediction of pain-related catastrophizing when controlling for other personality factors [18]. Furthermore, research in non-pain populations also supports a role for trait behavioral inhibition in a variety of psychological disorders associated with emotional and behavioral dysregulation (see review by Jensen and colleagues [8]).

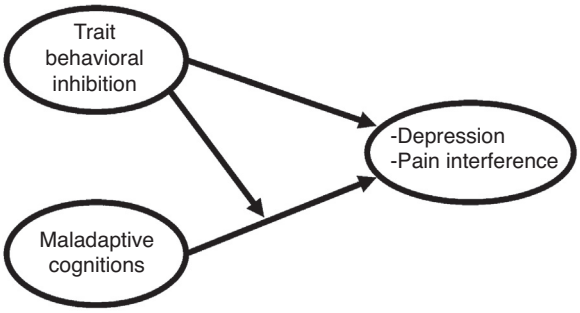

Fig. 1. Graphical representation of the study hypotheses.

While these preliminary findings are consistent with a model proposing a role for trait behavioral inhibition in how people respond to pain, to our knowledge there has been no research examining the direct and moderating effects of trait behavioral inhibition on psychological or physical function (e.g., depressive symptoms or pain interference) in clinical samples of individuals with chronic pain. The current study sought to address this knowledge gap by testing the hypotheses that (1) trait behavioral inhibition would make an independent contribution to the prediction of function over and above the negative effects of maladaptive pain-related cognitive responses (fear of movement [kinesiophobia] and catastrophizing) and that (2) behavioral inhibition would moderate the effects of maladaptive cognitions, such that individuals with chronic pain who also endorse high levels of behavioral inhibition would evidence stronger associations between measures of maladaptive cognitions and poorer function than those who show a lower level of trait behavioral inhibition. These hypotheses are graphically illustrated in Fig. 1.

2. Materials and methods

2.1. Participants and procedures

The participants in this study came from a consecutive group of patients who had been referred to an interdisciplinary chronic pain management program in Halifax, Canada. During the intake assessments, patients were administered and completed the measures used to test the study hypotheses. In all, 88 individuals completed the study measures. Sixty-three (72%) were women, and the mean age of the sample was 52.90 years (SD = 11.35; Range = 20–76). The majority of the participants (55 or 63%) reported that they had chronic pain in more than three sites; pain at only one site was extremely rare (5 participants, 6%). Of the remaining 28 participants